Implementation of No Checkout Technologies in Fast Fashion: A Portuguese Study

Mafalda Rilhó

Dissertation written under the supervision of Peter Rajsingh with the collaboration of industry expert André Pinho

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Abstract

Digital transformation and the development of new technologies are reshaping retail including Fast Fashion. Customer demands are changing and, in an era where online sales are on the rise, traditional stores need to adapt. No checkout technologies are presented as a way for physical stores to innovate. They are mainly applied in the grocery retail segment, as exemplified by Amazon Go stores, which offer a cashier-less and autonomous shopping experience based on advanced technologies. In Portugal, a distinct and less technology-enabled no checkout model is being implemented by Pingo Doce & Go, which served as a base for this study. Driven by the potential of these technologies and its impact on the customer experience, this dissertation aims to study the applicability of no checkout technologies in a different sector – Fast Fashion – with a focus on Portugal.

The results presented needed some adjustments to the Pingo Doce & Go model, such as a hybrid model with open entrances, and a robust security solution for removal of alarm tags. The most significant positive impact factors are the "in-store experience" and "customer satisfaction", and the main barriers identified by customers related to discomfort with the technology and payment systems. According to experts, the additional main driver is optimization of store employee functions and the main concerns relate to security and costs. Overall, both customers and experts consider no checkout to be a positive phenomenon that is feasible to implement and inevitable in the future.

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Sumário

A transformação digital e o desenvolvimento de novas tecnologias estão a reestruturar o retalho, incluindo Fast Fashion. As exigências dos consumidores estão a mudar e, numa era em que as vendas online aumentam, as lojas tradicionais precisam de se adaptar. Tecnologias "*no checkout*" constituem uma forma das lojas físicas inovarem. Estas tecnologias estão aplicadas principalmente no retalho alimentar, como exemplificado pelas lojas Amazon Go, que permitem uma experiência de compra autónoma, baseada em tecnologias avançadas. Em Portugal, um modelo distinto e menos avançado está a ser implementado pelo Pingo Doce & Go, sendo a base para este estudo. Assim, dado o potencial destas tecnologias e o seu impacto na experiência do cliente, a presente tese visa estudar a aplicabilidade de tecnologias "*no checkout"* num sector diferente - Fast Fashion - com foco em Portugal.

Os resultados apresentaram a necessidade de adaptações ao modelo do Pingo Doce & Go, como a existência de um modelo híbrido com entradas abertas e uma solução de segurança robusta para remoção de alarmes. Os fatores mais positivamente impactados por esta implementação são a experiência em loja e a satisfação do cliente, sendo que os obstáculos identificados pelos consumidores consistem na insegurança relativamente à tecnologia e ao pagamento. Quanto aos especialistas, a principal motivação adicional é a otimização dos empregados de loja, e as maiores preocupações estão relacionadas com a segurança e custos. No geral, tanto na perceção dos consumidores como na dos especialistas, "*no checkout*" é um fenómeno positivo, considerado exequível e inevitável no futuro.

Título: A Implementação de Tecnologias "No Checkout" em Fast Fashion: Um estudo português

Autor: Mafalda Monteiro Rilhó

Palavras-chave: "*No checkout*", tecnologia, experiência em loja, retalho, Fast Fashion, lojas físicas, transformação digital, implementação, consumidores portugueses

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Abbreviations

DIY – Do It Yourself

EU – European Union

IoT – Internet of Things

RFID – Radio Frequency Identification

UK – United Kingdom

NFC – Near Field Communication

PD&Go – Pingo Doce & Go

NPS – Net Promoter Score

RQ – Research Question

Q - Question

1. Introduction

Retail is being altered by digital transformation as traditional bricks-and-mortar stores innovate to remain competitive. As a sector of retail, Fast Fashion is a term used to describe the reproduction of highly fashionable clothes at high speed and low cost in order to quickly capture the most current fashion tendencies.

A recent trend regarding in-store experience is the concept of "no checkout technologies" known for being implemented in Amazon Go stores. This "just walk out" system allows customers to grab what they want to purchase and exit stores without any form of cashier touchpoints or checkout processes. In Portugal, as a way to offer an autonomous and fast shopping experience, a distinct concept is being implemented and tested by Pingo Doce & Go where customers use an app on their phones to perform check-outs via QR codes. Every product is registered on the app by NFC and customers scan QR codes to automatically process checkout and payment.

This research aims to assess the application of no checkout technologies (particularly this latter iteration of the concept) in a retail segment where it has not yet been implemented – Fast Fashion. Fast Fashion is a retail segment particularly amenable to no checkout solutions because it is a mass-market segment, which often leads to the presence of a large stream of customers in-store at the same time. This has consequences like long checkout lines that represent a pain for the customer and can even be the cause for abandonment of possible purchases. Additionally, it's a segment where customers don't usually seek for personalization or human interaction, value convenience and where there is a lot of online information accessible.

The focus of the study is the applicability of no checkout technologies in Fast Fashion in Portugal and, therefore, is focused on the Portuguese Fast Fashion industry and the Portuguese population's receptivity towards this tech innovation. The Research Questions are:

RQ1: How will no checkout technology impact Fast Fashion in Portugal?

RQ2: What are the drivers and barriers for the implementation of no checkout technology for Fast Fashion in Portugal from perspectives of the retailer and customers?

This dissertation aims to provide a contribution to the existing literature since this topic has not been studied in this specific context, given that no checkout is still yet to be implemented in Fast Fashion in Portugal. Furthermore, the topic connects with the need for traditional stores to innovate, as well speaks to a trend in retail which is likely to take root in Fast Fashion retail, transforming the shopping experience.

The study is composed by five chapters. The second chapter consists of the literature review, where knowledge from existing research was gathered, focusing on the Fast Fashion industry, the importance of brick-and-mortar stores and no checkout technologies. The third chapter presents the methodology used for this research, namely the quantitative and qualitative methods applied. It is followed by chapter four, where the results are analyzed in detail. Finally, the conclusion, limitations and future research are described in the fifth chapter.

2. Literature Review

This chapter provides a general overview of the Fashion Industry, more specifically the Fast Fashion segment, and the role of physical stores. It presents findings of prior research regarding no checkout technologies as well as what is implemented at the moment in the grocery retail segment. There is a focus in the Portuguese market and on the potential to expand this technology to other industries and sectors.

2.1. Retail Industry in a nutshell

2.1.1. Definition and Digitalization

Retailing consists of all the activities for selling goods or services directly to ultimate buyers for their personal, non-business use (Kotler & Armstrong, 2012). A retailer or retail store is, thus, any firm that markets goods to the ultimate consumer and, therefore, is the final business entity in a distribution channel that links manufacturers to customers (Hameli, 2012).

The retail industry has been evolving and with the spread of the internet, social media and the omnipresence of smartphones, this pace of change has been faster than ever (Grewal, Roggeveen, & Runyan, 2013). Digitalization is "one of the most significant ongoing transformations of contemporary society" (Hagberg et al., 2016) and multiple theoretical approaches are used by scholars to explain this phenomenon. One definition of digitalization is "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities" (Gartner Glossary, 2018). It has a meaningful importance for the retail sector, which affects and is affected by this transformation: retailers offer different digital products and services while being simultaneously affected by the new forms of consumption that arise from those technologies (Hagberg et al., 2016).

The retail industry has a vast number of sectors such as: food, electronics, DIY, furniture, personal care, fashion, and many more. This thesis focuses on the latter – Fashion.

2.1.2. Fashion and Fast Fashion

The Fashion/Apparel industry is composed by "companies that produce and sell clothing, footwear, accessories and other textile products" (Vecchi & Buckley, 2016). The total fashion industry presented revenues of approximately 1.46 trillion dollars in 2020 and is projected to reach a global value of 2.25 trillion dollars in 2025 (Statista, 2021).

This industry is characterized by the presence of global brands and fashion companies operating under a highly competitive environment, led by sudden changes and increasing uncertainty (Gazzola et al., 2020). It is thus crucial that fashion companies are flexible in order to ensure that the customers' needs are met as a primary objective (Gazzola et al., 2020).

Fashion is a complex social phenomenon that involves factors that are intrinsic to fashion and others that are extrinsic and related to individuals (Čiarnienė & Vienažindienė, 2014). One example of the latter is the creation of "an individual identity, being part of a group, emulating fashion leaders or rebelling against conformity" (Čiarnienė & Vienažindienė, 2014).

One segment of the fashion industry is Fast Fashion. Fast Fashion is a system that combines short production and distribution lead times with highly fashionable product design, in order to capture the latest consumer trends while enabling to match supply with uncertain demand (Cachon & Swinney, 2011). It has particular characteristics, such as "short life cycle products, volatile demand, low predictability, high level of impulse purchase, high level of price competition and global sourcing" (Mehrjoo & Pasek, 2015). Thus, in order to achieve profitability in Fast Fashion, retailers ought to take the "speed to market" approach (Bhardwaj & Fairhurst, 2010). Overall, retailers deliver designer products to a mass market at a relatively low price (Gupta & Gentry, 2018). In 2019, the global market value of Fast Fashion was 36 billion dollars and is expected to reach 43 billion dollars by 2029 (Statista, 2020).

Fast Fashion has changed the way we think about clothes and what we do with them, as "clothes became cheaper, and shopping became a form of entertainment." (Knošková & Garasová, 2019). The number of clothing purchased per person increased by about 60% between 2000 and 2014 (Remy et al., 2016). Over the years, this system has had progressively more environmental effects. If there are no changes regarding how clothing is made, these issues will grow proportionally as consumption rises, which has led Fast Fashion businesses to start facing these sustainability challenges and take some action (Remy et al., 2016).

The Fashion industry in Portugal is projected to reach 1.312 million dollars of revenue in 2021, and the average revenue per user (ARPU) for clothing is projected to be 183.27 dollars in the same year (Statista, 2021). In terms of Fast Fashion and the internal Portuguese market, the brand Zara (from Inditex Group) stands out with the highest annual revenue for 2020 of 425.51 million dollars (Dun & Bradstreet, 2020) and a total of 86 stores in Portugal (Dinheiro Vivo & Lusa, 2019). It is followed by Primark with an annual revenue for 2020 of 246.83 million dollars and H&M with 137.31 million dollars. Other relevant players are: Modalfa (MO), Pull and Bear, C&A, Mango, Bershka, etc. (Dun & Bradstreet, 2020).

2.1.3. Brick-and-Mortar Stores

The long-standing dominance of traditional retailers has been threatened by new entrants in the market, due to the growth of e-commerce, mobile shopping, and smart technologies. (Reinartz, Wiegand, & Imschloss, 2019). Physical retailing has been impacted by online and

mobile shopping and is now under pressure to redefine its position in the omnichannel environment. The omni-channel concept is an evolution from "multi-channel" and is focused on the customer and on providing a seamless experience between different channels, during one integrated purchasing process (Verhoef et al., 2015). The ability of retailers to innovate in their physical locations is becoming a mandatory factor in the present competitive environment, due to increasing customer demands for new shopping experiences and the rising trend of online shopping (Pantano & Migliarese, 2014). This gains importance since, more recently, due to the Covid-19 pandemic, physical stores have been greatly affected while, at the same time, online sales have skyrocketed. For example, results from Inditex show that 52% of their stores had restrictions at the date of January 2021, while online sales registered a growth of 77% during 2020 (Inditex, 2021).

With the growth of digital, the value of physical retailing remains essentially in empowering better decision making and creating superior experiences (Reinartz et al., 2019). Thus, in order to remain competitive, retailers have reacted by integrating digital in-store technologies into their physical locations (Linzbach et al., 2019). The actual trend is to integrate innovations that either change the service from the employees to the machine (e.g., self-service), or that enrich the traditional service by adding new technologies (Pantano & Migliarese, 2014). Over the past few years, pure online players have started to invest in physical stores, as an extension of their online businesses and as a way to further connect with their customers and provide different and improved in-store experiences.

