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**ANA FILIPA DA
COSTA LOPES DOS
SANTOS**

**AUGMENTED REALITY IN RETAIL: AN
EXPERIMENTAL CASE STUDY**

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Dissertação apresentada ao IADE - Faculdade de Design, Tecnologia e Comunicação da Universidade Europeia, para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Marketing e Inovação realizada sob a orientação científica do Doutor *Hélder Filipe Santos Barbosa Ferreira, Professor Doutor da Universidade Europeia* e do Doutor *André Miguel Sabino, Professor Doutor da Universidade Europeia*.

I dedicate this work to my beloved grandfather, whose
wisdom and kindness continue to inspire me every day.
Your memory and teachings live on in everything I do.

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palavras-chave

Realidade aumentada, comportamento do consumidor, intenção de compra, adoção de tecnologia, retalho

resumo

A presente pesquisa visa aprofundar a interseção entre realidade aumentada (RA) e o comportamento do consumidor num ambiente de retalho. Para melhor entender estes conceitos, foi realizada uma revisão da literatura sobre a jornada do cliente, realidade aumentada (tipos e experiência do utilizador), estudos de caso no retalho e estratégias de marketing. Deste modo, foi desenhado um estudo de caso experimental com o objetivo de apresentar uma experiência de RA, criada a partir do Adobe Aero, aos clientes de um café histórico em Lisboa, designado ‘A Brasileira’.

Considerando a falta de compreensão do comportamento do consumidor em relação à realidade aumentada no retalho, apresentamos um esquema conceptual que pretende examinar como os determinantes do comportamento do consumidor, tais como a motivação social, motivação hedónica e motivação utilitária, mediados pela expectativa de desempenho, expectativa de esforço e pelas emoções, influenciam a aceitação do uso de RA e a intenção de compra. Os dados foram recolhidos através de um questionário com 102 inquiridos, após uma visita ao café. Posteriormente, os dados foram analisados usando path analysis no software Jamovi.

Os resultados revelaram efeitos indiretos positivos significativos da motivação social e motivação utilitária na aceitação do uso de RA e na intenção de compra por meio da expectativa de desempenho e das emoções. O estudo conclui que a expectativa de desempenho e as emoções são mediadoras importantes no potencial substancial da RA para melhorar as jornadas dos clientes no retalho.

Keywords

Augmented reality, consumer behaviour, purchase intention, technology adoption, retail

abstract

The presented research seeks to deepen the intersection between augmented reality (AR) and consumer behaviour in a retail setting. In an attempt to better understand these concepts, a comprehensive literature review was conducted on customer journey, augmented reality (respective types and user experience), case studies in retail and marketing strategies. Thus, an experimental case study was designed with the objective to bring an AR experience, created on Adobe Aero, to the customers of a historical café in Lisbon, named ‘A Brasileira’.

Considering that there is still a lack of comprehensive understanding of consumer behaviour towards AR in retail, we presented a conceptual framework which intended to examine how consumer behaviour determinants, such as social motivation, hedonic motivation, utilitarian motivation, mediated by performance expectancy, effort expectancy and emotions, influenced AR acceptance and purchase intention. Data were collected from 102 respondents via a questionnaire after an *in situ* visit to the café. Subsequently, the data was analysed using path analysis in Jamovi software. The findings revealed significant positive indirect effects of social motivation and utilitarian motivation on the AR use acceptance and purchase intention through performance expectancy and emotions. The study concludes that performance expectancy and emotions are important mediators in AR’s substantial potential to improve customer journeys in retail.

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List of Abbreviations

AI – Artificial Intelligence

AR - Augmented Reality

AE – Augmented Experience

Apps – Applications

ARSGs – Augmented Reality Smart Glasses

CTR – Click-through-rate

EE – Effort Expectancy

HMDs – Head Mounted Displays

HM – Hedonic Motivation

PE – Performance Expectancy

PI – Purchase Intention

SM – Social Motivation

TAM – Technology Acceptance Model

UA_AR – Use Acceptance of AR

UM – Utilitarian Motivation

UX – User Experience

UTAUT - Unified Theory of Acceptance and Use of Technology

VR – Virtual Reality

WOM – Word of Mouth

1. Introduction

The high level of competition in retail has driven businesses to differentiate themselves through unique and memorable online and physical retail offerings. Physical spaces must be experimental, experiential (e.g., fun, theatrical), and engaging to facilitate consumers' immersion in the retail brand. Augmented reality (AR) emerges as a revolutionary technology tool in consumer decision-making, crucial in transforming the retail experience. AR is experiencing phenomenal growth, with projections estimating an increase from \$35.5 billion in 2023 to \$571 billion by 2032 (Gupta, 2024). Additionally, AR adoption is gaining traction across diverse sectors including retail, suggesting a transformative impact on various industries. This rapid expansion presents a significant opportunity for businesses to leverage AR's potential to enhance products and services (Gupta, 2024).

The increasing presence of mobile technology in retail stores and cafes is drawing attention to the vast possibilities of augmented reality. With the rise of smartphone usage for navigation and social media sharing, both in familiar and unfamiliar environments, it is clear that AR technology that seamlessly integrates with mobile devices is ripe for widespread adoption. However, some authors (Javornik, 2016; Poushneh & Vasquez-Parraga, 2017; Scholz & Smith, 2016) mention a lack of comprehensive studies on consumer behaviour concerning augmented reality.

In this sense, this research aims to explore the effect of augmented reality on the customer journey in retailtainment, a marketing strategy that combines entertainment elements (e.g., interactive elements) with traditional retail settings (Schmitt, 1999). Some of the main goals are to research how AR influences customer experience and customers' shopping intentions. Additionally, this research aims to offer valuable insights into the potential benefits of AR-enhanced customer journeys by seamlessly integrating physical and digital elements.

Therefore, this research seeks to answer the following questions:

Q.1. How do customer behavior determinants influence the acceptance of AR and purchase intention?

Q1.1. How do social, hedonic and utilitarian motivations influence the acceptance of AR and purchase intention in a retail setting, mediated by performance expectancy, effort expectancy and emotions?

Q2. Are there interaction effects between different motivations that amplify or diminish acceptance of AR use and purchase intention?

Q.3. What are the most significant interactions between performance and effort expectancy in acceptance of AR use and purchase intention?

Therefore, this research aims to achieve several goals. First, it seeks to understand the general impact of AR technology on consumer behaviour, specifically their acceptance of AR and purchase intentions. Second, this research aims to understand how different motivations (social, hedonic, and utilitarian) and the interactions between performance and effort expectancy influence the acceptance of AR technology and purchase intentions in retail settings. Third, the research seeks to understand customers' perceptions of how different AR design elements may influence their overall experience.

To address these fundamental questions and achieve the outlined goals, this study employs an experimental case study approach, integrating AR design elements within a physical retail environment. The methodology involves observing the scenario during the implementation of AR as an experimental intervention, followed by administering a survey after the experimentation period to collect data on customer perceptions and experiences.

Selecting a suitable single case study is a critical step in ensuring the overall validity of the research (Gerring & McDermott, 2007). Following a thorough evaluation process, *A Brasileira*, a historical café located in the heart of Lisbon, has been strategically chosen as the focal point of this study. *A Brasileira* attracts millions of visitors annually, creating a diverse and dynamic environment ideal for exploring the impact of augmented reality on the customer journey within the retail industry. This setting allows for an in-depth understanding of the effects of AR on customers' emotions, behaviors, and experiences within retail environments.

This research gathered 102 validated surveys during the AR experiment conducted in the real-world setting of *A Brasileira*. The principal researcher carefully oversaw the entire experiment and assisted respondents by addressing any questions.

The findings of this study contribute to a deeper understanding of AR's potential within the retail sector, providing valuable insights into customers' interests and intentions to use AR tools in retail stores.

The findings revealed that consumer behavior determinants interactions collectively impact the acceptance of AR use and subsequent consumers' purchase intention. This study highlights the significant positive indirect effects of social motivation and utilitarian motivation on the AR acceptance and customer purchase intention through performance expectancy and emotions. This demonstrates that the likelihood of a consumer to accept and intend to purchase through this technology increases when they perceive social and utilitarian benefits. Thus, performance expectancy and emotions have an important role in the acceptance and effectiveness of AR in enhancing the customer journey. On the other hand, effort expectancy does not work so well as mediator, and for this reason its highlighted in the present study that the perceived ease of use of AR may not be as critical as the perceived advantages and emotional engagement it provides.

Therefore, this study not only expands academic knowledge about AR in retailtainment but also provides practical suggestions for companies in the retail sector, aiming to assist managers in effectively implementing augmented reality to enhance and differentiate the customer experience and improve business outcomes.

To properly frame this research, Chapter 2 defines the main concepts of this study, specifically focusing on the customer journey, augmented reality, user experience, and retail. Chapter 3 details the methodology used to understand the experimental approach thoroughly. Chapter 4 presents the results, and Chapter 5 provides the discussion. Finally, Chapter 6 presents the conclusions and contributions to academia and management, the study's limitations, and suggestions for further research.

2. Literature Review

2.1. Customer Journey

Understanding the customer journey is essential for developing more effective marketing strategies (Viana & Da Silva, 2022). It enables businesses to identify critical touchpoints, anticipate customer needs, and tailor their experience. According to Rana et al., (2022), the customer journey encompasses several phases, each providing distinct experiences from the initial consumer intent to purchase a desired item. Moreover, Terra and Casais (2021) outline the key customer journey phases: Discovery, Research, Decision, Purchase, and Post-experience. Similarly, the customer journey can be broken down into five stages: Awareness, Consideration, Preference, Action, and Loyalty (Terra & Casais, 2021).

The customer experience contains every aspect of the interaction, from the initial search and purchase to consumption and post-sale stages, and it may involve various retail channels (Verhoef et al., 2009). Blázquez (2014) also argues that the customer experience begins when they enter the store and continues even after leaving. Similarly, Lemon and Verhoef (2016) state that the customer journey is characterized by its iterative and ever-evolving nature, starting with pre-purchase activities, the actual purchase, and finally, the post-purchase phase. More recently, Terblanche and Kidd (2021) also mention that the customer journey begins with the initial search for a product or service and extends until post-consumption.

Thus, throughout the customer journey, careful analysis of touchpoints is essential to identify ‘moments of truth’, i.e., how customers think, feel, and react to the different stimuli provided throughout the customer journey. These touchpoints can influence the overall customer experience assessment, shaping perceptions and decision-making processes (Tom Dieck & Han, 2022).

Therefore, brands need to consider that the customer experience can be affected by factors they can control, like service quality, store environment, product selection, and prices, as well as factors beyond their control, such as social influences and reasons to buy (Verhoef et al., 2009). In this context, understanding customer behaviours provides managers with numerous opportunities to improve the customer journey, meet customer needs (Lemon & Verhoef, 2016), deliver a unique customer experience (Terblanche & Kidd, 2021), increase repeat purchases, and foster brand

loyalty (Maechler et al., 2016). Furthermore, Maechler et al., (2016) confirm that providing a compelling customer journey, resulting in an excellent customer experience, leads to positive correlations with increased customer satisfaction, retention, and repeat purchases.

In today's digital age, the intersection of digital, physical, and social domains poses challenges and opportunities in creating engaging customer journeys. Thus, it is essential for businesses to deeply comprehend the customer journey, including the emotional and experiential elements of the customer (Hamilton & Price, 2019), and also take into consideration the potential paths and obstacles that customers may face in achieving their goals (Lemon & Verhoef, 2016).

Additionally, companies must recognize that the customer journey is not a linear process. Consumers change and evolve, which can delay their decision-making processes regarding products and brands (Hamilton & Price, 2019). For example, the adoption of technology by companies can significantly impact the value of customers' experiences during interactions across multiple touchpoints in the customer journey (Nöjd et al., 2020). Thus, integrating technology into the customer journey, from product discovery to post-consumption, will introduce new interaction points or modify existing ones (Widita et al., 2021).

In this vein, augmented reality technology is valuable during the early stages of customers' journeys (Jessen et al., 2020). According to Romano et al. (2021), augmented reality expands the range of options available, especially in the initial stages of consumer decision-making, influencing choices and helping consumers to make more informed decisions. For example, product visualization through augmented reality can boost customer confidence and reduce uncertainty in decision-making (Romano et al., 2021). Abou El-Seoud & Taj-Eddin (2019) also showcased the considerable potential of augmented reality in the pre-purchase phase, emphasizing its effectiveness in the decision-making process and its capacity to supplant traditional try-on methods. Conventional in-store try-ons can be time-consuming and may damage garments due to the many items tried on but not purchased, creating disadvantages for retailers. Augmented reality solves these challenges, streamlining the shopping experience and minimizing the impact on physical inventory.

Furthermore, according to (Jessen et al., 2020), augmented reality enhances customer creativity, potentially leading to a more improved and satisfying customer experience, as Srivastava et al. (2021) also stated. Moreover, using augmented reality on several points of contact throughout the customer journey may improve and create opportunities to co-create value between

peers and other stakeholders (Tom Dieck & Han, 2022). Thus, companies should identify specific cues influencing customers to continue or abandon their experiencing and purchasing journey (Lemon & Verhoef, 2016).

The following section presents and explains the concept of augmented reality, its types, and its various uses, particularly in the retail field.

2.2. Augmented Reality (AR)

Augmented Reality is a technological innovation that integrates virtual elements within the physical environment, such as images, videos, and other digital content (McLean & Wilson, 2019). This integration allows for a seamless and interactive coexistence in real-time, creating a blended experience (Caboni & Hagberg, 2019; Mashiata & Das, 2023). AR provides consumers with pertinent and timely information by overlaying computer-generated content over their view of the natural world (Mekni & Lemieux, 2014; Tom Dieck & Han, 2022). By augmenting the physical world with virtual components, AR leverages a confluence of technologies to enrich the consumer's experiential perception (Chenna, 2022; Srivastava et al., 2021). However, several factors influence the quality and effectiveness of the augmented reality experience, such as the field of view (i.e., the extent of the observable world that a user can see through the AR device at any one time) and the device screen resolution, which is essential for creating an immersive AR environment (Wedel et al., 2020).

In this vein, using AR implies employing smart devices like smartphones, tablets, or AR glasses. These smart devices facilitate AR using cameras and sensors to capture the real-world environment and overlay digital elements onto this reality, integrating it seamlessly with the consumer's physical surroundings (Caboni & Hagberg, 2019; Mashiata & Das, 2023). For example, several AR applications allow users to visualize how a piece of furniture would look in a specific area of their home, experiment with various makeup styles, try on eyewear, or even test virtual clothing (Raška et al., 2017). This integration aims to make the AR experience more intuitive, meaningful, and engaging for consumers (Zhu et al., 2004). Technology has also been upgrading fast, harnessing the use of head-mounted displays such as Meta Cookie, glasses such as Google Glass, and projectors like Le Petit Chef, enabling a more immersive interaction and users' visual experiences expanding beyond devices screen limitations (Styliaras, 2021).

Furthermore, Poushneh & Vasquez-Parraga (2017) highlight that AR facilitates displaying various product information in 3D format, in different colors and styles, enriching consumers' perception of reality and offering a more realistic experience. This advantage is particularly notable when contrasted with virtual reality (VR) experiences that entirely supplant the real world, as discussed by Caboni and Hagberg (2019) and by Rejeb et al. (2023). This distinction emphasizes AR's unique capacity to enhance the consumer's interaction with the physical world by incorporating digital elements to improve the consumer experience. In this context, integrating digital content can generate solid mental representations by merging the sensory experiences of physical objects with the imagined perceptions of digital or imaginary objects (McLean & Wilson, 2019).

AR stands out in integrating textual, visual, and video content into consumers' real-world perceptions (Javornik, 2016), creating mental representations of products and experiences, influencing consumer decision-making, leading to more effective and efficient outcomes (Martins et al., 2022), more significant in-store traffic and elevated brand perception (Abou El-Seoud & Taj-Eddin, 2019). Moreover, AR use in decision-making processes can empower consumers socially and lead to positive business outcomes. It gives decision-makers more options and increases the desire for the product among those giving recommendations (Lavoye et al., 2021). For example, augmented reality smart glasses (ARSGs) can enhance consumer experiences and aid in making decisions when used as retail technologies in stores (Pfeifer et al., 2023). In this vein, restaurants or cafés can apply AR by integrating interactive digital content into the customer's physical environment, such as 3D holograms of food or drinks from the menus, enhancing product visualization and customer convenience, and contributing to improving purchase decisions (Hilken et al., 2022).

Thus, using virtual products through AR with high spatial accuracy can enhance consumers' sense of presence in a given location, making them feel more connected to the environment (Chen et al., 2022), which strengthens the relationship between consumers and brands, leading to greater consumer engagement (Scholz & Duffy, 2018).

In this context, the efficacy of AR is primarily attributed to its capacity for the seamless integration of digital components within the real-world environment, enhancing the consumer's perception of their physical surroundings (Chenna, 2022; Scholz & Smith, 2016). Furthermore, adding virtual elements to real-world objects can enhance the consumers' hybrid experience. In

this vein, Mashiata and Das (2023) state that AR can enrich consumers' understanding, communication, and perception of their external environment, underlining AR's pivotal role in an augmented retail experience.

Therefore, retailers can leverage AR as a dynamic tool to engage customers at various journey stages (McLean & Wilson, 2019). For instance, AR technology can eliminate the need for consumers to visit stores and examine products firsthand during the pre-purchase phase, as noted by Gatter et al. (2022). For example, Ikea allows consumers to use their smart devices to select a digital product from their catalogue and place it within a real-world context, such as their home.

Thus, AR's sophisticated functionalities, such as object recognition, spatial mapping, and real-time information, can enhance and expand the customer experience (Riar et al., 2021).

In this sense, on the one hand, AR advances can replace traditional activities of searching or physically purchasing products, highlighting its transformative impact on retail shopping experiences; and on the other, implementing AR can increase retail visitors' interest, enthusiasm, and enjoyment, whether they are experimenting with a product or exploring a new design element (Widita et al., 2021). AR lets consumers virtually preview how the product would integrate into real-life spaces before purchasing it (Romano et al., 2021). This process facilitates the superimposition of the chosen product into the consumer's physical environment, achieved through virtual manipulation, resulting in a singular hybrid image (McLean & Wilson, 2019).

