# Proposal of an online grocery shopping application for the Moroccan market

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# ASSIGNMENT OF DIPLOMA THESIS
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## Theses guidelines

1. Provide the theoretical background of consumer behavior in the grocery sector in Morocco.
2. Define the main goal, state research questions, and choose adequate research methods.
3. Conduct primary research according to the goal of the work.
4. Evaluate and interpret the research results, and answer the research questions.
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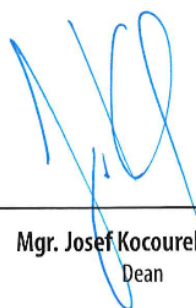GORDON, R. Foxall. 2014. *Consumer Behaviour: A Practical Guide.* Routledge. ISBN:1138832367.
MUNSON, Jo. TIROPANIS, Thanassis. LOWE, Michelle. 2017. *Online Grocery Shopping: Identifying Change in Consumption Practices.* Internet Science. INSCI 2017. Lecture Notes in Computer Science, vol 10673. Springer. ISBN : 9783319702841.
STAIANO, Fabio. 2022. *Designing and Prototyping Interfaces with Figma: Learn essential UX/UI design principles by creating interactive prototypes for mobile, tablet, and desktop.* Packt. ISBN: 9781800564183.

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## ABSTRAKT

Protože dochází k rostoucí oblibě online nakupovaní po celém světě, tato diplomová práce zkoumá potenciál online nákupu potravin v Maroku. Hlavním cílem práce je vytvořit návrh webové aplikace pro nákup potravin, která je zejména vhodná pro uspokojení požadavků a očekávání marockých zákazníků, s důrazem na supermarkety Carrefour jako subjekt projektu. Práce bude rozdělena do tří hlavních částí. Teoretické části, která zkoumá postoj zákazníků k nákupu potravin a elektronickému obchodování v Maroku. Výzkumné části, která zahrnuje průzkum provedený k otestování chování marockých zákazníků při nákupu potravin a v elektronickém obchodování, přičemž výsledky budou použity ve třetí část práce, kde bude diskutován návrh a vývoj aplikace. Projekt bude zahrnovat také testovací průzkum, který hodnotí uživatelskou zkušenost a shodu aplikace s cíli práce. Celkově tato studie přispívá k porozumění nakupovaní online a chování zákazníků v Maroku a poskytuje praktické řešení pro online odvětví nákupu potravin v zemi.

Klíčová slova: Online nákup potravin, e-commerce, spotřebitelské chování, uživatelská zkušenost, uživatelské rozhraní.

## ABSTRACT

Given the growing popularity of e-commerce worldwide, this diploma thesis investigates the potential of the online grocery shopping industry in Morocco. The thesis main goal is to propose a web application design for grocery shopping that is especially suited to satisfy Moroccan customers' demands and expectations, with a focus on Carrefour supermarkets as subject of the project. The thesis will be organized in three main parts, theoretical part that explores customers attitudes regarding grocery shopping and e-commerce in Morocco. Research part that involves a survey performed to examine the grocery shopping and e-commerce behaviors of Moroccan customers, with the results informing the third part of the thesis where design and development of the proposed application will be discussed. The project will include a testing survey as well that assesses user experience and the application's conformity to the thesis's objectives. Overall, this study contributes to the understanding of e-commerce and customer behavior in Morocco and provides a practical solution for the country's online grocery sector.

Keywords: Online grocery shopping, e-commerce, consumer behavior, user experience, user interface.

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# INTRODUCTION

The rise of e-commerce has altered the way in which consumers buy groceries. Online grocery shopping has grown in popularity, giving consumers more flexibility and convenience in their purchase practices. So far, the online grocery sector in Morocco is still in its development, with only a one dedicated grocery shopping app currently available. Thus, there is a need to investigate customer attitudes about online grocery shopping in Morocco and provide a solution to fill the market gap.

This thesis suggests an online grocery shopping application for the Moroccan market, with an emphasis on supermarkets of Carrefour brand. Beginning with a theoretical chapter of consumer behavior, the thesis provides an overview of Moroccan consumers' attitudes toward supermarkets and e-commerce websites. The research methodology and analysis part then gives the findings of a survey conducted to investigate Moroccan consumers behaviors towards the grocery shopping and e-commerce.

The design and development of the proposed grocery shopping application is informed by the survey results. The project section of the thesis describes the design and development process of the application, as well as the testing phase to evaluate user experience and determine the degree to which the application meets the objectives of the thesis.

This study is significant because it has the potential to address the demands of Moroccan customers and tap into the expanding online grocery sector. The proposed application purpose is to give consumers with a rapid and efficient method of grocery shopping, while simultaneously solving the challenges faced by the traditional in-store grocery shopping in Morocco. This diploma thesis contributes to the body of knowledge on e-commerce and customer behavior in Morocco and offers a practical solution for the country's online grocery sector.

# I.  THEORY

# 1 THE SIGNIFICANCE OF CONSUMER BEHAVIOR: EXPLORING INFLUENCING FACTORS AND ONLINE TRENDS

## 1.1 The need of studying consumer behavior

### 1.1.1 The Role of Consumer Behavior Research in Marketing

A consumer is any individual who engages in the consumption process. Consumers are individuals who make purchases for their own purposes or to meet the requirements of their families and households as a whole. Consumer behavior is the process through which individuals allocate their available resources, such as time, money, and effort, to the consumption of various goods and services. It includes what consumers buy, their motives, when and where they buy, how often they buy, and how often they utilize a product. The mental and social processes that occur before and after a person makes a purchase or uses a product or service are included in consumer behavior (Hoyer, Maclnnis & Pieters, 2012).

According to Leon G. Schiffman and Leslie Lazar Kanuk (2015), consumer behavior is the behavior that consumers exhibit in seeking for, purchasing, employing, evaluating, and discarding items, services, and ideas that they think will meet their wants. Consumer behavior is the manner in which a person acquires and utilizes goods and services. This action's decision-making process is influenced by the individual's personality qualities and environmental conditions.

The study of consumer behavior is extensive and diverse. Consumer knowledge and consumer behavior comprehension are not simple notions. It is nearly impossible to accurately predict consumer behavior in a particular situation. All marketing strategies are intended to influence consumer behavior in the desired direction. The success or failure of marketing initiatives and the organization itself is dependent on the outcome of this undertaking.

To develop effective communication strategies, marketers require knowledge of consumers' purchasing habits and preferred media formats. Information including:

- Who decides what to purchase?

- Who influences the purchase decisions of consumers?

- What motivates customers to take action?

### 1.1.2 Maximizing Business Potential through Consumer Behavior Analysis

Each effective business strategy must incorporate consumer behavior research. By gaining a deeper understanding of why and how individuals make purchasing decisions, businesses can tailor their products, services, and marketing initiatives to meet the needs and desires of their target market. So, it is vital to do research on consumer behavior in order to understand what motivates customers to purchase specific products, what influences their item selection, and how they perceive and respond to marketing messages.

One of its primary benefits is that it helps organizations better understand their customers. By studying consumer behavior, businesses can learn more about the preferences, attitudes, and motivations of their target market. This information can be utilized to create more successful marketing strategies when combined with improved product design and more individualized consumer experiences (Gordan, 2014).

Understanding consumer behavior is also essential for businesses to maintain their competitiveness. In today's fast-paced and fiercely competitive industry, companies that can anticipate and adapt to shifting consumer demands and trends are more likely to succeed. By analyzing consumer behavior, businesses can identify new trends and adapt their products and services to better meet the needs and preferences of their customers (Hoyer, Maclnnis & Pieters, 2012).

Moreover, consumer behavior research can help businesses make better decisions regarding pricing, distribution, and marketing strategies. By understanding the factors that influence client purchasing decisions, businesses may make more strategic decisions regarding the pricing of their products, the places where they will be sold, and the tactics used to sell them to their target market (Schiffman & Kanuk, 2015).

Eventually, the importance of understanding client behavior cannot be overstated. It is a vital component of any successful business strategy because it provides valuable information about what inspires customer behavior, how they perceive and react to marketing messages, and what influences their decisions. By analyzing consumer behavior, companies may improve product design, create more effective marketing efforts, and eventually increase sales and revenue.

## 1.2 Factors Influencing Consumer Behavior

The cultural, social, personal, and psychological aspects of an individual have a big impact on their purchasing decisions.

### 1.2.1 Cultural factors

**Culture:** A community's culture consists of the fundamental beliefs, values, desires, and behaviors that its members acquire from their families and other key institutions. In essence, culture is an intrinsic part of every community and a significant motivator of individual goals and actions. Because the impact of culture on purchasing behavior differs from country to country, marketers must be extremely cautious when analyzing the cultures of distinct groups, regions, or even entire nations (Gordan, 2014).

**Subculture**: There are numerous subcultures in every community, including those associated with distinct religions, nations, geographical places, racial groups, etc. By dividing the market into numerous small segments, marketers can utilize these subgroups. Marketers can build products that take into account the needs of a local group (Hoyer, MacInnis & Pieters, 2012).

**Social Class:** Social class is the hierarchical division of society into groups, each denoting a distinct social position or status. Social class has a tremendous impact on consumer buying behaviors, lifestyles, media habits, interests, and activities.

### 1.2.2 Social factors

Social considerations have an impact on customers' purchasing decisions as well. Family, role, status, and peer groups are key social influences.

**Reference Groups:** People influencing someone's attitudes and behaviors either directly or indirectly are their reference groups. Individuals take on these organizations' attitudes, concepts, and habits and then modify them to fit their own lives. Family and close friends are regarded as the most important reference groups in an individual's life because of their regular interactions with the person and the prominence of these significant persons in their lives. A person's secondary reference groups consist of friends, family, and acquaintances such as neighbors, coworkers, and classmates (Schiffman & Kanuk, 2015).

**Family:** The buying habits of family members are significantly influenced. Marketers are quite interested in the responsibilities and effects of the husband, wife, and kids. Marketers

will try to target women in their advertising if a wife influences a husband's choice to buy a particular product. It's critical to understand that as consumer lives change, so do the roles that consumers play.

**Roles and Status:** Each person has a unique function and status in society, depending on the groups, clubs, families, organizations, etc. to which he belongs. The consumer's social role and status have a considerable impact on his behavior and purchase decisions (Hoyer, Maclnnis & Pieters, 2012).

### 1.2.3   Personal Factors

Personal traits may also have an impact on consumer behavior. Significant personal factors that influence purchasing decisions include lifestyle, finances, employment, age, personality, and identity.

**Age:** Both age and stage of life may have an effect on a customer's purchasing behavior. Consumers gradually change the goods and services they purchase. Marketers are helped in developing solutions that are appropriate for each stage by the stages of the family life cycle, such as childhood, singlehood, motherhood, etc (Gajjar, 2013).

**Occupation:** A person's occupation has a big impact on their purchasing decisions. For instance, a company's marketing manager would make an effort to purchase business suits, whilst a low-level employee might opt to purchase rugged work attire.

**Economic Situation:** The consumer's financial status has a big impact on his buying choices. Consumers with large incomes and savings accounts frequently purchase more expensive things. On the other hand, a person with little income saved will purchase low-quality products.

**Lifestyle:** Consumer choices are significantly influenced by their way of life. A person's interactions with their surroundings and their way of life are referred to as their lifestyle. It is influenced by the customer's interests, viewpoints, and other activities and shapes their entire pattern of behavior and interaction with the outside world (Gordan, 2014).

**Personality:** Personalities differ from person to person, from time to time, and from place to place. As a result, it significantly affects how people respond while shopping. In reality, a person's personality is established by their actions in a variety of situations rather than by what they are wearing. It possesses a number of characteristics, including dominance and

self-assurance, that can be utilized to forecast consumer behavior for a particular commodity or service (Springer Behavioral & Health Sciences, 2022).

### 1.2.4 Psychological factors

Major psychological factors play a significant effect in customer choice. They are attitude, belief, motivation, and perception.

**Motivation:** A customer's level of motivation affects how they behave when making a purchase. Every individual has different requirements, including those that are physiologic, biological, social, and in other ways. Some of them are more urgent than others, which is how they need improvement. As a result, an urgent need becomes a motivator when it becomes more pressing, driving the person to seek fulfillment (Gajjar, 2013).

**Perception:** The process of selecting, organizing, and interpreting data to produce a meaningful sense of the outside world is known as perception. What a person believes about a particular good or service determines how they perceive it. People with the same desires could not buy the same goods because of perceptual variations. Three different perceptual processes include selective attention, selective distortion, and selective retention. Individuals who engage in selective attention pay attention to information that will be beneficial to them or members of their immediate family. Contrarily, consumers are more likely to understand information selectively twisted in a way that confirms their preexisting views and opinions. Consumers keep knowledge that they would find important and quickly forget the rest, which is similar to selective retention (Springer Behavioral & Health Sciences, 2022).

**Beliefs and Attitudes:** Consumers have specific views and attitudes regarding various products. These concepts appeal to marketers because they help create brand perception and affect customer purchase behavior. Marketers can affect the attitudes and beliefs of their target audience by launching focused activities in this area (Gordan, 2014).

## 1.3 Specifics of online consumer behavior

In the digital age, it is becoming more and more important to comprehend the characteristics of online consumer behavior. This section will look at the various aspects of online consumer behavior, including trends, motivating reasons, and the impact of social media. Understanding the unique characteristics of online consumer behavior helps businesses better understand their target customers and adjust their strategies.

In the digital age, a study by Pappas et al. (2016) on identifying patterns of online customer behavior is quite relevant. As e-commerce has expanded, understanding consumer behavior has become increasingly important to business success. The study revealed three unique types of online consumer behavior, including "bargain-hunters", "comparison-shoppers", and "loyal customers". Comparative product evaluation is more important to "comparison shoppers" than comparative product evaluation is to "bargain hunters," who are prepared to seek extensively for the best bargains. On the other hand, a "loyal consumer" is more likely to purchase products from the same store due to loyalty and trust. According to the study, firms may benefit from better concentrating their efforts on marketing and customer service if they are aware of these three unique patterns of online consumer behavior. This is due to the fact that each type of consumer requires a different marketing approach. For instance, the "cheap hunter" may be lured to coupons and discounts whereas the "loyal client" may be more open to rewards and loyalty programs (Pappas et al., 2016).

The modern period has unquestionably seen a growth in the significance of online customer behavior. Thus, it is essential to look into the factors influencing this behavior. Jin et al. (2014) did a study to learn more about how attitudes, perceived risk, trust, and perceived utility impact online customer behavior. The results of their study showed that while trust, perceived danger, and attitude are highly connected with online customer behavior, perceived utility is not. The findings of this study aid our comprehension of the factors influencing customer behavior online. The findings suggest that consumers' behavior when making online transactions is significantly influenced by trust, attitude, and perceived risk. This demonstrates how important it is to create a trusting relationship between online merchants and customers as well as to create a positive perception of online shopping. The findings also suggest that perceived utility is not an important factor in online consumer behavior and shouldn't be a major consideration when creating a successful online buying experience (Jin et al, 2014).

Duan, Yu, Cao, and Levy (2015) looked at the impact of social media on online shopper behavior. Researchers found that social media marketing improves the chance that a customer will be motivated to make an online purchase. This is mainly due to the fact that social media platforms allow businesses to promote their products with a far larger audience than they could with conventional marketing techniques, which in turn attracts more potential customers. Users who are exposed to a product on social media can increase its reach even further because they are more likely to tell their friends about it. The authors also

discovered that people are more likely to purchase items that are connected to positive social media experiences. For instance, if a customer had a positive experience with a product that was previously advertised on social media, they would be more likely to purchase it. This emphasizes how important it is for businesses to use social media to enhance customer experiences because it may have a big impact on how customers behave online.

When it comes to client behavior online, making certain they feel valued and protected is the most important factor. Building a culture of trust, being aware of their requirements, and exceeding their expectations can help businesses successfully engage with clients on an e-commerce platform (Driediger and Bhatiasevi, 2019). Businesses must recognize the advent of online consumerism and meet the expectations of their customers due to the rapid advancement of technology and its integration into daily life. A company's ability to offer customers value, meet their needs, and develop to its full potential depends on its understanding of the specifics of online consumer behavior.

# 2 THE MOROCCAN CONSUMER BEHAVIOR: EXPLORING ATTITUDES TOWARDS THE RETAIL SECTOR AND E-COMMERCE

## 2.1 Consumer behavior of Moroccans towards retail chains

### 2.1.1 Development of retail sector in Morocco

During the last decades, the world witnessed a sustained and irreversible evolution of the retail sector in most emerging countries, which plays a major and crucial role in their economic and social system. Indeed, the distribution landscape in these countries has undergone significant transformations, they have thus witnessed a real modernization of the distribution system which has taken place with varying speed depending on each country.

Morocco, meanwhile, is no exception, and has experienced a real boom in its retail sector over the past three decades. Despite its relative youth, the retail sector in Morocco remains one of the most dynamic and attractive in Africa, particularly in North Africa, and plays an extremely structuring role in the Moroccan economic fabric, with an average growth of 15% during the last five years and a significant participation in the formation of the GDP of about 12%, and a relatively important contribution in the evolution of consumer taste. However, this sector faces fierce competition from the traditional trade sector, and is still struggling to exceed 15% of the domestic trade market share. Consequently, it follows that its contribution remains negligible compared to Western countries where this share peaks at more than 80% (Daanoun & Messaoudi, 2017).

An exploratory study carried out with managers in retail sector in Morocco, demonstrated the existence of several major problems which slow down the development of the large-scale distribution. In fact Daanoun & Messaoudi (2017) were able to group together all the problems explaining the reasons for the slow pace of development of modern distribution despite the existence of assets and opportunities that are likely to revive this activity. The main problems identified in the study are related to product prices, high costs incurred by the modern distribution sector (such as taxes, duties, electricity, and labor costs), the cultural habits of Moroccan consumers who are accustomed to bargaining, high real estate prices (especially in big cities), non-transparency in the distribution market (including the existence of national importers who engage in fraud and sell without invoices to traditional traders to

avoid paying taxes), lack of skilled talents specialized in the retail sector, existence of informal trade and smuggling, absence of sector regulation, low purchasing power of Moroccans which leads to the absence of a sufficient average consumption basket, and high transport costs that lead to high prices of imported products.

### 2.1.2 Understanding Consumer Behavior and Perceptions in the Moroccan Retail Sector

Despite the difficulties experienced by the sector, the last thirty years have seen the birth and development of retail sector in Morocco, which has structured and even completely redesigned the commercial landscape. This phenomenon has not left Moroccan consumers indifferent. Initially visiting supermarkets out of simple curiosity, they gradually got used to them without neglecting other distribution channels which offer them other advantages. The implementation of promotional tools is a situational factor that strongly influences the behavior of Moroccan consumers. The impact, according to professionals, is remarkable and the return on investment is real. This explains the development of the use of these tools.

The diversity of products represents an important attraction for the Moroccan consumer. It allows him to avoid multiple trips to different points of sale. Nevertheless, the consumer is fascinated by self-service with the risk of being frustrated at checkout. With this new form of distribution, the consumer must learn to become independent, to find the products he wants to buy himself, but also to make his own accounts before going to the checkout. In addition, he is required to develop a real purchasing strategy by putting the different offers into competition. The undecided consumer has several choices concerning the points of sale. From now on, in addition to the choice of products, the consumer must also choose among the distribution formulas. Indeed, a study conducted by the National Democratic Research Institute among different socio-cultural categories revealed that the consumer seeks to combine between local shops and supermarkets to take advantage of the complementarity between the two forms (Souaf & Mekkaoui, 2009).