Although online shopping has been rapidly increasing over the years, in 2019, 67% of global consumers still shopped mostly from physical retail stores (Statista, 2019). Moreover, only 30% of the global customers think that shopping online is more convenient than shopping physically (Mckinsey & Company, & BoF, 2020). Portugal is one of the European countries where users shop less online and, despite e-commerce growth due to Covid-19, only 45% of internet users between the ages of 16 and 74 have purchased online, compared to the 89% from the EU (Rosa, 2021).

2.2. No checkout technologies

There are several types of checkout systems, categorized into different groups. Firstly, there is the ubiquitous system of traditional checkout manned by a cashier, which is labor-intensive and can constitute a great pain point for the customer if they have to wait in line (Hauser et al., 2019). To minimize this cost, there is the Self-service system, which demands little to no help from store employees and can be divided into two categories: centralized and

decentralized. Centralized systems include self-service checkout terminals, where shoppers must scan one by one the items they want to purchase, and tunnel scanners, where customers simply put their items on the conveyor belt, which uses cameras to scan the barcodes (Hauser et al., 2019). Decentralized systems allow shoppers to do a continuous scanning of the items, while walking through the store. This is done through a portable system which can either be provided by the retailer or be the customers' mobile phone, which requires the installation of an app (Hauser et al., 2019). Lastly, there's the Automated Checkout (or No Checkout), where the system automatically scans the items and charges the customer's purchases to a registered account, the moment that the customer leaves the store (Hauser et al., 2019).

The focus of this thesis is the latter – automated checkout. Existing research presents a possible no checkout system through the use of IoT, more specifically beacons (Manyika et al., 2015), or RFID (Hauser et al., 2019). Radio Frequency Identification (RFID) is a wireless system that includes tags and readers. "The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag" (FDA, 2018) which can be active or passive. Both these technologies (Beacons and RFID) would be applied in a similar way regarding automated checkout: a system at the store's exit that scans the products as they are leaving the store and charges the customers automatically (Hauser et al., 2019; Manyika et al., 2015). It is projected that the potential economic impact of Automated Checkout will be of 150 billion dollars to 380 billion dollars per year in 2025, with a reduction of checkout queue times by 40 to 88 percent and a 75 percent reduction in cashier cost (Manyika et al., 2015).

The concept of no checkout was made famous in Amazon Go stores with the "Just walk out" technology. The "Just walk out" technology is powered by computer vision, sensor fusion, and deep learning (Amazon, 2020) and operates through the use of ceiling cameras and shelves with incorporated weight sensors (Nishihara, 2018). In Amazon Go stores customers enter the store by scanning the QR code on their Amazon app or, alternatively, in certain locations shoppers can enter by inserting their credit card into a gated turnstile (Amazon, 2020). To do their shopping, customers just grab what they want, and the system automatically detects the products taken from or returned to the shelves, keeping track of them in a virtual cart. When they finish shopping, customers just leave the store, without any checkout or stops, and they are automatically charged for their purchases (Amazon, 2020). The most recent innovation from Amazon is Amazon One, which was introduced in September 2020. It is a "fast, convenient, contactless way for people to use their palm to make everyday activities like paying at a store more effortless" (Kumar, 2020). Amazon One uses palm recognition and has been implemented in a few Amazon stores. It will be present in more locations soon as an option for customers to

conveniently enter the store or complete their payment. After signing up for this technology, customers just need to hold their palm above the Amazon One device for about a second and will be able to enter the store (Kumar, 2020). Amazon Go currently has 29 stores, being that in March 2021, they opened the first store in Europe, more specifically in the UK (Faithfull, 2021).

In Portugal, no checkout technology is implemented in a grocery retail store – Pingo Doce & Go, a lab store located at Nova SBE. Although not as automated and technology-enabled as Amazon Go, in this store customers enter by using an app on their phones to scan their QR code in the designed turnstile. When shopping, NFC technology is used to scan the items which are added to their virtual cart. Near Field Communication (NFC) is a "short-range wireless communication technology which enables a safe communication between two devices that contain NFC chips" (Rahul et al., 2015). With this, at Pingo Doce & Go shoppers just need to bring their phones to within a few centimeters or touch the item's tag, to add it to their virtual cart. Checkout occurs via QR code again and the payment processes automatically (Salgueiro, 2019). Although this system involves a part of self-service, since customers need to scan the items themselves, NFC technology allows a fast and convenient experience.

This technology has a high impact on several factors, one of them and with special importance is workforce, since this new way of shopping may make certain jobs obsolete, such as cashiers (Polacco & Backes, 2018). According to Amazon, in these stores, employment undergoes a reorganization and store associates have their roles shifted to focus on other activities that help deliver a better customer experience (Amazon, 2020). At Pingo Doce & Go the same applies, being that employees are responsible for restocking, customer assistance, etc. (Salgueiro, 2019). With this evidence, we can conclude that people will still be needed in this type of retail, although in different capacities (Polacco & Backes, 2018). Another challenge is the potential rise of theft attempts (Polacco & Backes, 2018). In traditional stores, the most regular method to steal is to leave without paying for the products, but in the "Just Walk Out" technology, that's what customers are supposed to do, since the system automatically proceeds with the payment. Therefore, if any product isn't charged, whether the customer had any intention or not, it is a system error, which mis-scanned or skipped the items. According to Gianna Puerini, Vice President of Amazon Go, accidental shoplifting "happens so rarely that we didn't even bother building in a feature for customers to tell us it happened" (Bosa & Salinas, 2018). As for Pingo Doce & Go, André Faria also didn't show any concerns about this issue, stating that everything in the store is registered (Salgueiro, 2019).

Although we see most examples of no checkout technologies in the grocery retail sector that doesn't mean that they can't significantly impact other industries. Amazon has announced

in the beginning of 2020, that they will be selling their technology to other retailers, encouraged by the interest generated by others for offering a similar shopping experience (Amazon, 2020). According to Dilip Kumar (Amazon's vice president of physical retail and technology) this technology "has pretty broad applicability across store sizes, across industries, because it fundamentally tackles a problem of how do you get convenience in physical locations" (Dastin, 2020) and he asks, "Do customers like standing in lines?" (Dastin, 2020). This shows that the implementation of no checkout technologies in other industries is being studied and has potential "in places that have high demand, long lines, or wherever customers are pressed for time" (Amazon, 2020).

2.3. No checkout technologies in Fast Fashion

"Customers demand convenience and immediacy" (Mckinsey & Company, & BoF, 2020), and these two factors are key in terms of shopping. This way, physical stores are valuable, but "they need to be convenient and meaningful for customers" (Mckinsey & Company, & BoF, 2020). Stores can provide instant gratification and the opportunity to touch and try the fashion products before buying. For many people, these factors are particularly important in some retail segments, such as fashion, and are identified as the main reason to shop in physical stores and that limit the appeal of online shopping (Helm, Kim, & Riper, 2018). However, in recent findings, customers identified incompetent or unfriendly staff, crowded store spaces, unpleasant co-shoppers, and long checkout lines as reasons that stop them from shopping in physical stores (Helm, Kim, & Riper, 2018).

Recent research has shown some challenges to the implementation of no checkout in Fast Fashion, particularly regarding the Amazon Go model. One of them is that customers usually leave unwanted items in the changing room and wouldn't be willing to go back and search for the shelf where they picked it up from (Hauser et al., 2019). This is particularly challenging for the "Just walk out" technology since the system takes off the item from the virtual cart as customers place it back on the shelf. Another challenge is that the use of cameras may be problematic in key areas of fashion stores, for example changing rooms, where there is a concern for the customer's privacy (Hauser et al., 2019). This lack of cameras leads to the existence of "blind" areas, where there isn't any control. In the case of Fast Fashion stores, the cost of potential thefts or the mis-scanning of any product is significantly higher than in grocery stores, due to the medium price of items. Given these challenges, this study identified a different no checkout model applied to the Fast Fashion industry. As mentioned in Section 2.2., this model would be based on RFID, thereby taking advantage of a technology which is already

implemented across several brands. It consists of a "automated system with a central point of detection" (Hauser et al., 2019), where items would have an internal tag and would be identified as the customer leaves the store, by the RFID infrastructure. The system would assign each purchase to the corresponding customer, automatically charging them (Hauser et al., 2019).

One example of the use of technologies involving checkout in Fast Fashion is from Zara, which implemented self-service checkouts (kiosks) in some key locations, particularly in the United Kingdom. These kiosks are touch screen and they catch the signals from the RFID tags on the items that the customer is holding, automatically adding them to the virtual cart. Shoppers remove the security tags themselves and are able to complete a quick payment (Diner, 2017).

In Portugal, a study regarding consumption preferences of millennials showed that Portuguese millennials prefer physical shopping rather than online shopping (Costa, 2018). 86% of the respondents stated that they like to see and touch the products before making a purchase, as well as leaving the store with the products in hand. Furthermore, the waiting times to pay are identified as the main reason that discourage Portuguese consumers from shopping in physical stores and, 87% of the respondents said that the possibility to pay as fast as possible without waiting time would make them visit stores more often (Costa, 2018).

3. Methodology and Data Collection

3.1. Research Methodology

After analyzing the existing literature on relevant topics, the aim of this chapter is to explain how the research questions were answered, through the perspective of the retailer and the customer, using both primary and secondary data.

In order to address the first research question of "**How will no checkout technology impact Fast Fashion in Portugal?**", both a quantitative and qualitative approaches were used. Firstly, a survey was conducted, where participants were asked to rate their level of agreement with different statements that aimed to assess the impact of no checkout for five Fast Fashion variables. The main objective was to validate the impact of no checkout technologies in the sector, as well as to have a qualitative perception of this impact. Moreover, expert interviews were also conducted in order to further analyze this topic. The main advantage of this method is that it allows to collect in-depth and meaningful insights into a specific situation or problem, as well as generate new ideas. Interviewees were asked their opinion about the impact of no checkout in the same variables, as well as to quantify it, through an approximate projection. With this, a content analysis was performed, in order to identify and evaluate patterns within the content. The main insights arose from analyzing survey answers and comparing experts' insights, in order to reach consistent conclusions.

Regarding the second research question of "**What are the drivers and barriers for the implementation of no checkout technology for Fast Fashion in Portugal from perspectives of the retailer and customers?**" both quantitative and qualitative methods were also used. In order to address the perspective of the customer, the survey contained several key questions where respondents were asked to rate the advantages (drivers) regarding the implementation of this technology, according to the level of importance (on a scale from 1 to 5). The same approach was used for the barriers, being that participants had the opportunity to add any relevant driver/barrier that wasn't mentioned. Finally, they were asked about their overall perception of this solution, as the customer's opinion and openness to adoption is considered to be an important factor that influences the decision to implement. Regarding the perception of the retailer, the qualitative method identified above was used. Interviewees were questioned about the main drivers and barriers for the implementation of this technology, as well as to rate them according to importance (on a scale from 1 to 5). The main insights derived from the evaluation of patterns in experts answers and the analysis of survey results.

3.2. Data Collection

3.2.1. Primary data collection

This research generates new insights through the collection of primary data, gathered by the conduction of ten expert interviews. These interviews were semi-structured and were held through videocall and writing. Participants were all Portuguese, Fast Fashion professionals and represented the biggest Fast Fashion brands in Portugal. The interviews followed a similar structure, being that initially the PD&Go model was introduced, and then followed the same key questions (See Appendix 11). A complete description of the participants can be found in Table 1.