In this context, AR immerses consumers in an engaging retailing experience, allowing them to explore detailed specifications of products or services and fostering a sense of playfulness, particularly during the pre-purchase phases of the customer journey (Jessen et al., 2020). AR also increases consumer empowerment, providing a more informative experience (Lavoye et al., 2021; Riar et al., 2021).

However, the success of AR depends mainly on how consumers use and benefit from AR technologies (Batat, 2021) how AR impacts consumer behavior, how they think and feel about products and services, as well as their purchasing intentions to buy them (Raška et al., 2017; Riar et al., 2021).

In this vein Kumar (2022) identifies several key factors affecting consumer behavior in the AR context, such as interactivity, vividness of experience, experience augmentation, spatial presence, and emotional engagement. In addition, Chenna (2022) underscores the essential role of perceived usefulness and usability in AR applications. Specifically, McLean and Wilson (2019)

noted the importance of crucial technology acceptance variables, like ease of use, usefulness, and enjoyment, in fostering the successful adoption of AR technologies. AR acceptance can also vary according to consumer types. For example, innovation-oriented consumers may be more inclined to perceive AR apps as practical, easy, and fun (Eru et al., 2022) as well as efficient and convenient (Eyüboğlu, 2011).

In this context, Rauschnabel et al. (2022) concluded that AR applications have strategic value beyond just promotional or entertainment purposes and are moving away from superficial ‘wow’ factors (Pavenkov & Rubtcova, 2019), which is supported by the increasing sophistication, accessibility, and widespread use of AR (Martins et al., 2022).

Therefore, increasing physical retail places with AR introduces innovative opportunities to enrich customers’ shopping experience (Javornik, 2016), which justifies more research on the impact and effects of AR on consumer behaviors and experiences in physical retail environments.

2.2.1. Types of Augmented Reality (AR)

Styliaras (2021) categorizes AR applications into two primary types: image-based and location-based. Furthermore, image-based applications comprehend marker-based and marker-less augmented reality (Mashiata & Das, 2023). Marker-based uses visual cues and specific labels (Styliaras, 2021) such as QR codes, to detect and track physical objects in the real world via a camera. Once an object is recognized, virtual information overlaps it, augmenting the reality the consumer perceives. However, adopting marker-based AR can encounter certain obstacles across various environments where deploying such visual markers proves challenging. This limitation primarily stems from requiring these markers to be easily recognizable by the device’s camera. This condition may not always be feasible in dynamic or complex settings. Second, marker-less AR does not rely on specific visual markers for operation. It employs sophisticated computer vision algorithms to identify and monitor objects in the real world. In this case, an image (a photo of the natural environment) triggers the playback of multimedia content (Styliaras, 2021).

This form of AR finds utility in diverse applications, including virtual try-ons of clothing and furniture placement within a space. However, marker-less AR also encounters significant obstacles toward widespread acceptance, primarily due to its intensive demands for advanced computational power and sophisticated object recognition algorithms. This technology necessitates

robust processing capabilities, surpassing what many current consumer devices offer, limiting accessibility and overall performance. Marker-less AR also encompasses several subtypes: location-based AR, overlay-based AR, contour-based AR, and projection-based AR (e.g., used in artistic installations, marketing campaigns, and educational exhibits. These applications project virtual images onto physical surfaces, like walls or floors, to blend seamlessly with the environment, facilitating immersive experiences for participants (Mashiata & Das, 2023).

Moreover, while the activation of most internal AR applications often relies on product packaging, external applications offer a broader range of possibilities, such as interactive bus stops (e.g., Pepsi Max Bus Shelter), dining experiences with projectors (e.g., Le Petit Chef), exploring product origins (e.g., Patrón Experience), and engaging advertisements (e.g., M&M's Arcade) (Styliaras, 2021).

2.2.2. User Experience (UX)

Incorporating digital technologies like AR is progressively reshaping operations across various industries and altering how customers interact with brands (Batat, 2021). In this context, Poushneh and Vasquez-Parraga (2017) emphasize the importance of a well-designed AR user experience. Scholz and Duffy (2018) define user experience as a subjective combination of factors related to the product, the user, and the interaction context. Thus, to maximize the use of AR, it is essential to establish strategic points of contact during customer journeys by leveraging digital media techniques and a deep understanding of user experience (Terra & Casais, 2021). For example, Scholz and Duffy (2018) state that creating a successful AR app requires more than just advanced visual technology; it involves strategically understanding how the app can help consumers feel personally connected to the brand, positioning themselves at the center of the app's experience. Raška et al. (2017) also stated that AR becomes more captivating when the user controls the experience. In this vein, customers can actively contribute to shaping their experiences, often extending beyond established boundaries and occasionally operating independently of the originating company (Nöjd et al., 2020).

In this context, Olsson et al. (2012) noted that AR applications achieve higher user acceptance when they provide practical benefits like enhanced information delivery or interactive experiences. Similarly, Shin (2012) found that performance expectancy significantly influences the

acceptance of AR technologies in various settings, including retail. Furthermore, users are more likely to adopt AR technology when they believe it will enhance their learning or shopping experiences. When AR apps meet or exceed users' performance expectations, it leads to greater satisfaction, acceptance, and continued use of the technology (Thong et al., 2006).

AR may also assist consumers in comprehending and assimilating product information effectively at a cognitive level. As indicated by Riar et al. (2021), one potential reason for the elevated cognitive load is that AR users often need to process information from both the physical and virtual realms, which can place a greater demand on their cognitive faculties. The intention to use AR apps is directly affected by the perceived utility of AR in providing valuable content and improving user performance (Rauschnabel et al., 2016). For example, Pfeifer et al. (2023) suggest that shopping experiences are evaluated more positively in terms of decision comfort, satisfaction, and ease of evaluation when using equipment such as AR smart glasses (ARSGs) compared to AR on touchscreen devices, consequently exerting significantly favorable effects on purchase intentions, which means that this technology is evolving fast and that consumers are becoming more and more demanding, wanting to engage more deeply with digital content.

However, when AR is not technologically developed, it can affect the user experience and adversely impact the customer's experience (Batat, 2021). In this sense, companies should endeavor to provide an exceptional customer experience, which often involves significant costs. It is also essential to consider whether customers are willing to pay more for an enriching experience (Verhoef et al., 2009).

2.2.3. Augmented Reality (AR) in Retail

The evolution of retailing due to digitalization is profound, particularly at the interface between retailers and consumers (Hagberg et al., 2016). Over the past ten years, remarkable progress has been made in AR research (Chenna, 2022), presenting many opportunities for its application in various domains, including the retail sector (Mekni & Lemieux, 2014). In this context, the capacity of AR to facilitate interactive experiences provides businesses with innovative avenues for engaging consumers and enhancing the shopping experience (McLean & Wilson, 2019). For example, allowing customers to try on clothing virtually (e.g., Zara), create make-up looks based on skin color (e.g., Maybelline Virtual Makeover), envisage the placement of furniture

in their homes (e.g., Ikea), and interact with products more immersive before finalizing a purchase, or even obtaining a preview, from multiple angles and zoom levels, of how food appears in a table (Styliaras, 2021). These AR capabilities allow consumers to visualize products in their own space, such as seeing how a pair of glasses looks on their faces through the lens of a smartphone or AR glasses (Gatter et al., 2022). Smartphone technology has made augmented reality (AR) accessible to everyone, even to café owners, allowing them to enhance visitors' experiences by shifting focus from the physical look of the place to offering unique digital visuals, including memorable selfies that combine the natural café environment with virtual effects in one photo (Widita et al., 2021).

Therefore, AR enhances a company's value proposition by integrating immersive, fun, engaging, educational, and visually appealing elements into retail environments. This fusion underscores the application of gaming principles in a commercial setting and leverages AR's dynamic capabilities to contribute to a more engaging and enriching interaction with the consumer (Tom Dieck & Han, 2022). Moreover, AR can significantly reshape consumer expectations, transforming their interactions with products and brands (Scholz & Smith, 2016). Additionally, AR increases competitors' difficulty in replicating similar and holistic customer experiences (Tom Dieck & Han, 2022).

Thus, to offer retail interactive experiences, it is essential to recognize the critical function of AR in facilitating the customers' co-creation of value within the retail context (Nöjd et al., 2020), as well as understanding the factors that drive customers' visits and engagement with retailers. Blázquez (2014) highlights the need to transform the retail experience, especially in a landscape where many traditional brick-and-mortar stores face challenges from online competitors (Nöjd et al., 2020). Given the several advantages of AR, it becomes crucial for physical retailers to prioritize its implementation (Chenna, 2022; Spreer & Kallweit, 2014). Indeed, retailers must adopt innovative strategies to enhance customer relationships and develop compelling value propositions.

In this vein, AR emerges as a strategic tool to differentiate physical stores and amplify the shopping experience, e.g., enhancing the sensory richness of the experience (Watson et al., 2018), increasing the customers' engagement with the retail brand (Abou El-Seoud & Taj-Eddin, 2019), as well as to sustain a competitive position in the market (Terblanche & Kidd, 2021).

Therefore, implementing AR in retail can lead to multiple beneficial outcomes. For example, it enhances information accessibility and improves the evaluation of product details in physical retail environments (Spreer & Kallweit, 2014). Dacko (2017) also suggests that AR has

specific benefits, such as increased purchase likelihood (Pfeifer et al., 2023), positive word-of-mouth recommendations, increased store visits, and higher retail customer satisfaction. Watson et al. (2018) also highlight the positive impact of AR on purchase intention and the level of enjoyment obtained from the AR experience. Based on their research about using AR in a café's interior, Widita et al. (2021) also noted that AR could prolong visits, foster engagement, and generate additional value for customers. Scholz and Duffy (2018) also highlight that AR encourages consumers to be more creative in retail experiences.

Additionally, according to Tan et al. (2022), AR is not just a tool for enhancing practical aspects of shopping or product visualization; it can also create engaging and enjoyable consumer experiences. Jessen et al. (2020) also mention that AR enhances consumer satisfaction with their final purchase decisions. Dacko (2017) highlights the integrity of the information and increased confidence in the purchasing process with AR mobile shopping apps.

Watson et al. (2018) found that consumer responses to augmented reality (AR) vary based on shopping preferences. Consumers driven by hedonistic motivations show a stronger positive reaction to AR applications, implying that retail environments focused on convenience may not need AR technologies to satisfy consumers with lower hedonistic motivations. Karimun et al. (2023) also stated that customers' acceptance of AR in restaurant settings is positively affected by hedonic and utilitarian motivations and personal innovativeness, suggesting individual differences impact AR acceptance.

Furthermore, an Augmented Experience (AE) is the primary outcome of the AR retail shopping experience (Caboni & Hagberg, 2019). For example, in situations where product uncertainty is significant, the deployment of AR has been shown to mitigate such uncertainty and boost sales performance (Tan et al., 2022).

Therefore, while AR has the potential to enhance experiences and increase sales, it cannot entirely replace the deep emotional connection that comes from human interaction (Widita et al., 2021). In this vein, AR potential reveals several uncertainties, especially concerning its impact on business performance and consumer acceptance. Those uncertainties underscore the need for further research to better understand AR's implications (Riar et al., 2021).

2.2.4. Reasons to Adopt AR in Retail

The strategic deployment of AR significantly enhances the in-store experience by offering personalized interactions, underlining its growing importance in the retail landscape (Srivastava et al., 2021). In this context, retailers seek to enhance their capabilities for providing better experience in the retail stores (Spreer & Kallweit, 2014), such as using AR to facilitate more interactive and personalized interactions, cultivate positive brand attitudes, and subsequently enhance customer satisfaction (Eyüboğlu, 2011).

Several motivations drive the integration of AR into the retail environment (see Table 1), each aimed at transforming and enhancing the in-store shopping experience. For example, AR can improve customer engagement, enhance product visualization, boost sales, collect valuable consumer data, foster brand loyalty, and reduce return rates. Styliaras (2021) reinforces that AR fosters brand engagement and ignites consumers' purchasing inclination. More specifically, immersive displays to catch consumers' attention leads to a deeper connection between the consumer and the brand, improving customer engagement. Facilitating product visualization that lets consumers see how products look in a real-world context can decisively influence a purchase decision. A more interactive and informative shopping experience also helps to reduce purchase hesitation and boost sales. Collecting valuable data with AR may also enhance the overall shopping experience and offer unique and memorable experiences, fostering brand loyalty and attracting new customers. AR can also reduce return rates by offering customers a more accurate preview of products. When consumers find insufficient product information, they often abandon the purchase; however, AR applications provide additional product details, mitigating this issue (Eru et al., 2022). Implementing augmented reality (AR) is a pivotal approach to alleviate information gaps at the point of sale, thus elevating customer satisfaction while concurrently prompting retailers to devise pragmatic applications blending tangible, functional benefits with elements of enjoyment (Spreer & Kallweit, 2014).

Table 1 – Reasons for Adopting Augmented Reality in Retail and Related Studies

Reasons to adopt AR in RETAIL	Explanation of the Reason	Type of Study	Authors / Year
Improving Customer Engagement	AR makes shopping more interactive and engaging through virtual try-ons and immersive displays, captivating consumers.	Experimental study Quantitative Analysis	Jessen, A., et al., 2020
		Systematic Review	Styliaras, G.D., 2021
		Systematic Review	Kumar, H., 2022
		Experimental Study	Rhee, H. L., & Lee, K. H. (2021)
Enhancing Product Visualization	AR allows customers to visualize products in real-world contexts, aiding in more informed decision-making.	Experimental Study	Chen et al, 2022
		Exploratory Study	McLean, G., & Wilson, A., 2019
		Systematic Review	Mekni, M., & Lemieux, A., 2014
Increasing Sales and Conversion Rates	AR boosts sales, reducing purchase hesitation through enhanced engagement and information.	Systematic Review	Riar et al., 2022
		Systematic Review	Tan et al., 2022
Gathering Data for Personalized Experiences	AR apps collect valuable data on customer preferences, enabling tailored recommendations.	Systematic Review	Srivastava, V., et al., 2014
		Systematic Review	Lavoye, V., et al., 2021
Strengthening Brand Differentiation	AR experiences help retailers stand out, creating a memorable brand experience.	Analytical Review	Chenna S. (2022)
		Systematic Review	Caboni, F. & Hagberg, J. (2019)

Accurate product previews	AR ensure higher purchase confidence and satisfaction, reducing returns.	Case Study	Ozturkcan, 2021
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Thus, AR can transform the shopping experience for consumers and provide benefits for retailers, reflecting the potential of AR in retail. One of the benefits is that AR helps consumers learn more about the products, which makes the process enjoyable and memorable (Eru et al., 2022).

Given the wide range of benefits associated with AR, Chenna (2022) recommends that online retailers recognize its significant value and begin to invest more in AR technologies to distinguish their businesses from competitors. Nevertheless, AR also proves to be an asset in facilitating shopping experiences in physical or online stores, capturing the interest of hybrid consumers (Riar et al., 2022). In this vein, Caboni and Hagberg (2019) state that AR is a kind of digital tool that can be helpful when and where traditional and digital parts exist.

The adaptability of AR is also crucial to success, allowing customers to express their interests and preferences and feel more connected and engaged with the AR experience (Lavoye et al., 2021). Consequently, a personalized approach leads to a more immersive and satisfying experience, ultimately boosting the likelihood of purchase and fostering brand loyalty. In this sense, AR technology must be adaptable to foster exclusivity and relevance.

Therefore, the adoption of digital technology as AR has seen a significant increase, particularly in retail, with far-reaching effects for consumers and businesses (Batat, 2021).

2.2.5. Case Studies of Augmented Reality in Retail

This section presents case studies of several brands using AR in distinct contexts and fields (e.g., advertising campaigns, retail, and restaurants), showing its versatility in achieving several business goals, such as improving consumer engagement and satisfaction or conversion rates, among other objectives.

Advertising campaigns

For example, ‘The Walking Dead’ campaign took place on a bus shelter in Austria for just a few days, and the accompanying behind-the-scenes video achieved remarkable success, amassing 12 million views and over 400,000 shares on Facebook (Scholz & Smith, 2016). Similarly, the example of Pepsi Max's clever window campaign, where the real-life street scene visible through the bus shelter is transformed with captivating images depicting UFOs and majestic tigers, surprising people who pass by.

Retail

Numerous companies, such as BMW, Sephora, Dulux, Ikea, Zara, and L'Oréal, have launched their AR applications to allow users to virtually try on, shop, interact with, and evaluate their products (Kumar, 2022) with relevant information about the items presented when the user selects them (Kadam et al., 2022). In the case of the app launched by Sephora, a study conducted by Scholz and Duffy (2018) showed that when consumers are exposed to this type of immersive makeup testing experience in the comfort of their own homes, the final purchasing decision becomes less critical and what ends up being more valued is the fun and playfulness.

Other examples come from Ikea, Wayfair and Houzz, pioneers in AR solutions, providing customers with exceptional design experiences (Chenna, 2022), for example, implementing a try-before-you-buy approach in the furniture industry to foster, sustain, and cultivate customer trust.

Amazon or Ikea AR mobile apps also empower end-consumers to visualize how products effortlessly integrate and appear within their living spaces, facilitating informed purchasing decisions (Chen et al., 2022). The Ikea Place app offers promising alternatives to stressful in-store experiences by accurately adjusting selected products to match the shopper's room dimensions, aiming to reduce product returns and associated inconveniences, having an impressive accuracy of

98% (Ozturkcan, 2021). The customers can choose an item from the inventory and envision its appearance within their home, assessing its suitability for the available space and alignment with the existing decor (Srivastava et al., 2021), integrating virtual furniture items into their physical surroundings (McLean & Wilson, 2019). Amazon has an AR feature allows users to capture an image of a physical product with their smartphone's camera or scan its barcode to locate the item on Amazon's platform, seamlessly blending the boundaries between the real and virtual worlds (McLean & Wilson, 2019). Ray-Ban Virtual Mirror is another example of an online web-based AR application designed for the retail environment, easily accessed through the company's international website (Caboni & Hagberg, 2019). Some companies offer a virtual trial of shoes, where the user dons a specialized pair of socks, then steps in front of a camera and observes their reflection on the screen adorned with the selected pair of shoes (Mekni & Lemieux, 2014).