The motivations of Moroccan consumers for going to supermarkets are self-service and freedom to move and choose product in stores, hygiene and cleanliness of supermarkets, variety of products, and discounts. Nevertheless, they attach little importance to the atmosphere and animation of the point of sale (Souaf & Mekkaoui, 2009).

According to a study conducted in 2016 by Brouziyne and Lakhrif, about the exploration of the effects of the perceived crowd on the perceptions and behavior of the Moroccan consumer in the context of large and medium-sized stores, the results showed that the perception of the Moroccan consumer towards the price and the level of quality in a supermarket chain is not significantly influenced by the crowd, while the quality image of the store is very affected by the price levels displayed in this store. The ability to tolerate crowds had neither a direct effect on crowd perception nor an indirect effect on the consumer's decision to access or return to a store with high crowd levels.

In fact, among the most important results of the study, Brouziyne and Lakhrif (2016) demonstrated the absence of perceived crowd effects on both perceived price and perceived in-store quality, which supports Hall's (1966) results and his classification of cultures as contact cultures (Arabs, South Americans) and non-contact cultures (Americans, Europeans). This study states that the perceptions of people from contact cultures are less constrained by high densities than those from non-contact cultures, thus the perception of customers in Morocco towards price and quality in store does not seem to be affected by high crowd levels.

Another very important result of Brouziyne and Lakhrif study (2016), is the importance of price perceived among Moroccans and its effect on the perception of quality. This is because the overall quality image of the store is closely influenced by the price levels in that store. For the Moroccan consumer, a store that offers products at high prices generally offers products and assistance according to high quality standards. It should also be pointed out that, according to the study, the personal dimension (ability to tolerate high densities) does not seem to significantly change the decisions of the Moroccan consumer to access or revisit a store known for high levels of crowding. The reason that indicates that the commercial decisions of Moroccan consumers are guided mainly by price. Although the segment of customers concerned by the "movement" of mass distribution in Morocco is a young, relatively educated, and middle-class clientele, the price remains the key component in the perception of the image of retail chain brand, and the crowd are not a limiting factor.

Amine & Lazzaoui (2011) performed research on Moroccan consumers' perceptions of modern food retailing systems in order to analyze the behavioral variations between Moroccans from various social classes regarding supermarkets. Despite the fact that Morocco's population is diverse and split into three social classes (low, middle and upper segments). Their differences in education, way of life, and degree of allegiance to traditional

and religious views are all surprising. Because of this, these different client groups could go to the same stores for various reasons. According to the study, by examining consumers' representations and shopping behaviors within modern vs. traditional food stores, we can distinguish two main homogeneous discourses that refer to high and medium vs. low social groups that are distinct in terms of access to consumption (purchasing power, transportation options, and housing location), access to education (level of education), and openness to other cultures (travelling abroad, speaking languages). The study's findings show how hypermarkets are viewed as a setting for conflict between socioeconomic classes. Modern retail shops are frequented by various social groupings, but not generally for the same reasons.

Early adopters of the modern retail network in Morocco were the wealthiest, who used it as their main source of supplies. Consumers from the middle class soon followed after a while. Observations have revealed that a variety of items, including necessities like food and cleaning products that are frequently bought on the traditional circuit, are included in the shopping carts of these individuals. This shows how these customers have gotten used to and are supporting this new form of supply. Along with these "refined" items, high-income clients' trolleys often contain frozen meat, pie, cheese, smoked salmon, and "foie gras" which may not necessarily fit into the nation's typical consumption patterns. This particular client base views shopping more as a duty that needs to be finished in a short amount of time than as a leisure activity. The hypermarket would also be the ideal store for these clients to maximize their time.

The modest groups, on the other hand, see a walk through a supermarket as a pleasant exercise. Usually, they go there with their families for enjoyment and wandering around rather than necessarily to shop. This particular group of customers is curious to learn more about the products offered by these enormous stores, which although they have never been to, serve as the temple of consumption and convey luxury due to the accurate presentation of the products. Consumers in modest categories are nonetheless given a basket or shopping cart, an essential item and sign of immersion in the experience of consumption, even though they typically stick to a few promotional items and other small purchases. They expressly show their ability to shop in these kinds of stores by showing the bag bearing the store's emblem (Amine & Lazzaoui, 2011).

Modern retailing, which is located on the outskirts of the city, has long been perceived as being exclusive to customers from the humble class who feel that it is both physically and

symbolically distanced from them. As they were initially mostly frequented by members of the upper classes, these stores are perceived as not being meant for the lower class. For them, it is profoundly significant that they have to overcome psychological and social barriers in order to access these businesses and make a few small purchases.

Like many other developing countries, Morocco's big cities have a system of food retail ruled by conventional units (small neighborhood grocery stores), which are independent and unconnected but are strong due to their close proximity and geographical compactness. Customers are able to purchase frequently in small amounts and develop fragmented buying habits for a variety of product categories because of their close proximity. Daily supply missions to conventional establishments are consequently initiated because of their closeness and the intrinsic desire for engagement and social ties with the store owner and other customers (even without a purchasing goal). These purchasing practices are expanded to hypermarkets rather than declining in comparison to traditional commerce. For the consumers who revert to fragmented patterns of purchasing due to cultural factors, it is necessary that a modern retail establishment is situated close to a residential area (Amine & Lazzaoui, 2011).

## 2.2 Moroccans consumer behavior towards e-commerce

### 2.2.1 The Impact of E-Commerce on Morocco's Economy and Society

E-commerce is an extremely powerful tool for Moroccan companies, especially those looking to strengthen their business activities and improve their performance. In a report published by Soudane and Bendraoui (2018), it is clear that Moroccans are increasingly interested in e-commerce. The development of this industry is supported by factors such as the increase in the number of Internet users, the availability of new technologies and the development of commercial and financial infrastructure. However, e-commerce in Morocco also presents many challenges. For example, lack of consumer confidence and lack of consumer protection mechanisms are significant issues, in fact the study demonstrates that 97,3% of payments in e-commerce are done through cash on delivery. Moreover, the lack of skills and knowledge in digital technologies and data security is another obstacle for companies looking to develop their e-commerce activities. Thus, the benefits and challenges of e-commerce in Morocco are connected, and businesses will need to meet the challenges to fully reap the benefits of e-commerce.

E-commerce opens up new opportunities for Moroccan companies. These opportunities are linked to the implementation of new technologies, which allow companies to position themselves on global markets, to adapt to different market segments and to better optimize their operations. E-commerce also offers Moroccan companies the opportunity to reduce costs, which, in turn, allows them to offer products at more competitive prices and take advantage of greater operational efficiency. In addition, e-commerce allows Moroccan businesses to access valuable information about their consumers, allowing them to better understand their needs and better tailor their products and services accordingly. Finally, e-commerce allows Moroccan companies to compete on an equal footing with their competitors on an international scale and to take advantage of the advantages offered by international trade (Bouayad & Tabyaoui, 2022).

The social and economic implications of the development of e-commerce in Morocco are considerable. According to Khalkhali and Elghazouli (2017), the development of e-commerce in the country has led to a reduction in production and distribution costs, which has contributed to lower product prices. This has therefore favored household consumption and led to economic growth. Moreover, the development of e-commerce helps to increase employment, because it creates jobs in the logistics and technology sectors. It also encouraged innovation and sustainable development. Indeed, e-commerce promotes the creation of new, more efficient, and ecological products and services. Moreover, the development of e-commerce has encouraged equal opportunities and social inclusion, as it provides economic opportunities to people from disadvantaged backgrounds (Khalkhali & Elghazouli, 2017).

Finally, the development of e-commerce has allowed businesses to diversify and open up to new markets, which has contributed to economic growth and improved living conditions for citizens.

### 2.2.2 Understanding the Moroccan consumer behavior in the digital age

Moroccan consumer behavior online is influenced by several factors. According to Riad and Ouidad (2022), price, product features, website content, consumer satisfaction and trust are important factors that can influence the behavior of Moroccan consumers online. Price is one of the main factors that can influence the behavior of Moroccan consumers. Moroccan consumers are more likely to choose low-cost products, as they have limited budgets and are

looking for affordable products. In addition, product characteristics are also important for Moroccan consumers. Moroccan consumers are more likely to buy products that meet their needs and expectations. In addition, the content of the website is very important for Moroccan consumers. Moroccan consumers are more likely to visit websites that offer detailed information and a user-friendly interface. Moroccan consumers are also sensitive to satisfaction and trust. Moroccan consumers, according to the study, are more likely to buy products from companies that offer an excellent experience and a good reputation. In sum, price, product features, website content, consumer satisfaction and trust are important factors that can influence the behavior of Moroccan consumers online.

The benefits of shopping online, such as convenience and product variety, were also cited in the study as important factors. Although Moroccan consumers are willing to pay more for higher quality products, they are also very sensitive to promotions and discounts. Moroccan consumers are also very active on social media, which allows them to discover new products and compare prices between different suppliers. Online consumers are very aware of the factors that influence their purchasing behavior. The behavior of e-consumers is influenced by the means of communication used by websites and, more particularly, by advertising campaigns on social networks. Facebook and Instagram have a significant impact on consumer intent, making consumers remember products and services that interest them and leading to impulse purchases. In general, impulse purchases occur when consumers are visually exposed to a product, and impulse purchases are stimulated by attractive offers on the website, advertising messages and sales incentives. Finally, when it comes to the security of online shopping, Moroccan consumers are very aware of the risks and tend to rely on well-known websites and trusted suppliers. These preferences can be used by suppliers and retailers to improve their products and services and attract more Moroccan consumers online (Riad & Ouidad, 2022).

Another study conducted in Morocco which main purpose was the identification of factors that influence the consumer behavior of Moroccan citizens to adopt online purchase instead of traditional channels, a survey was conducted towards 7395 respondents in a database of Moroccan e-commerce websites. The results demonstrated that convenience is the main motivation for consumers choosing to shop online. Convenience in this context implies an easier shopping experience, freedom of time and less effort. The second underlying motivation for online shopping, according to the study, is variety, stores can be reluctant to stock products aimed at niche markets, leaving part of the market disappointed. However, a

wider range of products ultimately leads to better decision making. When consumers see that they can make better purchasing decisions through online shopping, it creates greater motivation to buy. Variety ultimately has a positive impact on online shopping acceptance, which the study results support (Alla & Rajaa, 2022).

Trust is another major concern when consumers decide whether or not to make a purchase on the Internet. In the absence of physical interaction with the seller, the risk for the buyer increases. The study made by Alla and Rajaa (2022) support this argument in the context of the Moroccan market, indicating that the importance of trust increases in online shopping. Furthermore, the relationship with the perceived price is positive and significant. This can be attributed to the fact that most of the respondents of the study were from a middle-income group where price would have been such a big factor. The positive relationship between perceived price and acceptance of online shopping can be explained by the increase in prices due to inflation and currency fluctuations, so that customers perceive e-commerce to be cheaper than conventional means of purchases.

The consumer decision-making process and the business models of many organizations have both been impacted by the significant digital change that has occurred over the past 10 years. Actually, it appears that businesses are conscious of the enormous power of digital tools as a means of expression and a way to communicate consumer experience. An article published by Guelzim and Mdarbi (2022) about influence marketing in social media in the case of fast-moving consumer goods companies in Morocco, aimed to provide an exploratory overview about digital influencing practice through qualitative research based on semi-structured interviews with practitioners in the Moroccan market. The results show that the rather positive notion of the proximity created through human incarnation, which would be synonymous with influence strategies on social networks according to the study interviewees. Influencers would create a kind of bridge linking brands to Moroccan consumers. Among the positive effects cited by respondents are participation in the construction of brand awareness, the strengthening of emotional attachment to the brand and the improvement of positive perceptual value. Influencer marketing would have a positive effect on them Moroccan consumer's ability to identify the brand. The experts highlight the sentimental character embodied by the digital ambassadors who represents the brand, they affirm the transfer of sympathy and affection towards the brand, which by transitivity, would create an emotional attachment between the consumer and the brand. Indeed, in the Moroccan market, according to the study, using an influencer to carry a brand's messages

would also help improve brand perception and image, which experts say would look more positive in the eyes of the consumer. Indeed, the overall judgment of the target groups is improved, and the superiority anchored in the subconscious of the consumer more effectively after an efficient use of influence marketing. As for the key factors for the success of the use of influence marketing, the study highlights three essential levers according to the experts interviewed. The quality of the choice of the influencer, the time factor, and the homogeneity of the communication campaign in general.

To investigate about the determinants of online purchasing of organic food products among Moroccan consumers, Zemrani and Hamadi (2020) published an article about their study that demonstrated that speed and ease of use are the main motives that pushes Moroccans to use e-commerce websites. Indeed, respondents of the study stated that the advantages of online purchase are fast and targeted research, no line in front of the checkout, possibility to read testimonials, and everything is done in one click without even having to move. Other respondents insist on a significant element which is access to consumer reviews which makes the choice of products online easier for them. On the other hand, several respondents stated that they don't make their purchases online due to restrictive payment methods, they cannot judge the product based on photos only, payment on delivery is more suitable payment method for Moroccans according to the study. Sometimes delivery cost, are also a limiting factor to make an online purchase, sometimes more important than the price of the product itself, according to study respondents. These responses show that considerable efforts still need to be made in this direction in order to encourage e-commerce adoption.

Moroccans recently are getting more and more used to purchase organic food products online, the products that are most purchased in Morocco are olive oil, vegetable milk and seeds. The shopping experience is perceived generally good by Moroccans, however, there are still efforts to be made in order to make the user experience even more interesting. The opinion of other consumers is a fundamental parameter to be taken into consideration before putting a product in the basket, it becomes a reflex for all Moroccan cyber-consumer, some of them state that they cannot place another if they don't see good reviews about it. The opinion of consumers is considered useful especially for a first purchase (Zemrani and Hamadi, 2020).

We can conclude that the behavior of the Moroccan consumer online is constantly changing. The motivations related to the purchase of products online is related to speed, targeted research, time saving, variety of choices. However, the rising interest in the purchase

products and services online is due to the price which can sometimes be more attractive. Previously, the majority of Moroccan internet users only bought local products and international services online, but their interest in foreign products and regional platforms has increased considerably, and they are more motivated by finding the best offers on the market. The COVID-19 pandemic has also helped accelerate the adoption of online shopping, which has created a favorable environment for businesses to keep up to date with current trends and provide true integrated customer service online.

# 3 RESEARCH METHODOLOGY

## 3.1 Main objective

The main goal of the thesis is to investigate and comprehend the variables that influence Moroccan customers' adoption and utilization of online grocery services. By doing this, the purpose is to suggest a web application design that is especially suited to satisfy Moroccan customers' demands and expectations. Its design will consider elements like usability, convenience, brand trust, and other crucial factors that the research has discovered. Carrefour supermarkets are chosen as subject of this thesis.

Based on the findings of the study, which will involve a survey with Moroccan consumers who have used or are considering utilizing e-grocery services, the web application design will be created. The design will be made with the intention of producing a user-friendly and intuitive platform that satisfies the specific requirements of Moroccan consumers while still being consistent with Carrefour's brand identity.

## 3.2 Sub-goals

The specific objectives of the study derived from the general goal stated above are described as following:

- Determine usefulness of e-grocery in the Moroccan market.

- Find out the main factors that contribute to making people more interested in buying their groceries online.

- Propose a web and mobile application for e-groceries adapted to the Moroccan customer behavior.

## 3.3 Research questions

Questions that will be investigated in this thesis research are the following:

- RQ1: Who are the people that are more interested in buying groceries online?
- RQ2: Which factors can contribute to make people interested in buying groceries online, and how to encourage them to consider it?
- RQ3: Which features the e-groceries app should have to appeal to the Moroccan consumers?

## 3.4 Research methods: Quantitative and Qualitative research

Quantitative research refers to the systematic gathering and examination of numerical data, typically by means of surveys, experiments, or other statistical techniques. Quantitative research has the potential to give exact and objective measurements, which can assist researchers in identifying patterns and correlations between variables. This is especially important for determining cause-and-effect links and evaluating theories. In addition, quantitative research facilitates the comparison of data across several groups or time periods, making it a potent instrument for assessing trends and formulating predictions (Rahman, 2017).

Even if quantitative research is a good way to gather numbers and evaluate ideas, but it may not show the full complexity of a phenomenon or consider individual experiences. In order to get a deeper understanding of the phenomenon being examined, it is often necessary to supplement quantitative study with qualitative research. By using qualitative research methods, we can collect information that is more nuanced and context-specific, complementing the results of quantitative data analysis. This can contribute to the success of the thesis project and provide a more comprehensive response to the thesis objectives.

# II. RESEARCH CHARACTERISTICS AND ANALYSIS

# 4 RESEARCH CHARCTERISTICS

## 4.1 Research design

### 4.1.1 Quantitative research

Due to their ability to collect substantial volumes of data that can be statistically examined, quantitative research methods are frequently utilized in market research. Particularly when used as a research method, online surveys provide several benefits, such as the capacity to reach a broad and diverse audience rapidly and effectively, and the simplicity of data collection and processing.

Regardless of their location or availability for in-person interviews, data can be gathered from a wide spectrum of Moroccan supermarket customers by employing an online survey. Also, online surveys facilitate the access to both current and potential users of e-grocery applications, which can offer important insights into the variables influencing consumer acceptance of these services.

Quantitative research techniques are also very helpful for finding patterns and connections in huge datasets, by utilizing statistical analysis methods to find significant associations between characteristics like age, occupation, online purchasing habits, and adoption of e-grocery by gathering numerical data from the online survey and analyzing it.

Overall, employing an online survey as a research tool allows to quickly and affordably collect large amounts of data, evaluate it, and find important patterns and associations that can guide the creation of an e-grocery application in Morocco.

### 4.1.2 Sampling method

To respond to our research question "Who are people that are more interested in buying groceries online, and how to encourage them to order online for home delivery?", We need to make a survey online and ask randomly people to answer the questionnaire. We will take a sample size of around 300 people, divided in 3 main age groups.

The quasi-representative sampling method is a type of non-probability sampling that involves selecting participants based on certain predetermined criteria, such as age, gender, or location. In this thesis research case, age was chosen as the criterion for selecting participants, and have divided the sample into three age groups: 20-30, 30-40, and 40-60.

There are several reasons that makes this sampling method more appropriate for the study. First, by selecting participants based on age, we can compare and identify which age group is more inclined towards e-groceries. This can provide valuable insights into the demographic factors that influence consumer adoption of e-grocery services in Morocco and can help inform marketing and product development strategies for retailers.

With the same number of respondents for each age group we can compare and identify which population segment, based on age, is more inclined towards e-groceries. Second, by selecting participants randomly within each age group, we can ensure that the sample is representative of the population of Moroccan supermarket customers within each age group. This can help to reduce bias and increase the objectivity of the findings.

