

Trends in B2C E-Commerce to Enhance its Accessibility for Older Adults in Greece

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This article explores the adoption of e-commerce among older people, focusing on the importance of information technology and informatics in encouraging this adoption. The study aims to help website designers, businesses, and service providers create effective platforms by exploring e-commerce adoption among older people, identifying barriers to adoption, and variables influencing it. The methodology used in the research design is a qualitative methodology that takes the form of interviews. The study examines the impact of IT services on e-commerce, focusing on developing scalable, secure, and customer-centric IT systems. It also examines factors influencing older individuals' engagement with e-commerce platforms (technological factors and individual characteristics). The research also explores some demographic characteristics of the Greek older population.

Povzetek: Članek analizira trende v B2C e-trgovini za izboljšanje dostopnosti starejšim v Grčiji, s poudarkom na uporabniški izkušnji, zaupanju in prilagoditvah za starejše z omejenimi digitalnimi spretnostmi.

1 Introduction

In recent years, the role of informatics and information technology has become increasingly important. As a scientific discipline, informatics plays a crucial role in designing and implementing the information systems underpinning e-commerce platforms. This involves the use of computer science, data analysis, and information management principles to develop efficient and secure electronic transactions. IT, on the other hand, provides the technological infrastructure and tools necessary for the execution of e-commerce processes. This includes electronic data interchange, online transaction processing systems, secure payment gateways, and web development technologies. In essence, e-commerce within the realm of informatics and IT involves leveraging computational and informational resources to facilitate seamless online transactions, enhance user experiences, and ensure the secure exchange of goods and services in the digital landscape.

The rapid growth of e-commerce has transformed how businesses operate and consumers shop. However, a significant demographic has been relatively underrepresented in e-commerce adoption studies: the elderly population. As the world becomes increasingly digital, understanding the factors that influence the adoption of e-commerce among older people is crucial from a technological perspective. This rationale outlines the importance of studying the adoption of e-commerce among elderly individuals, emphasizing the role of information technology and informatics.

Web design is an important factor to consider when studying e-commerce adoption among elders. Websites that are difficult to navigate or use small fonts and complex menus can be frustrating for older adults to use [21], [22]. Researchers can develop web design guidelines and best practices for e-commerce websites that are accessible and user-friendly for the elderly.

The primary aim of this research is to evaluate the website components that facilitate or hinder older people in their e-commerce endeavors, and to get a thorough comprehension of the factors that influence the participation of older adults in e-commerce activities.

The following are the specific goals of the study:

- To describe efficient structures of e-commerce platforms by understanding the unique traits of older people that impact their online buying.
- To identify and define the important and specific functionalities that an e-commerce website (platform) should possess through a comprehensive analysis and characterization of existing e-commerce websites.

2 Related work

Information technology and informatics play a crucial role in e-commerce, enabling businesses to operate online and reach global customers. IT and informatics encompass the hardware, software, and networks used to process and transmit data, and how to collect, store, manage, and use information. IT and informatics support e-commerce businesses in a variety of ways, including:

- Website development and hosting: E-commerce companies need to create and maintain websites that are informative, user-friendly, and secure. They provide the tools and technologies necessary to build and host these websites [1], [11].
- Product management: IT and informatics systems help e-commerce businesses track inventory, manage orders, and fulfill customer requests. This includes using data analytics to optimize pricing and promotions [2].
- Customer relationship management (CRM): They help e-commerce businesses collect and analyze customer data to improve their marketing and sales strategies. This includes the use of personalization techniques to tailor product recommendations and other offers to individual customers [2].
- Payment processing: IT and informatics systems enable e-commerce companies to accept payments from customers online. This includes the use of secure payment gateways and fraud detection systems [3]. They also play a key role in enhancing the customer experience in e-commerce [23].
- Search and navigation: IT and informatics systems power search and navigation features on e-commerce websites, making it easy for customers to find the products and services they are looking for [1], [20].
- Product recommendations: They can be used to generate personalized product recommendations for customers, based on their previous purchase history and browsing behavior. This can help customers discover new products and services that they may be interested in [4], [10].
- Customer support: They can be used to provide customer support through live chat, email, and social media. This allows customers to get help with their orders, products and accounts quickly and easily [1].

Information technology (IT) and artificial intelligence (AI) have enabled businesses to create user-friendly online shopping experiences, while blockchain technology is emerging as a key player in e-commerce [7]. Some studies examined the use of blockchain technology in e-commerce [15], [5]. The authors argue that the blockchain can be used to improve the efficiency, security, and transparency of e-commerce transactions. They also note that the blockchain can be used to develop new e-commerce applications, such as decentralized marketplaces and peer-to-peer payments. This paper discusses the future of informatics and IT in e-commerce. The authors of [16] argue that artificial intelligence (AI), blockchain technology, and the Internet of Things (IoT) will play a major role in the future of e-commerce. The authors present the power of machine learning techniques to predict the usefulness of e-commerce products' reviews [8].