Restaurant and cafes industry

AR is applied in various areas, including the restaurant industry, with emblematic cases like Le Petit Chef. There is an increasing interest in and adoption of this technology, reflecting a rising trend in its use in restaurants and cafés. The transformation of menu presentation and the integration of AR as a platform for healthy information to increase customer interest in visiting specific restaurants shows how dining experiences have been transformed (Balasubramanian, 2022). Indeed, integrating AR into menus represents a paradigm shift in how food and beverages captivate customers with visually appealing images, interactive nutritional details, engaging cooking demonstrations, and differentiating the business.

Prioritizing customer motivations and incorporating augmented reality (AR) in restaurant marketing can significantly enhance the dining experience. AR technology boosts enjoyment and anticipation by enabling unique interactions with the cuisine and ambiance, fostering a deeper connection with the meal (Karimun et al., 2023).

Therefore, according to Rhee and Lee (2021), retailers' survival hinges on adapting to digital transformation, allowing smart devices to experiment, experience, and purchase, linking online, digital, mobile, and physical dimensions under a holistic approach.

2.3. Marketing Strategies – Augmented Reality (AR)

Schmitt (1999) defines experiential marketing as a set of activities and processes that trigger pleasant emotions in consumers through memorable and holistic experiences. In this context, there is a growing emphasis on customer-centric approaches, placing greater importance on customer experience than ever before (Srivastava et al., 2021). Indeed, consumers are more informed and demanding due to the ease of access to information, and they have higher expectations regarding companies and their offerings (Viana & Da Silva, 2022). As a result, emergent technologies are essential in shaping consumer behavior and necessitate company strategy adaptations.

Eru et al. (2022) highlight that AR is an invaluable asset in experiential marketing, providing both short-term and long-term benefits, including cultivating positive brand attitudes and encouraging positive word-of-mouth promotion (Eyüboğlu, 2011). For example, according to Eru et al. (2022), AR applications allow users to scrutinize, explore, engage with, and express their opinions on products, among other factors, such as entertainment or gaming.

In this context, AR has become a significant interactive tool in marketing, gaining prominence in retail settings and frequently manifested through smart device applications (Javornik, 2016). AR is also helpful in digital marketing (Gatter et al., 2022) to confer a competitive edge to businesses by elevating consumer satisfaction levels, fostering loyalty, and ultimately contributing to the success of enterprises (Eru et al., 2022).

Scholz & Smith (2016) suggest that marketers should broaden their focus beyond merely adopting new technologies. Instead, they should create immersive consumer experiences that seamlessly integrate digital information into the social and physical environments. This approach emphasizes blending digital and real-world interactions to enhance overall customer engagement. In this sense, Marketers have numerous opportunities and challenges to enhance the retail shopping experience through AR, providing more engaging and interactive customer interactions (Rejeb et al., 2023).

In this vein, companies need to understand consumers' behavior, create strategies to attract and retain customers and understand which factors impact each point of contact with the company and their purchasing experiences (Viana & Da Silva, 2022). For example, according to Krieger (2013) participants who used AR displayed positive attitudes toward the products presented and the brand, influencing consumer behavior, enhancing brand value, and improving customer retention. Moreover, digital objects that align with users' self-presentation objectives are more

inclined to be shared on social media platforms, thus catalysing organic brand promotion through word-of-mouth (Scholz & Smith, 2016).

In sum, companies could gain an advantage by creating experiences tailored for personal devices like smartphones to facilitate user engagement and interactive responses, such as commenting (Scholz & Smith, 2016). Augmented and virtual reality technologies in advertising campaigns constitute facets of integrated marketing strategies (Pavenkov & Rubtcova, 2019). Moreover, some shopping gaps (e.g., higher return rates in online commerce) can be solved through marketing-oriented AR applications, providing consumers with more product details, consequently leading to heightened sales, profitability, and competitive edge (Eru et al., 2022). However, some perceived risk factors, such as customer privacy, must be observed when companies incorporate AR into their marketing strategies (Srivastava et al., 2021). It is also crucial for retailers to consider whether or not to provide stationary equipment, such as tablet PCs, at the point of sale so that customers can carry out the experience without having to use personal equipment (Spreer & Kallweit, 2014).

Therefore, there is an increasing necessity to understand AR advantages bring to creative activities within the marketing domain (Jessen et al., 2020).

3. Methodology

3.1. Introduction

This chapter outlines the research methodology employed in this study. It begins by identifying the research project (section 3.1), followed by the research opportunities and gaps highlighted in the literature review (section 3.2). These opportunities form the basis for developing the research questions and objectives presented in section 3.3. Subsequently, section 3.4. presents the analysis model used in this research.

The following sections describe the methodological choices made for the project, including the research design, data collection methods, data analysis techniques, and the overall approach taken to address the research questions.

3.1.1. Research Project

According to Gerring and McDermott (2007), different research methodologies, such as case study design and experimental design, play a crucial role in uncovering new insights and knowledge. Each methodology serves distinct purposes within varying contexts. These methodologies offer valuable approaches for a deeper understanding of different subjects and phenomena.

In this context, a case study design involves an in-depth analysis of specific phenomena within its real-world context, offering insights into the context and processes of the research. It can focus on single or multiple cases to investigate phenomena, individuals, or events in detail. It is usually used when the researcher has limited control over events and when studying contemporary phenomena in real-life contexts. Experimental design entails actively manipulating variables and environmental control, providing greater certainty in establishing cause-and-effect relationships (Cook et al., 2002).

Commonly employed in quantitative research, it involves the deliberate manipulation of variables by the researcher, alongside the control of other pertinent variables, to observe their impact on one or more outcome variables. Experimental designs encompass controlled lab experiments and field experiments conducted in real-world environments. Typically, these studies type entails comparing a control group with one or more experimental groups to discern the effects

of manipulated variables. However, conducting an experimental study without a control group as a single-group experimental design is also possible (Campbell & Stanley, 1963).

Thus, determining which methods to employ is essential to consider factors such as the particular research inquiry, the attributes of the data under analysis, and the researcher's objectives. Each approach has unique strengths and the capacity to offer valuable perspectives in various contexts (Gerring & McDermott, 2007).

Moreover, many scholars recognize the value of using various research methods, with the potential for mixed methods to foster unity among scholarly communities by emphasizing shared interests over divisions (Honig, 2019).

This research employed mixed methods that integrate elements of a case study (*in situ* observation and subsequent analysis of individuals' behavior) and an experimental design (involving the controlled testing of the experience among participants). The combination of both approaches results in an experimental case study design, usually used to understand complex phenomena in specific contexts that can also involve in-depth qualitative analysis and quantitative measurement of outcomes. This method makes it possible to describe the phenomena and understand the causes and possible effects on consumers' behaviors due to AR use in retail.

Therefore, the research focuses on a singular case with an experimental component, specifically on incorporating AR design elements in the physical retail place.

Firstly, it was crucial to deeply understand the case study, the customer journey, the motivations, and the operational viability of implementing an AR experience in the physical environment of the case study.

More specifically, the experimental case study takes place in *A Brasileira*, a historical, traditional, and iconic century-old establishment in Lisbon's heart. The experimental study began by understanding the preferences, interests and needs of the *A Brasileira*'s customers through interviews with the marketing director of the "O Valor do Tempo" group and the store manager (see interview guide in the appendix A/B).

After these interviews and a deep understanding of the case, the researcher requested authorization to realize an AR experiment in the real environment. Fortunately, the company administrators approved the AR experiment with a few obstacles, such as the researcher following some organization and ethics rules and being present in all experiments and surveys. Additionally,

a person from *A Brasileira* was identified as responsible for receiving and supporting the researcher during their data collection process.

3.2. Gaps and Research Opportunities

The research on AR in retail reveals numerous gaps and opportunities for additional research to understand better AR's potential impact on business performance, consumer behaviors, and consumer acceptance (Riar, et al., 2021). Despite the increasing amount of information available on AR, there is still a lack of a comprehensive understanding of the impacts of using AR in retail, especially in physical retail places.

Existing studies suggest AR can enhance the shopping experience by providing interactive and immersive elements (Javornik, 2016). Nevertheless, there is limited empirical evidence on how these enhancements translate into measurable outcomes. In this sense, the increasing use of AR in physical retail places justifies additional research on the impact and effects of AR on consumer behaviors and the customer experience. Moreover, it is necessary to investigate consumers' attitudes toward AR in shaping user outcomes, as this area remains underexplored (Raška et al., 2017).

The retail field is, in general, increasingly incorporating mobile strategies and AR technologies to digitalize the shopping experience in physical spaces. In this context, research should also examine potential barriers to AR adoption, such as technological accessibility, user familiarity, and user acceptance, to understand the implementation challenges deeply.

In this vein, this study seeks to fill the gaps related to the influence of some determinants of consumer behavior, namely social motivation, hedonic motivation, utilitarian motivation, performance expectancy, effort expectancy, and emotions, on the acceptance of AR in retail and consumers' purchase intentions.

Additionally, it is necessary to understand the specific advantages that AR brings to marketing activities, such as enhancing and improving customer engagement and innovatively presenting products and services. Thus, researching this area is crucial to uncover how these AR-driven enhancements can transform traditional marketing strategies, lead to more immersive consumer experiences, and ultimately drive higher engagement and sales. Understanding these

dynamics will provide valuable insights for marketers leveraging AR technology effectively (Jessen et al., 2020).

Therefore, there is a need to carry out an empirical investigation to assess the impact of AR in retail.

3.3. Research Aims and Objectives

Considering the research opportunities described in the previous section, this dissertation aims to increase knowledge, and deeply understand the impact of using augmented reality in retail, especially in customer journeys in physical places.

Considering the importance of a well-designed customer journey strategy in retail, this study investigates the impact and effects of different AR design elements on customer behaviors (e.g., intention to buy, intention to repeat, intention to share), customer interactions with AR (usability, user experience), and overall customer experience (e.g., emotions, satisfaction).

In terms of marketing strategies, this research also explores the use of AR to augment the capacity of the operation at the point of sales, complementing the service provided by teams, providing a better customer experience, and establishing a competitive advantage through AR implementation.

In this context, the present study aims to address the following main research question:

Q.1. How do customer behaviour determinants influence the acceptance of AR and purchase intention?

Q.1.1. How do social, hedonic and utilitarian motivations influence the acceptance of AR and purchase intention in a retail setting, mediated by performance expectancy, effort expectancy and emotions?

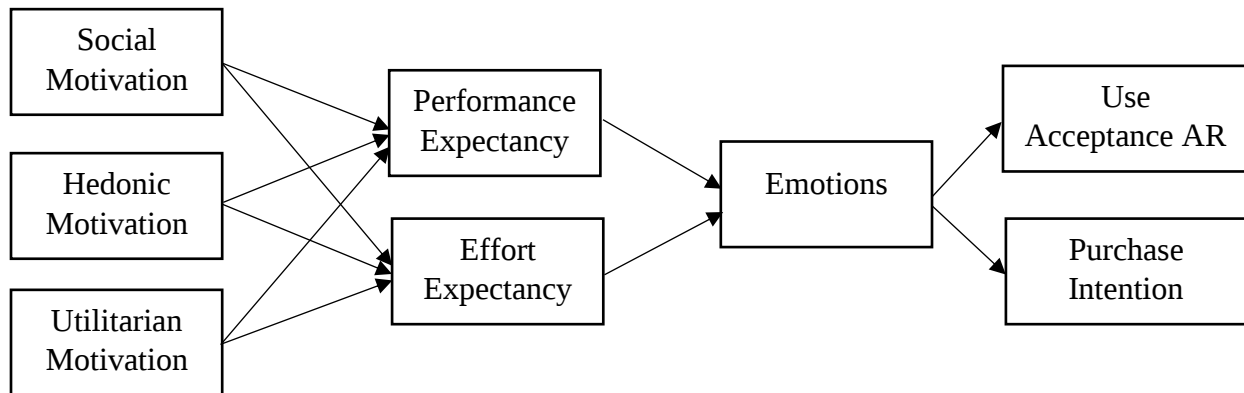
Q2. Are there interaction effects between different motivations that amplify or diminish acceptance of AR use and purchase intention?

Q3. What are the most significant interactions between performance and effort expectancy in acceptance of AR use and purchase intention?

3.4. Conceptual Framework

The perception of AR can vary depending on user characteristics, prior AR experience, types of products, shopping contexts, the abundance of information, and other relevant aspects (Riar et al., 2022). Nevertheless, the present study posits that customer use acceptance of AR and the purchase intention construct can be explained through a tripartite process: an initial phase involving motivations, an intermediary phase on mediating variables, and a subsequent outcome phase. In this sense, incorporating the research questions identified in the previous section (section 3.3.), this research adapted and developed a conceptual framework (see Figure 1) initially presented by Gursoy et al. (2019).

Figure 1 - Theoretical model with proposed paths to use acceptance of AR and purchase intention (*adapted from Gursoy et al. (2019)*)



3.5. Hypotheses Development

This study seeks to investigate the determinants of consumer behavior. The primary aim was to evaluate the impact of AR technology within the retail environment, specifically focusing on its implementation at the *A Brasileira* retail store, which involves assessing whether AR usage produces any benefits in influencing customer behaviors and enhancing their overall shopping experience.

Thus, regarding the consumer behavior determinants used in this study (i.e., social, hedonic, and utilitarian motivations), social motivation can be defined through the presence/influence that other people (e.g., family, friends, influencers) exert on the individual, putting them in a state that mediates subsequent attitude, and this state can produce the facilitation or inhibition of particular behavior (Geen, 1994). Sukoco and Wu (2010) describe social motivation as the desire for connection and recognition within society, i.e., the degree of influence a person perceives others have on them (Ghalandari, 2012). Rather (2018) stated that the standards and attitudes of customers' social networks influence individuals' intentions to behave in specific ways. When individuals do not have sufficient knowledge to make an informed decision (Venkatesh et al., 2003), they tend to be more vulnerable to being influenced by others. Therefore, if a customer's social network (e.g., friends, co-workers, family members) holds positive opinions and attitudes toward using AR apps in services/products and recommends it, this will enhance the customer's social identity (Gursoy et al., 2019). One aspect of the disposition of customers' behavior relates to the performance expectancy of the AR app, which refers to the advantages customers can obtain from using this technology. Therefore, considering this advantage, the consumer will align with their group's norms by developing a positive attitude toward AR technology.

Consequently, based on the literature review, the following hypothesis is proposed:

H1a. Social motivation is positively related to performance expectancy.

The effort expectancy is another factor of customer attitudes that is related to the observed complexity of using AR applications. It is related to how easy and convenient a person thinks it will be to use the system (Ghalandari, 2012), i.e. ease of use.

Therefore, it is imperative to ensure that AR application functions smoothly across all devices (Mashiata & Das, 2023) and to ensure interactivity, vividness, and novelty, which are fundamental characteristics of AR apps for their customer base (McLean & Wilson, 2019). Scholz and Duffy (2018) also noted that for an AR app to succeed, it must be practical and easy for users to navigate. According to Gursoy et al. (2019), social influence may impact one's perception of effort expectancy. Moreover, suppose consumers' social networks have favorable views of AR and find it intuitive, straightforward, and quick to use. In that case, consumers will likely see the technology as easy to operate.

Based on this, the following hypothesis is proposed:

H1b. Social motivation is positively related to effort expectancy.

Hedonic motivation is an essential determinant of consumer behavior that encompasses elements such as control, curiosity, deep engagement, pleasure, and temporal dissociation (Chang et al., 2023). It relates to the perceived fun or enjoyment an individual expects from interactive retail applications (Gursoy et al., 2019). AR presents a distinctive technological side capable of immersing customers in interactive, imaginative, and gratifying purchasing experiences (Jessen et al., 2020). When a customer exhibits hedonic motivation towards technology, utilizing AR applications will fulfil the customer's desire or need for novelty and entertainment (Fryer et al., 2017). For this reason, customers who use AR applications for fun and enjoyment are likely to have positive attitudes toward them, so the following hypothesis is proposed:

H2a. Hedonic motivation is positively related to performance expectancy.

When the task is more complex, a compensatory strategy is driven by consumer motivation (Hockey, 1997). Motivation interacts with task difficulty in a way that influences the perception of the mental effort required to complete it (Humphreys et al., 1984). Therefore, there is a relationship between hedonic motivation and the level of perceived difficulty or effort expectancy regarding a task (Capa et al., 2008). Effort expectancy links to an individual's willingness to use a system to help them complete their task (Tannady et al., 2024). Therefore, a higher hedonic motivation can lead to lower perceived difficulty, making users more likely to adopt systems that facilitate task completion. Based on this, more motivated consumers are less likely to perceive completing tasks related to complex AR applications as difficult. Thus, the following hypothesis is proposed:

H2b. Hedonic motivation is negatively related to effort expectancy.

An AR experience should encompass critical attributes such as practicality, user-friendliness, ease of use, ease of learning, attractiveness, and an appealing aesthetic (Poushneh & Vasquez-Parraga, 2017). Cai et al. (2018) define utilitarian motivation as consumer behavior's

practical, functional, instrumental and convenience aspects. Offering an AR experience can reduce shoppers' cognitive load by providing a representation of the product with minimal effort, making the technology appear user-friendly to consumers (McLean & Wilson, 2019). Raška et al. (2017) also suggest that combining a user-friendly interface and a strong sense of engagement with the AR content positively influences consumers' willingness to buy. Therefore, we assume that utilitarian motivation evokes a higher level of performance expectancy, being positively related to it:

H3a. Utilitarian motivation is positively related to performance expectancy.