### 4.1.3   Data collection method

Google Forms, a user-friendly online survey tool that is frequently used for research purposes, will be utilized to conduct the survey online. Google Forms is quite simple to use and adaptable to the research needs. It enables to construct surveys with several question types, including short response, checkbox, and multiple-choice questions, and adjust the design and layout. Moreover, Google Forms enables real-time data collection, making it possible to examine survey replies immediately after they are entered. This can be very helpful for performing quick and effective data analysis. Google Forms can also be viewed from any device with an internet connection because it is a web-based tool. This can broaden the survey's appeal and accessibility and make it possible to obtain information from respondents who might not have had access to other survey methods.

Given that French is the second most spoken language in Morocco and the most commonly used on the internet, the survey will be conducted in French language. The questionnaire is also available in English version for the thesis demonstration purposes (see Appendix).

### 4.1.4   Design of the questionnaire

To align with the research objectives and reply to research questions, the questionnaire was designed grasp better understanding of Moroccan consumer behavior and acceptance towards potential adoption of e-groceries. The questionnaire will start with first questions about habits of respondents regarding supermarkets and grocery shopping in general. These questions will cover how frequently they go to supermarkets, ease of finding enough time to

make groceries, and the overall customer experience when visiting supermarkets. Next questions will cover habits regarding online purchase experience, where we will investigate respondents experience with e-commerce websites, their degree of satisfaction, and if they used any e-grocery service before.

Following questions will investigate in more details the factors that can influence customer attitudes regarding online purchase. This will help to reply to the second research question:" Which factors can contribute to make people interested in buying groceries online, and how to encourage them to consider it?". In this part of the questionnaire, respondents will rate first the importance of different factors regarding e-commerce platforms, and then the importance of functionalities that those platforms could offer. More following questions will cover more detailed aspects regarding e-grocery experience such as preferred payment method, and some specific features that an e-grocery application can offer to attract the Moroccan consumer. Finally, last questions of the survey will cover the demographical aspects of respondents, such as genre, age, and occupation.

## 4.2 Significance of the Study

Many Moroccan studies are concentrated on e-commerce. There are several studies regarding the utilization and acceptance of e-commerce, but few of them (if not none) focus on e-groceries. Thus, the findings of this study will assist Moroccan supermarkets and retail chains in making informed decisions regarding their participation in the e-grocery business development. The retail chain Carrefour Morocco was selected as the focus of this study. The findings can assist supermarkets, hypermarkets, and even grocers in gaining a better understanding of customers' online grocery shopping attitudes and behaviors. Additionally, the outcome can be used to identify implementation-related problems and develop better solutions to win customer's trust.

Consumers must also be taught on how to utilize the e-grocery system to its maximum potential. Most people perceive traditional grocery shopping, which entails going to the store and selecting their own items, to be too convenient. Thus, it is essential to know how consumers perceive online grocery shopping and how they can accept it over traditional in-store shopping. If e-grocery in Morocco continues to grow, the purchasing process will eventually change, creating a new competitive landscape for retailers across the country.

# 5 RESEARCH RESULTS AND ANALYSIS

## 5.1 Interpretation and analysis of research results

For this research an online survey was conducted among Moroccan population asking them about their purchase behavior towards supermarkets, the number of respondents was 303 people in total with an approximate similar number of respondents for each age group between 20 to 60 years old, this specific age range is the focus of our research, and unfortunately we were not able to find enough respondents for age groups under 20 and over 60, but we assume that this will not affect the research results since the main target group for supermarkets are active people and adults with age over 20.

For the tree age groups: 20 to 30, 30 to 40, and 40 to 60 years old, as seen in Table 1 approximately the same number of respondents was collected, with respectively 89, 87 and 86 respondents per age group. Younger population, especially in Morocco are still dependents on their parents and don't usually have a stable revenue, therefore are not really considered as a target group for retail chain stores. For the older population (over 60), they could be considered as a target segment for supermarkets, but all statistics show that they are not users of e-commerce apps and websites, and therefore are not considered as target group in the online business in general.

| Age Groups | Count |
| --- | --- |
| 20 to 30 | 89 |
| 30 to 40 | 87 |
| 40 to 60 | 86 |
| Under 20 | 26 |
| Over 60 | 15 |
| **Grand Total** | **303** |

Table 1: Respondents by age groups. (source: own research)

To take a look at the general demographic profiles of respondents, for gender we obtained a majority of about 59.5% of female respondents, against 40.5% of males. Respondents replied also that their occupation schedule was mainly full time with a majority 76,6%, followed by part time occupation of around 17.5%, and only around 6% for people retired or without current occupation (Figure 1).
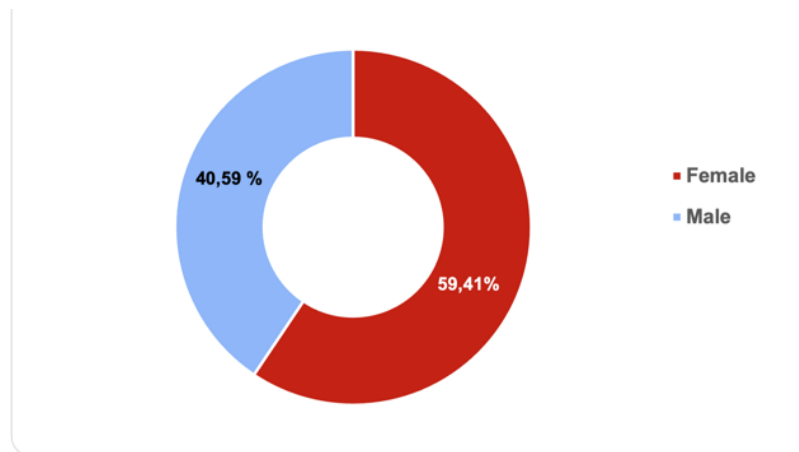
Figure 1: Gender of respondents. (Source: own research)

The first question in the survey where we aimed to see at which frequency people go to supermarket, results show that a big majority of respondents acknowledge that they go to supermarkets for groceries once a week. In fact, as illustrated in Figure 2, about 43% of respondents go to supermarket once a week. In second position, a quite big portion of our respondents (28%) stated that they go supermarket many times a week, followed by a frequency of once or twice a month with a percentage of 24% from total respondents. However, about only 5% of respondents stated that they go to supermarkets rarely. From those results, we can conclude that supermarkets became a usual place for Moroccans from where they buy groceries, since their expansion in many cities in the last previous years. Retail chains changed the consumer behavior of Moroccans who, in the past, according to studies we discussed in the theoretical part, were used to shop daily from small grocery shops that are found in all the streets in Morocco, to switch to a more modern shopping behavior and go to supermarkets often to get products they need in their daily life.
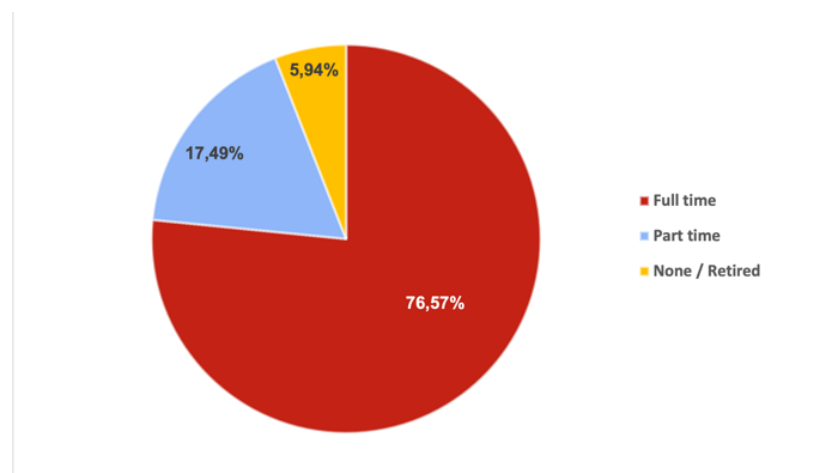


Figure 2: Occupation of respondents. (source: own research)

The second question in the survey addressed the point of ease to of finding enough time to do groceries, to see how people perceive the time they allocate to do their daily groceries, and how they manage finding enough time for this specific activity. The vast majority of our respondents recognized that it's "difficult" or "depends on the day", with respectively 130 and 114 respondents. While only 54 respondents stated that it's easy for them to find enough time for groceries (Figure 3). We can conclude from those results that most people perceive that making groceries is an activity that consumes their time, and they perceive that it's usually hard for them to manage to find enough time for it.
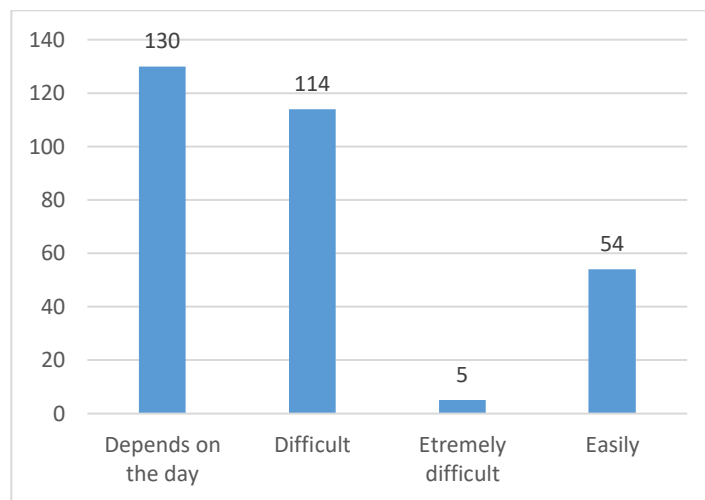


Figure 3: Ease to find enough time to do groceries. (source: own research)

Finding time to do groceries can be challenging, Table 2 shows that the majority of respondents (105 full-time workers, 7 part-time workers, and 2 people with no occupation schedule) found it difficult to find enough time to do groceries. This suggests that many people struggle to balance their work and personal responsibilities, including shopping for food.

Among those who found it difficult to do groceries, the majority were full-time workers. This could be because full-time work schedules can be more demanding and leave less time for personal errands like grocery shopping. Part-time workers were more likely to say that it depends on the day or that they find it easy to do groceries. This may be because they have more control over their schedules and can plan their grocery shopping around their work hours. While only a small number of respondents found it extremely difficult to do groceries, it's still notable that some people are struggling to find time for this basic task. This could be

due to a variety of factors, including long work hours, lack of access to transportation, or other personal responsibilities that take priority.

| Row Labels | Occupation Schedule | | | |
| | Full-time | Part-time | None(or retired) | Grand Total |
|---|---|---|---|---|
| Depends on the day | 95 | 26 | 9 | 130 |
| Difficult | 105 | 7 | 2 | 114 |
| Extremely difficult | 5 | 0 | 0 | 5 |
| Easily | 27 | 20 | 7 | 54 |
| **Grand Total** | **232** | **53** | **18** | **303** |

Table 2: Ease to find enough time for grocery shopping by age groups. (source: own research)

When asked about the availability of products needed when they go to supermarkets, a majority of around 54% of respondents stated that sometimes they don't find some of the products they need on supermarkets. Moreover, around 32% of respondents recognize that there is always something missing while they go for groceries. When only 14,5% of them said that availability of items was never an issue for them (Figure 4). This implies that it occurs quite often that products in supermarkets are out of stock, which could negatively impact the consumer experience, since customers usually go to retail chains stores with the expectation of finding all the products they need. This, if it occurs quite often could lead to a potential client dissatisfaction, since going to supermarkets will be perceived less convenient.
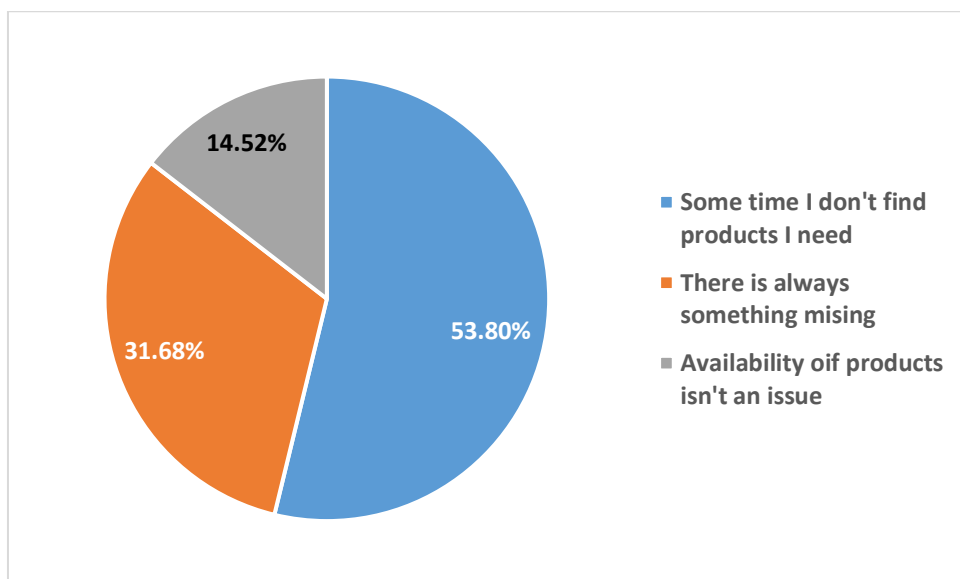


Figure 4: Availability of items needed when going to supermarket. (source: own research)

The following question regarding if customers, in general, enjoy going to supermarket, majority of respondents stated that they only do it because it's necessary. While fewer respondents claim that they enjoy it. In fact, 172 respondents go to supermarkets only because they think it's necessary, while 73 stated that it's usually a pleasing experience (Figure 5). From this we can conclude that most people perceive that supermarkets are only a place they go to fulfill their needs, and do not particularly find pleasure while experiencing the grocery shopping.
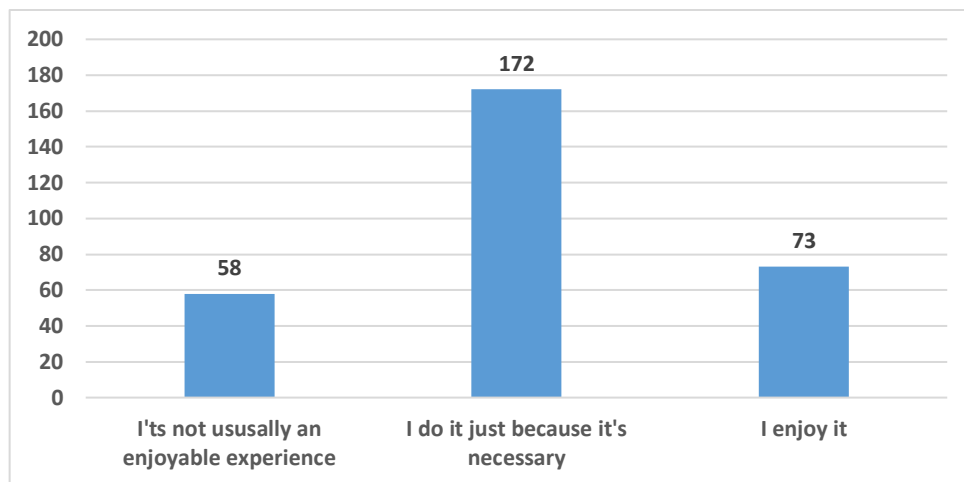
Figure 5: Enjoying the grocery shopping experience. (source: own research)

Concerning the perception of the grocery shopping experience for each age group, we can note that respondents under the 40 years old age (20 to 30, and 30 to 40) perceive it as an not enjoyable experience. In fact, around 38% of respondents for each of the two age groups don't usually enjoy going to supermarkets. On the other hand, respondents who answered that they usually enjoy going to supermarkets tend to be on the older age group (over 40 years old) with around 37% of respondents who gave the same answer (Table 3). It can be concluded, from the results, that younger generation under 40 years old don't usually enjoy going to supermarkets, or the grocery shopping experience in general. While people over 40 tend to enjoy it more.

| Row Labels | Age groups | | | Less than | Over |
| --- | --- | --- | --- | --- | --- |
| | 20 to 30 | 30 to 40 | 40 to 60 | 20 | 60 |
| It's not usually an enjoyable experience | 37,93% | 37,93% | 15,52% | 5,17% | 3,45% |
| I do it just because it's necessary | 28,49% | 30,23% | 29,07% | 8,14% | 4,07% |
| I enjoy it | 24,66% | 17,81% | 36,99% | 12,33% | 8,22% |
| **Grand Total** | **29,37%** | **28,71%** | **28,38%** | **8,58%** | **4,95%** |

Table 3: Perception of the grocery shopping experience by age group. (source: own research)

To see if people are in general aware of discounts and offers that are made by supermarkets, we asked in through our survey if the respondents know about those offers before they go to supermarket.