The literature on e-commerce and older people is growing, but there remains a significant gap in our

understanding of how older adults use and perceive e-commerce technologies [13], [14]. One of the key gaps in the literature is the lack of research on the specific needs of older adults in using e-commerce technologies. For example, older adults are more likely to have difficulty with complex tasks and technologies [17], and they have different preferences for how they interact with websites and mobile applications [14]. However, there is limited research on how to design e-commerce systems that are accessible and user-friendly for older adults. There is also a lack of research on the use of e-commerce technologies by older adults in different cultural contexts. For example, we know that there are significant differences in the way people use e-commerce in different countries, but we do not know how these differences manifest themselves among older adults [18]. Research in this area is important to ensure that older adults in all cultural contexts have access to the benefits of e-commerce. It is also important to ensure that older adults are protected from the risks of e-commerce, such as fraud and scams.

The researchers highlight the significant impact of big data on e-commerce, highlighting its potential to enhance customer insights, optimize operations, and introduce new business models [3], [6], [9]. They argue that big data can provide valuable insights into customer behavior, preferences, and needs, enabling businesses to improve their customer experience, develop new products, and target marketing campaigns more effectively.

3 Research methodology

In this study, the authors relied on a qualitative method - an interview, and their main goal was to analyze in depth the motivational aspect of the elderly to accept and use e-commerce. Through this qualitative method, the diagnosis of existing problem situations is guaranteed, as well as the generation of new ideas for innovation in the problem area. After an analysis by the authors of the different methods for qualitative analysis (focus groups with discussions, in-depth interviews, projective and role-playing methods, and etc.), only in-depth interviews proved to be suitable for conducting research among the hard-to-reach group of the elderly population.

The qualitative research approach was chosen since conducting interviews was determined to be the most effective method for gathering the quality of data required for analysis. Researchers can study their interlocutors and derive conclusions from the method in which the latter express themselves, whether vocally, through facial gestures, or even from the way in which they stand.

The interviews were carried out over a year, spanning from June 2021 to February 2022 and from March 2023 to July 2023. Notably, the period June 2021 - February 2022 coincided with Greece's implementation of stringent quarantine measures in response to the COVID-19 pandemic. As a result, there was a notable surge in online shopping activity, with more people opting to utilize e-commerce platforms to fulfill their purchasing needs during this time.

For this period, only telephone interviews were chosen as the preferred mode of communication due to the

stringent procedures in place to enforce quarantine measures, along with a paramount concern for safeguarding the elderly.

Notes were taken during each interview, both in terms of the precise phrasing of what interlocutors were saying, and the specifics of the way they communicate their emotions or thoughts.

The authors' objective was to thoroughly investigate the design elements and procedural aspects of e-commerce platforms that either facilitate or impede online purchasing for older individuals. This involved a comprehensive exploration of the features and functionalities of such platforms, focusing specifically on their usability and accessibility for older users. The study sought to identify the design elements that enhance older adults' online shopping experiences, as well as those that present challenges or barriers to their participation in e-commerce activities. By examining these factors in detail, the research aims to provide insights into how e-commerce platforms can be optimized to better serve the needs of older consumers and improve their overall online shopping experience.

In addition to that, one more reason for picking this approach was so that the authors could distinguish between the many responses to the same topic.

3.1 Interview process

The extremely important criterion that was used to pick the respondents was to locate them inside our familiar area of acquaintances that we shared. This was brought about by the COVID-19 epidemic, which resulted in numerous contacts, overcrowding that needed to be avoided, forced confinement of people in their homes, and strict health precautions. The use of various application in the telecommunications was the only risk-free method available for conducting high-quality research, and this was especially true for certain age groups that have been identified as vulnerable.

Participants were initially given information regarding on the general regulation on the protection of personal data (GDPR). This was done so that the desired outcome could be achieved. About forty minutes were spent during the conversation process that took place amongst some of the authors and the interviewees.

To allow for deeper digging, similar questions were asked in multiple ways and with alternative wording. However, this strategy required a significant amount of time and effort from both the interviewer and the interviewees. The semi-structured interview guide (according to [24]) was prepared in English for the interviews.

3.2 Interview protocol

The interviewees were initially prompted to provide some background information about themselves. The primary objective was an overall image to be obtained that would enable to better understand how the elderly respond to e-commerce usage. In addition, in accordance with the qualitative research technique, the interview was carried out within the framework of a debate. Without answering

with a simple and impersonal “yes” or “no”, the participants were able to freely express their opinions.

The interview questions are about frequency of online shopping, websites they usually shop on online, obstacles or problems clients run into when shopping online, their worries regarding security and privacy when making purchases online, how websites can help users, and what characteristics or elements would facilitate users' navigation and use of an e-commerce website.

3.3 Data collection

The next step was to collect fascinating data based on the potential divergences in the respondents' points of view.

Thirty seniors were carefully selected for interview study. The participants selected for this qualitative study represented a diverse age range, spanning from 53 to 85 years old. The authors opted to focus primarily on participants in their third age, as individuals in their seventh or eighth decades were more prone to encountering challenges in completing the quantitative study questionnaire, exacerbated by the constraints imposed by COVID-19 and the natural limitations associated with ageing. Furthermore, a deliberate attempt was made to encompass individuals residing in cities of diverse sizes and geographical locations across Greece. This strategic approach aimed to enhance statistical precision and strive towards a more accurate representation of real-world conditions.