Utilitarian motivation focuses on the AR app's practical and functional benefits, emphasizing efficiency, convenience, and functionality (Babin et al., 1994). Therefore, it is reasonable to hypothesize that consumers driven by such motivation will have lower effort expectancy when using the technology. Effort expectancy represents consumers' beliefs regarding the ease of use of AR, suggesting that these consumers are likely to perceive technologies that meet their practical needs as more straightforward to use. Thus, it can be proposed that utilitarian-motivated consumers will expect less effort in using AR applications. Consequently, we present the following hypothesis:

H3b. Utilitarian motivation is negatively related to effort expectancy.

Raška et al. (2017) stated that to increase the feeling of immersion and presence within the AR experience, companies should focus on enhancing the user experience of AR applications. This enhancement could involve improving the quality of 3D models, optimizing color vibrancy, and fixing any technical issues or bugs, among other factors.

In this context, creating high-quality AR content requires proficiency. For example, designers and developers must have expertise in 3D modelling, animation, and graphics programming to meet industry standards (Mashiata & Das, 2023).

Similarly, for an AR application to function optimally on customer smartphones, the devices must be compact, lightweight, easily portable, and fast enough to render graphics quickly (Mekni & Lemieux, 2014). If these conditions fail, customers may reject the technology.

Therefore, it is essential to consider the overall functionality of the technology. As Styliaras (2021) suggests, applications should maintain a consistent and reliable level of performance and content, delivering information and entertainment according to their intended purpose. For this reason, the following hypothesis is presented:

H4a. Performance expectancy is positively related to emotions.

Previous research has shown that users who perceive an application as easy to use tend to document more positive emotions during and after using the technology (Gefen et al., 2003; Sun & Zhang, 2006). A user-friendly and intuitive interface generally result in more positive user experiences, generating emotions such as satisfaction and pleasure (Thong et al., 2006; Zhang et al., 2008). The greater the perceived ease of use of a technology, the more positive the emotions experienced by users. Considering this, the following hypothesis is presented:

H4b. Effort expectancy is positively related to emotions.

Huang and Liao (2017) stated that consumers' intentions to use AR applications were influenced by positive emotions, such as excitement and satisfaction, generated by AR shopping experiences. Olsson et al. (2012) also emphasized that emotional responses are crucial in experiential outcomes.

Fredrickson (2001) also proposed that positive emotions broaden individuals' thoughts and encourage exploration and new experiences, suggesting that positive emotions towards AR can lead to a greater willingness to engage with and accept the technology.

In retail, there is evidence that AR applications evoke positive emotional responses, which enhance user satisfaction and, consequently, acceptance (Poushneh & Vasquez-Parraga, 2017). For these reasons, the following hypothesis is presented:

H5a. Positive emotions positively affect the use acceptance of AR.

Focusing on the emotional dimension ensures that technology meets functional needs while resonating with consumers on a deeper, more personal level. This fosters a stronger connection

with the brand and improves the likelihood of technology acceptance. Therefore, it is crucial to consider the emotional aspects of the user experience to create holistic and fulfilling customer engagement (Poushneh & Vasquez-Parraga, 2017). By addressing emotional responses such as excitement, satisfaction, and pleasure, businesses can enhance the overall effectiveness of AR applications.

For example, when consumers interact with virtual products through AR mobile shopping apps, they may engage more intensely with the information, experiencing heightened emotions such as excitement, stimulation, and activation. This emotional engagement can increase their inclination toward impulsive purchasing (Chen et al., 2022).

Therefore, when a customer in a retail environment experiences positive emotions, such as pleasure or arousal, the likelihood of purchase intention increases (Donovan et al., 1994). These pleasant feelings result in better marketing outcomes, such as having a more positive view of the brand, product, or app, and being more likely to make a purchase (Gatter et al., 2022).

Considering this, the following hypothesis is created:

H5b. Positive emotions positively affect purchase intention.

3.6. Data Collection

Data collection is a critical component of any empirical investigation. This study primarily collected data from primary sources, including interviews with two key collaborators from the case study, *A Brasileira*, the Marketing Director and the Store Manager. Additionally, this research involved direct observation and a consumer survey conducted at *A Brasileira*.

Interviews and direct observations were critical to designing the AR experience, namely for understanding the physical space, identifying the pains and challenges the businesses face, and selecting potential elements for the AR experimentation.

The interview with the marketing director was essential for asking permission to collect data in the physical location (authorized by the company's administrators), to understand the vision, values, and mission of the company, as well as the *A Brasileira*, and to receive the guidelines for executing the experiment without disrupting ordinary business operations.

Thus, diverse data collection techniques enabled the acquisition of qualitative and quantitative information, which helped deepen the understanding of the research topic. Triangulating the information obtained from various sources also reinforced the study's validity, ensuring a comprehensive and robust analysis.

In this vein, the following section briefly presents the case and the reasons for selecting the - *A Brasileira* -. Section 3.6.2 presents the interviews conducted before the AR experimentation and the observation guidelines to help design the AR experience. Section 3.6.3 presents the design of the AR Experience. Section 3.6.4 explains the software chosen to design the AR experience.

3.6.1. Selection of *A Brasileira* as a Case Study

A Brasileira do Chiado (Figure 2) is an iconic café located in Lisbon, known for its historical significance and distinct atmosphere. This establishment attracts diverse customers, including numerous tourists, making it a prime example of a location where retailtainment can be effectively studied. The café's rich history and storytelling potential provide unique conditions for exploring how traditional places can evolve through digital enhancements.

The selection of *A Brasileira* is particularly relevant due to its need to digitalize the customer experience despite its natural traditional values.

Thus, by integrating AR, the café can offer an enriched experience highlighting its historical elements while appealing to a modern audience. This setting offers a variety of elements that can be digitally enhanced, providing ample opportunities for research into AR applications in retail environments.

Furthermore, *Brasileira's* diverse customer base, comprising both locals and tourists, presents an ideal scenario to study the impact of AR on different demographic groups.

We believe that this case can shed light on how traditional retail spaces can adapt to contemporary digital trends, ultimately enhancing customer experience.

Therefore, by selecting the *A Brasileira*, this research aims to demonstrate the potential of AR in transforming traditional retail places, ensuring they remain relevant and engaging in an increasingly digital world.

Figure 2 - *A Brasileira* Café

Source: <https://www.abrasileira.pt/>



3.6.2. Preliminary Interview and Observation

After initially identifying *A Brasileira* as a potential case for research, it was necessary to validate this selection using established criteria to ensure its relevance and suitability. The validation process involved consulting with responsible stakeholders and assessing the physical place against specific eligibility criteria. This thorough evaluation confirmed *A Brasileira* as a pertinent and valuable case study for examining augmented reality's impact in retail.

Thus, the initial steps involved a comprehensive and profound examination of the physical environment of *A Brasileira*.

This encompassed rigorous non-participant observations to gain deeper insights into the commercial and atmosphere place. It includes observing the artworks adorning the walls, the product assortment, merchandise, layout, staff conduct, organization and the spatial arrangement of objects.

Subsequently, our focus shifted towards observing customers to understand their behaviours, draw insights into the customer journey, and design the AR experience.

In this sense, this methodological approach allowed the identification of visual elements within the environment suitable for the AR experience, such as the menus, tables, booklets distributed to the clients, table menus, and wall friezes.

To complement the previous observation method, an interview was conducted with the Marketing Director on November 15th, 2023, to capture additional rich data essential to designing the AR experience (see interview guide in appendix A/B).

The interview had several goals: (1) to understand how customers experience their visit to *A Brasileira*, (2) to find problems and areas for improvement in the customer journey and experience, (3) to identify the best elements in the physical place for using AR technology, and (4) to design a AR tech solution to address these challenges.

The following table (table 2) summarises the main factors, explanations and justifications for designing the AR experience at *A Brasileira*. They resulted from the interview with the Marketing Director and observations (see full interview in appendix A/B).

Table 2 – Key Factors, Explanations, and Justifications for Designing the AR Experience at *A Brasileira*

Main Factors	Explanation and Justification
Identify Customer Pain Points	Understand that customers are interested in the café's history but often do not get the information they seek due to busy staff.
Enhance Customer Experience	Use AR to provide historical information, increasing customer engagement and leading to higher consumption.
Historical Characters	Create AR representations of historical figures related to the café to narrate its story and highlight artistic elements and significant events.
3D-Rendered Products for sale	Present products for sale through AR to immerse customers in the café experience
Maintain Tradition and Essence	Ensure that AR integration respects and preserves the café's traditional identity and values.
Staff Support	Use AR to support staff tasks, reducing staff stress and workload (e.g., through QR codes)
Align with Modern Trends, e.g., Retail Mobile Strategies	Recognize that customers document their experiences with mobile devices and align the AR experience with these contemporary habits.
App Download Requirement	Address the challenge posed by the need for customers to download an app to access the AR features, which could be a barrier to usage.

Autonomous Sales Enhancement	Ensure that AR is used to autonomously boost sales and provide historical information without replacing staff, who have multiple roles beyond sales. Providing AR experience access to customers through QR codes
Marketing Concerns	Address the marketing director's concern about preserving the café's identity and concept, particularly as a historical establishment, and consider strategies to encourage QR code usage despite existing low engagement with QR codes on menus.

Therefore, anticipating designing the AR experience for *A Brasileira*, it is crucial to identify customer pain points and enhance the customer experience by integrating historical characters and 3D-rendered products for sale. The AR solution should maintain the café's tradition and essence, provide staff support, and align with modern trends such as retail mobile strategies. Addressing the app download requirement and focusing on autonomous sales enhancement will be essential to overcoming marketing concerns and ensuring a successful AR implementation.

The following section presents the design of the AR experience.

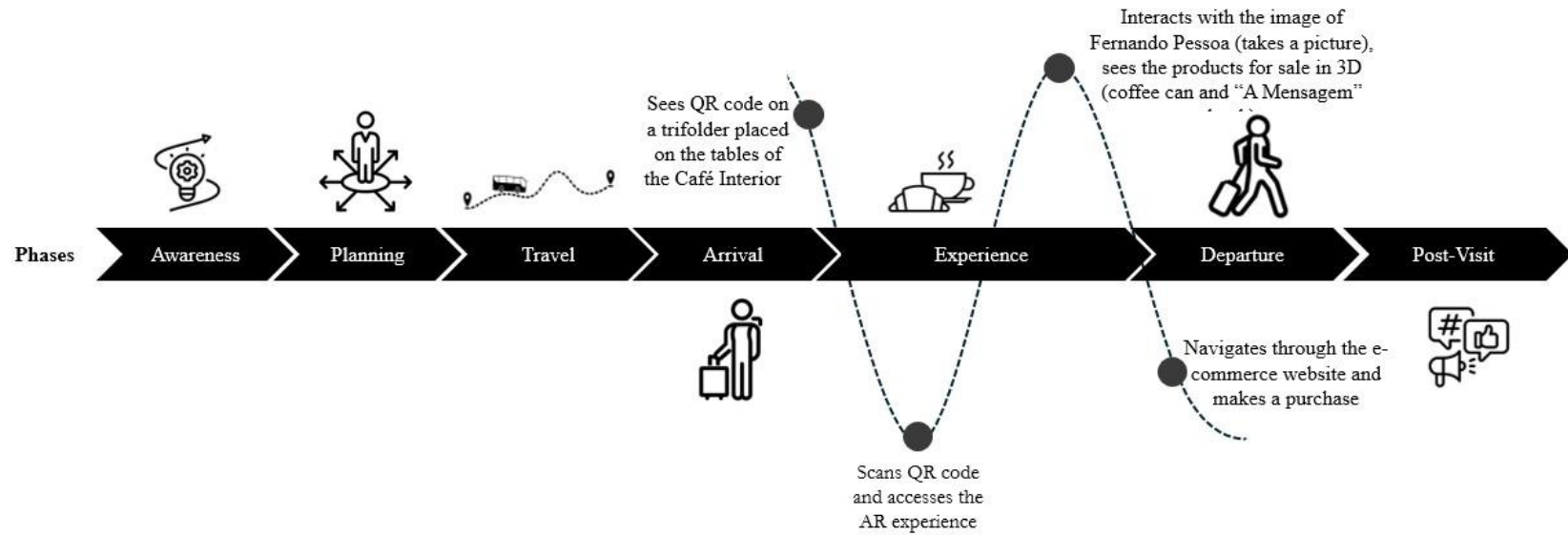
3.6.3. AR Experience and Customer Journey

To better understand the impact of AR in retail, more specifically on customer behaviours (e.g., intention to use, to repeat, to buy products from an AR app, or to share shopping experience memories), we build an AR experience prototype as part of an experimental case study in retail. As referred above, the case selected was the *A Brasileira*.

To accurately design the AR experience, it was also essential to understand the customer journey, including all touchpoints, activities, pain points, and challenges, to offer a unique AR experience. In this sense, the research method followed based on the interview with the marketing director, observations in the field, and the literature review was essential for designing a customized AR experience.

In this context, Figure 3 illustrates a personalized journey for the *A Brasileira*'s customers, including several AR features explained in detail later.

Figure 3 - Customer Journey of *A Brasileira* with AR



Customer Activity	The customer becomes aware of the "A Brasileira" historic café in the center of Lisbon	Café research, opening hours, reviews	Decide on means of transportation to get there, use map apps	Admires the façade, waits for a table on the queue	Appreciates the environment, admires the vintage decor, the paintings on the walls, orders and enjoys the food/beverage.	Takes care of the payment, receives thanks and leaves the. Might take a souvenir (coffee can, book or postcard).	Post photos/videos on social media; recommendation to friends/family
Touchpoints	WOM, traditional media, social media	Search engines, maps, review sites	Map apps, GPS, public transports	Café's exterior façade, service team	Café's exterior façade, service team	Cashier, service team	Social media, WOM

Therefore, the design of the AR experience follows several guidelines, making the experience relevant for customers and retailers, specifically for *A Brasileira*. These guidelines ensure that the AR integration is beneficial, enhances the customer journey, and supports the business objectives of *A Brasileira*, as defined by the Marketing director in their interview.

In this context, designing the AR experience accomplished essential goals and defining AR features to accomplish the guiding principles of interview and observation.

Table 3 - Main Goals in Designing the AR Experience

Main Goals	AR features (examples)
Enrich the customer journey by providing engaging and informative content, making the experience more enjoyable and memorable.	Through AR, customers can see several content such as the history of the café, art craft, among others (e.g., <i>paintings on the walls</i>)
Create an immersive storytelling experience to encourage the sharing of memorable brand experiences.	Through AR, customers can see AR representations of historical figures, take photos and share. (e.g., <i>Fernando Pessoa</i>)
Augment sales through new channels (e.g., mobile experience) to sell physical products in-store.	Through AR, customers can see products available for purchase in-store. (e.g., <i>coffee can and book</i>)
Reduce the burden on staff and provide an AR-accessible and user-friendly experience.	Through QR codes easily accessible, customers can access the AR app and navigate the experience (e.g., <i>QR codes in tables</i>)

Therefore, AR integration must respect and preserve *A Brasileira*'s identity and not disturb the staff members, who have well-defined operations and serve customers well. The AR solution must complement the existing marketing strategies.

Thus, with the design of this AR experience, this research aims to assess the influence not only on the intention purchasing decisions but also on customer experience (e.g., interactions with the AR experience) and recommendations (e.g., customer satisfaction and intentions to share).

3.6.4. Design the AR experience

To understand the AR experience applied to A Brasileira as an experimental study, this chapter describes each element used in the AR experience and the reasoning behind each choice.

One goal identified above was using historical and illustrious figures linked to the history of the *A Brasileira*. An unavoidable figure is Fernando Pessoa, an iconic figure in Portuguese literature who frequently visited the *A Brasileira* in Chiado, Lisbon. The cafe was a central place where he routinely engaged in intellectual discourse with peers. To understand Pessoa's cultural significance, a sculptural monument was unveiled outside of the *A Brasileira* on his centennial birth anniversary. Presently, this monument stands as one of the most photographed landmarks in Lisbon. Based on that and considering the marketing director's opinion, we used 'Fernando Pessoa' as a digital element in the AR experience.

Thus, the experience was designed to have *Fernando Pessoa* sitting at the table with the customers, so ideally, they should have positioned him in front of one of the chairs (see Figure 4).

Figure 4 - Fernando Pessoa with options (AR Experience)



The experience design involves scanning a QR code to open the interaction. The first step, perhaps the most challenging of the process, is to find a horizontal surface where the image of Fernando Pessoa can be anchored.

Once the surface is recognized, the image appears with four text boxes aligned vertically, with the following order from top to bottom:

- *Take a picture with me*
- *Learn More about me*
- *Share on Social Media, and*
- *Product*

Clicking on the first option '*Take a picture with me*' hides the text boxes, allowing the consumer to take a photo with *Fernando Pessoa*. Clicking on the figure makes all previous options reappear. The experiential scheme was devised to guide individuals towards an e-commerce platform, crafted through Google Sites and customized in alignment with the users' selected preferences.

Selecting the "*Learn More about me*" option will help consumers move towards a dedicated webpage spotlighting Fernando Pessoa on the designated website.

The third option, "*Share on Social Media*," redirects them to a webpage delineating the prototype's nature. Regrettably, the "Take a picture with me" feature remained untraceable, ensconced within the confines of the Adobe Aero application itself.

The last option, activating the "*Products*" icon, customers can observe two distinct offerings (see Figure 5):

- The emblematic coffee can
- The book 'A Mensagem'

Figure 5 - Presentation of available products in 3D



These emblematic coffee cans are available on the shelves of 'A Brasileira'; however, people may not associate these as products for purchase. Indeed, this was one of the main reasons to choose this product to digitalize it.

'A Mensagem', authored by *Fernando Pessoa*, comprises 44 poems portraying Portugal's glorious past, representing a literary masterpiece, in a special bilingual edition published exclusively by A Brasileira do Chiado.

Both commodities underwent meticulous 3D modelling and sculpting utilizing Blender, an advanced software renowned for its prowess in digital design.

These items were seamlessly integrated into the AR experience and are both available for sale at the café.

Selecting one or another, customers can zoom in for enhanced scrutiny and adjust various parameters for a personalized exploration, facilitating a more comprehensive observation of the merchandise.