Table 1: Interviewees' Description

Anonymous Interviewees				
Interview ID	**Type of company**	**Position**	**Range of revenues (Worldwide)**	**Reason for the interview**
Interview 1	Fast Fashion	App Development and Trainer	25,000 Million € - 30,000 Million €	27 years of experience in the industry. Position related with Omnichannel.
Interview 4	Fast Fashion	Project Delivery Lead	6,000 Million € - 9,000 Million €	11 years of experience in the industry. International experience in the USA and Europe.
Interview 5	Fast Fashion	Store Director	15,000 Million € - 20,000 Million €	14 years of experience working with different Fast Fashion brands. International experience.
Interview 6	Fast Fashion	General Store Manager	1,300 Million € - 2,000 Million €	8 years of experience working with different Fast Fashion brands.
Interview 7	Fast Fashion	Program Manager	350 Million € - 400 Million €	Responsible for a Business Transformation Program of several fashion brands.
Interview 8	Fast Fashion	Department Manager	6,000 Million € - 9,000 Million €	5 years of experience in the current position. 8 years of experience as Store Operations Manager in a different sector.
Interview 9	Fast Fashion	Department Manager	6,000 Million € - 9,000 Million €	8 years of experience in the current Fast Fashion company.
Interview 10	Fast Fashion	Flagship Department Manager	15,000 Million € - 20,000 Million €	14 years of experience in the current Fast Fashion company.
Interview ID	**Name**	**Company**		**Position**
Interview 2	Nuno Miguel Lemos	Mango		Administrative Assistant
Interview 3	Hugo Martins	Sonae Fashion		CFO at Sonae Fashion and CDO at Salsa

Table 1: Interviewees' description (Author's own illustration)

Furthermore, an online survey was conducted to explore the consumer perspective. The survey had 309 valid answers and was directed to Portuguese consumers, particularly Fast Fashion customers who shop in physical stores (See Appendix 12).

3.2.2. Secondary data collection

Regarding secondary data collection, this was mainly covered in the Literature Review and is based on academic articles, statistic data, articles from top journals, and company reports. These sources largely include Grade-A papers, essential to get a strong theoretical foundation on each of the topics addressed.

4. Results' Analysis

4.1. "No Checkout" model

This dissertation uses as a base case a particular "No checkout" model implemented by Pingo Doce & Go, a lab store located at Nova SBE, in Portugal. This is a tested model which has been successful in the grocery retail industry and is an example of implementation of these technologies in Portugal. This section is focused on studying the value creation of this model for Fast Fashion, including ways in which it could be adjusted to serve the industry better.

To do this, the experts' opinions were consulted, through the interviews conducted. All of the experts confirmed that their companies don't have "no checkout" solutions implemented at the moment in Portugal. Additional research shows that there are international experiences happening regarding these technologies. However, in Portugal these are not a reality and things are still in a very exploratory and initial basis. Furthermore, all of the experts agreed that the PD&Go model has potential to be implemented in Fast Fashion, although with some adaptations to fit the industry. These adaptations were assessed individually and can be divided into three major points, as demonstrated below.

- Hybrid model

Both experts and customers were asked what would be their ideal solution: a hybrid model (stores remain identical with the additional option of "No Checkout") or stores only with the "No Checkout" method. To this question, all of the interviewees had the unanimous opinion that the hybrid model would be better. The only variation consisted of the long-term applicability, since a few experts believe that, in the future, only "no checkout" would be more profitable. Regarding the customers, 92% of survey respondents also opted for the hybrid model, with the following two main reasons: "Otherwise, it wouldn't be suitable for people who are not comfortable with technology" with 67% of answers, and "I want to have the option to use the traditional method" with 15% (Appendix 14). Given this, implementation of a hybrid model would vary from PD&Go in the sense that there would still exist checkout counters.

- Open entrance

One of the main adjustments mentioned by the experts was the entrance. PD&Go has a closed entrance with gates, which contrasts with the characteristic wide and open entrances of Fast Fashion stores. Moreover, it is an aspect that is implicit with the adoption of a hybrid model.

In this sector, as opposed to what happens in grocery retail, customers enter the store not by necessity, but usually by impulse. Fast Fashion stores benefit from an unobstructed entrance

since a lot of store traffic is represented by customers who were walking by, rather than those who came to the specific store as a destination. Therefore, experts agree that entrances should remain open, as they are currently, with an additional check-in solution for customers who seek to use "no checkout".

- Security

Stock loss is one of the biggest problems in Fast Fashion and, therefore, security was pointed out as the biggest concern for the experts. Compared to the grocery retail industry, Fast Fashion has some additional difficulties such as the clothing security tags, which are attached to every item in store. These security tags need to be removed with a specific device which, in the traditional checkout method, is done by the cashier. This means that, with no checkout, there needs to be a solution for removing these alarms, while ensuring security and still providing a seamless experience to customers. This was considered the greatest difficulty to overcome.

In order to solve this issue, several alternatives were mentioned by the experts. For stores which already have RFID technologies implemented (such as the Inditex brands), it seems to be relatively easier. One suggestion was to have a control point where a store employee would scan the tags on the items (through RFID) and compare it to the receipt of what was paid by the customer (through scanning of the QR code). If it matched, the security tags would be removed. Currently, in the Inditex stores where self-checkout is implemented, customers are able to remove the alarms autonomously, however it has proven to be an obstacle for customers and is considered to be a point needing improvement. Another option would be to replace the physical tags with internal tags, which would be deactivated at the moment of purchase (Decathlon has this solution for self-checkout). This would allow for a better customer experience however there's considerably higher costs – the current security tags (which have the RFID chip inside) are always reused, and this solution implies one RFID chip for every item. Overall, regarding security, the best feasible solution would have to be further investigated and tested. At the moment, this point represents a significant barrier to full customer autonomy, and the optimized solution would need to focus on providing a seamless experience while taking costs into account.

Furthermore, in addition to these three points, there's a difference regarding the scanning method. At PD&Go, customers can use NFC by tapping on the price tags with their smartphones (one tag per group of products) while, in the Fast Fashion sector, that doesn't exist (there's one specific price tag per item). Thus, to provide an easy scan through NFC, there would need to be a different solution (maybe taking advantage of the RFID tags), being that barcode scanning would always be an option.

According to company reports, one of the highlights of Inditex 2020-2022 plan is to offer a "New customer experience driven technology solutions" (Inditex, 2020). The company plans to implement a unique shopping experience which includes "direct purchase" through the app, where "the customer will be able to directly purchase and pay in store and clear the alarm tag in a dedicated space" (Inditex, 2020). There isn't detailed information about this but, from what was determined, to start shopping customers can activate the "Geolocation" option for an automatic check-in as they enter the store, or instead, they can scan the QR code at the store's entrance. Scanning of items would be done through barcodes, and customers would need to go through a determined station to remove security tags. This model is more similar to what is implemented currently at Continente Siga, in Portugal, and it validates previous insights, as it consists of a hybrid model with open entrance stores and an alarm removal station. It also provides possible solutions to the addressed points (even though it's not clear how security would be controlled), so the model would better fit the Fast Fashion sector. Overall, it helps validating the potential of these technologies in the sector.

4.2. Impact of No Checkout Technologies

4.2.1. Qualitative Estimation

In order to answer RQ1, the first analysis aimed to prove that the independent variable "no checkout technologies" has an impact on the Fast Fashion sector, in Portugal. To do this, the impact of the independent variable was evaluated for the following aspects of Fast Fashion: in-store experience, customer satisfaction, competitive advantage, customer preference, and sales.

For this analysis, a qualitative estimation was conducted. In the survey, respondents were asked to rate their level of agreement with five statements using a 5-point Likert scale, where 1 represents "strongly disagree" and 5 represents "strongly agree". In addition, experts were also asked if they agreed with similar affirmations for each factor.

1 – In-store experience

For the statement "The introduction of no checkout technologies in Fast Fashion stores would improve my in-store experience." 75% of the respondents agreed as opposed to only 5% who disagreed (Appendix 15). This was the statement with a higher number of answers in the option "Strongly agree" (26%) and where respondents least selected negative answers. The experts' opinions also matched this result, as it was consensual that "In-store experience" is one of the most impacted factors. Therefore, it is possible to state that there is a strong correlation between the implementation of no checkout technologies and the customer in-store experience.

2 – Customer satisfaction

"The introduction of no checkout technologies in Fast Fashion stores would improve my satisfaction with the brand." Regarding this statement, 55% of the respondents agreed while a minor percentage (12%) disagreed (Appendix 16). Additionally, all of the experts interviewed also agreed that this factor is significantly impacted by the independent variable. Combining these results, it's possible to prove that "Customer satisfaction" has a high positive correlation with the independent variable.

3 – Competitive Advantage

"The introduction of no checkout technologies in Fast Fashion stores would influence my choice of store to shop in, when comparing to the competition." 50% of respondents agreed, while 22% disagreed (Appendix 17). Although the majority of customers agreed, the median is "Neither agree nor disagree" which means it's not possible to take any conclusions regarding correlation from this analysis.

To further evaluate this situation, a Spearman correlation test was conducted. This test compared the answers to the statement mentioned above, with the respondents' opinion about the introduction of no checkout technologies in Fast Fashion, measured from 1 – "Not useful" to 5 – "Extremely useful" (Q12). As the degree of correlation is 0.38 (Appendix 18) it is possible to state that there is a moderate positive correlation between the customer's opinion about the introduction of no checkout, and their view on this factor. Furthermore, when analyzing solely the answers of respondents who find the technology useful in the sector, the median answer for the statement on competitive advantage is "Agree".

This conclusion matched experts' opinions, which mentioned that no checkout would mainly have an effect regarding competitive advantage for the customers who attribute higher value to these technologies. Overall, 88% of the interviewees considered that there was an impact, which allows to conclude that there is a positive correlation.

4 – Customer Preference

"The introduction of no checkout technologies in Fast Fashion stores would influence my preference for the brand." For this statement, 43% of respondents agreed, 32% were neutral and 25% disagreed (Appendix 19). Considering that the distribution of results is dispersed, and the median is "Neither agree nor disagree", there aren't any strong conclusions regarding correlation from this analysis. The experts' opinions also showed different results, as 38% of the interviewee's disagreed that no checkout would have a positive impact in customer preference. Overall, given this evidence, there isn't enough data to prove correlation.

5 – Sales

"The introduction of no checkout technologies in Fast Fashion stores would increase my purchases." From all of the statements, this is the one where the answers were more equally distributed, and most respondents opted for the neutral answer (36%). Moreover, 38% chose the negative options, as 26% agreed (Appendix 20). In conclusion, and as the median is "Neither agree nor disagree", there was not enough customer data to prove correlation. To further evaluate the impact of no checkout technologies in the factor "Sales", the expert opinions were analyzed. All of the interviewees agreed that there was a positive impact and, a company that implemented self-checkout in a few stores in Portugal had already experienced an increase in sales. With this, it is possible to say that there is a positive correlation. Experts explained it due to the fact that a lot of customers give up on their intention to buy due to long queues for the checkout. With these technologies, this would not happen or would decrease significantly, with lower-cost brands (such as Primark) benefitting even more.

Overall, from this analysis, it can be established that no checkout technologies have a positive and significant correlation with in-store experience, customer satisfaction, competitive advantage, and sales. Experts also considered these to be the most impacted factors and didn't add any other relevant metric. Since these components are built into the general concept of Fast Fashion, and it was shown to correlate with no checkout, it is possible to generalize and state that no checkout technologies would have an impact as a disruptor for the Fast Fashion phenomenon. Moreover, by looking at Inditex 2020 Results, the importance of these factors is corroborated since some of the key points for 2020 were "Further strengthen our competitive advantage", "Stronger customer experience: Improved management of stores, inventory, supply chain, sales conversion" and "Focus on high quality stores: all integrated, digital, eco-efficient" (Inditex, 2021).