When conducting the qualitative research, a process of repetition of responses began to be observed. Almost identical responses were obtained for the respective type of interviewee (age, education, level of technology use). This is the reason why the authors chose thirty relatively different interviews.

To analyze the qualitative data collected through interviews, the technique "Thematic analysis" was used, preferring an inductive and semantic approach (in other words, the approach involves allowing the data define research themes and analyzing the explicit content of the data).

“Accuracy” in the thematic analysis of coding reliability was determined by consensus coding. The three authors are a guarantee of reliability. They independently coded all the interviews and compared the results on a one-to-one basis. Because the process of consensus coding is slow, establishing reliability took longer.

The "Validity" quality of the study, which refers to how well the results gathered after analyzing the study participants' data represent true findings among similar individuals outside the study population, is confirmed by conducting a thorough survey of the existing literature on these topics.

Table 1 provides a sample of the participants along with some fundamental information about them. Additionally, to preserve the individuals' privacy the monikers were used.

The interviewees were questioned about their e-commerce habits and asked to list any websites they had previously used to make purchases. The following Table 2 was created with the most used e-commerce websites.

Simultaneously with the qualitative research, a quantitative research was conducted to determine the level of acceptance of e-commerce among the elderly population of Greece. The age range of the respondents is 50-83 years. A questionnaire with 38 questions was used. When filling out the questionnaire (online and on paper), the respondents experienced many difficulties related to various health problems caused by their advanced age - visual and mental. Some of the respondents also used help from friends or relatives in reading the questions and making sense of them. The process of data collection through a questionnaire proved to require a longer period of time. Interview participants felt significantly more comfortable than survey participants.

Table 2: Most used e-commerce websites by older people

No.	E-commerce platforms	Product type
<1>	e-food.gr	Food from delivery services
<2>	ab.gr	Grocery products
<3>	pharmacy295.gr	Medicines and dietary supplements
<4>	plaisio.gr	Technology products
<5>	zara.com	Clothing, footwear, jewelry, and cosmetics
<6>	car.gr	Car or car parts
<7>	public.gr	Books, magazines and technology products

4 Result and analysis

To precisely formulate the data that was acquired, the analysis of the interviews was carried out one at a time, individually, and with a great deal of care. The information that was gleaned from the transcription of the oral speech was utilized in the production of a comprehensive written text that included aspects of the conversation. In the interviews, in addition to the primary body of questions, there are references to personal instances that the interviewee himself discussed with the researcher over the course of the conversation.

Using older individuals, [19] created an e-commerce website specifically for seniors as part of his research. To comprehend how elder consumers might develop e-commerce web pages, co-design research was done with older adults. The product photos, price, and "add to cart" button were chosen items by the older adults for inclusion in the e-commerce websites. His study's findings offered suggestions for a website prototype design that was senior-friendly.

The following Table 3 compares the most popular e-commerce websites that are presented in the research (Table 2) to the Osman research design principles. The websites were examined, and a "YES" was entered in the appropriate table cell if it was determined that they were senior-friendly.

As seen on Table 2, the websites that incorporate the most 'senior-friendly' features are <6> and <4>, whereas the ones with the least 'senior-friendly' features were <3>, <5> and <7>. All the seven e-commerce websites can incorporate more features for older users.

4.1 Website assistance recommendations

The recommendations provided by older individuals regarding assistance features on e-commerce websites offer valuable insights into addressing the specific challenges they encounter. One prominent suggestion is for websites to implement a simplified checkout process. This recommendation aligns with the desire for an intuitive user experience, reflecting the importance of minimizing complexity during the purchasing journey. By simplifying the checkout process, e-commerce platforms can cater to the preferences of older users who may have

Table 1: The qualitative research sample

Respondents	Age	Gender	Education level	Technology use
res-1	55	male	primary	PC
res-4	75	female	university	smartphone, tablet
res-5	85	female	technical degree	PC
res-8	75	male	secondary	smartphone, PC, tablet
res-11	77	female	university	PC, smartphone
res-12	61	female	technical degree	smartphone, PC
res-13	63	male	university	smartphone
res-14	56	male	technical degree	smartphone, PC

limited familiarity with online transactions, thereby enhancing usability and facilitating more seamless transactions.

Step-by-step guides were also highlighted as a helpful resource for older users navigating e-commerce websites. This recommendation underscores the importance of providing clear and comprehensive instructions to assist users in completing various tasks, such as product search, selection, and checkout. By offering step-by-step guidance, e-commerce platforms can empower older individuals to navigate the website with confidence, thereby enhancing their overall user experience and reducing frustration associated with unfamiliar digital interfaces.