The results showed that more than half of our respondents are never aware of those offers (53% of total respondents). Moreover, 35% of them said that they can sometimes know about discounts offered by supermarkets, while only 11,5% stated that they usually know about it (Figure 6). We can then conclude that even if retail chains companies do serious efforts to promote their efforts to promote their offers and discounts regularly to attract customers and keep them informed, those efforts are not efficient because most people are usually not aware of those offers even if they go regularly to supermarket. This is probably due to the timing and choice of media channels used that are not effective for this specific kind of promotion. People usually won't pay attention to retail chain stores promotions when they're not, at the same instant, thinking about going to do groceries. Plus, the weekly flyers that are usually used by supermarkets don't grab customers attention.
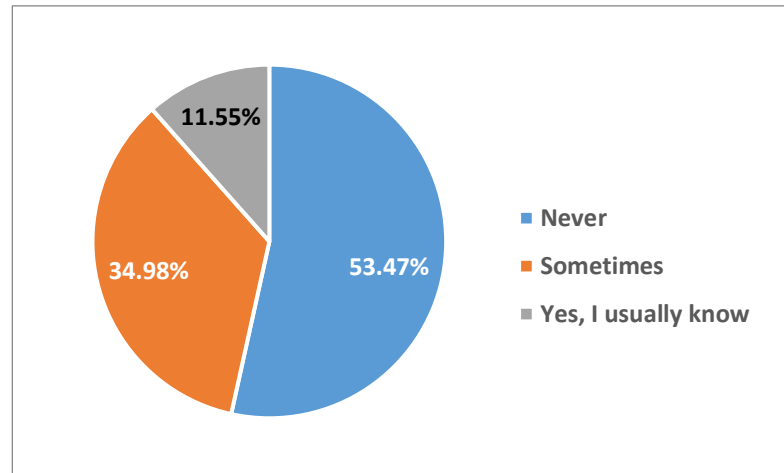
Figure 6: Knowing about discount offers before going to supermarket. (source: own research)

To examinate about the Moroccans general experience with e-commerce websites, we asked through the survey if they have an online purchase experience in the past. As illustrated in figure 7, results showed that most respondents, about 182 out of 303 in total, said that they already experienced online purchase, while 121 of respondents never did. It's also important to note that the majority of respondents who stated that they already have an experience with e-commerce are the age groups under 40 years old. While more than 85% of people who replied "yes" have less than 40 years old. On the other hand, the majority of respondents who replied "no" are over 40 years old with more than 61% of total respondents. We can conclude then that younger people are more interested and used to buy products online than the older generation. We can assume also that people less then 40 years old are more likely inclined to buy products and services online and should be main age group to target for online businesses.
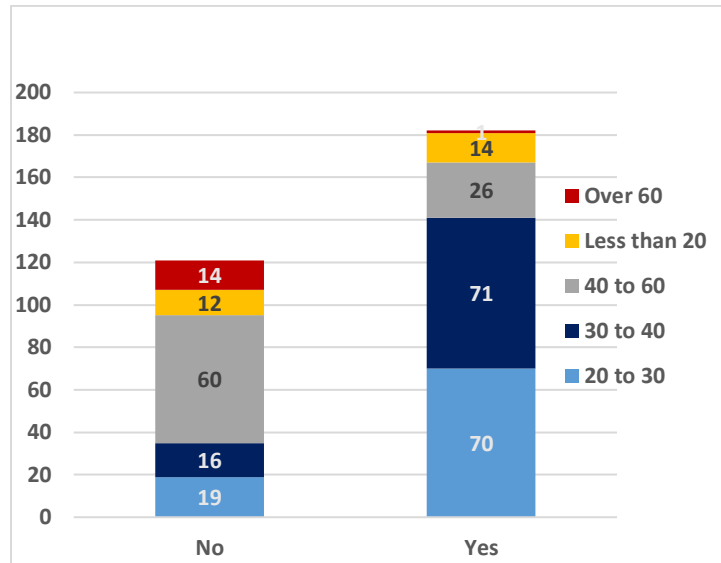
Figure 7: Previous online purchase experience. (source: own research)

After asking for the pas online purchase experience, we focused on the following question about the past experience regarding e-groceries (or online groceries), results showed that only 11% of respondents already bought groceries online, while vast majority of 89% never tried it (Figure 8). This implies the fact that e-groceries are a very new concept to the Moroccan consumer, since there are not many grocery platforms available till now in the country, and communication about these services are almost inexistant.
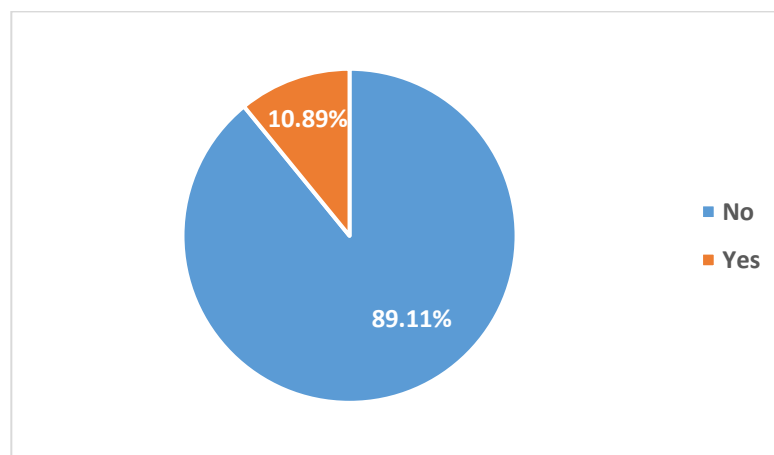


Figure 8: Previous purchase experience of groceries online. (source: own research)

Concerning the preferred online payment method for our respondents, a big majority of around 82% replied that they prefer payment on delivery, while only 18% stated that they prefer opting for online payment (figure 9). This confirms the past studies results we discussed in the theoretical background chapter, which confirms the fact that Moroccans still don't trust completely the online payment method, since e-commerce is still relatively new

in the country. Therefore, online businesses should always have the payment on delivery (also called cash on delivery) option to encourage hesitant customers and make them feel secure regarding payment.
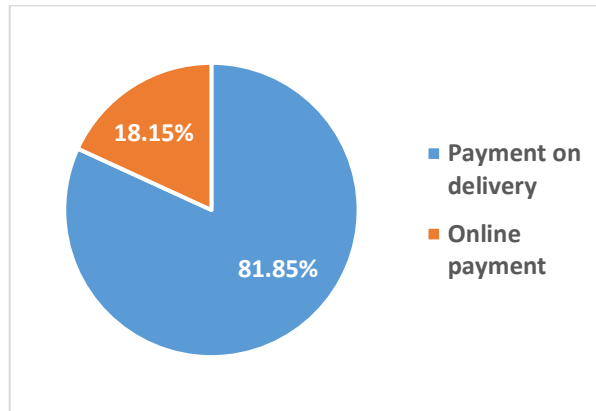


Figure 9: Preferred online payment method. (source: own research)

To examine which factors can encourage Moroccans to buy products and services online, we asked through the survey respondents to rate from a scale of 1 to 5, with 1 not important to 5 extremely important, factors that can encourage them to use an e-commerce website. Respondents had to rate the importance, from their own point of view, of the following 4 factors:

- Trust in the brand/website

- Security of payment

- Confidentiality of data

- Quality of products

We collected the rating from our respondents and calculated the average rating for each factor in order to be able to compare between those factors, and to sort them from the most important to the less important. Results found are summarized in the following table:

| Factors | Average rating |
|---|---|
| Quality of products | 4,78 |
| Trust in the brand / website | 4,70 |
| Secure payment | 3,70 |
| Confidentiality of Data | 3,43 |

Table 4: Average rating of factors encouraging usage of e-commerce websites. (source: own research)

From these results we can observe that quality of products and trust in the brand are the most important factors that influence our respondents in the decision making when buying products online. Therefore, we can conclude that an online platform or website with a high brand awareness and with good quality products will more likely attracts customers to make orders online.

In third and fourth position in factors importance ranking we found security of payment and confidentiality of data, with respectively 3,7 and 3,43 points average, which means that those two factors are still quite important for our respondents when it comes to online purchase decision but comes in second position and are not a priority in the decision-making process. This doesn't imply that those factors are not important, security of payment and confidentiality of personal data should be considered when developing any e-commerce platform in order to gain the trust of customers. We would recommend that when advertising for e-commerce websites or applications to focus and emphasize more the brand name and the quality of their products, than payment security and data confidentiality since those two last factors are not highly considered by customers while making an online purchase.

To dig deeper and understand which factors perceived as most important when opting for an e-commerce website we asked respondents which features they would prefer the most in an online grocery shopping application. We asked our respondent to rate again from 1 to 5 the importance of each of the following features:

- Discounts and good prices.

- Good design and easy to use.

- Quality and diversity of products.

- God user reviews and ratings.

- Fast delivery.

After collecting the rating responses from respondents, we calculated the average rating given for each feature. Results are summarized as follows:

| App Features | Average rating |
|---|---|
| Discounts and good prices | 4,80 |
| Good design and easy to use | 4,71 |
| Quality and diversity of products | 4,61 |
| Good user reviews and rating | 3,40 |
| Fast delivery | 3,34 |

Table 5: Factors perceived important when opting for e-commerce websites. (source: own research)

Results of our survey shows that discounts and good prices were rated 4.8 on average making it the most important criteria, according to our respondents, that can encourage them to use an e-commerce website or application. This proves that good prices and sales offers offered by online platforms are the most important motive that encourages customers to make online orders. Therefore, e-commerce platforms should make offers regularly and advertise on them to attract more customers. In the second place, comes the good design and ease to use with an average rating of 4.71. In fact, results show that respondents give particular attention to design and general user experience when it comes to adopting an e-commerce platform. This implies that one of the most important aspects to take into consideration when developing an application or website is a better design, and making the experience as easy an intuitive as possible for users, in order to encourage them to use it more and more. In the third place, with the average of 4.61 points, rated quite as important as the previous feature, comes the quality and diversity of products. In fact, according to survey results, respondents consider the good quality and variety of choices of products in an e-commerce platform as well a key feature that will encourage them to use it more. In fact, people nowadays are looking for convenience, and therefore, they would prefer an e-commerce platform where they find all the products that they may need, the more choice of products available are varied the better the platform will be considered in the user perception.

Last features in the ratings rank are "Good user reviews" and "fast delivery", with respectively an average of 3.4 and 3.34. This shows that even if those features are still considered important in the overall online purchase experience, but the previous cited features are prioritized during the decision making. Therefore, we can conclude that an e-commerce app should generate good user reviews, and have the ability to deliver orders fast,

but the key features that can make it surpass competition, and make more people using it are:

- Discounts and good prices.

- Good design and ease of use.

- Quality and diversity of products.

To narrow down the question from general e-commerce platforms to online groceries applications (or websites), we asked our respondents to choose which functionalities they would prefer the most when using e-grocery application. Respondents could choose maximum 2 functionalities from the following:

- Display of discounts and new offers.

- Collect loyalty points and customer bonuses.

- Flexible delivery schedules.

- Description and product details.

Results collected from our survey, as illustrated in Figure 10, the first feature chosen by our respondents was display of discounts and offers as the most preferred functionality they would like to have on an online grocery shopping application. This confirms results obtained from previous question that discounts and good prices are important factors that attract customers to make an online purchase. Therefore, an e-grocery app should pay specific attention to new offers and display them display them clearly to the user so he can be aware of new offers that are available, especially as discussed previously that most supermarkets customers are not aware of discounts before going to retail stores. An application is a perfect media to advertise new offers and discounts instead of traditional medias, because they will first encourage users to place orders online when they perceive they are making good deals, and also those offers will be displayed at the exact moment when the user is in the need to buy groceries, it's at that specific moment that the user will pay more attention to those offers.

In the second place, the feature that is considered also important, according to our survey respondents, is the display of descriptions and products details in a e-grocery platform. We can then conclude that users are interested in knowing product information when searching for groceries. In fact, information like country of origin, composition, nutrition elements, brand and other related details are crucial in the decision making. Therefore, e-groceries apps

should display those informations when the user clicks on a specific product to help him during the purchase decision making.

In the third position comes the customer loyalty program where respondents stated that this feature could be also an attractive functionality when it comes to adopting ordering from an e-grocery app. Therefore, supermarkets or grocery shopping dedicated apps should consider offering bonuses rewarding customers for their loyalty, to encourage them to place orders frequently. Another big advantage of customer loyalty programs is that users can collect points either when making in-store purchases or online, this allows to have a tracked purchase history of every customer.

In last position comes flexible delivery schedule with only 30 votes. This implies that previous features are more crucial in the customers perception regarding e-grocery apps, but still the delivery service shouldn't be neglected as it is part of the online purchase experience, it's just that previously cited functions should be more prioritized.
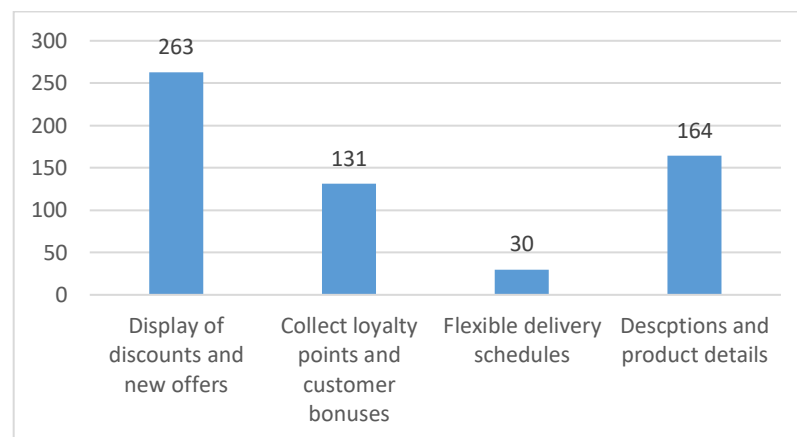


Figure 10: Preferred features in an e-grocery application. (source: own research)

## 5.2 Research questions answers

**RQ1: Who are the people that are more interested in buying groceries online?**

It should be noted that the COVID-19 epidemic has had a significant impact on online purchasing behavior, and it is possible that more consumers are now willing to buy groceries online owing to safety and convenience concerns. According to Google, both "along my route" and "curbside pickup" showed an increase in global searches in 2020 compared to the previous year (plus 100% and 3000%, respectively). Consumers depend on convenience

more than ever before. Convenience became a crucial distinction for organizations able to quickly adjust. Even if pre-pandemic practices return, consumers will likely continue to rely on post-pandemic shopping possibilities, establishing a new post-pandemic shopping norm. (Bradley, 2021).

According to the earlier-discussed survey results, online buying is growing more prevalent in Morocco, since the vast majority of respondents across all age categories had previously made online purchases, indicating that online shopping is becoming more prevalent across all age demographics. This could be due to a variety of reasons, including the expansion of e-commerce platforms, the convenience of online buying, and the influence of the COVID-19 epidemic on shopping behavior.

Younger individuals are more likely to shop online, as a greater proportion of respondents in the 20 to 40-year-old age group had made online purchases in the past compared to respondents in other age groups. This indicates that younger individuals may be more comfortable with technology and more prone to adopt innovative shopping practices. Despite having the lowest percentage of respondents with previous online shopping experience, over a quarter of those aged 40 to 60 claimed having shopped online before. This shows that middle-aged individuals are becoming more accustomed to shopping online, although they may still be less likely to shop online than younger age groups. Based on the results of our survey, we can conclude that the primary demographic for an online grocery shopping platform is the generation under 40 years old.

The fact that respondents who had previous online purchase experience were more likely to say "Yes" to the question could suggest that once people have tried online shopping, they are more likely to continue using it in the future. This could have implications for businesses looking to attract new online shoppers, as they may need to focus on providing a positive first-time experience to encourage repeat purchases.

Furthermore, the data collected shows that the majority of respondents across all age groups do not enjoy going to the supermarket for groceries, with a higher percentage of respondents in the 20 to 30 and 30 to 40 age groups indicating that it's not usually an enjoyable experience or that they do it just because it's necessary. However, there is still a significant percentage of respondents in all age groups who enjoy going to the supermarket for groceries. Given this data, it's likely that people who would be more interested in online grocery shopping are those who do not enjoy going to the supermarket or who find it to be a chore that they do

just because it's necessary, a tendency that is particularly found on younger generation under 40 years old as the survey results demonstrated.

Occupation schedule also plays an important factor that can determine the willingness to adopt online grocery shopping, according to research results, and as discussed earlier, people working full-time suggested that it's usually difficult for them to find enough time to go to supermarkets for groceries. Then we can conclude that full-time worker are more likely prepared to e-grocery shopping since it's a more convenient option.

**RQ2: Which factors can contribute to make people interested in buying groceries online, and how to encourage them to consider it?**

Based on the survey results, it seems that a majority of the respondents find it either "difficult" or "depends on the day" to find enough time to go to the supermarket for groceries. Specifically, 114 respondents reported finding it difficult, while 130 said it depends on the day. In contrast, only 54 respondents said it was easy for them to go to the supermarket for groceries. These results suggest that many people find it challenging to make time for grocery shopping, which can be a barrier to maintaining a healthy and well-balanced diet. This is where the convenience of online grocery shopping can come in. By allowing customers to order groceries online and have them delivered to their doorstep, online grocery stores can help eliminate the need for people to take time out of their busy schedules to go to the supermarket. Therefore, the survey results suggest that the convenience of online grocery shopping may be appealing to people who find it difficult or time-consuming to go to the supermarket for groceries. This could be a factor contributing to the growing popularity of online grocery shopping in recent years.

The survey results suggest that a significant proportion of the respondents, or 86%, reported experiencing issues with finding the products they need when shopping at the supermarket. Specifically, 54% of the respondents reported that they sometimes don't find the products they need, while 32% of the respondents reported that there is always something missing. In contrast, only 14% of the respondents reported that the availability of products is not an issue for them. These results suggest that a significant proportion of people struggle with finding all the items they need when shopping at the supermarket, which can be frustrating and time-

consuming. This can be due to a variety of reasons such as stock shortages, crowded stores, or simply not being able to locate the products they need.

In this context, online grocery shopping can be an attractive option for people as it offers the convenience of being able to shop for groceries from the comfort of their homes and have them delivered to their doorstep. Online grocery stores often have a wider range of products available, and customers can easily search for the items they need using the store's website or app. Therefore, the survey results suggest that the difficulty of finding all the necessary items when shopping in-store may be a factor that contributes to people's interest in online grocery shopping. By eliminating the need to physically search for items in-store, online grocery shopping can help save time and reduce frustration for customers.

Regarding the perceived experience at in-store supermarkets, the survey results suggest that a majority of the respondents, or 70%, do not enjoy going to supermarkets. Specifically, 58 respondents reported that it's not usually an enjoyable experience, while 172 respondents reported that they only do it because it's necessary. In contrast, 73 respondents reported that they actually enjoy going to supermarkets. These results suggest that for many people, grocery shopping is seen as a chore or an inconvenience rather than an enjoyable experience. This may be due to a variety of factors such as the time it takes to physically go to the store, the crowds and queues, or the stress of finding all the necessary items. In this context, online grocery shopping can be an attractive option for people as it offers the convenience of being able to shop for groceries from the comfort of their homes and have them delivered to their doorstep. Online grocery stores often have a wider range of products available, and customers can easily search for the items they need using the store's website or app.

Therefore, the survey results suggest that the lack of enjoyment or convenience associated with going to the supermarket may be a factor that contributes to people's interest in online grocery shopping. By providing an alternative way to shop for groceries, online grocery stores can help alleviate the stress and inconvenience associated with traditional in-store grocery shopping, making it more appealing to customers.

Another factor that may contribute to motivation of customers to adopt online grocery shopping is they offers and discounts. According to the survey results, a majority of the respondents, or 53%, do not know about discounts and offers before going to supermarkets. This suggests that many people may miss out on potential savings when shopping in-store, as they are not always aware of the discounts and offers that are available. This may be due to a variety of factors such as not being subscribed to the store's mailing list or not checking

the store's website for promotions, or even the fact that supermarkets chains campaigns do not reach potential customers on the right moment when they think about buying groceries. In this context, online grocery shopping can be an attractive option for people as online grocery stores often have a dedicated section for discounts and offers. Customers can easily browse through the available promotions and deals, and can often receive them via push notification when new offers are available.

Therefore, the survey results suggest that the lack of awareness about discounts and offers when shopping in-store may be a factor that contributes to people's interest in online grocery shopping. By providing a more visible and accessible platform for promotions, online grocery stores can help customers save money and get better value for their purchases.

To summarize, there are several ways that an online platform can encourage people to consider using their online shopping app:

- Emphasize the convenience: One of the main reasons people are interested in online grocery shopping is the convenience it offers. The online platform can highlight this by emphasizing the time and effort customers can save by shopping online and having their groceries delivered to their doorstep.

- Promote a wider range of products: Online grocery stores often have a wider range of products available compared to traditional supermarkets. The online platform can highlight this advantage by showcasing the variety of products available, and how customers can easily search for the items they need using the store's website or app.

- Highlight discounts and offers: The survey results suggest that many people may miss out on potential savings when shopping in-store. The online platform can emphasize the availability of discounts and offers, and how customers can easily browse through the available promotions and deals.

- Address concerns about missing items: The survey results suggest that some customers may have concerns about not finding all the items they need when shopping in-store. The online platform can address this by highlighting the availability of all products and emphasizing the accuracy of their inventory management system.