4.2.2. Quantitative Estimation

With this conclusion, and in order to make a complete evaluation of how much each of these factors are impacted, a quantitative estimation was conducted.

In this estimation, since the independent variable "no checkout technologies" is immeasurable, the factors previously identified were used as proxies, given their proven correlation with the variable of interest. In the interviews, experts were asked to estimate the approximate level of impact of no checkout technologies for each of the factors, using percentage intervals (0-10%, 10-20%, 20-30%, 30-40%, 40-50%, >50%, "I can't predict"). The results are summarized in Table 2.

Table 2: Level of Impact

Factors	Impact								Mean
In-store experience	20-30%	10-20%	Can't predict	30-40%	20-30%	0-10%	40-50%	40-50%	**28%**
Customer satisfaction	20-30%	10-20%	40-50%	30-40%	10-20%	30-40%	40-50%	40-50%	**33%**
Competitive advantage	0-10%	0%	0-10%	30-40%	0-10%	20-30%	0-10%	30-40%	**14%**
Sales	10-20%	10-20%	10-20%	10-20%	0-10%	10-20%	0-10%	10-20%	**13%**

Table 2: Level of impact (Author's own illustration)

By observing these results, the in-store experience and customer satisfaction stand out, which were also identified in the previous section as the factors with greater impact according to customers.

Some conclusions can be taken by exploring each of the factors. Starting with "in-store experience", it is possible to observe that, according to this study, the customer in-store experience would increase by approximately 28% due to the implementation of no checkout technologies. In the survey, respondents were asked to rate, on average, their experience in Fast Fashion stores, in a scale of 1 to 5 (being 1 the lowest and 5 the highest). The mean of answers was 3.61 which can be taken as a baseline. This indicates that, if this value increased by 28%, the customer in-store experience rate would improve to 4.62. This demonstrates a significant gain which can be explained by several aspects, that were also evaluated in the survey. Respondents were asked to rate how much some specific factors negatively influence their in-store experience (Q5). For the options "Queues to Checkout" and "Too many customers in store at the same time" 70% of respondents said that it negatively influences their experience, being that from this percentage, around 35% chose "Totally influences". In aspects related to employees' tasks: 45% of respondents agreed that "Few employees available to help" influences their experience, while 76% had the same opinion towards "Untidy store". Overall, since no checkout would partially affect each of the aspects mentioned, this explains the improvement in the factor "in-store experience".

As for customer satisfaction, this study shows a 33% positive impact due to the implementation of no checkout. This factor is incorporated in metrics such as Net Promoter Score (NPS) which is used to assess customer satisfaction and loyalty to the brand. As an example, according to NPS benchmarks, Zara has an estimated NPS of 3, in a scale of -100 to 100 (Customer Guru, 2021). With an increase of 31%, in this case, Zara's estimated NPS would be 4. Considering that the retail industry average is 0, this impact would allow the brand to further differentiate from the norm.

As for competitive advantage, experts' insights show that it would increase by approximately 14%. There are three generic strategies to gain competitive advantage: cost leadership, differentiation, and focus (with 2 variants) (Porter, 1980). The implementation of no checkout would allow the company to differentiate from competitors by offering a unique shopping experience and, therefore, this follows a differentiation strategy. The impact can be materialized, for example, by saying that the number of customers who choose to shop in a specific brand's store instead of the competition would increase by 14% due to the fact that it has no checkout technologies. This means that if usually, the brand would have 500 visits per day, after implementation it would have 570.

Finally, for the factor "Sales", this is where results are less dispersed since all experts decided on an interval of impact from 0-10% or 10-20%, resulting in a mean of 13%. Taking another example: Zara had an actual annual revenue of 425.51 million dollars in 2020, in Portugal. According to this estimation, if the brand were to implement no checkout, its annual revenue would increase by approximately 55.32 million dollars. Experts also mentioned that this increase in sales would be amplified during periods of discounts (such as Black Friday, etc.), where traditional stores are full, and a lot of customers don't buy due to long queues, therefore resulting in lost sales.

Overall, when analyzing the four factors as a whole, although there are differences of opinion between the experts, it is possible to observe a pattern. For the variables "in-store experience" and "customer satisfaction", related to the customer, experts tend to be more optimistic, as the estimated impact is higher. As for the variables "competitive advantage" and "sales", more related with the business itself, answers are more contained and the estimated impact is perceived as considerably lower, although still positive and with significant impact. These results match what was already observed in Section 4.2.1. It is also relevant to acknowledge the limitations of this quantitative estimation, since it resulted from the answers of a limited number of experts, as well as from a simplified approach.

In conclusion, when experts were asked, in general, if they considered that no checkout would have a positive impact in Fast Fashion in Portugal, all responded with a solid yes, which corroborates the previous insights.

4.3. Main drivers and barriers to the implementation of no checkout technologies

4.3.1. Customer Perspective

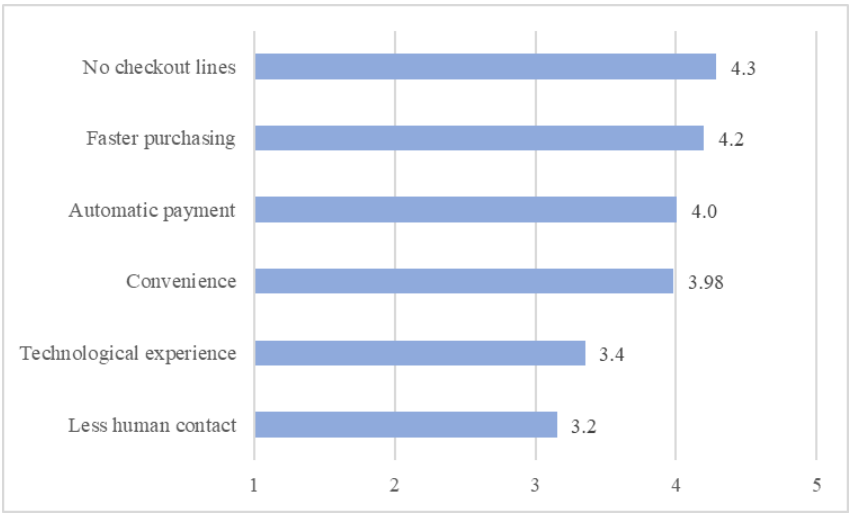
To answer RQ2, the perspective of the customer regarding drivers and barriers to the implementation of these technologies was assessed through the survey conducted. Respondents

were asked to rate several advantages of implementing no checkout according to their level of importance, in a scale from 1 to 5 (being 1 – Not important and 5 – Extremely important) (Q13) and the same happened for the disadvantages (Q15). Furthermore, respondents had the opportunity to add any other advantage/disadvantage that they considered relevant.

Drivers

The average importance rate for each advantage can be found in Graphic 1.

Graphic 1: Drivers – Average rate (Customer perspective)



Graphic 1: Drivers to the implementation of no checkout - Customer perspective (Author's own illustration)

Analyzing this graphic, it is possible to observe that "No checkout lines" is considered to be the main advantage of this implementation, with an importance average of 4.3. From the total, 49% of respondents considers this aspect to be "Extremely important". This data matches the main value proposition of these technologies, which aim to provide a seamless and fast "no checkout" experience. "Faster purchasing" appears right after, with an importance average of 4.2. This can be explained since these aspects are connected – no checkout lines provide a faster purchasing process, which is also a part of the value proposition. The third and fourth options are very closely rated with an average of 4. "Automatic payment" is a factor which provides greater purchasing speed as well, being that the payment process is not even a concern to the customer. In Portugal, alternative digital payment methods have been slowly gaining strength, and the Covid-19 pandemic has accelerated this transformation since it created a greater awareness of convenience. Given this, adoption of contactless technology and mobile payments are increasing (Pequenino, 2020), which contributes to the customers' readiness to accept and use this new payment method through QR code scanning. "Convenience" is also a relevant

advantage, since 74% of respondents considered it to have importance, although the most voted rate was 4 (for the previous aspects it was 5).

For "Technological experience" the average stands in the neutral rate (3), which leads to a conclusion that the fact that no checkout allows a more technological in-store experience, isn't part of the main drivers of this implementation. This can be explained since it's a factor that varies depending on the customer typology. An interesting insight is that, when comparing the answers to this question with the factor "Age", there's an ascending tendency of the average importance rate, as age gets higher (Appendix 21). Older age groups attribute greater importance to having a technological experience than younger ones.

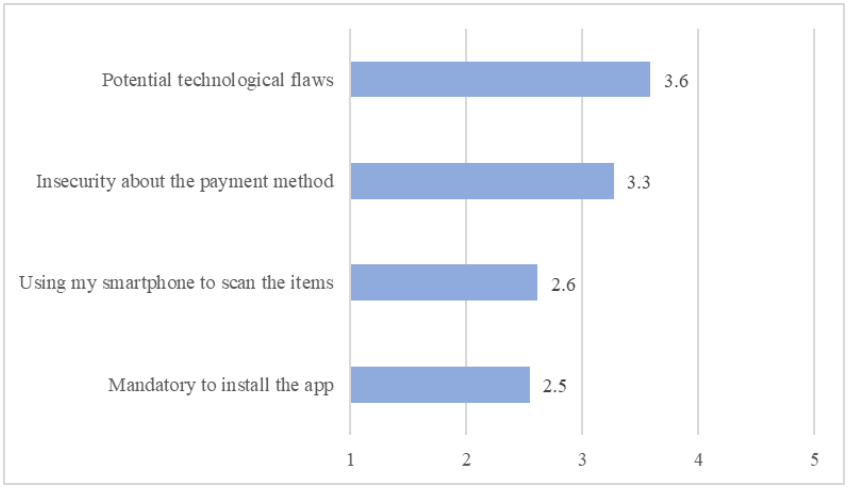
Finally, "Less human contact" is perceived as the driver with less importance, given an average of 3.2. From all the above, it has the higher percentage of responses in the rates 1 and 2 (27%) and in the neutral answer (31%). With no checkout, there still would be interaction with store's employees for any needed help or advice during the shopping experience. Thus, it is possible to conclude that the lack of human interaction at the checkout moment is not one of the main drivers.

Overall, 97% of respondents didn't have any advantage to add and, from the remaining 3%, there was one other valid factor. It consists of the possibility to control the total value/expense of the items during the shopping experience. With the traditional model implemented at the moment, customers are only presented with the total value of the purchase at the moment of checkout and, if they want to keep track of the expense during the shopping process, they need to add prices manually. With no checkout, as customer scan their items, they can always know what is the total price, just by looking at the app.

Barriers

The average importance rate for each disadvantage of the implementation of no checkout regarding the customer perspective can be found in Graphic 2.

Graphic 2: Barriers – Average rate (Customer perspective)



Graphic 2: Barriers to the implementation of no checkout - Customer perspective (Author's own illustration)

Analyzing this graphic, the most relevant barrier is "Potential technological flaws" with an average importance rate of 3.6 and in which, 56% of respondents considered it to have importance. This can be explained due to the fact that the concept of "No checkout technologies" is still very recent in Portugal and customers view it as a new technology that the majority never tried before. Furthermore, it is based in complex and advanced technologies which can also increase insecurity about the risk of something failing. If this happens, customers won't be able to finish the process independently and will have to seek for help, as opposed to the security of the traditional method with cashiers managing all of the process. From the survey respondents, 17% had already shopped at Pingo Doce & Go (Q7) and therefore, experienced this technology. Although only 8% confirmed that they felt difficulties during the purchasing process (Q9), they consisted of some technological flaws (product wasn't recognized, barcode couldn't be read, problems with paying through MBWay) (Q10). Thus, although systems that rely on technologies have always some risks associated, it is important for retailers, when considering the implementation of no checkout, to try to minimize this risk as much as possible, since it's a sensitive point for consumers.