Selecting the book (by clicking the image), a spectrum of choices is presented (see Figure 6):

- 'Buy'
- 'Send to someone Special'
- 'Read Me'
- 'Back to the Experience'

The first three options effectuate redirection to the designated website. At the same time, the latter prompts a return to the nascent stage featuring the visage of Fernando Pessoa.

Figure 6 - Book with respective interactive options



Selecting the coffee can (by clicking the image), five options are presented (see Figure 7):

- *'Buy'*
- *'Learn more about me'*
- *'Send to someone special'*
- *'Get a Discount'*
- *'Back to the Experience'*

The four options guide individuals towards the designated website (see appendix D) , with the 'Learn More about me' providing insights into the product's contents and its availability in both ground and whole bean variants for purchase (see Figure 7).

Figure 7 - Coffee Can with respective interactive options



Therefore, the uniqueness of this approach lies in the fact that despite the introduction of digital elements, such as projections or interactive information related to Fernando Pessoa, the *coffee can* and the book, the physical environment of the café remains unchanged.

This AR experience maintains the integrity and authenticity of the brand's identity while improve the consumer journey, enrich the customers' experience in a physical context with additional layers of digital content, and offering a new way for customers to connect with the brand.

3.6.5. Communication of AR Experience in point of sales

In addition to designing the AR experience, it was crucial to determine how to effectively communicate with customers to guide them through the AR immersive experience. This step was essential because it directly influenced the participants' overall experience; however, it could not destroy or disturb the ambience, as referred to by the marketing director. The discussion also encompassed the potential deployment of QR codes on banners surrounding the café's outdoor seating area, enabling consumers to scan these codes while waiting in line to enter the establishment. However, this strategic placement of QR codes is envisioned as a consideration for a more advanced stage of the project's implementation. Given this, the optimal solution identified was to create trifolders with QR codes featuring graphic elements from 'A Brasileira', generously provided by "O Valor do Tempo" group. These trifolders were subsequently placed strategically on the tables inside the café.

Thus, the final decision was to include a well-designed poster with the brand image, an invite to customers to access 'Scan me', and a QR code (Figure 8). Moreover, to control the experimentation and facilitate customer visualization and access to the AR experience, the researcher defined specific tables.

Figure 8 - Trifold with QR code



This option also results from the customers' observations, where it was possible to see that several customers use their mobile phones to take pictures of the establishment, the paints, pastries, and other things. Thus, combining this type of communication with mobile trends, we facilitate access to customers using their mobile devices to strategically scan the QR code positioned on a trifold on the table to access the AR experience through the Adobe Aero application. This method was chosen due to the ubiquitous integration of QR technology within the camera functionalities of contemporary mobile devices.

3.6.6. Software used in AR experience

Adobe Aero was the tool chosen to create this AR experience. Adobe Aero constitutes a software solution offered by Adobe Systems Incorporated, facilitating the conception and dissemination of AR experiences and the convergence of digital and physical realms (Adobe Inc., 2023). This tool empowers users to craft and distribute interactive AR environments without the exigency of intricate programming expertise. Individuals can use Adobe Aero to harness images generated through various Adobe software suites, including Adobe Illustrator and Photoshop (Adobe Inc., 2023). Moreover, Adobe Aero provides a user-friendly interface with interactive elements and animations within the AI space, enabling the development of fundamental interactions with the models.

Therefore, this option aligns with our research objective of exploring the impact of AR on the customer journey, offering a dynamic and engaging application that bridges the digital and physical realms.

The AR app created using Adobe Aero will undergo rigorous usability testing to ensure that it aligns with the research objectives and provides a seamless and enjoyable user experience.

This ease of use not only accelerates the prototyping process but also allows for rapid iteration and testing of the augmented reality features. An additional attribute of Adobe Aero pertains to its user-friendliness after experiment configuration, as it facilitates experiment dissemination via social media platforms or the internet. Users can effortlessly share experiment access via generated links or QR codes. There is no need to download the app. This functionality significantly influenced our tool selection, mainly owing to its intuitive nature aligning with the

requirements of our experimental case study, wherein expertise in avatar modelling and 3D elements was limited.

AR' software limitations

The paintings on the walls, despite their historical interest, were first option to customers scan the AR experiences, however we conclude due to their complex visuals, making them difficult to scan with a mobile phone

The facade and the “pastel de nata” were excluded from the augmented reality integration due to the requirement of a QR code for this functionality. The incorporation of augmented reality necessitates the QR code to be positioned on a surface that allows for its scanning. However, a proposal emerged to place this QR code on the paper covering the tray, capitalizing on the common behaviour of many people taking photographs of the cakes. This strategic approach provides convenient access to QR code scanning, as when individuals use their smartphones to photograph what is on the tray, the QR code is automatically scanned. This solution aims to optimize customer interaction with the augmented reality experience in an intuitive and effective manner. Other suggestions presented, such as the possibility of placing the QR code on the table stand or even on the menu provided by the staff to customers, have the potential to incorporate the QR code that will lead to the augmented reality application.

Due to the exigency of specialized expertise in 3D modelling tools for accurately portraying Fernando Pessoa's avatar, a recourse to artificial intelligence (AI) was made to generate an image of the poet. Despite it being a static image and needs improvements did not limit the study.

3.7. Questionnaire Design

The survey (appendix C) used in this study consisted in two main sections: one with demographic information and the principal one with questions about the determinants of customer behaviour. There was an additional section explaining some concepts related to augmented reality concept.

Our aim is to prove that social motivation, hedonic motivation and utilitarian motivation will independently influence performance expectancy and effort expectancy, which in turn will also influence the consumer's emotions, serving as mediators and leading customers to accept the

use of augmented reality and enhance their purchase intention through the introduction of this technology.

All the items for each construct created in this study were adopted and adapted from previous scales of existing literature (Gursoy et al., 2019). The following calculations were made using SPSS Statistics. To measure the social motivation, we created a six-item scale. This was a robust tool for measuring the perception of social status and the influence of AR devices on an individual's social networks. Three items were related to personal perceptions (e.g., 'Using AR devices reflects a status symbol in my social networks (e.g., friends, family, and co-workers)', 'People in my social networks who utilize AR have more prestige than those who do not', and 'People in my social networks who utilize augmented reality have a high profile') and the other three to external influences (e.g., 'People who influence my behaviour would want me to utilize AR', 'People whose opinions I value would prefer that I utilize AR devices', and 'People who are important to me would encourage me to utilize AR devices'). Cronbach's alfa coefficient was applied to evaluate the internal consistency of the scales used. For social motivation, the six-item scale exhibited good internal consistency ($\alpha=0.896$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

To capture the hedonic motivation of users when interacting with augmented reality devices, a 5-item scale was used. This scale provides a comprehensive view of the user experience and their hedonic motivations (e.g., ‘I have fun interacting with AR’, ‘Interacting with AR devices is experiential’, ‘Interacting with AR devices is entertaining’, ‘Interaction with AR is enjoyable’ and ‘The actual process of interacting with AR would be pleasant’) and exhibited a very good internal consistency ($\alpha=0.918$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

To measure utilitarian motivation, a 9-item scale was used, combining items that assess different aspects of AR utility, providing a comprehensive view of this factor. This scale offers a comprehensive and reliable measure of the ease of use, effectiveness, and practical utility associated with interacting with AR (e.g., ‘Using AR does not require much mental effort’, ‘Interaction with AR is clear and understandable’, ‘I find AR easy to use’, ‘I find it easy to get AR to do what I want’, ‘Using AR makes it easier to deliver the brand’, ‘Using AR is useful for the experience’, ‘Using AR allows me greater accomplishment with the brand offer’, ‘I feel more effective concerning the experience when using AR’ and ‘I find AR useful’). This scale presented

a great consistency as well ($\alpha=0.912$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

Performance expectancy, which refers to the anticipation of an individual of utilizing the system that will help enhance the tasks, leading to better results (Ghalandari, 2012), was measured by a four-item scale. It was used to measuring users’ performance expectancy regarding augmented reality devices. The scale covers various dimensions of performance expectancy, from accuracy and consistency to the reduction of human errors (e.g., ‘AR information is more accurate than information provided by human beings’, ‘AR is more accurate with less human errors’, ‘AR provide more consistent service than human beings’ and ‘Information provided by AR devices are more consistent’). The four-item scale demonstrated good internal consistency ($\alpha=0.858$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

To measure users’ effort expectancy regarding augmented reality (AR) devices, a three-item scale was presented, serving as a simplified tool. This scale addresses different aspects of effort expectancy, including time, comprehension difficulty, and learning time (e.g. ‘Using AR devices takes too much of my time’, ‘Working with AR devices is so difficult to understand and use in services’ and ‘It takes me too long to learn how to interact with AR devices’). The three-item scale presented a good consistency ($\alpha=0.826$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

Emotions are responsible for providing important information to identify differences between products, predict what consumers will choose, and give more insight into how products are perceived (Kenney & Adhikari, 2016), affecting consumers’ shopping behaviour outcomes (Herter et al., 2014). A five-item scale was used to monitor users' emotions regarding the use of AR apps. The scale addresses both negative and positive emotions, providing a comprehensive view of the user's emotional experience (e.g. ‘Feeling bored vs. feeling relaxed with AR’, ‘Feeling melancholic vs. feeling contented with AR’, ‘Feeling despairing vs. feeling hopeful with AR’, ‘Feeling unsatisfied vs. feeling satisfied with AR’, ‘Feeling annoyed vs. feeling pleased with AR’). The five-item scale exhibited a great consistency ($\alpha=0.938$). Participants scored their emotions on a five-point Likert scale based on how positively or negatively the augmented reality experience made them feel.

Technology acceptance can be defined as the intention to use a certain technology or the actual use of it (Peek et al., 2014). So, to measure the use acceptance of AR in this study, we formed a three-item scale that includes measuring user acceptance of AR devices (e.g., ‘I am willing to receive AR services’, ‘I will feel happy to interact with AR devices’ and ‘I am likely to interact with AR’). The consistency exhibited on this case was good ($\alpha=0.895$). Participants rated all items on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’.

Finally, to measure purchase intention, which is the consumer's inclination or willingness to buy a product (Arifani & Haryanto, 2018), a seven-item scale was created. The items address different dimensions of purchase intention, including probability, consideration, perceived benefits, and willingness to buy (e.g., ‘The likelihood of purchasing this product with AR is’, ‘If I were going to buy this product, I would consider buying it with AR’, ‘At the benefits shown, I would consider buying the product with AR’, ‘The probability that I would consider buying the product with AR is’, ‘My willingness to buy the product is’, ‘If I were going to buy a Brasileira’s product, the probability of buying com AR is’ and ‘I would purchase these products or others with AR’). The seven-item scale exhibited a great intern consistency ($\alpha=0.952$) which suggests that all items are consistently measuring this variable. Participants rated all items related to their opinions on a five-point Likert scale ranging from 1-‘Completely Disagree’ to 5-‘Totally Agree’, and the items related to the probability ranging from 1-‘Very low’ to 5-‘Very high’.

The results are summarised in the table below (see table 4).

Table 4 – Cronbach’s α and number of items per scale

	SM	HM	UM	PE	EE	Emotions	UA_AR	PI
Cronbach’s alpha	0.896	0.918	0.912	0.858	0.826	0.938	0.895	0.952
N	6	5	9	4	3	5	3	7

3.8. Sample

The sample was collected through a questionnaire presented to *A Brasileira* customers after their AR experience. A total of 102 visitors were randomly selected to participate in the AR experience by doing the experiment and answering 42 questions under 8 categories.

The sample was an approximate representation of *A Brasileira*'s customers, primarily tourists visiting this historic location in Lisbon. Among the respondents, 55.9% were female and 44.1% were male.

The participants' ages cover a wide range and are grouped into generational categories according to Kotler et al. (2021). Most of the respondents were aged between 12 and 29 years old (44.12%) belonging to generation Z; the following group was aged between 30 and 44 (29.41%) belonging to millennials; next group was aged between 45 and 59 years old (18.63%), belonging to generation X; at last, aged between 60 and 78 years old (7.84%), the baby boomers (see table 5).

Table 5 - Age organisation by generation

Age Ranges	% Age	Correspondent Generations
12-29	44.12	Gen Z
30-44	29.41	Millennials
45-59	18.63	Generation X
60-78	7.84	Baby Boomers

All participants had smartphones; however, a small minority encountered technical issues that prevented them from accessing the AR application. In these instances, the researcher's phone was used to allow them to access and explore the AR experience.

To test our augmented reality prototype, we assembled a control group (who conducted the experience under the researcher's guidance and comprised 73.5% of the sample) and an experimental group (who initiated the experience independently and comprised 26.5% of the sample).

The first group (i.e., the control group) was informed of AR experience existence and were invited to participate. In contrast, the latter group (experimental group) remained uninformed about the experimental case study. The primary aim was to assess whether the uninformed group would engage with the experimental experience by scanning the QR code and accessing it.

Ultimately, 102 participants from both groups were invited to respond to a questionnaire about their retail AR experience. Carrying out the experiment and answering the questionnaire took around 10 to 15 minutes.

3.9. Data Analysis

Considering the impact of AR technology on the customer journey, and to test which determinants would be most involved in consumer behaviour in terms of purchase intention and the acceptance of augmented reality use in retail setting, a statistical analysis was conducted.

In terms of data analysis, the study initially employed descriptive statistics to summarize and describe the main features of the data set, such as means, minimums, maximums and standard deviation of the items individually.

The data was collected using scales, but the variables used in the study were transformed into composite variables, where the score of the variables used is equal to the average of the scores of the items in the scales. The eight variables in the model were calculated in this way. For the second part, a path analysis was conducted to examine the relationships among the variables under investigation, utilizing Jamovi software (The jamovi project, 2023).

Path analysis is a set of multiple regressions that makes it possible to assess the direct and indirect effects on a set of variables, being particularly used to test theoretical models that specify causal relationships between variables, which is the case in this experimental study. Through Jamovi software it is possible to construct a path diagram to visually represent the hypothesized relationships and then estimate the strength and significance of these paths (Hair et al., 2014). Our research choice was the DWLS estimation method, which, although it does not directly use Likert scales (categorical/ordinal data), allows us to use variable scores that were obtained from categorical data, so the variable scores cannot be considered continuous (DiStefano et al., 2019), so we decided that this method would be the most appropriate.

To evaluate the model, it was necessary to use some fit indices, including the chi-square GOF test (goodness of fit), the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR) (absolute fit indices), the Tucker Lewis Index (TLI) and the comparative fit index (CFI) (incremental fit indices). The chi-square value gives the disparity between the observed and estimated covariance matrices, being the only statistical test of the difference between matrices in SEM (structural equations model). The ratio between the chi-square value and the degrees of freedom must be less than 3 so we can have a good goodness of fit. Concerning the residual fit indices, which assess how far the proposed model deviates from the real model (the lower the values of the residuals the better), the RMSEA represents an

approximation error and should take values in the range <0.06 or 0.08 (90% CI) <0.1 , while the SRMR is relative to the square root of the sum of the differences between the correlations of the postulated matrix and the sample matrix and should take values <0.8 . The CFI is used to compare the estimated model with a null or independence model, where the covariance between all the variables is 0. That said, its value should be $CFI >0.90$ or 0.95 . Finally, the TLI is a similar index to the previous one but adds a penalty for more complex models, with the ideal values also being $TLI >0.90$ or 0.95 (Hair et al., 2014).

4. Results

4.1. Measures

The field investigation was conducted at the café ‘A Brasileira’ during the end of April and beginning of May (2024) and lasted for 8 non-consecutive days. During this period, data were collected through questionnaires, direct observations of customers behaviour, and interactions with customers to assess the impact of AR on their experience and purchase intention. The extended duration of data collection allowed for a representative sample and the acquisition of robust insights into the variables of interest.

Two pre-screening questions were presented on the questionnaire regarding the frequency of new technology usage and the level of augmented reality experience to try to frame the background of the type of consumers participating in the study.

The first question followed a 5-point Likert scale (never to always), while the second question followed a 4-point Likert scale (no experience/limited/moderate/high).

The results are presented in the table below (see table 6).

Table 6 - Prescreening questions

Prescreening Questions	
How often do customers use technologies	Percentage
Never	1%
Rarely	11.8%
Occasionally	26.5%
Frequently	44.1%
Always	16.7%
Level of experience with AR	Percentage
No experience	24.5%
Limited	45.1%
Moderate	24.5%
High	5.9%

Descriptive statistics were analyzed to understand the fundamental characteristics of the data collected. This analysis included the evaluation of measures such as the mean, minimum, maximum and standard deviation. The results provide an overview of the behavior and trends of the data, serving as a basis for subsequent analyses (see table 7).