**RQ3: Which features the e-groceries app should have to appeal to the Moroccan consumers?**

Even if the e-commerce industry in Morocco has grown in recent years, online grocery shopping is still a relatively new concept in the nation. In truth, just one supermarket chain, "Marjane," offers the e-grocery service to customers at this time. This is also supported by the findings of the study, which indicate that the vast majority of respondents, 89%, have never purchased groceries online. Just about 11% of respondents indicated that they have previously utilized online grocery shopping. Hence, in order to develop a new e-grocery service, supermarket chains should analyze which characteristics can motivate the Moroccan population to select for this type of service and abandon their reliance on physically visiting stores to purchase goods.

For a better and smooth introduction in the Moroccan market, the e-grocery platforms should be adapted to the specificities of the Moroccan consumer. For this reason, in the research survey, respondents were asked about features and options that the application should have so they can consider using it. First topic covered in the survey was the payment method, where a large majority of Moroccan respondents (82%) prefer payment on delivery when shopping online, while only a small percentage (18%) prefer online payment. This implies that payment on delivery is a popular and trusted payment method in Morocco, and online payment may not yet be fully embraced by the majority of the population.

Including payment on delivery as an option in an online grocery shopping app for the Moroccan market is important for a many reasons. First, it addresses the preference of the majority of Moroccan consumers, making the shopping experience more appealing and convenient. This can increase the likelihood of people using the app and making purchases. Second, payment on delivery can help build trust with consumers who may be hesitant to make online payments due to concerns about fraud or security. By allowing them to pay when they receive the goods, it eliminates the need for them to share their financial information online, which can help serve their concerns. Third, payment on delivery can also help increase sales and reduce cart abandonment. Some consumers may be discouraged from making a purchase if they are required to pay online upfront, but offering payment on delivery may encourage them to complete the transaction.

In conclusion, the preference for cash-on-delivery among Moroccan consumers highlights the need of incorporating this option within an online grocery shopping app. This can enhance the user experience, raise trust, and eventually boost revenue.

To understand which factors contribute the most to motivate the Moroccan consumers to order online, survey results suggest that the quality of products and trust in the brand/website are the two most important factors that can encourage Moroccan consumers to buy online, with average ratings of 4.78 and 4.70 out of 5, respectively. Secure payment and confidentiality of data are also important but are rated slightly lower, with average ratings of 3.70 and 3.43, respectively.

To attract Moroccan customers, an e-grocery app should prioritize providing high-quality products and establishing the brand's or website's credibility. This can be accomplished by giving extensive product descriptions, photos, and customer reviews to illustrate the quality of the sold products. In addition, the app should have clear procedures about returns and refunds, as well as secure and dependable delivery services, in order to increase client confidence. The app should feature trustworthy and secure payment mechanisms, such as payment upon delivery, and have comprehensive security measures in place to protect client data. These can include encryption, secure communications, and transparently defined data protection procedures.

Overall, an e-grocery app that prioritizes product quality, trustworthiness, secure payment methods, and data privacy is likely to appeal to the Moroccan customer and encourage them to make purchases online.

The survey results suggest also that Moroccan consumers place a high value on discounts and good prices when using an e-commerce platform, with an average rating of 4.8 out of 5. This is followed by good design and ease of use, with an average rating of 4.71, and quality and diversity of products, with an average rating of 4.61. Good user reviews and ratings and fast delivery were rated lower, with average ratings of 3.40 and 3.34, respectively. Therefore, to appeal to the Moroccan customer, an e-grocery platform should prioritize offering competitive prices and discounts, while also ensuring that the platform is well-designed and easy to use. This can include a simple and intuitive interface, clear product descriptions and images, and easy-to-use search and filter features. Additionally, the platform should offer a wide range of high-quality products that meet the needs and preferences of Moroccan consumers. In terms of user reviews and ratings, the e-grocery platform should provide a platform for customers to leave feedback and reviews of products and services. This can help

build trust with potential customers by providing social proof of the quality of the products and services being offered. Furthermore, the platform should prioritize fast and reliable delivery to meet the expectations of customers in terms of convenience and timeliness.

Concerning the features that appeal the most to the Moroccan consumer, The survey results suggest that the majority of Moroccan consumers are interested in seeing discounts and new offers on an e-grocery app, with 263 respondents selecting this feature as their top preference. Additionally, 164 respondents indicated a preference for product descriptions and details, while 131 respondents would like to collect loyalty points and customer bonuses. Flexible delivery schedules received the fewest responses, with only 30 respondents indicating a preference for this feature.

Therefore, to appeal to the Moroccan consumer, an e-grocery app should prioritize displaying discounts and new offers prominently on the platform. This can include a dedicated section or page for special deals, as well as push notifications or email alerts to notify users of new offers. Additionally, the app should ensure that product descriptions and details are clear, informative, and easy to access, to help users make informed purchasing decisions. To further incentivize usage and build customer loyalty, the e-grocery app should also offer a loyalty program that allows customers to collect points and receive bonuses or rewards for repeat purchases. This can help to build long-term relationships with customers and encourage them to continue using the app for their grocery shopping needs. While flexible delivery schedules received the fewest responses, it is still important for an e-grocery app to offer delivery options that are convenient and flexible for users. This can include offering same-day or next-day delivery, as well as options for scheduled or on-demand delivery. Additionally, the app should have a reliable and efficient delivery system to ensure that customers receive their orders on time and in good condition.

Overall, an e-grocery app that focuses on offering discounts and new offers, clear product descriptions and details, and a loyalty program, while also providing flexible and convenient delivery options, is likely to appeal to the Moroccan consumer and encourage them to use the app for their online grocery shopping needs.

# III. PROJECT

The emergence of e-commerce has transformed the relationship between consumers and retailers, particularly in the grocery market. In recent years, the popularity of online grocery shopping has increased globally, including in Morocco. In this context, this thesis suggests the implementation of a Moroccan-specific online grocery shopping app.

To ensure the success of the proposed application, it was essential to comprehend the online grocery buying behavior of Moroccan consumers. In order to gain insight into the preferences and expectations of Moroccan customers about online grocery shopping, a research study was conducted. The research findings gave vital information regarding the features that the app should include, such as secure payment choices, an intuitive User experience, and the display of current offers and promotions.

The app development process consisted of multiple phases, beginning with the creation of the design system and concluding with the launch of the finished solution. The design process involved the development of components, wireframes, the visual identity, and the user interface. Throughout the app's development process, the React framework was used to ensure a fluid and responsive user experience while adhering to IT industry standards and best practices.

In addition, the app was combined with a product search bar, customized recommendations, a shopping cart, and a checkout procedure. These elements were created to facilitate a seamless shopping experience for Moroccan consumers, taking into account their preferences and expectations for online grocery shopping.

This thesis suggests the strategy for creating an online grocery shopping app for the Moroccan market. The proposed application intends to match the needs and expectations of Moroccan consumers by incorporating crucial features and a user-friendly design, and consequently contributing to the expansion of e-commerce in the nation.

This chapter will cover the entire application development process, from design and sketches until implementation. The initial sections of this chapter will detail the design thinking phase of the application, including the tools used to develop the design system and an overview of the online user journey through the entire app, taking into account the research results presented in the preceding chapter. Subsequent sections will focus on the application's development, where we will describe the application's technical architecture and justify the selection zf the programming language, frameworks, and other technical tools used to build the application. To test the application solution and ensure that the project accomplishes its

objectives, qualitative research will be undertaken in the final sections to see if the application meets user expectations, followed by necessary revisions to enhance the overall user experience.

# 6   DESIGN STRATEGY: MOBILE FIRST APPROACH FOR DESIGNING A RESPONSIVE USER EXPERIENCE

## 6.1   Importance of responsive design

Mobile devices are now the primary means of Internet access in the digital age. As a result, it is now vital to design for mobile to ensure a responsive and user-friendly experience. A mobile-first strategy is then essential when establishing an online grocery shopping app for the Moroccan market.

Responsive design in the IT sector refers to creating a website or application to adapt to the screen size and orientation of the user's device, ensuring optimal usability and accessibility. A flexible design strategy is essential for a mobile-first app since it enables the app to be viewed on devices with varying screen sizes.

Responsive design is an essential element of contemporary web design, particularly for systems that facilitate online grocery shopping. It is the capacity of a website or application to adjust to different screen sizes, device types, and orientations. In other terms, responsive design ensures that the application is accessible and usable across multiple devices, such as desktops, laptops, tablets, and smartphones (Staiano, 2022).

It is impossible to overestimate the significance of responsive design in online grocery shopping applications. This is because users access the internet and shop online from a variety of devices today. Some clients may choose to order groceries from their desktop PCs, while others may prefer to use their cellphones while on the go. Without responsive design, a web application for online grocery shopping may not provide an appropriate user experience for all users.

One of the primary advantages of responsive design is that it adjusts the application's layout and functionalities for various screen sizes. This means that users may quickly navigate the program and execute the appropriate activities on any device. For example, a responsive application for online grocery shopping may include larger buttons and fonts on smaller screens, making it easier for consumers to tap and understand information.

Moreover, responsive design might aid in enhancing the application's loading times and overall speed. This is due to the fact that the application's content and layout can be tailored for each device, delivering a rapid and seamless loading experience. Users are hence more

likely to continue using the application and complete their purchases, resulting in increased customer satisfaction and loyalty.

In summary, responsive design is a crucial part of building an application for online grocery shopping. It ensures that the app is accessible and simple to use for all users, regardless of device. Including responsive design into the application's design thinking process will allow us to produce an application that provides a seamless and delightful user experience for all customers.

## 6.2   Benefits of mobile-first approach

A mobile-first design strategy for an online grocery shopping application is justifiable given the increasing prevalence of mobile devices. There has been a massive rise in the use of smartphones and tablets for online shopping in recent years, with mobile devices accounting for more than half of all e-commerce traffic worldwide (Petrov, 2023).

By adopting a mobile-first strategy, designers can guarantee that the application is optimized for mobile devices, which are the major method through which many consumers access the internet. This entails developing the application's layout, content, and functionality with mobile devices in mind before scaling them up for larger displays.

In addition, a mobile-first strategy can enhance the application's usability and user experience. This is due to the fact that designing for mobile devices requires designers to prioritize information and features, focusing on what is most important to users. This strategy ensures that the application is efficient, quick, and user-friendly, resulting in more user engagement and satisfaction.

A further advantage of a mobile-first strategy is that it might help the application to be future-proof. Due to the rapid rate of technological progress, it is crucial to build applications that can adapt to various devices and screen sizes. By beginning with a mobile-first strategy, designers can guarantee that the application is adaptive and flexible, making it easy to expand to larger displays and additional devices in the future.

In conclusion, a mobile-first design strategy for an online grocery shopping application is reasonable. It helps improve the application's usability, user experience, and future-readiness by giving priority to mobile devices, which are the major means by which many customers access the internet. By adopting a mobile-first strategy in the design thinking process of the

current project, we can produce an application that satisfies the needs of contemporary users and adapts to newly emerging technologies.

# 7 DESIGN PROCESS OF THE APPLICATION

## 7.1 Building the design system

A design system is a set of guidelines, principles, and components that define the appearance, feel, and functionality of an application or website. It consists of a variety of design elements, including font, colors, iconography, and user interface components, that deliver a consistent and unified user experience across all touchpoints.

Before building an online grocery shopping application, it is essential to develop a design framework to ensure consistency, efficiency, and adaptability in the design process. By developing a set of design principles and components, designers can save time and resources while ensuring that the design of the application is consistent and on-brand (Staiano, 2022).

In addition, a design system aids in maintaining consistency and coherence across all touchpoints, which is essential for delivering a seamless and engaging user experience. With a well-defined design system, designers can ensure that all user interface elements are consistent in design, functionality, and behavior, thereby decreasing the likelihood of user misunderstanding, annoyance, and errors.

Components of the design system chosen for Carrefour grocery shopping app (see Appendix IV), are described as follows:

**Typography:** The typography for the Carrefour grocery shopping app uses a sans-serif font for headings and body text, with appropriate font sizes and line heights to ensure legibility.

**Colors:** The color palette for the app uses a combination of primary and secondary colors, with different shades and tints to provide hierarchy and visual interest.

**Buttons:** The button styles use a consistent shape, size, and color, with appropriate hover and active states.

**Icons:** The icons use a consistent style and stroke weight, with appropriate sizing and positioning based on their usage.

**Input fields:** The input fields for the app use a consistent style and shape, with appropriate placeholder text and error messaging.

**Navigation:** The navigation for the e-grocery app uses a consistent layout and structure, with appropriate icons and labels for each section, and has two version one for mobile and one for desktop.

## 7.2 Sketching and designing the user experience

### 7.2.1 Mobile version design of the app

The app will start with a welcome page as invitation to introduce the user that the app serves for delivery of groceries, with a button displayed "Shop now". After clicking on shop now, the user will be directed to the Sign In page, where he will be asked to put his credentials to log in to his personal account. For a first use, the user can click on Sign Up to register and create a new account. By creating an account, the user will have his own space on the app personalized based on his needs and can also collect customer bonuses based in his purchase history. The user will have as well his own unique QR code that identifies his account on both Carrefour online app and sores.
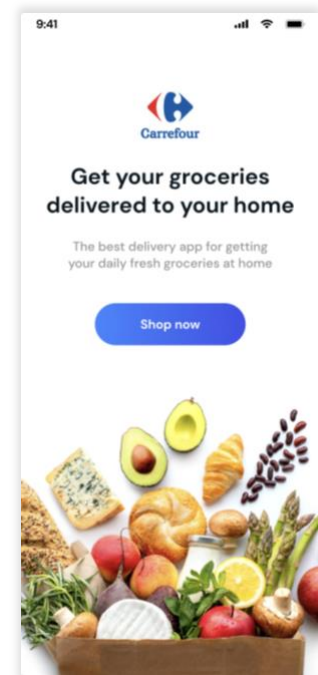


Figure 11: Mobile welcome page. (source: own design)
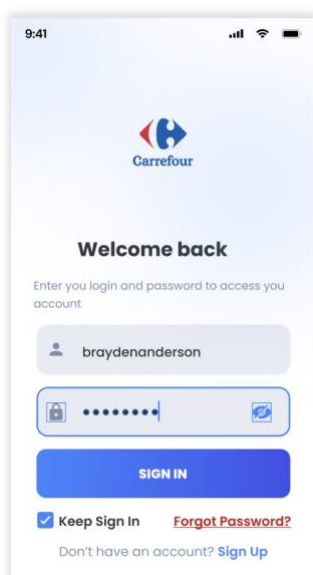


Figure 12: Mobile SignIn page. (source: own design)

After authentication, the user will be directed to the main page of the app where first, at the top, will be displayed his full name along with a welcoming message underneath: "Good morning", or "Goog evening". The choice of displaying the name of the user plus the welcome message is made to give better proximity to the user so he feels that it's his own private space, plus that he's having a personal direct contact with the supermarket brand, which will contribute to create a feeling of direct contact with the brand. By fostering this connection, the app can increase, user engagement, customer loyalty, and ultimately, sales.

Next will be the search bar where user can search for a specific product. The search bar will be accompanied with a filter tool to allow users to narrow down search results. We will describe the search and filter tool in more detail later. Under the search bar, the app will display the current offers and discounts with large banners where the image of the of product, or range of products, will be displayed next to the title, brief description, and discount percentage in the offer. The choice of displaying the discounts and offers in large banners in the middle of the screen is made to highlight the latest offers available during that specific period. According to our survey results discussed earlier, where we demonstrated that discounts and good prices are one of the best features that can encourage an Moroccan consumer to use an e-commerce application, and therefore they should be placed where they catch users attention first when opening the app. Those banners, once clicked, the app will display the discounted items to the user so he can add them to his cart to benefit from the actual discounts.

Figure 13: Mobile home Page. (source: own design)

Under the discounts section, will be displayed the best-selling products, this will allow the user to see first the most purchased products on the app, which will most likely be the recurring products that all users will probably select on each grocery orders. This is made to enhance the user experience so the user can select first products from the most recurring grocery orders, and then look for other products either by search or by selecting specific categories based on each users need. Those best-selling products will be programmed based on the quantity of real users purchases over time.

Every products on the list will be displayed along with a picture presenting the product, its name and the price on quantity (piece, wight or liter…) accompanied with a plus sign for to adding the product to the cart, and a heart sign that will add the product to the personalized wish list that the user can customize with the items that the user wants to by frequently so one can access them directly from their own wish list instead of looking for them each time they want to place an order, we will describe the Wishlist feature in more details later.

At the bottom of the app, there is a navigation bar that will be displayed to allow the user to navigate between different pages of the app. The choice of placing the mobile navigation bar
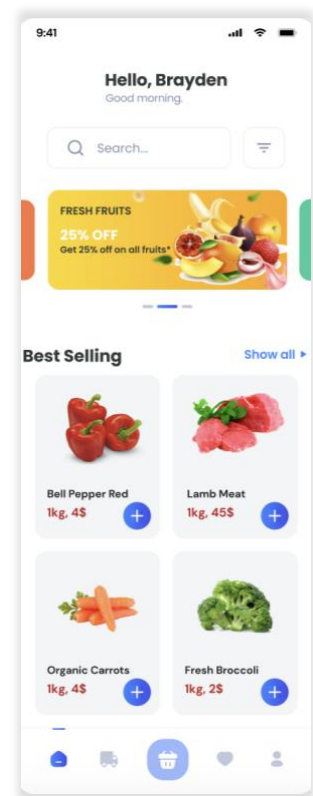
at the bottom is justified by the fact that it will improve accessibility and ease of use for users. With a navigation bar on the bottom, users can easily access it while holding their mobile devices in one hand, with the thumb one can easily click on each icon to navigate from a page to another. Additionally, it can also be more convenient for users to access frequently used features, which will improve the overall user experience by making it easier for users to navigate through the app. In our case, the navigation bar will include 5 icons described as follows:

- Home page icon: to allow users to come back to the main home page.

- Truck icon: to access orders tracking page.

- Cart icon: placed in the middle with a counter that increment each time the user adds a new item to the cart. The cart icon is placed in the middle relatively bigger that the other icons in the navigation bar to give it more emphasis so the user doesn't forget to proceed to checkout when he finishes adding items to his order.

- Wishlist Icon: where the user will be directed to his Wishlist that contains the most recurring items or favorite items chosen by the user, so it can be easily accessed to select the products that are ordered often. This will enhance the user experience since one doesn't have to search each time for all items that are needed often.

- The profile icon: Where user can go to the profile page to change his personal information: username, address, payment method…

As described briefly earlier, the app has a search feature where the user can write keywords on search field and look for items. The related items will appear in the search results list while the user is typing keywords. Recent search keyword list is displayed also to help the user when typing. Next to the search field, a filter button will be available to show the user the filter options page that contains the filter parameters described as follows:

- Sort by price range: Where the user can filter results based on a price range.

- Sort by discounts: To enable the user to filter items based discount percentages.

- Sort by categories: Where the user has the possibility to display search results in a specific product category.

By selecting the chosen criterias and clicking on the "Apply filter" button, the user will be redirected to the search results page, with the products displayed according to the selected criteria. This is an important feature that improve the user experience since the users are allowed to narrow down the search results to easily find the items they're looking for.

Besides the keywords research, the user has also the possibility to search for products in a specific category either by clicking on the category icon the categories menu on the main page, or to display the hole categories menu list by clicking on show all next to categories section.