The recommendation for a customer support hotline reflects the need for accessible and responsive assistance channels to address queries and resolve issues in real-time. Older users may prefer direct human interaction when seeking assistance, making a dedicated customer support hotline a valuable resource for addressing their concerns

promptly and effectively. By providing personalized assistance via phone support, e-commerce platforms can cater to the specific needs and preferences of older users, thereby fostering greater trust and satisfaction with the

navigating the website. By offering live chat assistance, e-commerce platforms can enhance the accessibility of support services and improve the overall customer experience for older individuals, thereby fostering greater

Table 3: Senior-friendly design status for e-commerce websites

No.	Design Aspects	<1>	<2>	<3>	<4>	<5>	<6>	<7>
1	Menu – Navigation (sticky)	YES	YES	YES	YES	YES	YES	YES
2	Font – Size	YES	YES	YES	YES	-	YES	-
3	Add-to-cart-button - Color	YES	YES	YES	YES	-	-	YES
4	Add-to-cart-button – Focus indicator	-	YES	-	-	-	YES	-
5	Add-to-cart-button – Contrast ratio	YES	-	-	-	YES	YES	-
6	Add-to-cart-button – Label	-	YES	-	-	-	YES	YES
7	Add-to-cart-button - Feedback	-	-	YES	YES	YES	YES	YES
8	Buy box design	-	-	-	-	-	-	-
9	Buy box design - Objects	-	YES	YES	YES	-	YES	-
10	Offer - Location	YES	-	-	YES	YES	-	-
11	Product page - Presentation	YES	-	-	option	-	option	YES
	Total	6/11	6/11	5/11	7/11	4/11	8/11	5/11

overall shopping experience.

Visual tutorials and video tutorials were cited as effective tools for providing visual guidance and instructions to older users. This recommendation recognizes the importance of catering to diverse learning styles and preferences, particularly for individuals who may benefit from visual aids when learning new tasks or processes. By incorporating visual tutorials and video guides into the website's support resources, e-commerce platforms can enhance accessibility and comprehension for older users, thereby facilitating greater engagement and participation in online shopping activities.

The recommendation for a live chat assistance feature reflects the growing demand for real-time support options that offer immediate assistance and guidance to users. Live chat support can provide a convenient and efficient means of addressing queries, troubleshooting issues, and providing personalized assistance to older users

satisfaction and loyalty.

Clear return policies emerged as another important recommendation, underscoring the need for transparency and clarity regarding the procedures and conditions for returning purchased items. Older users may place greater emphasis on trust and reliability when making online purchases, making it essential for e-commerce platforms to provide clear and easily understandable return policies that instill confidence and mitigate concerns about potential risks or uncertainties associated with product returns. By offering a clear return policy, e-commerce platforms can reassure older users and facilitate more confident and informed purchasing decisions.

The recommendation for personalized recommendations reflects the growing importance of leveraging data-driven insights and algorithms to deliver tailored and relevant product suggestions to users. Older individuals may benefit from personalized recommendations that take into account their preferences, browsing history, and purchase behavior, thereby enhancing the relevance and utility of product suggestions and facilitating more efficient and satisfying shopping experiences. By incorporating personalized recommendation features into the website's inter-face, e-commerce platforms can enhance engagement, increase conversions, and foster greater customer satisfaction among older users.

In summary, the recommendations provided by older individuals regarding assistance features on e-commerce websites underscore the importance of catering to their specific needs, preferences, and challenges. By implementing features such as simplified checkout processes, step-by-step guides, customer support hotlines, visual tutorials, and personalized recommendations, e-commerce platforms can enhance accessibility, usability,

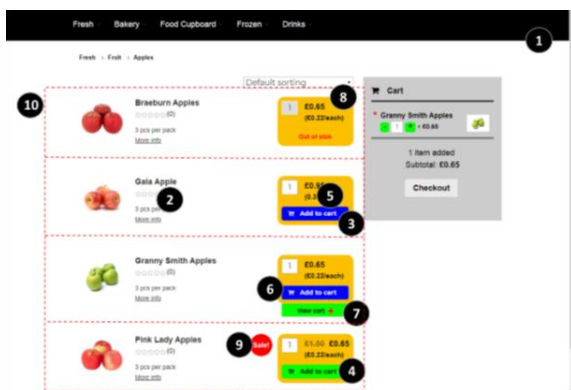


Figure 8: Website design, which incorporated senior-friendly features [19]

and satisfaction for older users, thereby fostering greater engagement and loyalty in the increasingly digital marketplace.

4.2 Website design recommendations

The recommendations provided by older individuals regarding website design improvements offer valuable insights into creating a more user-friendly and accessible online shopping experience for this demographic. One prominent suggestion was for websites to utilize a larger font size and clear navigation elements. This recommendation reflects the importance of readability and ease of navigation, particularly for older users who may have visual impairments or difficulty with small text. By employing larger font sizes and clear navigation menus, e-commerce platforms can enhance usability and ensure that information is easily accessible and comprehensible to older individuals, thereby facilitating a more enjoyable and efficient browsing experience.