Table 7 - Descriptive Statistics

Constructs	Item NO.	Items	Minimum	Maximum	Mean	SD
Social Motivation	SM1	Using AR devices reflects a status symbol in my social networks (e.g., friends, family, and co-workers)	1	5	2.90	1.29
	SM2	People who influence my behavior would want me to utilize AR	1	5	2.53	1.11
	SM3	People in my social networks who utilize AR have more prestige than those who don't	1	5	2.55	1.26
	SM4	People whose opinions that I value would prefer that I utilize AR devices	1	5	2.44	1.20
	SM5	People who are important to me would encourage me to utilize AR devices	1	5	2.68	1.11
	SM6	People in my social networks who utilize augmented reality have a high profile	1	5	2.91	1.22
Hedonic Motivation	HM1	I have fun interacting with AR	2	5	4.19	0.89
	HM2	Interacting with AR devices is experiential	2	5	4.20	0.86
	HM3	Interacting with AR devices is entertaining	2	5	4.22	0.84
	HM4	Interaction with AR is enjoyable	1	5	4.06	0.97
	HM5	The actual process of interacting with AR would be pleasant	2	5	4.05	0.91
Utilitarian Motivation	UM1	Using AR does not require much mental effort	1	5	3.94	0.98
	UM2	Interaction with AR is clear and understandable	1	5	4.07	0.93
	UM3	I find AR easy to use	1	5	4.11	0.94
	UM4	I find it easy to get AR to do what I want	1	5	3.94	0.92
	UM5	Using AR makes it easier to deliver the brand	2	5	4.02	0.95
	UM6	Using AR is useful for the experience	2	5	4.02	0.87
	UM7	Using AR allows me greater accomplishment with the brand offer	2	5	3.97	0.95
	UM8	I feel more effective in relation to the experience when using AR	1	5	3.53	1.08
	UM9	I find AR useful	2	5	4.07	0.90

Performance Expectancy	PE1	AR information is more accurate than information provided by human beings	1	5	2.86	1.07
	PE2	AR is more accurate with less human errors.	1	5	3.27	1.00
	PE3	AR provide more consistent service than human beings.	1	5	3.25	1.09
	PE4	Information provided by AR devices are more consistent.	1	5	3.49	1.00
Effort Expectancy	EE1	Using AR devices takes too much of my time.	1	5	2.54	1.20
	EE2	Working with AR devices is so difficult to understand and use in services.	1	5	2.49	1.16
	EE3	It takes me too long to learn how to interact with AR devices	1	5	2.25	1.15
Emotions	Emotions1	Feeling bored vs. feeling relaxed with AR	1	5	3.70	0.876
	Emotions2	Feeling melancholic vs. feeling contented with AR	1	5	3.74	1.05
	Emotions3	Feeling despairing vs. feeling hopeful with AR	1	5	3.45	1.09
	Emotions4	Feeling unsatisfied vs. feeling satisfied with AR	1	5	3.77	1.15
	Emotions5	Feeling annoyed vs. feeling pleased with AR	1	5	3.75	1.14
Use Acceptance of AR	UA_AR1	I am willing to receive AR services	1	5	3.75	1.11
	UA_AR2	I will feel happy to interact with AR devices	1	5	3.72	1.00
	UA_AR3	I am likely to interact with AR	1	5	3.82	0.98
Purchase Intention	PI1	The likelihood of purchasing this product with AR is	1	5	3.35	1.05
	PI2	If I were going to buy this product, I would consider buying it with AR.	1	5	3.46	1.06
	PI3	At the benefits shown, I would consider buying the product with AR	1	5	3.43	1.07
	PI4	The probability that I would consider buying the product with AR is . . .	1	5	3.33	1.06
	PI5	My willingness to buy the product is	1	5	3.42	1.07
	PI6	If I were going to buy a Brasileira's product, the probability of buying com AR is	1	5	3.28	1.16
	PI7	I would purchase these products or others with AR.	1	5	3.44	1.14

Given the presented results, it can be concluded that the majority of respondents hold a neutral position regarding the social motivation exerted on them by people who use augmented reality, both on social media and by those around them, since the mean for each construct is approximately 3, which on the Likert scale used is equivalent to a neutral position.

To verify if the measurement model was valid, we sought to establish acceptable levels of goodness-of-fit for the model and to find specific evidence of construct validity (Hair et al., 2014). The chi-square value of the structural model was 24.9, and the degrees of freedom was 14 (yielding a ratio of Chi-square to degrees of freedom 1.78), which indicates a good model fit. The values of CFI and TLI were 0.98 and 0.96, respectively, so as these values are very close to 1, we can conclude that the model demonstrates a good fit (Hair et al., 2014). The RMSEA and the SRMR presented values of 0.09 and 0.09, respectively, which indicates values slightly higher than expected, which may be due to the small sample size (Hair et al., 2014).

This study found that social motivation is positively related to performance expectancy ($\beta=0.43, p<0.001$), as predicted in H1a, which is supported. Regarding to effort expectancy, social motivation shows a positive relation as well ($\beta=0.59, p<0.001$), supporting H1b. Regarding hedonic motivation, both hypotheses H2a ($\beta=-0.01, p=0.96$) and H2b ($\beta=-0.39, p=0.13$) were rejected due to the lack of statistical evidence supporting them. Utilitarian motivation is positively related to performance expectancy ($\beta=0.57, p=0.01$), which supports H3a. On the other hand, there is no support for H3b ($\beta=-0.09, p=0.77$), so utilitarian motivation is not negatively related to effort expectancy as expected. Performance expectancy is positively related to emotions as found in the results ($\beta=0.89, p<0.001$) and that supports H4a. Hypothesis H4b, which proposes that effort expectancy is positively related to emotions, is not supported by data and was rejected. The statistical analysis revealed that the correlation coefficient between effort expectancy and emotions was not significant ($p=0.10$). In addition, the standardised beta values in the path analysis model indicated a weak and non-significant relationship between these variables ($\beta=-0.19$). Positive emotions were positively related to the acceptance of AR use ($\beta=0.88, p<0.001$) and purchase intention ($\beta=0.86, p<0.001$), supporting H5a and H5b.

To obtain more insights from the proposed model, indirect effects of social motivation, hedonic motivation and utilitarian motivation on performance expectancy and effort expectancy, through indirect effects on emotions to acceptance of AR use and purchase intention were estimated. Findings revealed a significant positive indirect effect on the acceptance of the use of augmented

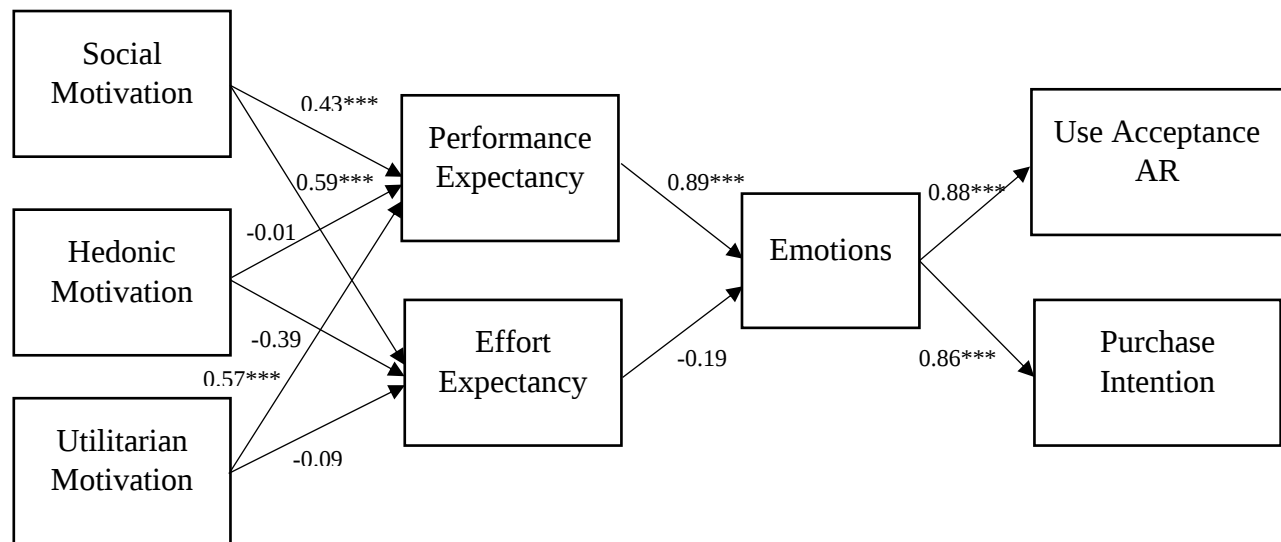
reality based on the path of social motivation through performance expectancy and emotions ($\beta=0.34$, $p<0.001$). The same applies to purchase intention, with social motivation through performance expectancy and emotions having a positive indirect effect on it ($\beta=0.33$, $p<0.001$). However, comparing to effort expectancy there are no statistical evidence for supporting this effect ($\beta=-0.10$, $p=0.151$) and ($\beta=-0.10$, $p=0.151$), which means that the impact of effort expectancy and emotions as mediators in this case is minimal or statistically insignificant.

Hedonic motivation through effort expectancy does not influence the acceptance of the use of AR ($\beta=-0.01$, $p=0.96$) neither purchase intention ($\beta=-0.01$, $p=0.96$).

Utilitarian motivation has a positive effect on use acceptance of AR through performance expectancy and emotions ($\beta=0.45$, $p=0.01$). There is also an indirect positive effect of utilitarian motivation on purchase intention through performance expectancy and emotions ($\beta=0.43$, $p=0.01$). Whereas, the same doesn't apply conducting these variables with effort expectancy ($\beta=0.02$, $p=0.77$; $\beta=0.01$, $p=0.77$).

As shown in Figure 9, results indicate that all of the proposed hypotheses are supported, excepting H2a, H2b and H4b.

Figure 9 - Results of the relations between variables



***: p-value statistically significant

5. Discussion

This study aimed to explore the relationships between different types of motivations and their impact on performance expectancy, effort expectancy, and emotions, which are considered the mediators of the relationships and, ultimately, the AR acceptance and customers' purchase intention through AR.

Findings provide valuable insights into the dynamics of user motivations and their effects on AR acceptance and purchase intention.

Social motivation (SM) indicates that customer's social networks may be relevant to their behaviour's influence. Individuals may perceive AR as highly reliable and consistent, presenting more accurate information and enhancing performance expectancy. This is due to social encouragement to use AR, which will enhance the perceived performance benefits of the technology, showing consistency with the significant $\beta=0.43$ and indicating that social motivation positively shapes performance expectancy. When AR is presented by social networks, customers may perceive it as easier to use, assuming they do not require too much time for the learning or interaction process, which reduces the effort people expect to exert (lower EE). An AR user (SM3) may reduce the perceived difficulty of using AR, as people often believe prestigious tools are designed to be intuitive and easier to learn and use (lower EE). Social encouragement to use AR devices (SM2) can reduce expected effort, consistent with the significant $\beta=0.59$, which indicates that social motivation positively affects effort expectancy.

Thus, findings support the hypothesis that social motivation is positively related to both performance expectancy and effort expectancy, as expected. Social aspects significantly shape individuals' perceptions of AR technology, making it seem beneficial, consistent, reliable, and easy to use.

The significant beta coefficients for performance expectancy ($\beta=0.43$) and effort expectancy ($\beta=0.59$) underscore the importance of social elements in technology acceptance models. This is consistent with findings by (Li et al., (2009), Van der Heijden, (2004), and Zhou, (2011) who also demonstrated that social factors influence the acceptance of technology through performance expectancy and effort expectancy.

Although previous research (Gursoy et al., 2019) had confirmed the direct effect of social motivation on purchase intention, in the present one, we intend to go further and demonstrate that there is an indirect influence of social motivation through mediators such as performance expectancy, and effort expectancy, both passing through emotions and having an effect on AR acceptance and purchase intention.

In this way, we demonstrated that, effectively, there is an effect on both purchase intention and use acceptance of AR use mediated by performance expectancy (PE - $\beta=0.34$), effort expectancy (EE - $\beta=0.33$), and emotions caused by social motivation. This finding is in accordance with a previous study conducted by Venkatesh et al. (2003) that demonstrated that social influence is an important criterion for customers to assess the performance benefits of technology devices, which prompts positive emotions and behavioural outcomes.

A study conducted by (Raška et al., 2017) about the Ikea Place app influencing purchase intention demonstrated that the main determinants influencing purchase intention encompass product familiarity and the hedonic and utilitarian value delivered through the AR. However, we demonstrated that after receiving an effect of another variable, such as performance expectancy, effort expectancy, or emotions, the results are different, with the influence of utilitarian motivation on purchase intention being verified only through the performance expectancy and emotions.

Hedonic motivation (HM) in consumer behaviour refers to the fun, entertaining, enjoyable and pleasant aspects of using and interacting with the AR app. Therefore, it was hypothesized that this factor would enhance performance expectancy (PE).

However, the lack of statistical evidence suggests that the enjoyment of using AR does not significantly influence users' expectations regarding AR applications' accuracy, consistency, and reliability. This could be because the performance expectancy metrics are more related to functional and practical benefits rather than the experiential and emotional satisfaction that hedonic motivation causes in customers.

For this reason, there was no statistical evidence supporting H2a since the p-value had a value of 0.96, exceeding the standard significance threshold (usually 0.05), reinforcing the obtained result. In the H2b case, the hypothesis suggested that the more enjoyable and entertaining the AR experience (HM), the easier it would be to use the AR app (EE).

However, hypothesis H2b was rejected because the data did not support it, as the statistical analysis yielded a beta coefficient (β) of -0.39 with a p-value of 0.13. Although the beta coefficient is negative, the p-value is high, indicating that the relationship between hedonic motivation and effort expectancy is not statistically significant. Thus, the enjoyment of using AR does not necessarily indicate a good perception of ease of use. Users might still find AR devices time-consuming, difficult to understand, and challenging to learn, independently of the enjoyment factor. This contrasts with (Thong et al., 2006), who showed that hedonic motivation impacts the acceptance of technology with ease of use and perceived usefulness as mediator.

In contrast, a positive relationship between utilitarian motivation and performance expectancy is supported by hypothesis H3a ($\beta=0.57$, $p=0.01$), which aligns with Kim et al. (2007), who found that utilitarian motivation influences the acceptance of technology through perceived usefulness. Thus, findings suggest that the practical motivation to use a technology is associated with a positive expectancy regarding its performance. This indicates that users value AR apps' clarity, ease of use, usefulness, and effectiveness, contributing to their performance expectations.

These utilitarian factors are directly related to the perception that AR offers more accurate information, is related to fewer human errors, and more consistent services and information, as highlighted by the PE items. Statistically, the beta coefficient of 0.57 suggests a strong positive influence of utilitarian motivation on performance expectancy, while the p-value of 0.01 confirms that this is a statistically significant relationship.

The accuracy of the information provided by AR (PE2) and the reduction of human errors (PE1) are characteristics that users with a high utilitarian motivation expect due to the effective and easy use of technology. The consistency of the service (PE3) and the information provided by AR (PE4) is in line with the expectations of users who value the usefulness and effectiveness of AR.

Concerning the utilitarian motivation related to effort expectancy, we expected that this determinant would contribute to a lower perception of effort. However, the hypothesis was rejected because the beta coefficient of -0.09 suggests a very weak, almost non-existent influence, while the p-value of 0.77 indicates that this is not statistically significant.

The data indicated a positive relationship between performance expectancy and emotions ($\beta=0.89$, $p<0.001$), which suggests that when users perceive that augmented reality (AR) technology offers superior performance, they tend to experience more positive emotions during its

use. Users' trust in technology can be boosted by technologies perceived as accurate and consistent (such as AR), providing a more pleasant experience (Venkatesh et al., 2003). The accuracy and consistency of the information provided by AR (PE) reduce frustration and increase user satisfaction (Lin & Bhattacharjee, 2010), which contributes to positive emotions such as happiness and satisfaction. Agarwal & Karahanna (2000) similarly indicated that the cognitive absorption of consumers mediates the relationship between emotions and technology acceptance.

Regarding hypothesis H4b, obtained data showed that the relationship between effort expectancy and emotions was not significant ($\beta=-0.19$, $p=0.10$), indicating that perceived ease of use does not translate directly into positive emotions. Statistical analyses revealed a weak and non-significant correlation between these variables. Previous research (Venkatesh et al., 2003) suggests that the expectation of effort is more directly related to the continued use and technology acceptance but not necessarily to emotions.

The statistical analysis revealed that positive emotions are a strong predictor of use acceptance of AR, supporting hypothesis H5a. The result showed a significant relationship between positive emotions and acceptance of AR use ($\beta=0.88$, $p<0.001$), indicating that positive emotions strongly impact users' willingness to adopt this type of technology. This aligns with Venkatesh et al.'s (2003) studies, which emphasize that a positive emotional response increases the likelihood of adoption and continued use of new technologies. This finding also aligns with Forgas (1995) and Fredrickson (2001), who suggested that emotions influence decision-making, leading to purchase intentions leveraged by performance and ease of use.

Relating to H5b, findings show a significant relationship between positive emotions and purchase intention with AR ($\beta=0.86$, $p<0.001$), indicating that positive emotions strongly impact purchase intention.

Statistical analysis revealed that positive emotions are a strong predictor of purchase intention, supporting the hypothesis previously presented Hb5. This is in line with the literature, namely Hirschman & Holbrook, (1982), which stated that hedonic consumption experiences involving positive emotions are directly related to purchasing behaviour.

The indirect effects analysed provide valuable insights into consumer motivations and how they influence the use acceptance of AR and purchase intention. Performance expectancy, for example, was identified as a significant predictor of technology acceptance in the Technology Acceptance Model (TAM) of Davis (1989) and is considered a strong determinant of online

purchase intention, reinforcing the idea that consumers' expectations of performance benefits drive their purchasing decisions Pavlou (2003).

Similarly, in their UTAUT (Unified Theory of Acceptance and Use of Technology) model, introduced by Venkatesh et al. (2003), effort expectancy is a critical determinant of user acceptance and technology usage behaviour.

In retail, AR shopping apps were more likely to be used by consumers when they found them easy to navigate and interact with, reinforcing the positive impact of effort expectancy on technology acceptance (Pantano et al., 2017).

Thus, considering the previous research, if users perceive AR apps as easy to use, they are more open to accepting and adopting them.

Applying the UTAUT and the TAM models to purchase behaviour, consumers may perceive a product as beneficial to their performance, and consequently, their purchase intention will be positively influenced.

Considering the results of the indirect effects, social motivation has a significant indirect effect on the use acceptance of AR ($\beta=0.34$, $p<0.001$) and purchase intention ($\beta=0.33$, $p<0.001$), mediated by performance expectancy and emotions, which is in line with the literature. Cheung et al. (2008) and Overby and Lee (2006) similarly showed that social and utilitarian motivations influence purchase intention through emotions, performance expectancy, and effort expectancy. On the other hand, hedonic motivation, mediated by effort expectancy, does not significantly influence the use acceptance of AR ($\beta=-0.01$, $p=0.96$) or purchase intention ($\beta=-0.01$, $p=0.96$), and utilitarian motivation has a positive effect on the use acceptance of AR ($\beta=0.45$, $p=0.01$) and purchase intention ($\beta=0.43$, $p=0.01$) through performance expectancy and emotions but not through effort expectancy.