Figure 14: Filter options page. (source: own design)

According to our research results, respondents stated that details and descriptions of products is an important feature that a groceries shopping app should have so it can be perceived useful from their own point of view. Therefore, the app will provide detailed information on every product. To achieve this, each product will have his own page with a big image to display the product, its category, name, unit measurement (weight, volume, piece …), price with the original price plus the discounted price (is applicable), buttons + and – to add or remove the product to the cart, detailed description of the product where the user can read details of each product, and underneath the product details information, a related product list will be displayed to allow the user to see items in the same category of the displayed product page to help him discover items in the same range of products easily.



Figure 15: Mobile Product Page. (source: own design)

After selecting the products that the user wants to order, the user can click on the cart icon in the navigation menu to be directed to the shopping cart page where the list of previously selected items is displayed. On each product row will be displayed the

image, title, and price (along with discounted price if any) accompanied with quantity chosen that could be adjusted with + and – icons displayed next to the quantity that gets incremented every time the user makes an adjustment. This will give the user a last chance to review his cart and adjust the order as they wish, and at the end of the list the total price of the order is displayed so the user knows the amount that will be charged when he proceeds to checkout. To do so, a checkout button is placed at the bottom of the page, and when clicked the user will be directed to the delivery information page where he can adjust the delivery details: name, email, phone and address. Those informations are filled automatically if the user had already set his profile parameters, but they can be changed on each delivery based on the client needs. After finishing the delivery information, the user can clock on "Next" button to proceed to the payment method page where he can select the desired payment method.
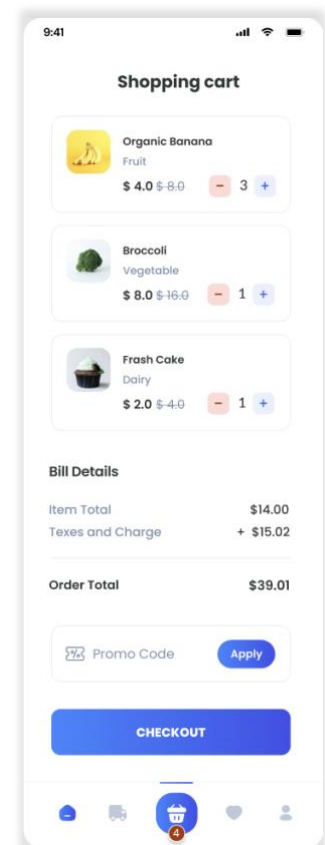


Figure 16: Mobile Shopping Cart. (source: own design)

Based on research results, we found out that about 82% of our respondents prefer the payment on delivery method, while only 18% would like to pay online. Therefore the app will provide 2 options: online payment where the user can enter his card details and save the card information (if he wants) in the app. This will make later payment easier for the user, so he's not obliged to enter payment details each time he's placing an order. Since ordering groceries is a recurrent need, the user could be discouraged if one must enter those numbers each time, saving card details will enhance the user experience regarding payment. Furthermore, for users who are not secure about the online payment and wish to pay once they're delivered, the app will provide a second option: Payment on delivery. Once the payment method is confirmed, the user can click on confirm and his order will be placed, and then can be viewed on the orders page.

In the orders page, the user can view all his history of placed orders from newest to oldest. For the ongoing orders, the icon of the order will be displayed in orange with the number of the order, number of items, and status of the order. On each order row, the user can click and display the steps of the order which are described as follows:

- Order placed: when the user just submitted the order.

- Order confirmed: when the order is received at the store, and it's being prepared.

- Order on delivery: When the order has been prepared and getting on the way for delivery.

- Order delivered: when the order has been delivered and received by the client.

Each of those steps will be tracked from the app on real time with the exact time and date of completion. Whenever a step is completed, it will be checked on the list with a blue check mark, so the user has a clear information about the processing of his order.

The orders list can be filtered by choosing "Ongoing delivery" or "Completed orders". The latter will still be displayed on the orders list with a green icon making the order with green icon marking the order as delivered and completed.

Last feature on the application is as briefly described earlier, the Wishlist page that is customized by the user himself based on his own habits and needs. In this Wishlist, the user is enabled to save the products that are ordered frequently so they can be accessed easily instead of looking for them each time he wants to place an order. This will give the app an advantage to appeal more to the user with making order placing easier and finding frequently needed items always at the same place.

Figure 17: Mobile orders page. (source: own design)

Finally, the last page of the app is the personal profile page where the user can set his own personal data and parameters, like name, address, payment methods, settings of the app, contacts, app rating, etc.…

### 7.2.2 Desktop version design

The welcome page will change mainly the background image that will fit the full screen of the desktop browser page, with a wide background image showing vegetables and fruits as a reference for the main purpose of the app : groceries shopping, and to give the user the feeling of buying fresh natural products. The welcome message will be the same as displayed for the mobile version, same for login and registration page where the fields display will be kept the same.
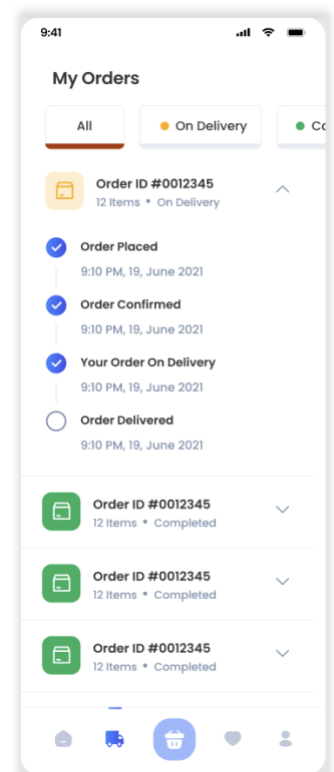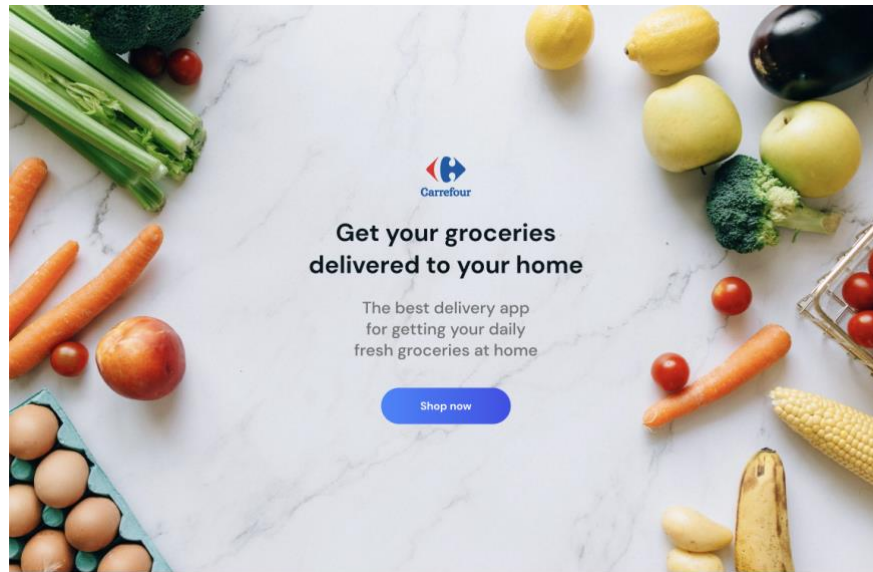
Figure 18: Desktop welcome page. (source: own design)

The main page will be displayed with the same order as the mobile version, some changes are done to make user experience and interface better for the desktop user who has a wider screen size. First the filter option, instead of a dedicated filter page as described for the mobile application, in the desktop the filter options will be displayed on the top of the products list, this will make filtering products list easier while using the space on the wide computer screen. The 3 filter options: Category, discount, and price range, will be displayed as a drop-down menu for each filter criteria, that when clicked, each filter option will show the user the menu to select and change the criteria based on their need.

Under the "Sort by" feature, the products list will be displayed as a grid of 6 columns of products, this will give the user more visibility on available products since there is more room for display on larger screen, which was not the case for mobile version where only display of 2 columns was possible to view products properly.
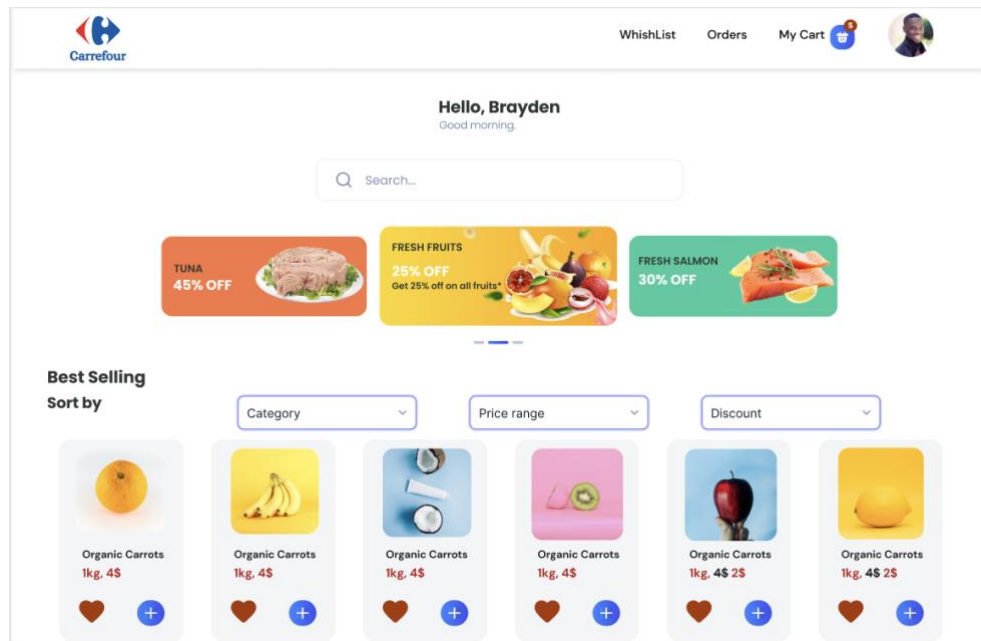
Figure 19: Desktop Home Page. (source: own design)

Another customization to note for the desktop version of the app is the shopping cart page, that will be merged along with the checkout pages as described above for the mobile layout of the application. Instead of having different pages for adjusting the shopping cart, entering delivery information and choosing the payment method, all those steps will be put in one single page, since the wide desktop app allows the user enter all those details easily without having to be directed from a page to another as done with mobile where this method was more convenient, since each page was supposed to fit the smaller screen size to make it easier for the mobile user. The total amount along with the order confirmation button will be displayed on the right side of the screen. This will help the user, at anytime he finishes the order information, to proceed to the order confirmation since the confirmation button and total of the order will be always visible at the right of the page.

Figure 20: Desktop Cart Page. (source: own design)

For the navigation menu, on the computer version of the app, instead of the bottom navigation bar as done for mobile, the navigation menu will be displayed on the top of the screen, and also on fixed position to make it always visible when scrolling down, to facilitate the access to other pages of the website. The desktop navigation menu contains the logo of Carrefour brand that serves as a link to redirect to the home page which is a pattern used in most websites nowadays, Wishlist section, orders section, cart and the profile icon referring to the user profile page.

# 8 TECHNICAL ARCHITECTURE OF THE APPLICATION SOLUTION

## 8.1 The choice of programming languages: JavaScript, HTML & CSS

To build the application, decisions must be taken regarding the programming language based on requirements, compatibility, and project peculiarities. In the context of the Carrefour supermarket shopping app, HTML, CSS, and JavaScript were selected as the programming languages.

HTML, or Hypertext Markup Language, serves as the basis for all web pages and web applications. It defines the structure and content of a webpage, including headings, paragraphs, graphics, and hyperlinks. Thus, it is an essential component of any web-based program, such as online grocery buying software. HTML allows us to develop a well-structured, readily navigable interface that can be accessed by people on a variety of devices and platforms.

CSS, or Cascading Style Sheets, is a language used to enhance a web page's visual appearance. CSS enables developers to control the layout, colors, fonts, and other visual features of a webpage, making it an essential component of every web application. We can design a visually beautiful and user-friendly interface with CSS, to consequently enhance the entire user experience. CSS can be used to style product lists, shopping carts, and other visual elements in an online grocery shopping application, making it easier for consumers to browse and purchase products.

JavaScript is a sophisticated and dynamic programming language that can be utilized for both frontend and backend development. It is commonly used in web development to add interactivity and dynamic elements to web pages, which makes it a great choice for online grocery shopping applications. By utilizing JavaScript, we can add features such as real-time updates, interactive forms, and shopping carts that make it easy for customers to navigate and purchase things.

There are multiple justifications for selecting Javascript, HTML, and CSS as the programming languages for the grocery shopping application project:

- Cross-Platform Compatibility: JavaScript, HTML, and CSS are all cross-platform compatible, which means they may be utilized on any device with a web browser, including

desktops, laptops, tablets, and smartphones. This makes them a perfect option for creating web-based apps that are accessible from a range of devices.

- Flexibility and Scalability: JavaScript, HTML, and CSS offer excellent flexibility and scalability, allowing developers to design dynamic and complex web applications. Also, they are always changing, with regular upgrades and enhancements that facilitate the development of more sophisticated features.

- Integration with Backend Technologies: JavaScript can be used as both a frontend and backend language, allowing it to integrate with backend technologies like Node.js, MongoDB, and Express.js. This enables greater development process flexibility and can facilitate the creation of more advanced features.

- Compatibility with APIs: JavaScript, HTML, and CSS are interoperable with several APIs, which makes it easier to incorporate third-party services, such as payment gateways, maps, and social media platforms, into the application.

JavaScript, HTML, and CSS are a popular combination for designing web-based applications due to their adaptability, scalability, user-friendliness, and cross-platform compatibility.

## 8.2 Choice of React Framework for building a modern online groceries shopping experience

React was selected as the primary framework for the Carrefour online grocery shopping application for several reasons. First, React is a well-known and widely-used JavaScript package that is renowned for its speed and performance. Its modular, component-based architecture allows developers to develop dynamic, complicated user interfaces with relative simplicity.

React's ability to efficiently manage massive volumes of data and state changes is another justification for its utilization. Being an online grocery shopping application, it is anticipated that the app will manage a huge quantity of data, including product lists, customer information, and payment information. React's virtual DOM and efficient rendering algorithms allow for the real-time management and modification of this data, resulting in a seamless user experience.

In addition to React, Material UI, a prominent React-based User Interface toolkit, was utilized to improve the application's aesthetic design. Material UI offers a collection of pre-built, modifiable components that may be used to create a consistent and aesthetically pleasing user experience. By combining Material UI and React, we can create a modern and user-friendly shopping experience that satisfies the requirements of the users.

The combination of these technologies will provide a versatile and scalable development platform, allowing me to build a robust and dependable application capable of meeting the requirements of a real-world e-commerce business.

# 9 APPLICATION SOLUTION TESTING

## 9.1 Qualitative survey for testing the application prototype

The purpose of this project is to propose an online grocery ordering application for Carrefour Supermarkets that would allow customers to place orders and have them delivered. Before launching the final version of the app, it will be necessary to conduct user experiments to determine how to deliver the greatest user experience and whether the app fulfills expectations and accomplishes its goals.

Before publishing the final version of an application, it is essential to test it with real users to gain vital insights on how users interact with the app, what they like, dislike, and what could be improved. By collecting user feedback, the app developer is able to uncover usability difficulties, design faults, and functionality gaps, and then make the required modifications to improve the user experience.

In the case of testing the online grocery shopping application for Carrefour, respondents were instructed to recreate a typical consumer journey by searching for products, adding them to a shopping cart, and placing an order. Questions centered on the general experience, the simplicity of navigating the app, the convenience of the search and filter choices, the use of the various features, and the suggestions that may be made to improve the app. Questions with free-form responses were used to collect more in-depth feedback on particular features of the app.

The survey was offered in French, and an electronic version was made available through Google Forms. There were 15 answers received. In the next section, findings will be discussed together with an explanation of how survey responses contributed to the application's enhancement.

## 9.2   Improving the application based on testing results

### 9.2.1   Improving the User Experience with Quantity Control on Product Cards

After user testing, one of the significant enhancements added to the online grocery shopping application was the addition of a quantity control on each product card. With the initial version, customers could only add items to their cart by clicking the plus symbol displayed on each product card. However, this functionality didn't allow users to specify the desired number of each item.

After collecting users' feedback, we determined that many users want better control over the number of products added to their shopping carts. To remedy this issue, an input element was introduced to each product card, allowing consumers to choose the precise number they wish to purchase. The input element includes a plus and minus sign, allowing users to easily increase or reduce the quantity.

This new feature not only enhanced the user experience by providing greater control and flexibility, but also simplified the ordering process. Customers could now specify the exact number of any item they wished to purchase without having to navigate between the product page and the shopping cart.

User testing may significantly improve the layout and functionality of an application, as demonstrated by the incorporation of quantity control to product cards, we were able to design a more user-friendly and effective program by carefully considering user feedback and comprehending their preferences and needs.
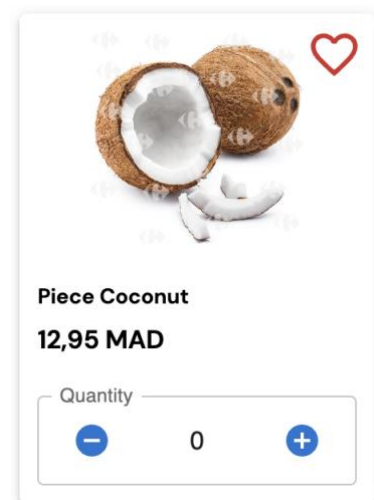
Figure 21: Enhanced product card. (source: own design)

### 9.2.2   Enhancing User Experience with displaying discount percentage on product cards

After user testing, one of the most significant changes made to the online grocery shopping application was the placement of the discount percentage to the top of each product card. In the product card of the initial prototype, customers could only see the old price and the new

price. This function, however, did not inform users of the discount amount applied to the purchase.

After collecting respondents' feedback, we determined that many users wanted to know the discount percentage before adding a product to their shopping basket. This input was vital, as consumers significantly rely on discounts and promotions when deciding to make a purchase.

Together with the old and new pricing, the discount percentage was placed to the top of each product card to address this issue. This function provides users with the information required to make informed buying selections. The discount percentage enables users to know the actual amount of money they will save by purchasing the product, which can be a determining factor in their decision to buy. This modification will enhance the user experience overall by making it more transparent and efficient.
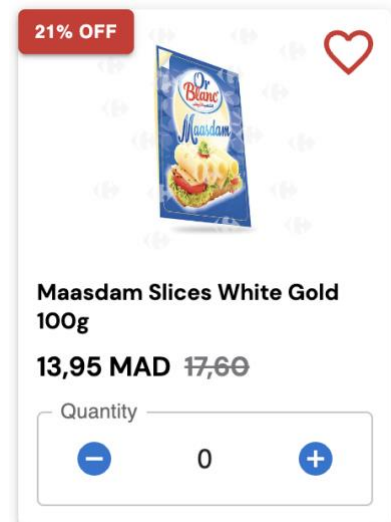


Figure 22: Product card with discount. (source: own design)

### 9.2.3 Improving the app Performance

One of the main complaints received from users during testing of the online grocery shopping application was the performance of the search feature. Users reported that when typing in the search field, the application would freeze for a few seconds before displaying the search text and filtered results. This lag in performance was frustrating for users and impacted their overall experience with the app.