Simplicity in layout and a reduction in distractions emerged as another key recommendation. Older users expressed a preference for websites with simple layouts and fewer distractions, allowing them to focus on the task at hand without being overwhelmed by extraneous elements. Clear categories and a prominent search bar were highlighted as essential features for facilitating efficient navigation and product discovery. By simplifying the layout and minimizing distractions, e-commerce platforms can enhance usability and streamline the browsing experience for older users, thereby increasing engagement and satisfaction with the website.

Intuitive icons and large buttons were cited as effective design elements for improving usability and accessibility. Older individuals expressed a preference for websites with intuitive icons and large buttons that are easy to identify and interact with. Additionally, clear instructions and easy-to-read text were emphasized as important factors for ensuring comprehension and guiding users through the shopping process. By incorporating intuitive icons, large buttons, and clear instructions, e-commerce platforms can enhance usability and reduce cognitive load for older users, thereby facilitating a more seamless and enjoyable browsing experience.

Contrasting colors and simple language were highlighted as important considerations for improving readability and comprehension. Older individuals expressed a preference for websites with contrasting colors and simple language, which facilitate easier navigation and understanding of content. Additionally, intuitive categorization and visible contact information were cited as important design elements for enhancing usability and providing reassurance to users. By employing contrasting colors, simple language, and intuitive categorization, e-commerce platforms can improve accessibility and ensure that information is easily accessible and understandable to older users, thereby enhancing their overall browsing experience.

Consistency in layout and accessibility of buttons were also emphasized as important design principles for improving usability. Older individuals expressed a

preference for websites with consistent layouts and accessible buttons, which facilitate easier navigation and interaction. Clear call-to-action buttons with descriptive labels were highlighted as essential features for guiding users through the shopping process and encouraging conversion. Additionally, minimal distractions and clear prompts were cited as important design considerations for maintaining focus and facilitating task completion. By ensuring consistency in layout, accessibility of buttons, and clarity of prompts, e-commerce platforms can enhance usability and facilitate a more seamless and enjoyable browsing experience for older users.

In summary, the recommendations provided by older individuals regarding website design improvements underscore the importance of prioritizing readability, simplicity, and usability. By incorporating features such as larger font sizes, clear navigation, intuitive icons, and simplified language, e-commerce platforms can enhance accessibility and ensure that older users can navigate the website with ease and confidence. Additionally, features such as contrasting colors, consistent layouts, and clear call-to-action buttons can further improve usability and facilitate more efficient task completion. Overall, by implementing these design recommendations, e-commerce platforms can create a more inclusive and user-friendly online shopping experience for older individuals.

5 Discussion

Next table presents some findings from the interviews taken and their analysis. The interviewee's frequency of online shopping provides valuable insights into their familiarity and comfort with online platforms. Understanding their preferred websites and their trust levels can help identify best practices and areas for improvement. Obstacles faced during online shopping can help identify areas where e-commerce platforms may fall short in meeting the needs of older users. Website comprehensibility can be measured, providing a tangible measure of user-friendliness.

Security and privacy concerns are crucial for older users, as they may be more susceptible to online threats. Understanding these concerns can help implement robust security measures and privacy policies that instill trust and confidence among users.

Design preferences and requirements can impact usability and accessibility for older individuals engaging in online shopping. Incorporating design recommendations directly from users can create more intuitive, user-friendly online shopping experiences that resonate with older consumers.

By categorizing participant feedback into these distinct categories, the Table 5 serves as a comprehensive tool for analyzing and synthesizing qualitative data gathered from user interviews, surveys, or usability testing sessions. Each column of the table represents a critical aspect of the e-commerce experience, providing a clear framework for identifying patterns, trends, and insights relevant to the research objectives.

Table 4: Participants difficulties with e-commerce websites

No.	Website	Frequency	Comprehensibility	Difficulties	Other obstacles	Security & Privacy
1	public.gr e-jumbo.gr	Once a month	Moderate	Encountered	Payment errors	Credit card fraud
2	ebay.com	Weekly	Low	Small font size	Slow internet	Data breaches
3	ab.gr e-food.gr	Rarely	High	Confusing checkout process	Complicated returns	Phishing emails
4	plaisio.gr	Monthly	Moderate	Difficulty finding products	Limited product variety	Identity theft
5	e-shop.gr	Bi-weekly	Low	Complex registration forms	Incompatibility with assistive technology	Information leaks
6	ab.gr	Quarterly	Moderate	Unclear shipping costs	Limited payment options	Account hacking
7	zara.com	Rarely	High	Lack of customer support	Technical glitches	Privacy policy transparency
8	e-jumbo.gr	Monthly	Moderate	Poor search functionality	Confusing navigation	Phishing attempts
9	plaisio.gr	Fortnightly	Low	Slow website loading	Limited device compatibility	Unauthorized access
10	zara.com car.gr	Yearly	High	Complicated returns process	Limited payment methods	Data mining
11	pharmacy295.gr	Monthly	Moderate	Small clickable areas	Lengthy checkout process	Identity theft
12	etsy.com	Occasionally	High	Difficulty in changing quantities	Poor site accessibility	Phishing scams
13	ebay.com	Bi-monthly	Moderate	Unclear product descriptions	Confusing product categorization	Privacy policy concerns
14	e-shop.gr public.gr	Seldom	Low	Complicated account creation	Limited language options	Credit card fraud
15	ab.gr	Weekly	High	Hidden fees	Website crashes	Identity theft