6. Conclusion

6.1. Final Considerations

This study developed an augmented reality app created on Adobe Aero and presented it to customers of a historical café to get feedback and test a theoretical model to explain the many paths that exist to achieve purchase intention and the use acceptance of a new technology, namely AR. Considering social motivation, hedonic motivation and utilitarian motivation (independent variables) and taking into account, based on previous studies, that these three determinants of consumer behaviour have a direct impact on the acceptance of the use of augmented reality and on purchase intention, we sought to identify and contribute academically with the analysis of indirect effects, namely through performance expectancy, effort expectancy and emotions. So we seek to understand how customer behaviour determinants influence the use acceptance of AR and the purchase intention in a retail setting, answering our main research question, and the findings showcased that social motivation positively affects both, which indicates that customers who perceive social benefits from using AR are more likely to accept it and intend to purchase products through this technology. On the other hand, hedonic motivation does not show a significant influence on use acceptance of AR or purchase intention through the mediators, which suggests that although the importance of enjoyment and entertainment factors, those are not sufficient alone to trigger use acceptance of AR or purchase intentions without practical utility or performance benefits. At last, utilitarian motivation has a robust influence on AR acceptance as well as in purchase intention through performance expectancy and positive emotions, suggesting that customers driven by practical advantages tend to perceive the technology as a tool that contributes to leverage shopping efficiency and satisfaction, thereby increasing their likelihood of accepting and purchasing with AR. When we place mediators in the path, relationships are likely to change.

Social and utilitarian motivations appear to influence the use acceptance of AR and purchase intention through their own pathways. So, these findings highlight that, in order to drive effectively customer engagement and sales, retailers should focus on the practical utility and social benefits of AR.

6.2. Limitations

Some of the limitations of this study relate to the small sample size, as well as the difficulty of approaching people inside the *A Brasileira* café, since it is a small space (the study was only carried out inside the establishment), and it is difficult to reach many people. It was also difficult in some cases to carry out the experiment, the lighting conditions were not the most favorable and the device used also has an influence on how easy it is to access the experiment. Internet connectivity was also a limiting factor.

The data collection also involved measuring the click through rate (CTR) of the website created, however, these values ended up being disregarded due to some technical problems (such as network failures, experience button failures).

In terms of results, the path analysis was unable to establish the relationship between hedonic motivation and performance expectancy (due to some unknown software problem), so it was not possible to make any conclusions about this relationship in relation to acceptance of the use of augmented reality and purchase intention.

6.3. Future Research

In future work, it could be interesting to conduct similar research incorporating variables such as gender, level of experience with AR or age and study the relationship between these demographic factors with the consumer behavior determinants (social motivation, hedonic motivation and utilitarian motivation). This would be useful to gather more insights about the introduction of AR in a retail setting.

In addition, it would be valuable to address technical problems observed in our current study. For example, measure the click-through rate (CTR) of the website created to check consumers' interests (history of the establishment, product information, product purchase), once it was not possible to do that in the present study. Overcoming these technical challenges will allow for a more comprehensive and accurate analysis of the impact of AR on consumer behaviour and on customer journey.

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Appendix

Appendix A – Interview Transcript Director of Marketig ‘O Valor do Tempo’ group (Portuguese Version)

Caso de estudo: “A Brasileira” – A Brasileira do Chiado.

Investigador principal: Filipa Santos (R1)

Investigadores complementares: Hélder Barbosa Ferreira e André Sabino

Entrevistada (1): E1

Função: Diretora de Marketing do Grupo O Valor do Tempo

Entrevistada (2): E2

Função: Gerente do espaço comercial

Data da entrevista: 15 de novembro

Duração da entrevista: 120 minutos

OBJETIVOS:

1. Compreender em profundidade a jornada do cliente no espaço físico: “A Brasileira”
2. Identificar os pontos de dor e oportunidades de melhoria do espaço na jornada do cliente
3. Identificar locais e elementos físicos potenciais para aplicação de realidade aumentada
4. Idear uma solução de realidade aumentada para dar resposta a potenciais desafios descritos na alínea 2.

INTRODUÇÃO

1. Apresentação dos investigadores e do projeto de investigação
2. Explicação sintética do que é realidade aumentada e como esta pode ser aplicada num espaço comercial retalhista e restauração.
3. Realização da Entrevista
4. Utilização da técnica de Observação ao espaço comercial. Esta será realizada pelo investigador principal com a supervisão dos orientadores.

Guião de questões semiestruturadas

Secção 1: Jornada de cliente

1. Quais são os pontos de dor no espaço ‘Brasileira’ durante a jornada do cliente?
2. Que oportunidades de melhoria da experiência do cliente pensa/sente ser necessário melhorar?

Secção 2: Incorporação de tecnologia no ponto de venda

3. Acha possível e interessante incorporar novas tecnologias, como a realidade aumentada?
4. Na sua opinião, segundo o que sabe sobre realidade aumentada, como percebe que esta possa ser utilizada no espaço comercial para diferenciar a sua oferta?
5. Vislumbra oportunidades para melhorar o negócio? Se sim, poderão ser passíveis de usar realidade aumentada?
6. Refere muitas vezes a necessidade de manter o negócio tradicional. Ainda assim, como percebe a oportunidade de usar realidade aumentada neste espaço comercial?
7. Observamos que os clientes costumam aguardar na fila, no exterior do espaço, por algum tempo. Perguntamos se já fizeram algo para diminuir a percepção do tempo de espera? Ou se para vocês não é sequer um problema?
8. Em linha com o respondido anteriormente, perguntamos se a utilização de realidade aumentada poderia contribuir para a melhoria da experiência do cliente?
9. Na sua opinião, os clientes utilizam muito o telemóvel no espaço comercial? Para tirar fotos ou para outros fins mais lúdicos?
10. Quais são as suas principais dúvidas, inseguranças ou desconforto com o uso de uma tecnologia, como a realidade aumentada num espaço comercial como este?
11. Na sua opinião, conhecendo melhor a aplicabilidade da realidade aumentada, pergunto-lhe se esta na sua opinião pode substituir ou complementar a função dos colaboradores, nomeadamente enquanto força de vendas?
12. Qual a sua opinião sobre o uso de RA num conceito tradicional como este negócio? É exequível? Podem coabitar estrategicamente?

Outras questões:

13. Os quadros que se encontram expostos nas paredes “d’A Brasileira?” são originais? Contam alguma história?
14. É possível colocar elementos visuais externos (tipo QR Codes) no espaço comercial?
15. Os clientes que entram na loja, filmam e fotografam vários locais do espaço comercial? Consegue identificar quais os locais com mais exatidão? (respondida pela gerente comercial/observado pelos investigadores)
16. Existe flexibilidade para trabalhar elementos visuais no ‘cardápio’ do livro, nas chávenas de café, tripé da mesa ou outros elementos?

Encerramento

17. Tem mais algum assunto/ tema que gostasse de partilhar? E/ou que poderia ter sido previsível ter perguntado.

Transcrição e verificação do conteúdo pela entrevistada.

Q1. Quais são os pontos de dor no espaço ‘Brasileira’ durante a jornada do cliente?

E1: Existe um grande interesse por parte das pessoas em conhecer a história “d’A Brasileira”, no entanto, o staff não consegue auxiliar neste aspeto devido ao volume de trabalho.

Q2. Que oportunidades de melhoria da experiência do cliente pensa/sente ser necessário melhorar?

E1: seria interessante explorar algo que pudesse ajudar no enriquecimento da experiência do cliente na sua jornada n’*a Brasileira*.

Q3. Acha possível e interessante incorporar novas tecnologias, como a realidade aumentada?

E1: Sinceramente não sei, será que a realidade aumentada vai proporcionar uma experiência mais enriquecedora? Como é que a tecnologia pode contribuir para trazer a história de volta? A utilização de RA resultará num aumento do tempo que as pessoas passam no café e, consequentemente, num maior consumo? São questões que gostava de ver respondidas.

Q4. Na sua opinião, segundo o que sabe sobre realidade aumentada, como percebe que esta possa ser utilizada no espaço comercial para diferenciar a sua oferta?

E1: Uma das ideias que gostaria de saber se era possível concretizar, seria: se através da utilização da realidade aumentada é possível trazer de volta algumas personagens históricas e emblemáticas deste espaço, para poderem contar a história do café e, assim, envolver mais os clientes, despertando-lhes um maior interesse em relação à experiência na Brasileira.

Q5. Vislumbra oportunidades para melhorar o negócio? Se sim, poderão ser passíveis de usar realidade aumentada?

E1: Procuramos oportunidades todos os dias. Se nos ajudarem a identificar mais oportunidades seria positivo.

Q6. Refere muitas vezes a necessidade de manter o negócio tradicional. Ainda assim, como percebe a oportunidade de usar realidade aumentada neste espaço comercial?

E1: Nós gostamos de manter a traça tradicional em todos os negócios que estamos envolvidos. Para nós é importante fazer diferentes dos outros, mas gostamos muito de valorizar o que nos caracteriza, o que é tradicional.

E, sim, temos sido mais reticentes em incluir tecnologias porque não queremos desfigurar o nosso negócio. No entanto, estamos abertos para experimentar coisas novas.

Q7. Observamos que os clientes costumam aguardar na fila, no exterior do espaço, por algum tempo. Perguntamos se já fizeram algo para diminuir a percepção do tempo de espera? Ou se para vocês não é sequer um problema?

E1: Relativamente às filas, no passado realizamos umas cartas para se entregar aos clientes que se encontram a aguardar na fila de espera. Estas cartas continham informação sobre os produtos que se encontram à venda no café. No entanto, uma das maiores dificuldades que detetamos é que os funcionários acabam por não as conseguir distribuir aos clientes, devido à quantidade de trabalho que têm.

Q8. Em linha com o respondido anteriormente, perguntamos se a utilização de realidade aumentada poderia contribuir para a melhoria da experiência do cliente?

E1: como já respondi antes, vemos com bons olhos a experimentação de coisas novas. Como esta é uma dificuldade para nós, dado o trabalho que os empregados têm, o uso de realidade aumentada poderia ajudar, mas sinceramente tenho dúvidas que se consiga. A experimentar, sem dúvidas.

Q9. Na sua opinião, os clientes utilizam muito o telemóvel no espaço comercial? Para tirar fotos ou para outros fins mais lúdicos?

E2: Os clientes tiram fotos de tudo: desde a montra dos bolos aos quadros na parede, ou ainda a estátua de Fernando Pessoa que se encontra no exterior. Tiram também fotos, muitas vezes, antes de entrar na loja. No fundo, penso que os clientes acham graça ao facto de o café nunca ter sido alterado.

Q10. Quais são as suas principais dúvidas, inseguranças ou desconforto com o uso de uma tecnologia, como a realidade aumentada num espaço comercial como este?

E1: A dúvida principal é assegurar que o uso dessa tecnologia não desvirtua a experiência ou atrapalhe o trabalho dos empregados no seu dia a dia. Por outro lado, não acredito que os clientes baixem uma aplicação na visita que fazem para aceder à realidade aumentada. E isso penso que pode ser um problema grande.

Q11. Na sua opinião, conhecendo melhor a aplicabilidade da realidade aumentada, pergunto-lhe se esta, na sua opinião, pode substituir ou complementar a função dos colaboradores, nomeadamente enquanto força de vendas?

E1: A realidade aumentada não vai substituir os empregados, mas como já lhe disse antes, os empregados não conseguem ser muito efetivos na venda, porque têm muitas tarefas para fazer. Aí penso que se calhar essa tecnologia podia conseguir ajudar. Mas como já lhe referi não conheço estudos sobre negócios como este que tenham revelado um aumento das vendas com RA.

Por exemplo, recordo que há algum tempo atrás, mandámos fazer uns envelopes destinados a serem entregues pelos funcionários junto com os recibos aos clientes. No entanto, essa prática foi interrompida por falta de colaboração do staff. Os envelopes ostentavam os logótipos de outras empresas do grupo, visando informar os clientes d'A Brasileira sobre a existência de outras marcas associadas.

Portanto, a introdução de tecnologia na jornada do consumidor d'A Brasileira poderia facilitar a operação nalgumas etapas, pois permitiria que os clientes tivessem autonomia no processo, eliminando a necessidade e dependência dos funcionários.

Q12. Qual a sua opinião sobre o uso de RA num conceito tradicional como este negócio? É exequível? Podem coabitar estrategicamente?

E1: A proposta deste grupo é caminhar para onde os outros não estão, isto porque há poucos cafés históricos e, por isso, a nossa abordagem não se resume à digitalização integral, sendo imperativo preservar e manter o conceito original. Ainda assim não excludo a possibilidade de tentarmos aplicar a RA e ver como funciona.

Q13. Os quadros que se encontram expostos nas paredes “d'A Brasileira?” são originais? Contam alguma história?

E1: Os primeiros quadros que A Brasileira expôs nas suas paredes foram colocados em 1925 e posteriormente retirados em 1971, tendo sido substituídos pelos que cá se encontram atualmente. Em 2025 iremos celebrar o centenário da colocação dessas artes, pelo que estamos a pensar fazer algumas parcerias estratégicas para lançar um concurso que ainda se encontra numa fase embrionária, mas que poderá ser um prémio literário ou algo mais abrangente que promova a criação artística.

Q14. É possível colocar elementos visuais externos (tipo QR Codes) no espaço comercial?

E1: Não somos nada adeptos de colocar elementos no espaço comercial, no entanto, isso já não é novo para nós. Por exemplo, temos um QR code aqui no cardápio (não funcionou).

Portanto, desde que não fique muito visível ou choque a imagem que temos, somos abertos a utilizar os QR codes, mas não sei se isso é RA. Isso já temos e tanto quanto eu sei não é realidade aumentada.

Q15. Os clientes que entram na loja, filmam e fotografam vários locais do espaço comercial? Consegue identificar quais os locais com mais exatidão? (respondida pela gerente comercial/observado pelos investigadores)

E1: sinceramente tenho alguma dificuldade de lhe responder a essa questão com precisão, no entanto, o que lhe posso dizer é que essencialmente tiram fotografias globais ao espaço e também, muito aos quadros. Mas como referi podem tirar até aos pastéis.

Q16. Existe flexibilidade para trabalhar elementos visuais no ‘cardápio’ do livro, nas chávenas de café, tripé da mesa ou outros elementos?

E1: Sim, estamos abertos a experimentar. E nesses locais não me parece que sejam ofuscantes ou perturbem a imagem global que queremos passar. Portanto, sim, se quiserem experimentar podem usar esses elementos.

Q17. Tem mais algum assunto/tema que gostasse de partilhar? E/ou que poderia ter sido previsível ter perguntado.

E1: Gostava de saber quando é que querem aplicar e o que precisam mais. É apenas para estudo, certo.

RESULTADOS DA OBSERVAÇÃO:

Da entrevista e observação no local, foram identificados alguns elementos com potencial de utilização da RA, nomeadamente os descritos na tabela seguinte:

Elementos observáveis	Local	Observações	Decisão
10 Quadros	Paredes	Apenas um quadro foi identificado com potencial de aplicabilidade da RA	Não avançar
Tripé	Mesas	Tem potencial	Possível
Cardápio de café	Elemento físico sem local fixo. Entregue pelos colaboradores aos clientes para efeitos de up-selling.	Pode ser utilizado RA no cardápio ou noutra local, de modo a complementar a ação de vendas do colaborador.	Não avançar
Fachada	Exterior da loja/Entrada da loja	Foram observados muitos clientes a tirar fotos à fachada, bem como muitos clientes no exterior aguardando pela sua vez.	Não avançar
Pastel de nata	Interior do ponto de venda	Foram observados vários clientes a fotografar este elemento visual no espaço comercial.	Não avançar

Appendix B – Interview Transcript Director of Marketig ‘O Valor do Tempo’ group (English Version)

Principal Investigator: Filipa Santos (R1)

Supporting Investigators: Hélder Barbosa Ferreira and André Sabino

Interviewee (1): E1

Role: Marketing Director of O Valor do Tempo Group

Interviewee (2): E2

Role: Store Manager

Interview Date: November 15

Interview Duration: 120 minutes

OBJECTIVES:

1. Understand the customer journey in the physical space: ‘A Brasileira’.
2. Identify pain points and opportunities for improvement in the customer journey.
3. Identify potential locations and physical elements for the application of augmented reality (AR).
4. Design an AR solution to address potential challenges mentioned in point 2.

INTRODUCTION

1. Presentation of the investigators and the research project.
2. Brief explanation of what augmented reality is and how it can be applied in a retail and restaurant space.
3. Conduct the interview.
4. Use the observation technique in the commercial space. This will be carried out by the principal investigator under the supervision of the advisors.

Semi-structured Question Guide

Section 1: Customer Journey

1. What are the pain points in the ‘Brasileira’ space during the customer journey?

2. What opportunities for improving the customer experience do you think/feel need to be addressed?

Section 2: Incorporating Technology at the Point of Sale

3. Do you think it is possible and interesting to incorporate new technologies such as augmented reality?
4. In your opinion, based on what you know about augmented reality, how do you perceive it could be used in the commercial space to differentiate your offer?
5. Do you see opportunities to improve the business? If so, could they potentially use augmented reality?
6. You often mention the need to maintain the traditional business. Even so, how do you perceive the opportunity to use augmented reality in this commercial space?
7. We observe that customers often wait in line outside the space for some time. Have you done anything to reduce the perceived waiting time? Or is it not a problem for you?
8. In line with the previous answer, do you think the use of augmented reality could contribute to improving the customer experience?
9. In your opinion, do customers use their mobile phones a lot in the commercial space? For taking photos or for other recreational purposes?
10. What are your main doubts, insecurities, or discomforts with using a technology like augmented reality in a commercial space like this?
11. In your opinion, knowing better the applicability of augmented reality, do you think it can replace or complement the function of the staff, particularly as a sales force?
12. What is your opinion on the use of AR in a traditional business concept like this one? Is it feasible? Can they coexist strategically?