To address this issue, it was necessary to build a debounce function to enhance the functionality of the search feature. The debounce function is a programming technique used to regulate the frequency of a function's execution. In the case of the search functionality, the debounce function was employed to delay the execution of the search function until the user finished typing, hence decreasing the frequency of function execution and enhancing the application's performance.

With the addition of the debounce function, the performance of the search feature will significantly improve for users. The issues with latency and freezing have been rectified, and users can now view search results more quickly and effectively. This enhancement not only

addressed the problems reported from respondents, but also enhanced the application's general effectiveness.

In addition, the implementation of the debounce function improved the application's speed and effectiveness, making it more responsive to user input. Users could now navigate the application without encountering any lag or delays, allowing for a faster and more efficient experience.

In conclusion, including user feedback through testing is essential for detecting and resolving issues that affect the user experience. The enhancements detailed in this section are only a few examples of how user testing can result in substantial performance and functionality enhancements to an application. By offering consumers with a quick and responsive application, it is possible to maximize user satisfaction and the probability of re-use.

```javascript
const debouncedSearch = debounce(searchFiltering, 500);

const handleSearch = (e) => {
  debouncedSearch(e.target.value);
};

const inputRef = useRef(null);
const inputMobileRef = useRef(null);

const closeSearch = () => {
  setState((prevState) => ({
    ...prevState,
    searchFilter: "",
    currentPage: 1,
  }));
  if (inputRef.current) {
    inputRef.current.value = "";
  }
  if (inputMobileRef.current) {
    inputMobileRef.current.value = "";
  }
};

const handleCategoryChange = (e) => {
  setState((prevState) => ({
    ...prevState,
    categoryFilter: e.target.value,
    currentPage: 1,
  }));
};
```

Figure 23: Search algorithm with debounce function included. (source: own code)

# 10 APPLICATION FINAL DEPLOYMENT

### 10.1.1 The project scope

This project's scope is limited to the creation of the front-end of the online grocery shopping application. The goal is to provide customers with a seamless and user-friendly experience, allowing them to explore and purchase groceries online with ease. The scope of the project did not include the creation of back-end technologies, such as user authentication, inventory management and payment algorithms. Although, it's important to note that the app front end development made in this project is scalable and took into consideration future possible integration of a back-end algorithms that manage supermarkets and users data, payment, etc.…

It is crucial to remember that the data presented in the application are for illustrative purposes only and do not reflect the actual offers of Carrefour supermarkets in Morocco. This project's primary objective is to demonstrate the design and functioning of an online grocery shopping application, not to give correct pricing or product information.

The project was able to provide a good user experience by limiting its scope to the front-end development of the application, ensuring that the app is intuitive, easy to use, and aesthetically pleasant.

### 10.1.2 Source code and app deployment links

The source code for the online grocery shopping application developed for this master's thesis was stored in a GitHub repository, and can be accessed in the following link:

*https://github.com/zillias/Grocery-shopping-App*

The proposed Carrefour online grocery shopping application was also deployed and hosted on the cloud-based platform Netlify, and can be accessed in the link below:

*https://zillias-grocery-app.netlify.app/*

## CONCLUSION

This Thesis paper provided in-depth research of the online grocery business in Morocco, emphasizing the necessity for a solution that addresses the market gap. Through the research on Moroccan individuals, the study gained significant insights into consumer attitudes toward grocery shopping and e-commerce, which guided the design and development of the proposed online grocery shopping application.

The proposed application focuses on Carrefour supermarkets as the project's subject, offering consumers a convenient and effective method of grocery shopping. In the project section of the thesis, the design and development process of the application has been described in detail, showing the numerous processes required in building a user-friendly and effective app. The testing part of the application has been completed in order to evaluate the user experience and examine the app's conformance to the thesis's objectives. The testing phase revealed that the application provides a positive user experience and achieves the thesis's objectives.

This thesis has added to the corpus of knowledge on e-commerce and customer behavior in Morocco by offering a realistic solution for the country's online grocery sector. The proposed application has the potential to tap into Morocco's expanding online grocery market and provide consumers with a simple and effective method of grocery shopping.

This thesis gave a complete analysis of the online grocery business in Morocco, emphasizing the necessity for a solution to fill the market gap. The suggested application has been created to fulfill the needs of Moroccan consumers by providing them with a convenient and time-saving method of grocery shopping. This thesis contributes to the body of knowledge on e-commerce and customer behavior in Morocco and offers a practical solution for the country's online grocery sector.

Therefore, the research questions were answered, and the main objective of this thesis was met.

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Appendix P IX: Application Testing Responses

## APPENDIX P I: SURVEY QUESTIONNAIRE IN ENGLISH

### Questionnaire about grocery shopping habits at supermarkets

How often do you go to the supermarket?

- o Multiple times a week
- o Once a week
- o Once or twice a month
- o Rarely

How hard is it for you to make enough spare time for your groceries?

- o Easily
- o Depend on days.
- o Quite hard
- o Extremely difficult

Do you often find all the items you need when you go to the supermarket?

- o Yes, availability of products has never been an issue.
- o Sometimes I face the problem of availability of products I'm looking for.
- o I always face this problem, there is always something missing.

Generally, do you enjoy going to the supermarket to buy groceries?

- o Yes, I like it
- o I just do it because it's necessary.
- o It's not usually a pleasing experience.

What makes you, or can make you loyal to a specific supermarket?

- o Localization
- o Availability of different choices for goods
- o Good prices and discounts
- o Customer loyalty program
- o Other: …………………………..

Do you usually know about the discounts and offers available at the supermarket before going?

- o Yes I usually know
- o Sometimes I do
- o Never

Are you familiar with online shopping, you did it before?

- o Yes
- o No

If yes, how do you qualify your online shopping experience?

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not satisfied | ○ | ○ | ○ | ○ | ○ | Very satisfied |

Have you ever bought general groceries online?

- o Yes
- o No

From these factors, rate the importance of what can motivate you to buy online?

- Trusting the website/app

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Security of payment

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Confidentiality of data

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Quality of products

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

From all those features, rate the importance of each feature that can make an e-commerce platform more attractive for you?

- Design and easy to use

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Quality and variety of goods

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Discounts and good prices

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Fast delivery

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

- Good ratings and users' reviews:

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Not Important | ○ | ○ | ○ | ○ | ○ | Extremely important |

For online purchase, what do you like the most?

- o Cash on delivery
- o Online payment

Which features would you like the most if you use a groceries delivery app? (Max 2 options)

- o Display of current discounts and new offers.
- o Collect of customer loyalty points and bonuses.
- o Customized delivery schedules and options.
- o Descriptions and details about the products.
- o Other: ……………………

What is your schedule at work and/or study:
- o Part-time
- o Full-time
- o None (or retired)

Gender:
- o Male
- o Female

Your age:

- o Less than 20
- o From 20 to 30
- o From 30 to 40
- o From 40 to 60
- o More than 60

## APPENDIX P II: SURVEY QUESTIONNAIRE IN FRENCH (ORIGINAL)

### Questionnaire des habitudes d'achat des courses au supermarché

À quelle fréquence allez-vous au supermarché ?

- o Plusieurs fois par semaine
- o Une fois par semaine
- o Une ou deux fois par mois
- o Rarement

Est-il facile pour vous d'avoir suffisamment de temps libre pour faire vos courses ?

- o Oui, facilement
- o Ca dépend des jours
- o Difficile
- o Extrêmement difficile

Trouvez-vous souvent tous les articles dont vous avez besoin lorsque vous allez au supermarché ?

- o Oui, la disponibilité des articles n'est pas un problème
- o Parfois je ne trouve pas quelques articles au supermarché
- o Il y a toujours quelque chose qui manque quand je fais mes courses

En règle générale, aimez-vous aller au supermarché pour faire vos courses ?

- o Oui j'aime bien
- o Je le fait juste paracerque c'est nécessaire
- o Ce n'est généralement pas une expérience agréable

Qu'est-ce qui vous fidélise ou peut vous fidéliser à tel ou tel supermarché ?

- o La localisation
- o Disponibilité des différents choix de marchandises
- o Bon prix et réductions
- o Programme de fidélisation de la clientèle
- o Autre :……………

Êtes généralement au courant des réductions et des offres disponibles au supermarché avant d'y aller ?

- o Oui, d'habitude je suis au courant
- o Parfois
- o Jamais

Êtes-vous habitué aux achats sur internet, vous l'avez fait au paravent ?

- o Oui
- o Non

Si oui, comment qualifiez-vous votre expérience d'achat en ligne ?

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Pas satisfait | ○ | ○ | ○ | ○ | ○ | Très satisfait |

Avez-vous déjà acheté des produits d'épicerie générale en ligne ?

- o Oui
- o Non

A partir de ces facteurs, évaluez l'importance de ce qui peut vous inciter à faire un achat en ligne ?

Confiance vis à vis de la marque/site web :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Sécurité de paiement :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Confidentialité des données :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Qualité des produits :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Parmi toutes ces facteurs, évaluez l'importance de chaque critère qui peut rendre une plateforme e-commerce plus attractive selon vous ?

Bon design et facile à utiliser :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Qualité et diversité des produits :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Remises et bons prix :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Livraison rapide :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Bonne évaluation et avis des utilisateurs :

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Peu important | ○ | ○ | ○ | ○ | ○ | Extrêmement important |

Pour l'achat en ligne, quel mode de paiement préférez-vous ?

- o Paiement en ligne
- o Paiement à la livraison

Quelles fonctionnalités aimeriez-vous le plus si vous utilisez une application de livraison de courses ? (2 choix maximum)

- o Affichage des remises en cours et des nouvelles offres
- o Collecter les points de fidélité et les bonus client
- o Options de livraison flexibles
- o Descriptions et détails sur les produits
- o Autre ………………….

Quel est votre horaire de travail et/ou d'études ?
- o À temps partiel
- o À plein temps
- o Aucun (ou retraité)

Genre :

- o Homme
- o Femme

Votre Age :
- o Moins de 20 ans
- o De 20 à 30 ans
- o De 30 à 40 ans
- o De 40 à 60 ans
- o Plus de 60 ans

## APPENDIX P III: SURVEY RESULTS

How often do you go to the supermarket?

| Row Labels | Count |
|---|---|
| Many times a week | 85 |
| Rarely | 15 |
| Once a week | 130 |
| One or Twice a month | 73 |
| **Grand Total** | **303** |

How hard is it for you to make enough spare time for your groceries?

| Row Labels | Count |
|---|---|
| Depends on the day | 130 |
| Difficult | 114 |
| Extremely difficult | 5 |
| Easily | 54 |
| **Grand Total** | **303** |

Do you often find all the items you need when you go to the supermarket?

| Row Labels | Count |
|---|---|
| Sometimes I face the problem of availability of products I'm looking for. | 163 |
| I always face this problem, there is always something missing. | 96 |
| Yes, availability of products has never been an issue. | 44 |
| **Grand Total** | **303** |

Generally, do you enjoy going to the supermarket to buy groceries?

| Row Labels | Count |
|---|---|
| It's not usually a pleasing experience | 58 |
| I do it just because it's necessary | 172 |
| Yes I like it | 73 |
| **Grand Total** | **303** |

What makes you, or can make you loyal to a specific supermarket?

| Row Labels | Count |
|---|---|
| Good prices and Discounts | 114 |
| Availability and variety of products | 46 |
| Freshness of food products | 1 |
| Location | 139 |
| Location and availability of goods | 1 |
| Customer Loyalty Program | 2 |
| **Grand Total** | **303** |

Do you usually know about the discounts and offers available at the supermarket before going?

| Row Labels | Count |
|---|---|
| Never | 162 |
| Sometimes | 106 |
| Yes, I usually know | 35 |
| **Grand Total** | **303** |

Are you familiar with online shopping, you did it before?

| Row Labels | Count |
|---|---|
| No | 121 |
| Yes | 182 |
| **Grand Total** | **303** |

If yes, how do you qualify your online shopping experience?

| Row Labels | Count |
|---|---|
| 1 | 3 |
| 2 | 56 |
| 3 | 192 |
| 4 | 376 |
| 5 | 55 |
| **Grand Total** | **682** |

Have you ever bought general groceries online?

| Row Labels | Count |
|---|---|
| No | 270 |
| Yes | 33 |
| **Grand Total** | **303** |

From these factors, rate the importance of what can motivate you to buy online?

| Values | Rating Average |
|---|---|
| Quality of products | 4,78 |
| Trust in the App / website | 4,70 |
| Secure payment | 3,70 |
| Confidentiality of Data | 3,43 |

From all those features, rate the importance of each feature that can make an e-commerce platform more attractive for you?

| Values | Rating Average |
|---|---|
| Discounts and good prices | 4,80 |
| Design and easy to use | 4,71 |
| Quality and variety of products | 4,61 |
| Good rating and user reviews | 3,40 |
| Fast delivery | 3,34 |

For online purchase, what do you like the most?

| Row Labels | Count |
|---|---|
| Payment on delivery | 248 |
| Online payment | 55 |
| **Grand Total** | **303** |

Which features would you like the most if you use a grocery delivery app?

| Row labels | Count |
|---|---|
| Display of discounts and new offers | 263 |
| Collect loyalty points and customer bonuses | 131 |
| Customized delivery schedules and options | 30 |
| Descriptions and product details | 164 |

Work/Study schedule:

| Row Labels | Count |
|---|---|
| Full time | 76,57% |
| Part time | 17,49% |
| None / Retired | 5,94% |
| **Grand Total** | **100,00%** |

Gender:

| Row Labels | Count |
|---|---|
| Female | 180 |
| Male | 123 |
| **Grand Total** | **303** |

Age:

| Age Groups | Count |
|---|---|
| 20 to 30 | 89 |
| 30 to 40 | 87 |
| 40 to 60 | 86 |
| Under 20 | 26 |
| Over 60 | 15 |
| **Grand Total** | **303** |

## APPENDIX P IV: APPLICATION DESIGN SYSTEM

### Colors

**Neutral Colors**

HEX #111827

HEX #77767c

HEX #374151

**Basic Colors**

**BLACK**
HEX #000000

**WHITE**
HEX #FFFFFF

**Brand colors**

**PRIMARY COLOR**
HEX #3F51B5

**SEONDARY COLOR**
HEX #F44336

**Status colors**

**GREEN**
HEX #1CAF5E

**BROWN**
HEX #AA3600

**YELLOW**
HEX #FFA902
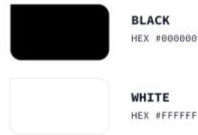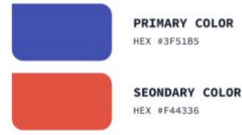
### Typography

Font Family :
DM Sans, sans-serif

SAMPLE

text-5xl / font-semibold

# Headline 1

text-4xl / font-semibold

## Headline 2

text-3xl / font-semibold

### Headline 3

text-2xl / font-semibold

#### Headline 4

text-xl / font-semibold

**Body text**

### Mobile Navigation Menu
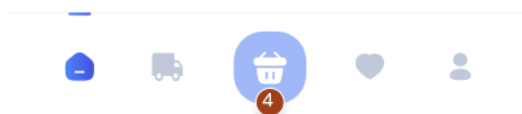


### Desktop Navigation Menu

## Buttons

Primary   **Text Button**

Icon inactive Button

Icon active Button

## Checkbox

☑ Selected option
☑ Unselected option

## Avatar

Avatar with picture

Avatar Without picture

H

## Inputs

| | |
|---|---|
| Basic Input | Placeholder |
| Input Left Icon | 🔍 Placeholder |
| Input right Icon | Placeholder 👁 |
| Input Both Icons | 🔍 Placeholder ✕ |
| Input with label | **Label** Placeholder |

Dropdown Menu    Chosen value ⌄

Choose value
Item 1
Item 3
Chosen value
Item 4

Slider    $10    $230

## APPENDIX P V: APPLICATION SCREENSHOTS (MOBILE VERSION)
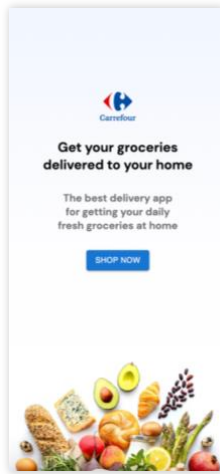


Mobile Welcome Page
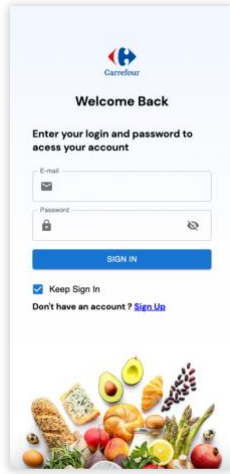


Mobile Login Page
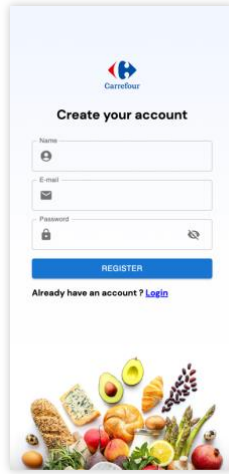


Mobile Register Page
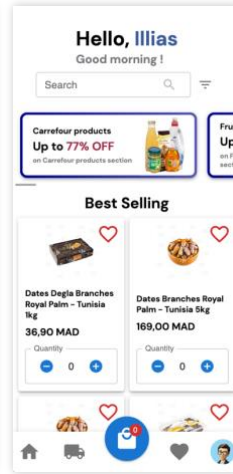


Mobile Home Page
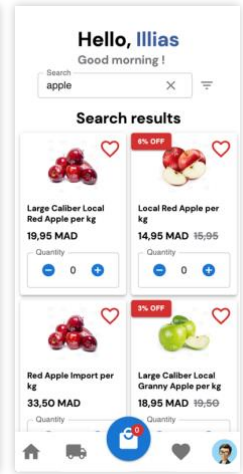


Mobile Home Page on Search
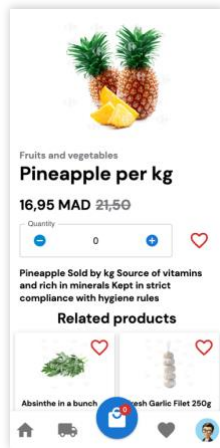


Mobile Product Page
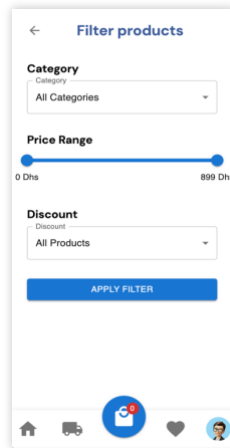


Mobile Filter Page
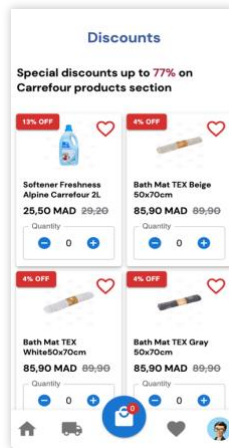


Mobile Discount Page
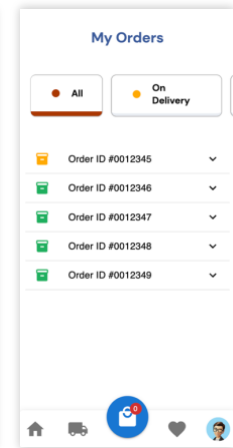


Mobile Orders Page
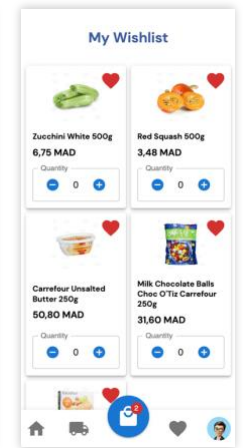


Mobile Wishlist Page
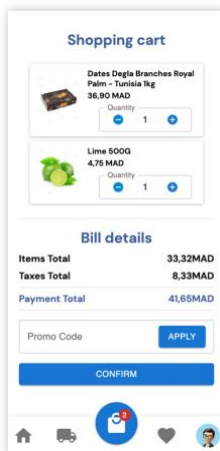


Mobile Cart Page
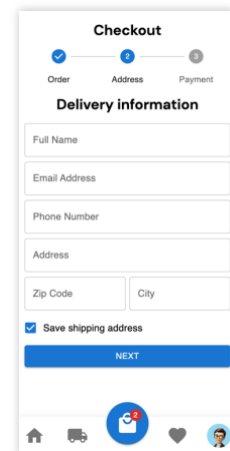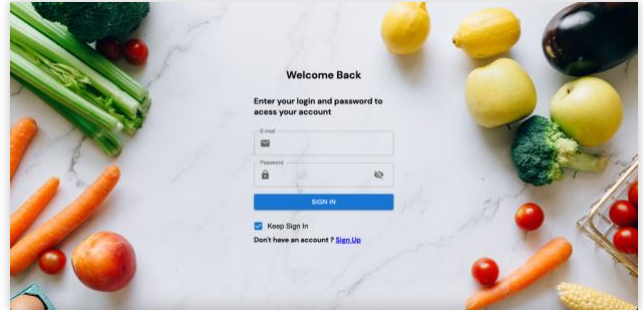