Regarding "Insecurity about the payment method" the average rate of importance is 3.3 and despite its proximity with the neutral value, it can be considered relevant since 47% of respondents rated it as an important factor. Comparing the answers of the respondents who had shopped at Pingo Doce & Go with the ones who had not, it was possible to see a difference (Appendix 22). Respondents who had shopped at PD&Go showed an average importance rate of 2.9 (0.4 lower) and 65% rate this factor as not important or neutral, versus the 51% of those who haven't visited. For this topic, discomfort about the payment constituted a barrier while,

simultaneously, automatic payment was one of the main drivers. A study from Nielsen reveals that 61% of Portuguese indicated that security is a concern regarding mobile payments (Monteiro, 2016). In general, digital payment methods are very secure, but the consumer perception is different. Despite this, there's the belief that adoption of new payment methods will continuously increase as user mentality changes and credibility is gained (Monteiro, 2016). Combining all this evidence, it shows us that as consumers experience these technologies, it's likely that they'll gain some trust regarding the payment and that this will progressively constitute less of a problem. However, it's something that retailers need to be aware of and can be a reason for some customers not to use "no checkout".

As for "Using my smartphone to scan the items" and "Mandatory to install the app", they are considered to be less relevant due to the lower average rate (2.6 and 2.5, respectively). For this first barrier, 23% of respondents found it had importance, and for the second 26%. These factors were seen as less significant since they were only relevant for a lower number of respondents.

Overall, 94% of respondents didn't have any disadvantage to add and, from the remaining 7%, there were four categories of barriers. The first one, which was the most mentioned, is related to the reduction of employment and was presented as a concern. Respondents supposed that this innovation would eliminate all the cashier jobs, although that isn't necessarily true (either due to the adoption of a hybrid model, or to the current roles being shifted to focus on other activities). The second most represented barrier was the decrease of social contact and interaction. As mentioned before, this would only happen at the moment of checkout, since for the remaining aspects of the shopping experience there still would be employees available to help, if not more, due to the shift in roles to focus on the client. For these two aspects mentioned, there would need to be a clear communication, as these conceptions aren't accurate and can lead to misunderstandings by customers. For example, Amazon Go has a part of its homepage dedicated to answering questions where these issues are addressed.

Thereafter, there's a factor related with privacy and data protection. This is very important and also needs to be aligned with the guarantee of a trusted Wi-Fi in-store. Customers are becoming increasingly more careful about sharing data and studies show that "92% of consumers agree companies must be proactive about data protection" while "85% of consumers will not do business with a company if they have concerns about its security practices" (PwC, 2017). The last barrier mentioned was that it isn't adaptable to everyone, due to differences in technological knowledge as well as the need to have a smartphone with minimum

functionalities. This needs to be taken into account since factors like inclusivity are gaining importance and can impact aspects regarding brand/company values.

4.3.2. Retailer Perspective

To evaluate the perspective of retailers about the drivers and barriers to the implementation of no checkout technologies, expert interviews were conducted. In the interviews, experts were asked to identify the main drivers and barriers to this implementation, as well as to rate them according to their level of importance, in a scale from 1 to 5 (being 1 – Not important and 5 – Extremely important).

Drivers

There were six main drivers identified by the experts, which can be divided into three different categories, as shown in Table 3.

Table 3: Drivers (Retailer Perspective)

Categories	Drivers
Customer-related	Improved in-store experience
	Customer satisfaction
Store-related	Optimization of store's employees
	Innovative Stores
Company-related	Competitive Advantage
	Higher profitability

Table 3: Main drivers– Retailer Perspective (Author's own illustration)

For the identified drivers, a further analysis was conducted, based on the number of times each of them was mentioned and the average importance rate attributed. Based on these two variables, a final rate was calculated, to serve as a mean of comparison. This analysis is summarized in Table 4.

Table 4: Drivers' Analysis (Retailer Perspective)

	Improved in-store experience	Optimization of store's employees	Competitive Advantage	Customer Satisfaction	Innovative Stores	Higher profitability
Count	7	7	5	4	4	2
Average Rate	4.4	3.9	4.0	4.5	3.5	5.0
Final Rate	31	27	20	18	14	10

Table 4: Drivers' Analysis– Retailer Perspective (Author's own illustration)

The driver "Improved in-store experience" stands out in terms of number of times mentioned and average rate. With this, it is possible to state that according to this study, the

main driver for implementing no checkout is the ability to provide an improved in-store experience to the customers. This driver is closely followed by "Optimization of store's employees" which was mentioned the same number of times, however, it showed a lower importance rate. This optimization is due to the reduction (totally or partially) of the number of employees in cashier positions. It would allow them to focus on other areas such as customer assistance, restocking, etc., leading to improvement in the factors identified in the survey as negative influences on the customer's experience, such as "Few employees available to help" and "Untidy store", as already mentioned (Q5). In third place, we find "Competitive advantage". It is possible to observe that the three main drivers correspond to the three different categories: customer-related, store-related, and company-related. The factor "Customer Satisfaction" has a very similar rating, since it was mentioned fewer times although with a higher rate and is followed by "Innovative stores". Finally, there's "Higher profitability" which was only mentioned by two experts but had the highest importance average of 5. This driver was mentioned by the experts in a long-term perspective, in the sense that after the initial investment and with the growing adherence by the customers, the company would start to benefit financially from being at the cutting edge of technology.

Barriers

There were five main barriers identified by the experts, which can also be divided into three different categories, as shown in Table 5.

Table 5: Barriers (Retailer Perspective)

Categories	Barriers
Customer-related	Digital Gap between customers
	Teaching the customer how to operate / Adaptability
Company-related	Security Control
	Implementation Costs
External	Fiscal Constraints

Table 5: Main barriers– Retailer Perspective (Author's own illustration)

For the identified barriers, the same analysis was conducted. The results are summarized in Table 6.

Table 6: Barriers' Analysis (Retailer Perspective)

	Security Control	Implementation Costs	Teaching the customer how to operate / Adaptability	Digital Gap between customers	Fiscal Constraints
Count	9	8	2	5	1
Average Rate	4.9	4.0	4.5	1.4	5.0
Final Rate	44	32	9	7	5

Table 6: Barriers' Analysis– Retailer Perspective (Author's own illustration)

Observing the table, "Security Control" is the main barrier to the adoption of these technologies. It was mentioned in all of the interviews and the average importance rate of 4.9 demonstrated the level of concern regarding this topic, which was already explored in detail in sector 4.1. The following barrier is "Implementation costs" which was referred to a similar number of times but has a 0.9-point lower average rate of 4.0. This factor depends on variables such as the company's financial ability to invest in these technologies. Moreover, according to the experts, as RFID may be essential for ensuring security, the preexistence of this technology in stores would also have an influence, since for companies that don't currently have it implemented, the investment would be considerably greater. Currently, the impact of the Covid-19 pandemic on sales and profitability also has an influence on the company's financial positions to invest in no checkout, as observed in some interviews.

The first two main barriers are thus company related and the next two are customer related. The "teaching the customer how to operate/adaptability" is related to the fact no checkout would be a novelty in the market and a new experience for most customers. Therefore, there would need to be an adjustment phase as the customer learns and gets used to this new way of shopping. This phase is where a lot of doubts would come up and some difficulties may arise (for example, related to the app). It's important to note that this barrier has a much lower rate than the previous ones, but it's a challenge that companies need to be ready to face and may be characterized by a lower initial percentage of users. Additionally, the "Digital gap between customers" was mentioned 5 times although with low importance. Experts considered this would be one of the main problems for "no checkout" only stores, but it would not constitute a significant problem for the hybrid model. Related to this, and throughout the interviews, there were some concerns regarding the Portuguese population's adherence, due to the medium-high average age which implies some level of technological illiteracy, aligned with the resistance to change and less openness to new technologies.

Lastly, there was the external barrier "Fiscal Constraints". Although this barrier was only mentioned one time, it was stated by an expert whose company has considered implementing this technology in Portugal and was faced with this obstacle, thereby rating it with an importance of 5. It is related with electronic invoicing and the mandatory use of a certified program, which can take several months to be implemented. Additionally, there are fiscal alterations for the year of 2021, which the expert believed would give some room to move forward. It's important to note that some measures that were initially planned to be implemented for this year have been postponed to 2022, due to the Covid-19 pandemic (Gomes, 2020).

In conclusion, when customers were asked about their overall opinion on the introduction of "no checkout" in Fast Fashion stores (Q12), 74% found it useful while only 7% considered it wasn't useful. This data is relevant since it gives a general impression about the customer willingness to adopt these technologies. With this, it is possible to state that customer opinion regarding possible implementation is significantly positive. As for the experts, when asked to rate, from 1 to 5 the feasibility of implementing this technology in Fast Fashion in Portugal, the average of answers was 4.1 (Appendix 23). Furthermore, analyzing qualitative statements regarding the interviewees' opinions on this implementation, it is possible to add some interesting points. The majority mentioned that these technologies will eventually come to Portugal and become a reality, and that Portuguese customers would like this type of solution although younger generations would be more open, and the general population would be slower to adopt. There were also several advantages referred to, besides the main ones, such as: companies would be able to obtain more customer data, through the records of in-store purchases, leading to a greater customer knowledge which can have several purposes like, for example, personalization. Moreover, the volatile variable regarding the cashiers' attitude, which may be influenced by fatigue and excessive repetition of the task and therefore reduce customer's satisfaction, would also be eliminated. As a consequence of this implementation, it was also mentioned that return rates may be impacted, since a faster checkout may lead to a smaller reflection time, resulting in less deliberation about purchases. Overall, no checkout would need to integrate a long-term strategy and some experts proposed an implementation plan which consisted of starting with a few stores, probably in Lisbon and Porto, followed by other strategic cities to prove the concept and, afterwards, to start expanding to other locations.

In regard to digital enablers, there are a few most important factors that need to be in place to assure success of this digital transformation. Starting with people and capabilities, some restructuring is needed – there will be fewer cashier positions and roles will shift to higher value-added activities that provide better store management and, specially, a higher focus on

customers. Moreover, the shopping journey will be more digital which implies training store staff to be able to fully support the customer. Related to this, the organization and culture need to be adapted to embrace digitalization. It is something that Fast Fashion companies are already starting to change and, as more technologies are implemented, this becomes even more crucial. At the core of this transformation, there is the required IT infrastructure, technology & security that make all of the no checkout models possible to be implemented. The main technologies needed depend on the model implemented and can be more or less complex accordingly. But the essential factor is a store's app with all the functionalities (scanning, create baskets, perform payments, issuing invoices, generate QR codes, etc.), a method to check-in and checkout, possible NFC reading, and lastly, a security system (through RFID technology or any other solution). To do this, it is likely that a technological partner ecosystem is necessary.

5. Main Conclusions, Limitations and Future Research

5.1. Main Conclusions

This research provides a contribution to the existing literature by studying in detail the applicability and possible implementation of no checkout technologies in the Fast Fashion industry in Portugal, according to expert and customer perspectives. The "No checkout" model implemented at Pingo Doce & Go was used as the base case for this study.