The inclusion of positive characteristics in e-commerce websites within the table allows for the identification of features and functionalities that older adults perceive as beneficial or desirable. These positive aspects shed light on successful strategies employed by e-commerce platforms to cater to the needs and preferences of older users, offering valuable insights for informing design decisions and best practices. Additionally, the website assistance recommendations column provides specific insights into the types of support mechanisms that older adults deem necessary for overcoming challenges and navigating e-commerce platforms effectively. From providing clear instructions during the checkout process to offering accessible customer support channels, these recommendations offer practical guidance for improving user assistance strategies and enhancing overall usability. Finally, the web design recommendations column offers actionable insights into the design elements and user interface considerations that contribute to a positive and intuitive e-commerce experience for older adults. By synthesizing participant feedback within these distinct categories, the table serves as a valuable resource for

informing the development of user-centered design solutions aimed at enhancing the accessibility, usability, and satisfaction of older adults engaging in e-commerce activities.

As a result, we have included a summary and a categorization of all the "Difficulties" and "Other obstacles" from the Table 4, the respondents had when purchased online in the Table 6.

It is evident that the most common issues older adults have when shopping online fall into the "Navigation and User Interface" category (seven issues), which is followed by the six issues in each of the categories "Product Discovery and Selection" and "Checkout and Account Management."

- Navigation and user interface

The "Navigation and User Interface" category encompasses several challenges that older users encounter while navigating e-commerce platforms. These challenges include confusing navigation, small clickable areas, limited device compatibility, poor site accessibility, slow website loading, and website crashes. Confusing navigation can lead to frustration and disorientation,

Table 5: Websites positive characteristics and recommendations

No.	Websites Used	Positive Characteristics	Website Assistance Recommendations	Web design Recommendations
1	public.gr e-jumbo.gr	Detailed product descriptions, easy returns process	Simplified checkout process	Larger font size, clear navigation
2	ebay.com	Helpful customer reviews, wide product variety	Step-by-step guides	Simple layout, fewer distractions
3	ab.gr e-food.gr	Deals and discounts, user-friendly mobile app	Customer support hotline	Clear categories, prominent search bar
4	plaisio.gr	Reliable customer service, secure payment options	Visual tutorials	Intuitive icons, minimal pop-ups
5	e-shop.gr	Diverse product selection, frequent sales events	FAQ section	Large buttons, intuitive icons
6	ab.gr	Transparent pricing, easy account management	Live chat assistance	Clear instructions, easy-to-read text
7	zara.com	Detailed product specifications, reliable delivery	Clear return policy	Contrasting colors, simple language
8	e-jumbo.gr	Loyalty rewards program, hassle-free returns	Video tutorials	Intuitive categorization, visible contact information
9	plaisio.gr	Customizable search filters, personalized recommendations	Virtual assistance	Consistent layout, accessible buttons
10	zara.com car.gr	Fashion trend guides, responsive customer support	User-friendly interface	Clear call-to-action buttons, descriptive labels
11	pharmacy295.gr	Product samples with purchase, loyalty program benefits	Chatbot support	Minimal distractions, clear prompts
12	etsy.com	Product comparison tools, verified seller badges, personalized recommendations	Personalized recommendations	Simple language, prominent help section
13	ebay.com	Wide selection of educational materials, reliable customer reviews	Visual aids	Consistent layout, easy-to-find search bar
14	e-shop.gr public.gr	Flash sales, user-friendly mobile app	Senior discounts	Simplified checkout process, prominent help button
15	ab.gr	List favorites, personalized recommendations	Easy returns process	Clear product images, concise descriptions

making it difficult for older users to find the products or information they are seeking. Additionally, small clickable areas can pose a significant obstacle, especially for those with reduced dexterity or vision impairments, as they struggle to accurately interact with interface elements. Moreover, limited device compatibility can restrict access for older users who may be using older devices or assistive technologies, further exacerbating their difficulties. Poor site accessibility, including issues such as inadequate contrast, improper heading structure, or missing alternative text for images, can hinder older users' ability to navigate and comprehend the content effectively.

- Product discovery and selection

This category encompasses challenges related to finding and selecting products on e-commerce platforms, which can be particularly daunting for older users. Difficulties in this category include the struggle to find desired products, confusion regarding product categorization, limited

product variety, lack of product reviews, unclear product descriptions, and poor search functionality. For older users, these challenges can result in frustration, wasted time, and ultimately, abandonment of the website.

- Checkout and account management

This category presents challenges related to the final steps of the e-commerce process, including completing purchases and managing user accounts. These difficulties can significantly impact older users' experience, with issues such as a confusing checkout process, complex registration forms, lengthy account creation procedures, hidden fees, and limited payment options posing significant barriers to smooth transactions. Additionally, technical glitches and payment errors can further exacerbate frustration and hinder older users from successfully completing their transactions.