Mobile Delivery Info Page
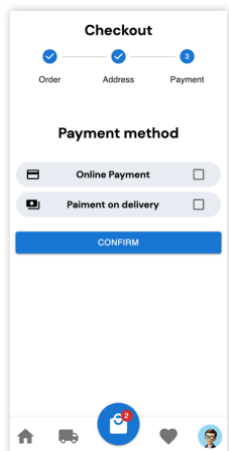


Mobile Payment Page
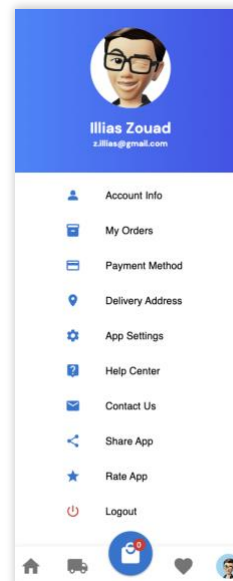


Mobile Profile Page

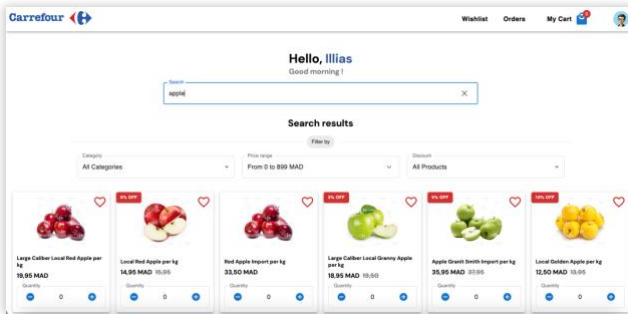# APPENDIX P VI: APPLICATION SCREENSHOTS (DESKTOP VERSION)
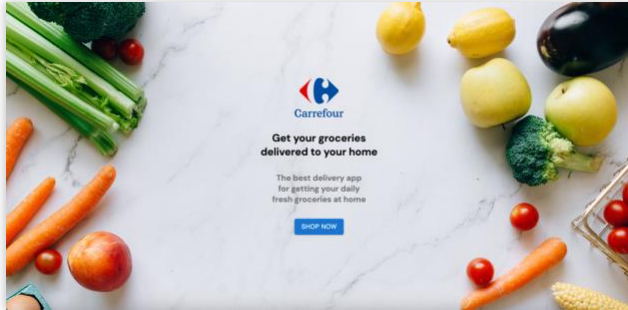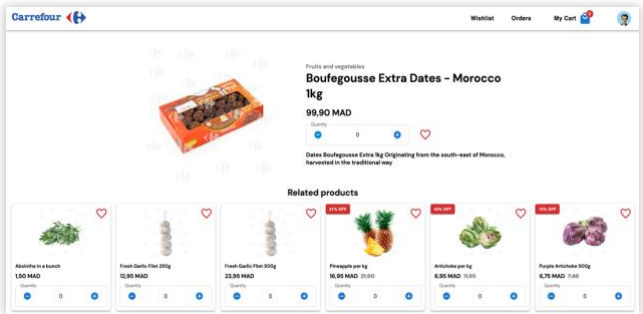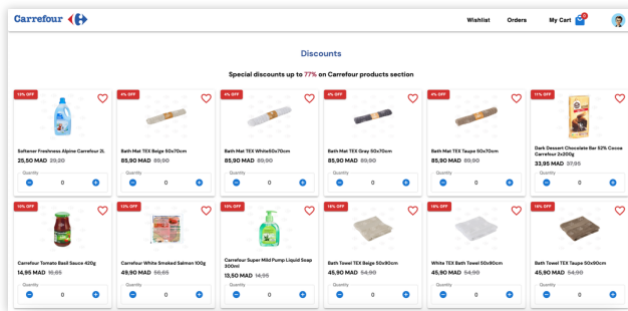


Desktop Welcome Page



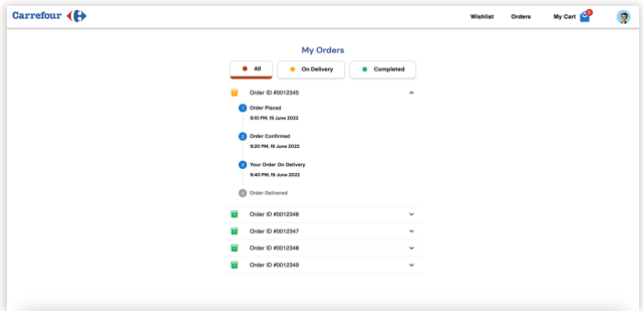Desktop Login Page
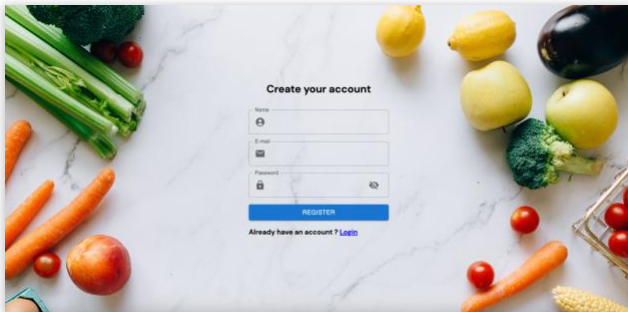


Desktop Register Page
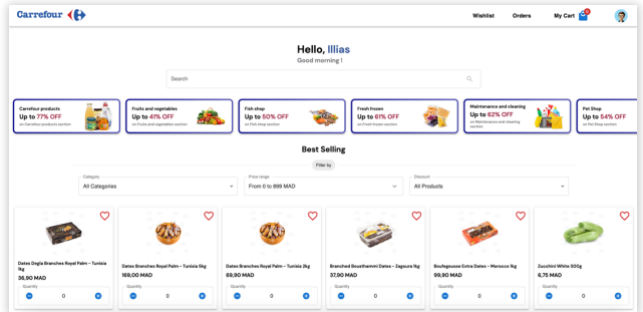


Desktop Home Page
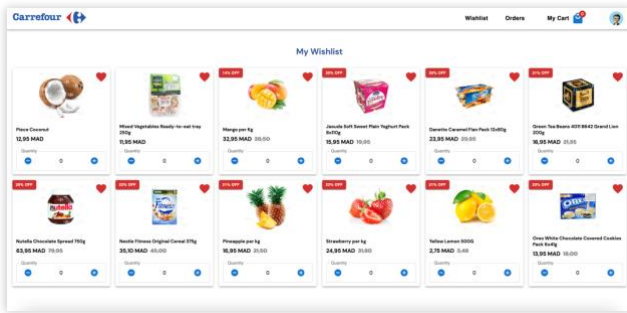


Desktop Home Page on Search
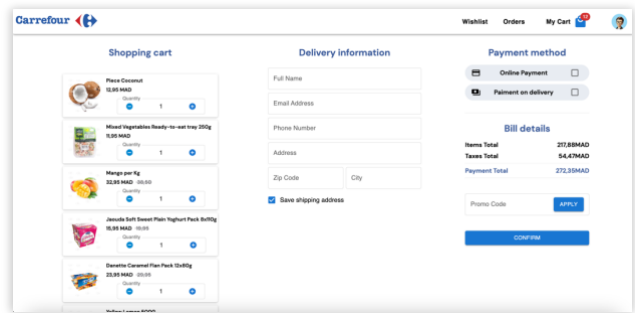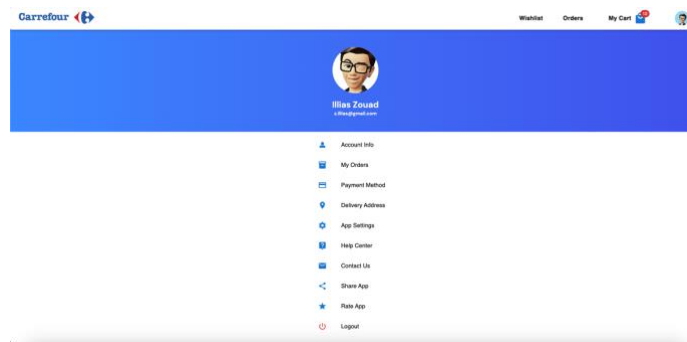


Desktop Product Page



Desktop Discounts Page



Desktop Orders Page

Desktop Wishlist Page



Desktop Delivery info page



Desktop Profile Page

# APPENDIX P VII: APPLICATION USER TESTING QUESTIONNAIRE IN ENGLISH

## Test of an online grocery shopping app

Welcome to the survey test for the online grocery application developed as part of a master's thesis project. The purpose of this application is to facilitate online grocery shopping for Carrefour supermarkets in Morocco. We appreciate you taking the time to try out our app and share your feedback with us.

Please note that you do not need to enter any login credentials to access the application. Just click on the login button to access the app and start ordering different items using filter and search options. We encourage you to explore the different features and pages of the app.

Thank you for your time and cooperation.

**Questions:**

How would you rate your overall experience with the app?

Were you able to easily navigate the app and find the products you were looking for?

What did you like most about the app?

What improvements do you think the app should make to enhance the user experience?

## APPENDIX P VIII: APPLICATION USER TESTING QUESTIONNAIRE IN FRENCH (ORIGINAL)

### Test d'une application de commande de courses en ligne

Bienvenue à l'enquête pour l'application d'épicerie en ligne développée dans le cadre d'un mémoire de fin d'étude pour Master. Le but de cette application est de faciliter les achats d'épicerie en ligne pour les supermarchés Carrefour au Maroc. Nous apprécions que vous preniez le temps d'essayer notre application et de partager vos commentaires avec nous.

Veuillez noter que vous n'avez pas besoin de saisir d'identifiants de connexion pour accéder à l'application. Cliquez simplement sur le bouton de connexion pour accéder à l'application et commencer à commander différents articles à l'aide des options de filtre et de recherche. Nous vous encourageons à explorer les différentes fonctionnalités et pages de l'application.

Nous vous remercions pour votre temps et votre collaboration.

**Questions :**

Comment évaluez-vous votre expérience globale avec l'application ?

Avez-vous pu naviguer facilement dans l'application et trouver les produits que vous cherchiez ?

Qu'est-ce que vous avez aimé le plus dans l'application ?

Selon vous, quelles améliorations l'application devrait-elle apporter pour améliorer votre expérience ?

## APPENDIX P IX: APPLICATION TESTING QUESTIONNAIRE RESPONSES

Comment évaluez-vous votre expérience globale avec l'application ?

| |
|---|
| J'ai adoré l'application! C'était très simple et intuitif à utiliser et j'ai pu rapidement trouver ce que je cherchais. |
| J'ai eu une excellente expérience avec l'application. C'était simple et facile à utiliser. |
| J'ai trouvé l'application très facile à utiliser et j'ai apprécié la facilité de navigation. |
| J'ai eu une excellente expérience avec l'application. Les produits proposés sont très variés, c'était très facile à utiliser et j'ai pu rapidement trouver ce que je cherchais. |
| J'ai apprécié l'application et j'ai trouvé qu'elle était facile à utiliser. |
| J'ai trouvé l'application très utile et j'ai apprécié la facilité d'utilisation. |
| J'ai trouvé l'application très pratique, bien pensée et facile à utiliser. |
| L'application était simpliste et facile à utiliser. |
| J'ai trouvé l'application très facile à utiliser et à naviguer. |
| L'application était très pratique, mais j'ai rencontré quelques problèmes de lenteur. |
| Perso, je trouve que l'application était fantastique! C'était très facile à utiliser et j'ai pu rapidement passer une commande. |
| L'application était facile à utiliser mais le processus de commande pourrait être amélioré. |
| l'appli est simple bien fonctionnelle |
| J'ai beaucoup aimé la conception, l'utilisation est simple et pratique |
| J'ai trouvé l'application très pratique et facile à utiliser. |

Avez-vous pu naviguer facilement dans l'application et trouver les produits que vous cherchiez ?

| |
|---|
| Oui, l'application était très facile à utiliser et je n'ai eu aucun problème à naviguer dans les différentes pages et fonctionnalités. |
| Oui, l'application était très conviviale et j'ai rapidement trouvé tout ce dont j'avais besoin. |
| Oui, l'application était très intuitive et je n'ai eu aucun problème à naviguer dans les différentes pages et fonctionnalités. |
| Oui, j'ai pu facilement naviguer dans l'application et trouver les produits que je cherchais. J'ai aussi aimé le concept de list des produits souhaités que je peux enregistrer pour un achat ultérieur. |
| Oui, j'ai trouvé l'application très intuitive et j'ai rapidement trouvé les produits que je cherchais. |
| L'appli est facile a utiliser, et l'option de recherche facilite beaucoup la tâche. |
| Oui, j'ai trouvé l'application très facile a utiliser et j'ai rapidement trouvé les produits que je cherchais. |
| Oui, j'ai pu facilement naviguer dans l'application et trouver les produits que je cherchais. |
| Oui j'ai rapidement trouvé les produits que je cherchais. |

| |
|---|
| Oui, j'ai trouvé l'application très intuitive et j'ai rapidement trouvé les produits que je cherchais. |
| Oui, j'ai pu trouver les produits que je cherchais, mais j'ai parfois dû attendre longtemps pour que les pages se chargent. |
| Oui, j'ai trouvé les produits que je cherchais en quelques clics seulement. |
| Oui, j'ai trouvé les produits que je cherchais mais j'ai eu des difficultés à modifier la quantité des produits lors de la selection. |
| j'ai plus rapidement chercher les produits et placer ma commande |
| A part quelques petits bugs de retard de temps de réponse, j'ai pu facilement trouver ce que je recherche |

Qu'est-ce que vous avez aimé le plus dans l'application ?

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| J'ai vraiment apprécié les options de filtre et de recherche. Elles ont rendu la recherche de produits très facile et plus efficace. |
| J'ai apprécié la conception de l'application. C'était très propre et facile à naviguer. |
| J'ai vraiment aimé les options de recherche et de filtrage. Elles ont rendu la recherche de produits très facile. |
| J'ai beaucoup aimé la fonctionnalité de recherche avancée. Elle m'a permis de trouver facilement des produits spécifiques. |
| J'ai beaucoup aimé la fonctionnalité de recherche par catégorie. Elle m'a permis de trouver facilement les produits dont j'avais besoin. |
| ai apprécié la fonctionnalité de recherche par mot-clé. Elle m'a permis de trouver facilement les produits que je cherchais. |
| J'ai beaucoup aimé la fonctionnalité de filtre par prix. Elle me permettra de trouver facilement des produits dans mon budget. |
| J'ai beaucoup aimé le design simpliste et la fonctionnalité de filtre de recherche qui m'a permis de trouver rapidement les produits que je cherche. |
| la simplicité et facilité d'utilisation |
| l'experience en generale, l'application contient tout les produits que l'on peut rechercher, et l'utilisation etait tres simple |
| J'ai aimé la variété de produits proposés et la qualité des descriptions sur certains produits. |
| L'experience en general est agréable, le fait de pouvoir modifier la commande avant de procéder au paiement. Et la possibilité de choisir le paiement à la livraison |
| J'ai aimé la fonctionnalité de trier les produits par remises, ca permettra aux client de profiter des bons deals |
| La simplicité, et la navigation sur les differentes pages |
| L'organisation et la categorisation des produits est top |

Selon vous, quelles améliorations l'application devrait-elle apporter pour améliorer votre expérience ?

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| Il serait génial que l'application propose une fonctionnalité qui permette de suivre votre commande en temps réel, genre sur une carte google maps, et de voir quand elle sera livrée. |
| Il serait utile que l'application offre davantage de recommandations ou de suggestions de produits. |
| Il serait génial que l'application propose une fonctionnalité qui permette de voir le coût total de votre commande à mesure que vous ajoutez des articles à votre panier. |

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| Il serait utile que l'application permette de donner plus d'informations et de details sur les produits, surtout les produits alimentaires. |
| Meme si je l'aime bien dans sa simplicité. Je pense que le design de l'application peut etre amélioré en rajoutant plus de couleurs. |
| Lors de la selection des produits dans la page principale, il serait plus utile je trouve que je puisse controller la quantité de chaque produits, tu pourra rajouter le signe moins ( - ) aussi si je veux diminuer la quantité commandée |
| Lors de la saisie sur la barre de recherche, l'appli prends du temps a montrer ce que je saisissait, ca met un petit moment de confusion. Mais sinon tout est top ! |
| je trouve que c'est top rien de plus a rajouter |
| Le design, meme s'il est déja plutot bien, il peut etre encore mieux amélioré. De plus, le montant de la remise peut etre affiché sur chaque produits, cela pourra attirer plus l'attention des client |
| La barre de recherche met du temps a afficher le texte (à part si le probleme viens de mon coté) |
| Il serait utile que l'application corrige les problèmes de lenteur et de plantage. |
| Rajouter plus de couleur pour que l'appli soit plus attractive, mais sinon tout est bon |
| Il faut rajouter la possibilité de supprimer un produit lors de la selection sur la page principale et aussi montrer la quantité commandée |
| rien à signaler |
| Affichage du pourcentage de la remise sur les produits serait un plus |