Since this model is applied in the grocery retail industry, as are most of these technologies, there are some adjustments needed to better suit the Fast Fashion sector, which were analyzed with experts. The adapted version would be centered on a hybrid model, enabling stores to offer "no checkout" while still having the option of traditional checkout methods, as one of the main insights is that closed entrances wouldn't work for this industry. With this, Fast Fashion stores would maintain and keep leveraging their characteristic open entrances, with a different check-in solution for those who aim to use these technologies (e.g., geolocation or QR code scanning). To provide an easy item scanning process, stores would need to adapt to the use of NFC, being that barcode scanning can always be an option. Lastly, security was found to be the major difficulty in this implementation, due to the presence of security tags in every item in store. A detailed solution would need to be further investigated to guarantee an autonomous and seamless customer experience.

Although there are more complex and advanced technologies already in use in the retail industry as mentioned in the Literature Review, when analyzing the proposed model, it needs to be taken into consideration that this study is focused on Portugal, where Fast Fashion stores are still very traditional, and the general population isn't familiar with these technologies. Thus, a model as the one presented needs to be initially implemented as a proof of concept. This would demonstrate that the no checkout model can be successful in the industry and would allow customers to adapt to the new experience.

Concerning the impact of no checkout, it was found that the factors "in-store experience", "customer satisfaction", "competitive advantage" and "sales", intrinsic to the Fast Fashion sector, are impacted by the introduction of these technologies and, therefore, the impact of no checkout in Fast Fashion was proven. According to both experts and consumers, the most impacted factors would be "in-store experience" (28%) and "customer satisfaction" (33%), followed by "competitive advantage" (14%) and "sales" (13%). This is aligned with the main value proposition of no checkout, which is focused on the customer and on providing an improved in-store experience, through the elimination of waiting times, therefore increasing

satisfaction. Consequently, brands will be able to differentiate themselves from the competition, which has high value in the extremely competitive market of Fast Fashion. This would also contribute to the business's main goal – sales – either by customers who value these technologies choosing the brand over competition, or by decreasing the number of customers who give up on their intention to buy due to long checkout queues.

From the perspective of the customer, "no checkout lines", "faster purchasing", "automatic payment" and "convenience" were considered to be the most valuable drivers regarding the implementation of no checkout, while "potential technological flaws" and "insecurity about the payment method" were pointed out as the main concerns and potential barriers for adoption. In the experts' opinions, the most important drivers identified were "improved in-store experience" and "optimization of store's employees". As for the barriers, "security control" stands out as the main barrier towards implementation, as previously mentioned. This was followed by "implementation costs" which was also considered of high importance.

With this assessment**,** it is possible to conclude that both customers and experts place more value on the drivers than on barriers, given that 74% of consumers find these solutions useful, while the experts were also positive as they expect that no checkout will become a reality and that it is feasible to implement. The main concerns are related to the possible slow adoption of this new way of shopping by the Portuguese population due to its demographic characteristics, which also aligns with the identified main customer concerns. Furthermore, the most crucial point regarding implementation is to find a solution regarding security which companies are comfortable with and which complements the customer experience in the most frictionless way possible.

In general, no checkout will create value by increasing revenues and contribution margins. To optimize gains from implementation, Fast Fashion companies must focus on a customer-centric vision supported by technology. By implementing this solution, core aspects of Fast Fashion stores will be greatly enhanced, therefore generating significant benefits for both experts and customers. Overall, although clearly requiring significant investment, appropriate security controls, training and market adjustments, the results demonstrated by this study make the benefits worth pursuing. No checkout would be a meaningful and viable solution for Fast Fashion stores.

5.2. Limitations and Future Research

Throughout this research, there were limitations that should be considered which may have influenced the results. Firstly, the sample of the questionnaire is not fully representative, since

the female gender was more represented and there are fewer respondents from certain age groups, especially older ones (Appendix 13). Moreover, the survey was conducted online which implies that respondents are predisposed to the use of technologies and the internet. This may have partially biased the results, since the opinion of people who don't fit this description was not considered.

Regarding the interviews, the sample of experts is also relatively small and, therefore, possibly not fully representative, or generalizable. Additionally, given the characteristics of the Fast Fashion industry, a major part of companies' management is done internationally, thus the experts interviewed had more store experience and knowledge, and less office and strategic views.

In the future, it would be interesting to study in detail the optimized and fully adapted "no checkout" model for the Fast Fashion industry, as well as all the inherent technologies, organizational adjustments and strategy required to successfully implement this model. Lastly, how to integrate further advanced technologies (already implemented in other retail sectors) could be studied, along with their feasibility in Portugal.

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7. Appendices

Appendix 1: Interview 1 - Key Insights

The interviewee's company has "No checkout" implemented in some of their biggest stores (internationally) and has considered implementing in Portugal. RFID technology is present in every store in Portugal. Currently, they have self-checkout counters in a few Portuguese stores and, with this, were able have less employees at the checkout position, which were allocated to other tasks (optimization). There are still improvements to be made since it's not possible to add the tax number, to return items, and the alarm removal process has proven to be an obstacle for customers. The main goal of stores is to sell more with less resources.

The main barrier mentioned was the fiscal constraints, followed by security control, due to the alarm removal which is an impediment to the customers' full autonomy. In terms of implementation costs, it isn't a problem for the company, since it is willing to invest in technologies that have future return. They do a lot of tests and pilots, and the process to implement something new is slow. The covid pandemic and the associated concerns have created more awareness to the value of these solutions and, at the moment, would be the best time to implement. At the same time, it is a bad period regarding sales, which makes this barrier gain importance.

In general, believes that it must be a hybrid model and that Portuguese customers would like and adapt to this type of technology. There is increasingly more integration between the physical and the online, and a focus on customer's autonomy in-store. It's a new experience which is what stores need to offer in order to differentiate from the competition. Believes this technology will come to Portugal in the near future.

Appendix 2: Interview 2 - Key Insights

The model must be hybrid. Some of the metrics analyzed in customer satisfaction are store tidiness, waiting time to be helped by an assistant, assistants ready to help, etc. With the staffs' optimization, there could be a better response to these factors. Refers the optimization of store's employees and improved experience (through the reduction of waiting times) as the main drivers. As for the barriers, expressed concerns regarding implementation costs, followed by security control. Overall, the implementation depends a lot on costs and viability but believes it's significant in terms of waiting time and especially in certain regions.

Appendix 3: Interview 3 - Key Insights

The PD&Go model has potential to be applied to Fast Fashion, with some adjustments as there are additional difficulties in the sector. When it comes to visual recognition of the products, a lot of them look very alike, especially if not totally opened. The checkout process would need another type of control at the exit, for example: scanning the tags (would have to be through RFID, not NFC) and compare it to the receipt of what was paid by the customer (e.g., through scanning of QR code). The entrance should not be closed as that represents a physical barrier to the customers and fashion stores benefit a lot from an open and unobstructed entrance, since most of the store's traffic is constituted by customers who were walking by and not customers who had that specific store as a destiny. The ideal is the hybrid model.

The competitive advantage depends on the store's format, as this solution increases its importance depending on convenience, low prices, and high volumes. It will also have an impact on the return rate. By doing a faster checkout, the reflection time of the purchase will be reduced, which will lead to more sales but, part of them will be less deliberated, leading to an increase of returns. Implementation costs will imply RFID technologies. Considers this model should come to Portugal in the next couple of years.

Appendix 4: Interview 4 - Key Insights

The majority of the company’s stores have the traditional method, although there are some pilot stores where new solutions are tested. The PD&Go model has potential to be applied to Fast Fashion but adapted by each retailer. The hybrid model is the ideal and some of the adjustments include a solution to remove security tags. Considers that it also depends on the number of units sold, and it's a good solution for a limited number of articles (considering dimension and volume). Other points to have in consideration: exchanges and returns, issuing invoices/tax free.

In general, it is a viable option but requires resources (time and money). RFID technologies will facilitate the process with less resources and more security and, since “stock loss” is a very important KPI, there needs to be a tight security control (alarms, control of surveillance cameras, etc).

Appendix 5: Interview 5 - Key Insights

The PD&Go model has potential to be applied and, in some respects, it will be similar to what the company has implemented in self-checkout. Some adaptations include keeping an open entrance since customers enter the store by impulse and not necessity (as it happens in grocery retail). A solution to take off security tags is critical and the greatest difficulty to

overcome, as stores must provide a seamless experience for the customer while assuring security. The current hard alarms need to be removed but in the future some technology should be used in this regard.

Regarding the impact in sales, the company already has higher sales in self-checkout because there are less customers giving up on their intention to buy due to checkout queues. Customers have less time to reflect on their purchases - in low-cost brands there are a lot of customer that give up on impulse purchases when they are waiting to pay. With no checkout, this wouldn't happen. There would only be an impact regarding competitive advantage for the customers who value to these technologies (more young people). For other types of customers, for example, in older age groups, it wouldn't have an impact.

Overall, considers that it is viable - firstly will be implemented internationally and eventually come to Portugal. It's not a priority, probably many things will happen before it is a reality. Different stores have different investments. A possible strategy can be to start with Lisbon, Porto, and expand to different cities depending on the type of customers (ex: Braga, Guimarães).

Appendix 6: Interview 6 - Key Insights

Regarding no checkout, an experience happened in the UK and the initial feedback has demonstrated potential and optimism. The technological advancements driven by the pandemic and "forced adaptation" of the general population will lead to the creation of the conditions to implement these technologies. There is a delay of most countries of the EU regarding technology, and Portugal has a population with a medium-high age average which implies some "technological illiteracy".

Considers that the hybrid model should be applied initially for adaptation. In the long term, the most viable solution will be only "No Checkout" stores, although customers would always need to have the alternative to pay traditionally. In the adaptations of the model, brands will have to find an alternative to the physical alarms found on garments, replacing them, for example with an internal tag that deactivates at the moment of purchase. This way, the tags would be deactivated as the customer leaves the store, adding value to the customer experience, since they wouldn't have to worry about the security alarm.

In general, is in favor of the implementation of this technology in the Fast Fashion industry. Thinks that it benefits the customer's shopping experience as well as allows stores to allocate and focus their human resources on customer service, which is undoubtedly the most important aspect of implementing a technological innovation. It will also influence other factors such as:

the industry will be more aware of demand instead of supply, leading to more sustainable and limited manufacturing, thus avoiding waste with high environmental impact. Brands will get to know their clients not only through the feedback obtained by the commercial teams, but also through the personalized record of each purchase made by a customer in-store, thus being able to obtain more customer data. No checkout also allows the extinction of the checkout task, allowing customers to avoid the change of attitude of the cashier, often motivated by fatigue and excessive repetition of the task, and it is possible to guarantee the continuity of the customer's experience in store.

Appendix 7: Interview 7 - Key Insights

The implementation of these technologies started being discussed by the company in the beginning of 2020 (still on a very exploratory basis - identification of implementation scenarios, potential benefits, and benchmarking). The hybrid model is ideal, as one of the barriers identified is the resistance to change by the older population.

It will be inevitable in a medium term, however it's necessary to do a ROI evaluation and to find solutions that guarantee a better fraud risk management. There’s a significant investment associated with RFID.

Appendix 8: Interview 8 - Key Insights

The PD&Go model has potential to be applied in Fast Fashion., as it's important that the in-store experience is reviewed and dynamized (which gives strength to the concept). Maybe start with some stores to prove the concept and get feedback. Initially the ideal is the hybrid model, to introduce the concept, get feedback and analyze reactions. In the future, only "No Checkout" stores.

Regarding sales, there will always be people who won't use this technology, but for those who do, sales can increase due to the comfort of purchasing. Some additional barriers mentioned were the dependency on a smartphone and good internal Wi-Fi and, the fact that logistics may need to be optimized. With no checkout there is the possibility of buying more and faster however logistics may not be prepared to have stock coverage or sizes available. The app is of little use if there is no stock (possibility of combining an online order with the app in case there is no stock in the store).