- Customer support and assistance

In the realm of "Customer Support and Assistance," older users face unique challenges that can impact their overall satisfaction and confidence in utilizing e-commerce

Table 6: E-commerce website issues arising from the interviews

Navigation and User Interface	Product Discovery and Selection	Checkout and Account Management	Customer Support and Assistance	Internet and Technical Issues	Language and Localization
Confusing navigation	Difficulty finding products	Confusing checkout process	Lack of customer support	Slow internet	Limited language options
Small clickable areas	Confusing product categorization	Complex registration forms	Complicated returns process		
Limited device compatibility	Limited product variety	Complicated account creation	Technical glitches		
Poor site accessibility	Lack of product reviews	Lengthy checkout process	Incompatibility with assistive technology		
Slow website loading	Unclear product descriptions	Hidden fees			
Website crashes	Poor search functionality	Limited payment options			

platforms. These challenges encompass issues such as the lack of readily available customer support, navigating through a complicated returns process, encountering technical glitches, and dealing with incompatibility with assistive technologies. For older users, encountering these obstacles can lead to frustration, uncertainty, and a diminished sense of trust in the platform.

- Internet and technical issues

This category encompasses challenges arising from connectivity issues and technical limitations that older users may encounter while navigating e-commerce platforms. Slow internet speeds can significantly impede the loading times of web pages, leading to frustration and potential abandonment of the site. Furthermore, technical glitches, such as website crashes or errors, can hinder older users to complete transactions successfully.

- Language and localization

The "Language and Localization" category encompasses challenges related to language barriers and limited localization options, which can significantly impact older users' ability to engage with e-commerce platforms effectively. Issues in this category include a lack of language options, inadequate translation quality, and limited localization features, all of which can hinder older users' comprehension and navigation of the website content.

- Security and privacy concerns

As depicted in Table 4, one of the primary apprehensions raised was credit card fraud, a worry rooted in the proliferation of online transactions and the inherent vulnerability of financial information in digital environments.

The adoption of tokenization techniques can serve to further mitigate the risk of credit card fraud by replacing sensitive financial data with unique identifiers, thereby adding an additional layer of security to the transaction process.

Another worry expressed by older participants was the specter of data breaches, highlighting the ever-present vulnerability of personal information stored by e-

commerce platforms. To effectively combat this pervasive threat, organizations must prioritize the implementation of regular security audits and employ advanced intrusion detection systems capable of promptly identifying and mitigating any breaches that may occur.

Privacy policy transparency emerged as a key factor influencing trust in e-commerce platforms, emphasizing the importance of clear and concise communication regarding data handling practices. To address this concern, organizations must ensure that their privacy policies are easily accessible, comprehensible, and regularly updated to reflect any changes in data processing procedures. Providing users with granular control over their privacy settings and consent preferences can further enhance transparency and foster greater trust in the platform's commitment to protecting users' personal information.

6 Comparison with existing literature

This research provides theoretical implications by including trust along with e-commerce platform quality as factors to consumer e-commerce adoption, in order to develop a more comprehensive model of consumer behavior in e-commerce literature. In line with the study of [25], website quality was measured in terms of user interface, information quality, perceived privacy, perceived security. In their research [28] Ganguly et al. have also shown that trust acts as a mediator the relationships between social presence and online purchase intention and between self-efficacy and online purchase intention amongst elderly citizens. The authors of [29], after conducting a qualitative study in the form of semi-structured interviews, obtained similar results as those of the described study, namely that elderly people have difficulty trusting technologies and novelties.

Regarding the user interface, it is the key factor influencing consumers' e-commerce acceptance and this finding is consistent with the work of Wang and Sun [22]. They emphasize the importance of designing e-commerce

interfaces that are accessible and user-friendly for older adults. They argue that older adults face challenges when using e-commerce, such as using small fonts and buttons, understanding complex instructions, and navigating complex websites. To improve user experience, companies should focus on creating a user-friendly website interface that includes features that allow users to compare products, helping them make informed decisions, as in [34]. Ensuring accurate and comprehensible product descriptions is also important to avoid misleading consumers. By assessing customer trust in the e-commerce platform, the study of Pono [33] examined the preconditions of customer trust when executing e-commerce transactions. The results implied that information quality, service quality, and seller reputation all affect users' trust in merchants.

Ultimately, businesses should solicit feedback and recommendations from their consumers in order to gain a better understanding of their desires and preferences. This can help companies develop new features and improve their services to better meet consumers' expectations. Similar results can be found in the study published in [30].

Information quality is another crucial factor that influences consumers' adoption of e-commerce. While [32] considered information quality as the factor consumer valued most when intend to use some site, the current study emphasizes that there are several factors that affect parallelly on the process of e-commerce adoption. One of them is the website design. Information quality includes various aspects such as product images, videos, and branding, which should be presented in a clear and transparent manner to avoid confusion or doubts in consumers' minds. E-commerce companies should provide accurate and up-to-date information about the products, with high-quality images to ensure that consumers feel confident about the product's authenticity and suitability for their needs. Osman and Hwang in [33] showed that on e-commerce websites, older people place a high level of importance on product photos, prices, and the presence of a "add to cart" button.