Other Questions:

13. Are the paintings displayed on the walls of "A Brasileira" originals? Do they tell a story?
14. Is it possible to place external visual elements (such as QR codes) in the commercial space?
15. Do customers who enter the store film and photograph various locations within the commercial space? Can you identify which locations more precisely? (answered by the store manager/observed by the investigators)

16. Is there flexibility to work on visual elements in the menu, coffee cups, table tripod, or other elements?

Closing

17. Is there any other topic you would like to share? And/or something that we should have asked but didn't?

Transcription and verification of content by the interviewee.

Q1. What are the pain points in the 'Brasileira' space during the customer journey?

E1: There is a great interest from people in learning about the history of "A Brasileira," however, the staff cannot assist with this due to the workload.

Q2. What opportunities for improving the customer experience do you think/feel need to be addressed?

E1: It would be interesting to explore something that could help enrich the customer experience during their journey at A Brasileira.

Q3. Do you think it is possible and interesting to incorporate new technologies such as Augmented Reality?

E1: Honestly, I don't know. Will augmented reality provide a more enriching experience? How can the technology help bring the history back? Will the use of AR result in people spending more time in the café and, consequently, increasing consumption? These are questions I would like to see answered.

Q4. In your opinion, based on what you know about augmented reality, how do you perceive it could be used in the commercial space to differentiate your offer?

E1: One idea I'd like to know if it is possible to implement is: through the use of augmented reality, can we bring back some historical and emblematic characters of this space, so they can tell the story of the café and thereby engage customers more, sparking greater interest in the experience at A Brasileira.

Q5. Do you see opportunities to improve the business? If so, could they potentially use augmented reality?

E1: We look for opportunities every day. If you can help us identify more opportunities, that would be positive.

Q6. You often mention the need to maintain the traditional business. Even so, how do you perceive the opportunity to use augmented reality in this commercial space?

E1: We like to maintain the traditional charm in all the businesses we are involved in. It is important for us to stand out from others, but we greatly value what characterizes us, what is traditional. And yes, we have been more hesitant to include technologies because we don't want to distort our business. However, we are open to trying new things.

Q7. We observe that customers often wait in line outside the space for some time. Have you done anything to reduce the perceived waiting time? Or is it not a problem for you?

E1: Regarding the lines, in the past we created cards to hand out to customers waiting in line. These cards contained information about the products sold in the café. However, one of the biggest difficulties we found was that the staff couldn't distribute them to the customers because of their workload.

Q8. In line with the previous answer, do you think the use of augmented reality could contribute to improving the customer experience?

E1: As I mentioned before, we are open to experimenting with new things. Since this is a difficulty for us, given the employees' workload, the use of augmented reality could help, but honestly, I doubt it can be done. We are willing to try, without a doubt.

Q9. In your opinion, do customers use their mobile phones a lot in the commercial space? For taking photos or for other recreational purposes?

E2: Customers take photos of everything: from the cake display to the paintings on the wall, or even the statue of Fernando Pessoa outside. They also take photos often before entering the store. Essentially, I think customers are amused by the fact that the café has never been altered.

Q10. What are your main doubts, insecurities, or discomforts with using a technology like augmented reality in a commercial space like this?

E1: The main doubt is ensuring that the use of this technology does not distort the experience or interfere with the employees' day-to-day work. On the other hand, I don't believe customers would download an application during their visit to access augmented reality. And I think that could be a big problem.

Q11. In your opinion, knowing better the applicability of augmented reality, do you think it can replace or complement the role of the staff, especially as a sales force?

E1: Augmented reality will not replace the employees, but as I mentioned before, the employees cannot be very effective in sales because they have many tasks to do. There, I think maybe this technology could help. But as I mentioned, I don't know of studies on businesses like this that have shown an increase in sales with AR. For example, I recall that some time ago, we had envelopes made to be handed out by the staff along with the receipts to customers. However, this practice was stopped due to lack of cooperation from the staff. The envelopes displayed the logos of other companies in the group, aiming to inform A Brasileira's customers about the existence of other associated brands. Therefore, the introduction of technology in A Brasileira's customer journey

could facilitate operations at some stages, allowing customers to be more autonomous in the process, eliminating the need and dependence on the staff.

Q12. What is your opinion on the use of AR in a traditional concept like this business? Is it feasible? Can they coexist strategically?

E1: The group's proposal is to go where others are not because there are few historic cafés, and therefore our approach is not just about complete digitization, but it is imperative to preserve and maintain the original concept. Still, I do not rule out the possibility of trying to apply AR and see how it works.

Q13. Are the paintings displayed on the walls of "A Brasileira" originals? Do they tell a story?

E1: The first paintings that A Brasileira displayed on its walls were placed in 1925 and later removed in 1971, being replaced by the ones currently there. In 2025 we will celebrate the centenary of the placement of these artworks, so we are thinking of making some strategic partnerships to launch a contest that is still in an embryonic phase, but it could be a literary prize or something more encompassing that promotes artistic creation.

Q14. Is it possible to place external visual elements (such as QR codes) in the commercial space?

E1: We are not very keen on placing elements in the commercial space, however, this is not new to us. For example, we have a QR code here on the menu (which did not work). So, as long as it is not very visible or disrupts the image we have, we are open to using QR codes, but I don't know if that is AR. We already have this and as far as I know, it is not augmented reality.

Q15. Do customers who enter the store film and photograph various locations within the commercial space? Can you identify which locations more precisely? (answered by the store manager/observed by the investigators)

E1: Honestly, I find it difficult to answer that question precisely, but what I can say is that they mainly take general photos of the space and also a lot of the paintings. But as I mentioned, they could take photos of anything, even the pastries.

Q16. Is there flexibility to work on visual elements in the menu, coffee cups, table tripod, or other elements?

E1: Yes, we are open to experimenting. And in those places, I don't think they would overshadow or disturb the overall image we want to convey. So yes, if you want to try, you can use those elements.

Q17. Is there any other topic/subject you would like to share? And/or something that should have been asked but wasn't?

E1: I would like to know when you want to apply it and what else you need. This is just for study, right?

RESULTS OF THE OBSERVATION:

From the interview and on-site observation, several elements with potential for the use of AR were identified, as described in the following table:

Observable elements	Local	Observations	Decision
10 Paintings	Walls	Only one framework was identified with potential AR applicability	No progress
Tripod	Tables	Potential	Possible
Café's Menu	Physical element with no fixed location. Handed out by employees to customers for up-selling purposes.	AR can be used on the menu or elsewhere to complement the employee's sales activity.	No progress
Façade	Shop exterior/Store entrance	Many customers were seen taking photos of the façade, as well as many outside waiting for their turn.	No progress
Pastel de nata	Interior do ponto de venda	Several customers were observed photographing this visual element in the commercial space.	No progress

Appendix C - Questionnaire

Section 1 of 4

Augmented Reality (AR) in Retail

This study is part of a research project on the use of Augmented Reality in retail and the potential impact it may have on the customer journey. Participation in the study is strictly voluntary: you may choose freely to participate or not participate. In addition to being voluntary, participation is also anonymous and confidential. The data obtained is intended solely for statistical analysis, and no responses will be analyzed or reported individually. At no point in the study do you need to identify yourself.

Section 2 of 4

A brief explanation of the concept of Augmented Reality (AR)

Before answering the questions presented in this questionnaire, we ask that you briefly understand the definition of Augmented Reality.

Augmented Reality (AR) Concept

Augmented Reality (AR) is a technological innovation that integrates visual elements, such as images, videos, and other digital content, into the physical environment. Its goal is to provide consumers with relevant and timely information by overlaying computer-generated content onto their view of the natural world. Mobile devices are used to access this technology.

Section 3 of 4

1. **You conducted this experiment because...**
 - Researcher's Indication
 - Own initiative

2. **How often do you use new technologies?**
 - Never
 - Rarely

- Occasionally
- Frequently
- Always

3. **What is your level of experience with augmented reality (AR)?**

- No experience
- Limited
- Moderate
- High

Section 4 of 4

ALL FOLLOWING QUESTIONS ARE RELATED TO THE AUGMENTED REALITY APP YOU EXPERIENCED AT THE COMMERCIAL ESTABLISHMENT "A BRASILEIRA"

Please answer the following questions based on your experience using the app.

Remember that there are no right or wrong answers.

We ask that you respond to all questions with the utmost attention and honesty.

On a scale of 1 (completely disagree) to 5 (completely agree), please respond to the following questions:

Social Motivation (SM)	1	2	3	4	5
SM1. Using AR devices reflects a status symbol in my social networks (e.g., friends, family, and co-workers)					
SM2. People who influence my behavior would want me to utilize AR					
SM3. People in my social networks who utilize AR have more prestige than those who don't					
SM4. People whose opinions that I value would prefer that I utilize AR devices					
SM5. People who are important to me would encourage me to utilize AR devices					
SM6. People in my social networks who utilize augmented reality have a high profile					

Hedonic Motivation (HM)	1	2	3	4	5
HM1. I have fun interacting with AR					
HM2. Interacting with AR devices is Experiential.					
HM3. Interacting with AR devices is entertaining					
HM4. Interaction with AR is enjoyable					
HM5. The actual process of interacting with AR would be pleasant					

Utilitarian Motivation (UM)	1	2	3	4	5
UM1. Using AR does not require much mental effort					
UM2. Interaction with AR is clear and understandable					
UM3. I find AR easy to use					
UM4. I find it easy to get AR to do what I want					
UM5. Using AR makes it easier to deliver the brand					
UM6. Using AR is useful for the experience					
UM7. Using AR allows me greater accomplishment with the brand offer					
UM8. I feel more effective in relation to the experience when using AR					
UM9. I find AR useful					

Performance Expectancy (PE)	1	2	3	4	5
PE1. AR information is more accurate than information provide by human beings					
PE2. AR is more accurate with less human errors.					
PE3. AR provide more consistent service than human beings.					
PE4. Information provided by AR devices are more consistent.					

Effort Expectancy (EE)	1	2	3	4	5
EE1. Using AR devices takes too much of my time.					
EE2. Working with AR devices is so difficult to understand and use in services.					
EE3. It takes me too long to learn how to interact with AR devices					

Emotions	1	2	3	4	5
E1. Feeling bored vs. feeling relaxed with AR					
E2. Feeling melancholic vs. feeling contented with AR					
E3. Feeling despairing vs. feeling hopeful with AR					
E4. Feeling unsatisfied vs. feeling satisfied with AR					
E5. Feeling annoyed vs. feeling pleased with AR					

Use Acceptance of AR	1	2	3	4	5
UAR1. I am willing to receive AR services					
UAR2. I will feel happy to interact with AR devices					
UAR3. I am likely to interact with AR					

Purchase Intention (PI)	1	2	3	4	5
PI1. The likelihood of purchasing this product with AR is...					
PI2. If I were going to buy this product, I would consider buying it with AR.					
PI3. At the benefits shown, I would consider buying the product with AR					
PI4. The probability that I would consider buying the product with AR is...					
PI5. My willingness to buy the product is...					
PI6. If I were going to buy a Brasileira's product, the probability of buying com AR is...					
PI7. I would purchase these products or others with AR					

Age:

Gender

- Female
- Male
- Other

Academic Qualifications

- 9th grade or less
- 12th grade
- Bachelor's Degree
- Master's Degree
- PhD

Professional Status

- Student
- Unemployed
- Employee
- Freelancer

- Public Servant
- Other

Appendix D – Website Images

[Home](#) [Fernando Pessoa](#) [Products](#) [Test](#) [Q](#)



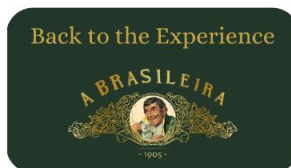
The Brasileira do Chiado continues to import coffee, with a special predominance from Brazil, where some of the world's most awarded beans are produced, due to the excellence of the entire production process - from cultivation to roasting.

The Brasileira do Chiado's own blend, resulting from a careful selection and mixture of bean varieties, allows one to savor special and unique characteristics such as sweetness, body, and aroma, making Brasileira coffee a gourmet drink for true connoisseurs.

Available in grain or powder.

Buy Coffee Beans

Buy Coffee Powder



Fernando Pessoa

Fernando António Nogueira Pessoa was born on June 13, 1888, in Lisbon. The early death of his father when Fernando Pessoa was just 5 years old made him a shy personality, taking refuge in his imagination and genius. At the age of 7, he traveled to Durban, South Africa, where he lived for 9 years with his family and returned to Portugal in 1905, the same year A Brasileira do Chiado was established in that historic neighborhood.

Throughout his life, he transformed into multiple identities, escaping through them from everyday life. In his poetry, the genius, who was many, unfolded into more than a hundred pseudonyms and alter egos with occupations as diverse as a translator, writer, essayist, philosopher, doctor, astrologer, and even a friar, each with their own distinct ideological vision. Although fragmented into many fictional literary personalities - enriching his literary legacy, heteronymy is the hallmark of his work. Endowed with biographies, the poet justified his three heteronyms as 'a trace of hysteria that exists within me. (...) The mental origin of my heteronyms lies in my organic and constant tendency towards depersonalization and simulation.'

Fernando Pessoa, who desired to be extraordinary, died on November 30, 1935, at the age of 47, in the same city where he was born. Much of his work was only known after his death, when the famous wooden chest was opened, delighting the world with literary treasures of immeasurable richness.

Appendix E – Informed Consent (Portuguese Version)

Consentimento Informado

Consentimento à recolha e ao tratamento de dados pessoais e de informações sobre o tema do estudo

Eu, _____, dou o meu consentimento à recolha e ao tratamento de dados e informações nos seguintes termos e condições:

O/A responsável pelo tratamento é Ana Filipa Santos, 934 699275 - (contactos);

Os dados e informações destinam-se a um estudo de caso experimental intitulado “Augmented Reality in Retailtainment An experimental case study of “A Brasileira”, uma tese de mestrado, e não serão tratados de forma incompatível com as finalidades da recolha. Dentro deste estudo, não há riscos envolvidos para o participante. O participante pode tornar essa partilha de dados e informações tão pessoal quanto desejar, e o investigador não deverá ultrapassar esses limites.

Os dados pessoais podem ser recolhidos e/ou utilizados pelas entidades que constituem a Universidade Europeia e seus parceiros, que estão sujeitas às mesmas obrigações de confidencialidade. A partilha não causa prejuízo aos/às titulares e é necessária para proteger os interesses vitais do/a titular dos dados e/ou decorre de uma obrigação legal. Estes dados são conservados pelo período considerado necessário para a intervenção (prazo ou, se não for possível, critérios usados para definir esse prazo) respeitando a sua conservação as garantias de sigilo e confidencialidade exigidas pelo Regulamento Geral de Proteção de Dados - RGPD;

Durante a fase de transcrição das gravações e tratamento das fotografias/imagens, todas as informações e os dados pessoais sobre o participante ou a organização para a qual trabalha serão anonimizadas. Todos os dados recolhidos durante este estudo poderão ser utilizados para a elaboração de uma dissertação/tese e/ou artigos científicos. A desistência do estudo pode ocorrer antes, durante e após a recolha dos dados. Após a recolha, o entrevistado tem três dias para se retirar do estudo. Após três dias não é possível a desistência, devido a limitações de tempo para o investigador encontrar um substituto.

Assistem-me, na qualidade de titular dos dados pessoais, os seguintes direitos:

- de solicitar à pessoa responsável pelo tratamento dos meus dados pessoais, o acesso aos mesmos, a sua retificação ou eliminação, bem como a limitação ou oposição ao seu tratamento;

- de retirar o consentimento a qualquer momento, sem no entanto comprometer a licitude do tratamento efetuado com base no consentimento anteriormente dado e sempre que tal seja necessário para efeitos de cumprimento de obrigações do/a responsável pelo tratamento dos dados; podendo exercê-lo por escrito, através do email dpo@universidadeeuropeia.pt. Incluindo a possibilidade de apresentar reclamação à Comissão Nacional de Proteção de Dados (CNPD) e não disponibilizar um ou mais dados solicitados no presente instrumento de recolha.

Se tiver qualquer questão relativa a este estudo, poderá contactar o investigador principal, através do email: 20220094@universidadeeuropeia.pt

Nome do investigador/assinatura/data

Nome do participante no estudo/assinatura/data

Appendix F – Informed Consent (English Version)

Informed Consent

Consent to the collection and processing of personal data and information about the study subject

I, _____, hereby consent to the collection and processing of data and information under the following terms and conditions:

The data controller is Ana Filipa Santos, 934 699275 - (contacts);

The data and information are intended for an experimental case study entitled "Augmented Reality in Retailtainment: An experimental case study of 'A Brasileira'", a master's thesis, and will not be processed in a manner incompatible with the purposes of the collection. Within this study, there are no risks involved for the participant. The participant may make this sharing of data and information as personal as desired, and the researcher shall not exceed these limits.

Personal data may be collected and/or used by the entities that constitute the European University and its partners, which are subject to the same confidentiality obligations. The sharing does not cause harm to the data subjects and is necessary to protect the vital interests of the data subject and/or is required by law. These data are retained for the period considered necessary for the intervention (deadline or, if not possible, criteria used to define that deadline) respecting their conservation as well as the guarantees of confidentiality required by the General Data Protection Regulation - GDPR;

During the transcription phase of recordings and processing of photographs/images, all information and personal data about the participant or the organization for which they work will be anonymized. All data collected during this study may be used for the preparation of a dissertation/thesis and/or scientific articles. Withdrawal from the study may occur before, during, and after data collection. After collection, the interviewee has three days to withdraw from the study. After three days, withdrawal is not possible due to time constraints for the researcher to find a replacement.

I, as the data subject, am entitled to the following rights:

- to request from the data controller access to, rectification, or erasure of my personal data, as well as the restriction or objection to its processing;
- to withdraw consent at any time, without affecting the lawfulness of the processing carried out based on the previous consent given, and whenever necessary for compliance with the

obligations of the data controller; and may exercise it in writing, via email, at dpo@universidadeeuropeia.pt. This includes the possibility of filing a complaint with the National Data Protection Commission (CNPD) and not providing one or more of the data requested in this data collection instrument.

- If you have any questions regarding this study, you may contact the principal investigator via email: 20220094@universidadeeuropeia.pt

Investigator's Name/Signature/Date

Participant's Name in the study/Signature/Date