It's a model that will eventually enter the market and become a reality. Currently there are already potential users of this technology, but we can't forget that the Portuguese market is "slow", so it will have to be implemented in a structured way, with a long-term vision. Start small, prove profitability, and then expand like any business. IT needs to guarantee that

everything functions correctly, aligned with the use of RFID to ensure security, which is a big investment. Visual merchandising has to be a differentiating factor.

Appendix 9: Interview 9 - Key Insights

The PD&Go model has potential to be applied and the ideal is the hybrid model, as the main goal is always to provide a good customer service - facilitate the process, save time, but do it with the largest number of customers. Being a novelty in the market and knowing the Portuguese public, considers that the initial percentage of users of the new technology will be small. The biggest concern has to be security, since one of the biggest problems is stock loss. Needs to have an intuitive trajectory, maintaining the existing physical experience and complementing it with a fast and comfortable technological experience. The need for adaptations to the PD&Go model will vary depending on the volume of items and sales of each store. It will be easier to adapt to a lower volume for easier control. Stores with higher volume will always need more specific adaptations, such as the identification of items. It needs to be taken into consideration that technology has an added cost, and the introduction of this technology can inflate the cost of the units.

The example of companies that have always been 100% online and that are now investing in physical stores with no checkout demonstrates the growing innovation and investment in these technologies. However, considers the Portuguese population is still not very prepared to these changes and has some concerns regarding the adherence (especially influenced by the older population). It is a viable sales channel, but with much investment, adaptation and training needed.

Appendix 10: Interview 10 - Key Insights

The PD&Go model has potential to be applied and the ideal is the hybrid model since it is a very specific technology, and the traditional customer would hardly stop shopping in the traditional way. However, more and more people want a fast purchase, in the sense of not "wasting time" and this could be a value added. It is a big investment and customers would need training and adaptation to this new shopping experience. Younger generations would be more open to these technologies.

It is difficult to make an implementation of this size: besides the costs, the control of items in hybrid stores would be complicated. Believes it's the future (or a similar solution) due to the improvement of the customer experience.

Appendix 11: Interviews' Guidelines

Section 1

1. a) Does your company have "No Checkout" technologies implemented at the moment? If not, please answer the 1. b)

   b) To your knowledge, has your company considered implementing these technologies in Portugal? If not, what's the reason?
2. a) Do you think that the model applied by Pingo Doce & Go has the potential to be implemented in Fast Fashion?

   b) In your opinion, the ideal model be: a hybrid model (stores remain identical with the additional option of "No Checkout") or stores only with the "No Checkout" method?

   c) Based on this same model and on your previous answer, do you think there are adjustments/changes needed to be made so that it better suits the Fast Fashion industry?

   d) If yes, which ones?

Section 2

3. In your opinion, would the existence of "No Checkout" technologies positively impact:

   a) Sales?

   b) Competitive Advantage?

   c) Customer Preference for the brand in question?

   d) Customer Experience in-store?

   e) Customer Satisfaction?

3.1 Is there any metric/KPI that has not been mentioned and that you consider relevant? If yes, which one(s)?

4. Do you think that, in general, "No Checkout" technologies would have a positive impact on Fast Fashion in Portugal? Please justify.
5. For each of the metrics identified in question 3, can you estimate what would be the approximate impact of "No Checkout" technologies?

Metrics	**Impact** (0-10%, 10-20%, 20-30%, 30-40%, 40-50%, >50%, I can't estimate)
Sales	
Competitive Advantage	
Customer Preference	

Customer Experience in-store	
Customer Satisfaction	
Other (if mentioned in 3.1.)	

Section 3

6. a) What are the main drivers (motivations) for the implementation of this technology in Fast Fashion in Portugal?

   b) Can you rate, on a scale of 1 to 5, the drivers identified in the previous question according to their level of importance? (being 1- Not Important and 5- Extremely Important)
7. a) What are the main barriers/difficulties for the implementation of this technology in Fast Fashion in Portugal? Do you foresee that this technology could bring any potential problems?

   b) Can you rate, on a scale of 1 to 5, the barriers identified in the previous question according to their level of importance? (being 1- Not Important and 5- Extremely Important)
8. What is your general opinion regarding the implementation of this "No Checkout" model in the Fast Fashion sector, in Portugal?
9. Please rate, on a scale from 1 to 5, the feasibility of implementing this optimized "No Checkout" model in the Fast Fashion sector in Portugal (being 1- Not Viable and 5- Extremely Viable).

Appendix 12: Survey Questions

Start of Block: Introduction

Dear Participant,

Welcome and thank you for your participation in this survey.

This questionnaire is being conducted as part of my master's thesis and aims to study the implementation of new checkout technologies in the Fast fashion sector in Portugal. The target is Portuguese people who frequent Fast fashion stores.

It has an approximate duration of 5 minutes. Your answers will be anonymous, strictly confidential, and the data collected will only be used for the purpose of this survey. Thus, I ask you to answer as honestly as possible. There are no right or wrong answers.

If you have any questions about the study, you can contact me at the following email address: 152119081@alunos.lisboa.ucp.pt

Thank you very much for your collaboration!

Mafalda Rilhó

Start of Block: Exclusion Factor

Q1 What is your nationality?

- Portuguese (1)
- Other (2)

Skip To: End of Survey If *What is your nationality = Other*

Start of Block: Fast Fashion

Fast fashion is a term used by brands that follow a concept of fast production of their garments. There is a high turnover of clothes and styles in order to guarantee the latest fashion trends at affordable prices. In Portugal, some examples of the best-known Fast fashion brands are: Zara, Pull & Bear, Mango, Primark, MO, H&M, Stradivarius, C&A, among others.

Q2 Do you go to Fast fashion stores?
Please consider normal circumstances, not affected by Covid-19.

- Yes (1)
- No (2)

Skip To: End of Survey If *Do you go to Fast fashion stores? = No*

Q3 How often do you shop at Fast fashion stores?
Please consider normal circumstances, not affected by Covid-19.

- Rarely (1)
- Sometimes (2)
- Often (3)
- Always (4)

Q4 How would you rate, on average, your experience in-store?
(1 being the lowest rating and 5 being the highest)

Q5 Please rate, from 1 to 5, the degree to which the following factors negatively influence your in-store experience.

	Little or no influence (1)	(2)	(3)	(4)	Totally influences (5)
Too many customers in store at the same time	○	○	○	○	○
Few employees available to help	○	○	○	○	○
Queues to fitting rooms	○	○	○	○	○
Queues to Checkout	○	○	○	○	○
Untidy store	○	○	○	○	○

Start of Block: "No Checkout" Technologies

Q6 Are you familiar with the term "No Checkout technologies"?

- ○ Yes (1)
- ○ No (2)

No Checkout technologies is a concept that was made famous in "Amazon Go" stores. It consists of the combination of several advanced technologies that allow customers to have a fast and convenient checkout, avoiding any kind of waiting line. In Portugal, Pingo Doce & Go (situated in Nova SBE) is an example of a store where this type of technology is implemented. Customers enter the store by scanning a QR Code (which implies the installation of an app) and make their purchases by registering the products through NFC or barcode scanning (which are added to a virtual cart). At checkout, they scan the QR Code again, and the payment is done automatically, through the credit card associated with the app. You can learn more about it in the following video: https://www.youtube.com/watch?v=VC1rGqJVoiE

Q7 Have you ever shopped at Pingo Doce & Go?

- Yes (1)
- No (2)

Skip To: Q11 If *Have you ever shopped at Pingo Doce & Go? = No*

Q8 How would you rate your in-store experience?
(1 being the lowest rating and 5 being the highest)

1	2	3	4	5

Q9 Did you feel any difficulty during your purchasing process?

- Yes (1)
- No (2)

Skip To: End of Block If *Did you feel any difficulty during your purchasing process? = No*

Q10 Please describe the difficulty/difficulties that you felt:

_____

_____

Display This Question:
If *Have you ever shopped at Pingo Doce & Go? = No*

Q11 Taking into account the description above, what's your opinion about this technology?

1 – Not interesting	2	3	4	5 – Extremely interesting

Start of Block: No Checkout Technologies in Fast Fashion

Pingo Doce & Go is an example of the application of these technologies in grocery retail.
In order to answer the needs of Fast fashion and adapt to the sector, the presented model is just a base, and some key points may be modified.
Some examples of changes are: having the same store entrance format as today, with the addition of an option for those who want to use this technology; a solution for removing alarms; among others.

Q12 In general, what is your opinion about the introduction of this technology (No checkout) in the Fast fashion sector?

1 – Not useful	2	3	4	5 – Extremely useful

Q13 Please rate, from 1 to 5, the following **advantages** of implementing this technology in fast fashion stores, according to their level of importance.

	1 – Not important	2	3	4	5 – Extremely important
Faster purchasing	○	○	○	○	○
Convenience	○	○	○	○	○
Less human contact	○	○	○	○	○
No Checkout lines	○	○	○	○	○
Technological experience	○	○	○	○	○
Automatic payment	○	○	○	○	○

Q14 Is there any advantage that wasn't mentioned, and you consider relevant?

- ○ Yes. Which one(s)? Rate its' importance. (1) _____
- ○ No (2)

Q15 Please rate, from 1 to 5, the following **disadvantages** of implementing this technology in fast fashion stores, according to their level of importance.

	1 – Not important	2	3	4	5 – Extremely important
Mandatory to install the app	○	○	○	○	○
Using my smartphone to scan the items	○	○	○	○	○
Potential technological flaws	○	○	○	○	○
Insecurity about the payment method	○	○	○	○	○

Q16 Is there any disadvantage that wasn't mentioned, and you consider relevant?

- ○ Yes. Which one(s)? Rate its' importance. (1) _____
- ○ No (2)

Q17 In your opinion, the ideal would be:

- ○ Stores remain identical as they are today, with the additional option of "No Checkout" (1)
- ○ Stores only with the "No Checkout" method (2)

Display This Question:

If *In your opinion, the ideal would be: = Stores remain identical as they are today, with the additional option of "No Checkout"*

Q18 Which reason led you to choose the previous option?

- ○ I want to have the option to use the traditional method (1)
- ○ I consider it to be a drastic transformation (2)
- ○ I value the presence of cashiers (3)
- ○ Otherwise, it wouldn't be suitable for people who are not comfortable with technology (4)
- ○ Other. Which one? (5) _____

Q19 Please evaluate the following sentences: "The introduction of no checkout technologies in fast fashion stores would improve my in-store experience."

○ Strongly disagree (1)	○ Disagree (2)	○ Neither agree nor disagree (3)	○ Agree (4)	○ Strongly agree (5)

Q20 "The introduction of no checkout technologies in fast fashion stores would improve my satisfaction with the brand."

○ Strongly disagree (1)	○ Disagree (2)	○ Neither agree nor disagree (3)	○ Agree (4)	○ Strongly agree (5)

Q21 "The introduction of no checkout technologies in fast fashion stores would influence my choice of store to shop in, when comparing to the competition."

○ Strongly disagree (1)	○ Disagree (2)	○ Neither agree nor disagree (3)	○ Agree (4)	○ Strongly agree (5)

Q22 "The introduction of no checkout technologies in fast fashion stores would influence my preference for the brand."

○ Strongly disagree (1)	○ Disagree (2)	○ Neither agree nor disagree (3)	○ Agree (4)	○ Strongly agree (5)

Q23 "The introduction of no checkout technologies in fast fashion stores would increase my purchases."

○ Strongly disagree (1)	○ Disagree (2)	○ Neither agree nor disagree (3)	○ Agree (4)	○ Strongly agree (5)

Start of Block: Demographic Data

Q24 What is your gender?