The study identified privacy as a crucial factor that can impact consumers' intention when use e-commerce. When a website shares consumers' private information with third parties without their consent, it can create doubts and hesitations in the consumers' minds, leading them to refrain from providing their private information such as phone numbers, addresses, and so on. This may even result in consumers switching to another platform that ensures their privacy. The security is another factor that significantly affects the e-commerce adoption of consumers. The study found that cyber security is a critical concern for consumers and can cause them to change their decisions at the last minute. Specifically, the risk related to loss of consumers' privacy and security of personal information was important barriers to consumer use as shown in [26]. In general, the results from [31] indicate a mistrust of internet shopping based on the fear of providing personal and bank data.

The conclusion made in this study (offering alternative methods of accessing support, such as phone support or live chat assistance, can provide immediate

assistance to older users experiencing technical difficulties, thereby reducing frustration and improving overall satisfaction) confirm the conclusions made by Xu and Wang in [27].

7 Research limitations and future research

The present qualitative research, based on interviews, was conducted in strict compliance with both the GDPR and the code of ethics of the university where it was conducted. For this reason, the questions were designed to be easy to understand and polite to the individuals participating in the study. All participants in the interviews were given information about the protection of their rights, potential dangers, as well as the objectives of the study, before conducting the study itself. The authors did not discriminate participants by factors such as gender, nationality, race, language, religious beliefs, physical and mental abilities, social class, and personal ethics in how they live their lives.

To reduce the possibility of errors in the management of personal information, the interviewer has taken all necessary precautions to keep the data secure and to ensure that an adequate degree of protection is provided. In addition, it is ensured that during data processing there has been no loss or alteration of data and there has been no access by third parties or transmission of information in any way. This is done to ensure the integrity of the data and the impartiality and open-mindedness of the authors.

The first period during which some of the interviews were conducted was from June 2021 to February 2022. It coincided with the implementation of strict quarantine measures in Greece in response to the COVID-19 pandemic. For this period, only telephone interviews were chosen as the mode of communication due to the strict procedures for implementing quarantine measures, together with the overriding concern for the protection of the elderly. When recording the texts of the interviews, special attention was paid to the emotional exclamations of the interviewees, their intonation and voice strength. This section is where it should be noted that in the face-to-face interviews from the second period of the study, greater confidence and calmness was observed in the elderly interviewed.

The authors' future plans for further research are related to investigating how e-commerce is accepted by the population in rural areas, and in particular in small mountain villages that are far from large and dynamic cities.

8 Conclusion

The qualitative study explored the relationship between the elderly and e-commerce, focusing on their preferences, trust levels, and challenges faced during online shopping. It highlights that website comprehensibility, security, privacy concerns, and design preferences can impact usability and accessibility. To create a positive experience for older consumers, e-commerce platforms should optimize navigation structure,

increase clickable areas, ensure device compatibility, adhere to web accessibility standards, and optimize website performance. Other challenges faced by older users include product discovery, checkout, account management, and customer support. To address these, e-commerce platforms should improve product organization, search functionality, product descriptions, and user interface accessibility. Security measures for data protection and clear communication channels can build trust among older users. Customer support can be enhanced by providing comprehensive options, clear instructions for returns, and technical glitches. E-commerce platforms should also address internet and technical issues, language and localization, security and privacy concerns, and identity theft. Design recommendations for older individuals include larger font sizes, clear navigation, simplicity in layout, intuitive icons, large buttons, contrasting colors, simple language, intuitive categorization, and consistent layouts. By creating user-friendly websites catering to the specific needs and preferences of older adults, businesses can expand their customer base, boost sales, improve customer satisfaction, and reduce operational costs.

E-commerce platforms should make general improvements to their websites and apps to make them more user-friendly for older adults. This includes using large fonts, clear instructions, and simple navigation. Many older adults may have difficulty using e-commerce websites and apps that are designed for younger users. By making general improvements to their websites and apps, e-commerce platforms can make them more accessible and enjoyable for all users.

Here are some specific ways that e-commerce platforms can make their websites and apps more user-friendly for older adults:

- Large fonts: Older adults may have difficulty reading small fonts, so it is important to use large fonts throughout the websites and apps. This includes the font size of the main content, as well as the font size of menus, buttons, and other interactive elements.
- Simple navigation: The navigation of the websites and apps should be simple and easy to understand. They must avoid using complex menus or submenus. Instead, they should use clear and concise labels for all the navigation elements.
- High contrast colors: High contrast colors can make it easier for older adults to read and navigate. Websites should choose colors that are easy to distinguish from each other, such as black and white or yellow and blue.
- Buttons and other interactive elements large and easy to click: Older adults may have difficulty clicking on small buttons or other interactive elements. Websites must be sure that all buttons and other interactive elements are large and easy to click.

By making these general improvements to their websites and apps, e-commerce platforms can make them more user-friendly for all users, including older adults.

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