- Female (1)
- Male (2)
- I'd rather not say (3)

Q25 What is your age?

○ < 18 (1) ○ 18-24 (2) ○ 25-34 (3) ○ 35-44 (4) ○ 45-54 (5) ○ 55-64 (6) ○ > 64 (7)

Q26 What is your level of education?

○ Less than High School (1) ○ High School (2) ○ Undergraduate (3) ○ Master's degree (4) ○ Doctorate (5) ○ Professional Course (6)

Q27 What is your monthly family income?

○ < 500€ (1) ○ 501€-1000€ (2) ○ 1001€-2000€ (3) ○ 2001€-3000€ (4) ○ 3001€-4000€ (5) ○ > 4000€ (6)

Appendix 13: Survey Demographic Questions

Gender – Q24

	Frequency	Percentage
Female	204	66%
Male	102	33%
I'd rather not say	3	1%
Total	309	100%

Age – Q25

	Frequency	Percentage
18-24	90	29%
25-34	18	6%
35-44	66	21%
45-54	96	31%
55-64	35	11%
>64	4	1%
Total	309	100%

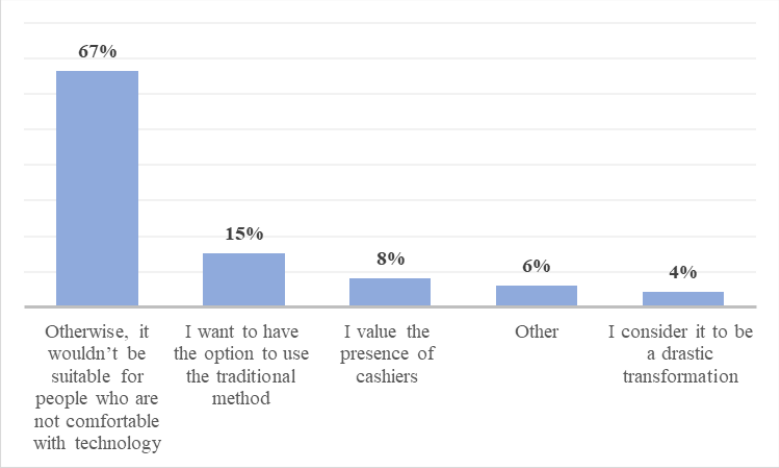
Level of Education – Q26

	Frequency	Percentage
Less than High School	0	0%
High School	62	20%
Undergraduate	160	52%
Master's Degree	74	24%
Doctorate	3	1%
Professional Course	10	3%
Total	309	100%

Family Income – Q27

	Frequency	Percentage
<500€	12	4%
501€-1000€	52	17%
1001€-2000€	91	29%
2001€-3000€	78	25%
3001€-4000€	37	12%
>4000€	39	13%
Total	309	100%

Appendix 14: Reason for choosing the "Hybrid model" – Q18

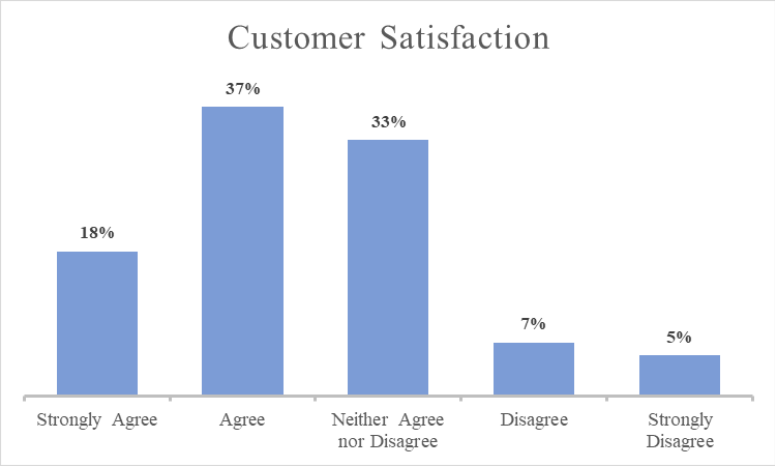


Appendix 15: Impact of no checkout in customers' in-store experience – Q19

"The introduction of no checkout technologies in Fast Fashion stores would improve my in-store experience."

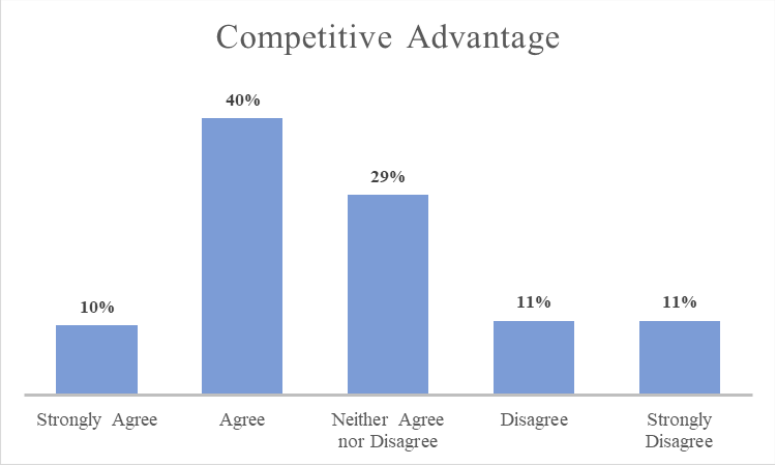
Appendix 16: Impact of no checkout in customer satisfaction – Q20

"The introduction of no checkout technologies in Fast Fashion stores would improve my satisfaction with the brand."



Appendix 17: Impact of no checkout in competitive advantage – Q21

"The introduction of no checkout technologies in Fast Fashion stores would influence my choice of store to shop in, when comparing to the competition."



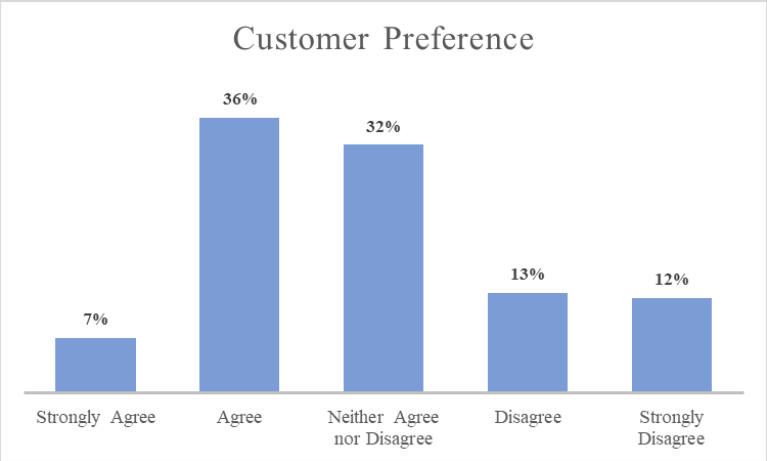
Appendix 18: Spearman Correlation Test

```
        Spearman's rank correlation rho

data:  Impact$Interest and Impact$`Competitive Advantage`
S = 3047576, p-value = 4.574e-12
alternative hypothesis: true rho is not equal to 0
sample estimates:
      rho
0.3802239
```

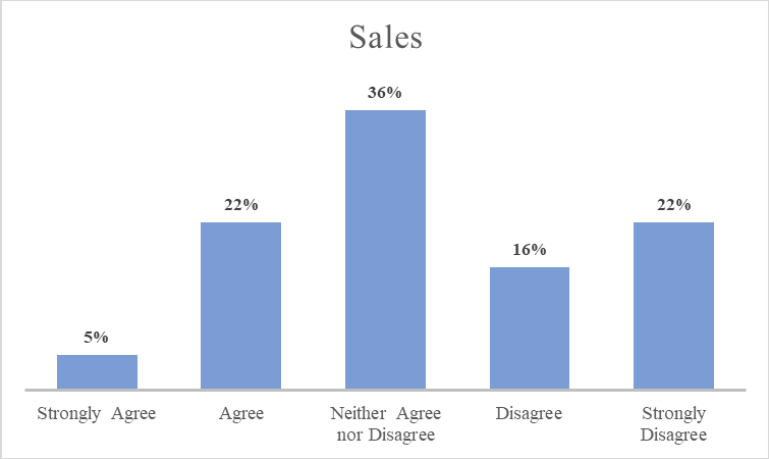
Appendix 19: Impact of no checkout in customer preference – Q22

"The introduction of no checkout technologies in Fast Fashion stores would influence my preference for the brand."

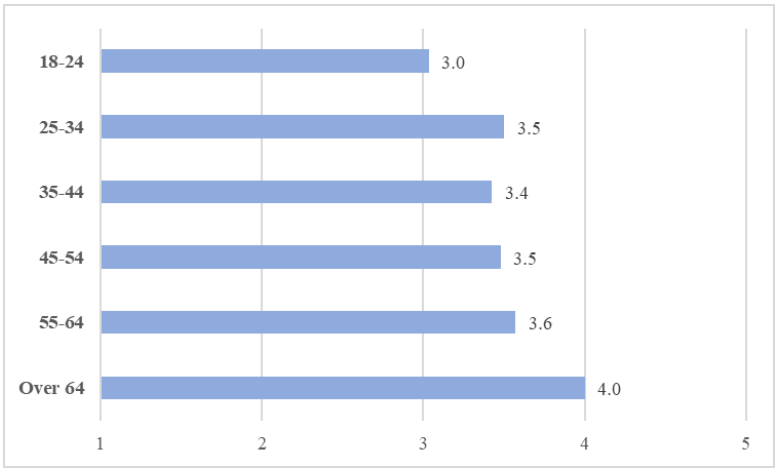


Appendix 20: Impact of no checkout in sales – Q23

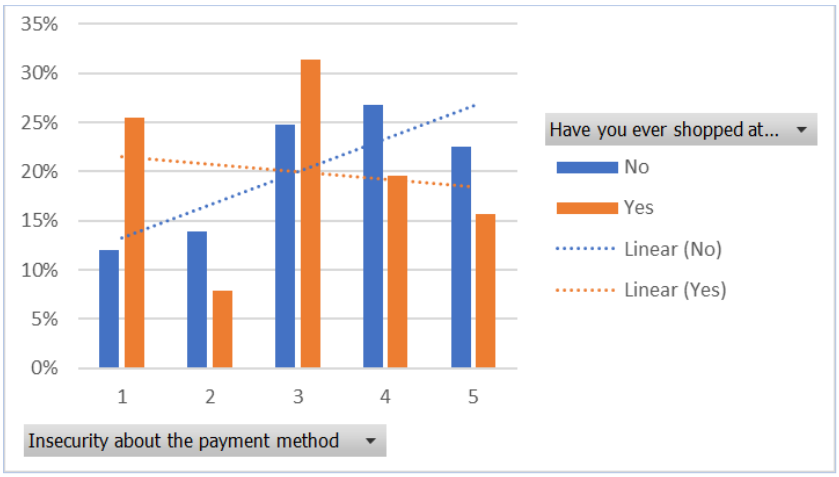
"The introduction of no checkout technologies in Fast Fashion stores would increase my purchases."



Appendix 21: Importance rate of the driver "Technological Experience" according to Age



Appendix 22: Customers who have shopped at Pingo Doce & Go versus "Insecurity about payment method."



Appendix 23: Rate of feasibility of implementing no checkout in Fast Fashion, in Portugal – Experts' insights

	Rate
Interviewee 1	5
Interviewee 2	3
Interviewee 3	4
Interviewee 4	4
Interviewee 5	5
Interviewee 6	5
Interviewee 7	4
Interviewee 8	3
Interviewee 9	5
Interviewee 10	3
Average	4.1