Article

Post-Pandemic M-Commerce—Leveraging Users' Review Comments to Enhance Mobile Grocery-Shopping Applications (MGSAs)

Sînziana-Maria Rîndașu [1] , **Bogdan-Ștefan Ionescu** [1] **and Liliana Ionescu-Feleagă** [2,*]

1   Department of Management Information Systems, Faculty of Accounting and Management Information Systems, Bucharest University of Economic Studies, 010374 Bucharest, Romania
2   Department of Accounting and Audit, Faculty of Accounting and Management Information Systems, Bucharest University of Economic Studies, 010374 Bucharest, Romania
*   Correspondence: liliana.feleaga@cig.ase.ro

Abstract: This paper aims to examine the main challenges encountered by mobile grocery-shopping applications' (MGSAs) users, wherein the analysis is based on the review comments for three popular MGSAs deployed by main grocery retailers in Europe. The research methodology used was qualitative in the form of a cross-sectional inductive approach, allowing for the identification of the main issues encountered by users and their classification into four categories for a more straightforward presentation. The research findings indicate that despite the below-average level of digital literacy, customers are trying to use MGSAs efficiently and are proposing different areas of improvement, such as the design, the general functionality of the applications, and other factors regarding the specific functionalities of MGSAs. The findings may be leveraged by grocery retailers to exploit this market efficiently in a post-pandemic context; moreover, the study's results could provide meaningful knowledge to the mobile retail industry, as the detailed insights offer adequate support for enhancing mobile-shopping (m-shopping) applications.

1. Introduction

The COVID-19 pandemic had a significant impact on e-commerce as more individuals, due to necessity, started to purchase groceries online as opposed to visiting physical stores, which has been detrimental to the latter practice. The World Economic Forum [1] states that "e-commerce is globalization's shot at equality" and that the pandemic acted as an accelerator [2] as consumers had to shift from in-store to online purchases (mobile and web stores) quickly. Nowadays, there is an increasing concern that, as the pandemic seems to be coming to an end, there is limited knowledge regarding the stability and evolution of e-commerce, as the latest data highlight that an abrupt decrease has been identified in countries where e-commerce was considered to be developed before the pandemic, while in countries where e-commerce was still emerging there is a great potential that can be exploited in a post-pandemic context [2].

In the online-purchasing field, mobile shopping (m-shopping) represents a significant share, as mobile applications' (m-applications) users consider such applications to provide better comfort in terms of search functions, access, and service recovery [3]. Furthermore, retailers can leverage new technological advancements, such as artificial intelligence (AI)-based features, to enhance the shopping experience [4,5] both in-store and online. Additionally, compared to web stores, mobile commerce (m-commerce) allows for a better level of interactivity, and retailers can deploy a variety of features still unavailable in web store versions [6].

Previous research has analysed the factors that influenced the consumers' intention to use m-applications [7–11], focusing mostly on determinants from technological and psychological models, such as the technology acceptance model (TAM), the unified theory of acceptance and use of technology (UTAU), and the theory of planned behaviour (TPB), with less attention being paid to the factors behind these determinants such as the challenges encountered while using mobile grocery-shopping applications (MGSAs).

The considerable increase in mobile grocery shopping requires an understanding of the main challenges faced by users, as little is known about the issues encountered by customers who shifted from in-store to MGSAs not out of curiosity, but rather out of necessity. With the uncertainties regarding e-commerce in a post-pandemic context as a starting point, the central objective of this paper is to examine the main issues encountered by popular MGSAs' users deployed by European retailers in Romania, a country where e-commerce is still considered emerging and where, according to Eurostat [12], the highest rate of grocery expenses from the total expenditures (26.4%) is recorded. Therefore, this study provides an important opportunity to advance the understanding of the main issues of MGSAs in an attempt to better understand the e-commerce challenges that must be addressed in a post-pandemic context. This study uses a qualitative, cross-sectional, inductive approach to examine users' review comments and to provide new insights for both researchers and retailers about an emerging market that can be successfully developed.

After the introduction, we present the relevant literature. The subsequent section describes the methodology and the research context, while in the third part we unveil and discuss the results obtained, providing practical recommendations. Finally, we draw conclusions and highlight the managerial implications, limitations, and future research directions.

2. Literature Review

Grocery shopping through m-applications was one of the most undeveloped branches of e-commerce before the pandemic, even in developed countries [8], mostly due to the logistical challenges faced by the retailers [13] and the inadequacy of the infrastructure [14]. The pandemic context, however, led to an accelerated development of online grocery platforms and MGSAs [15] by improving, up to a certain point, the reliability of the ordering process and its logistics, resulting in an increase in the number of individuals shopping for groceries online, either by using platforms or m-applications. The relevant literature focusing on explaining consumers' behaviour in the context of situational factors, such as sanitary restrictions and new social norms, suggests that this new trend might be reversible [11], while other studies contend that the recently adopted shopping behaviours may result in a new normal [16].

In general, a significant percentage of consumers is not completely satisfied with shopping for groceries online [17,18], with their expectations being that in a post-pandemic context where retailers do not address MGSAs' challenges and fail to meet consumers' needs, the shopping behaviours determined by the pandemic might change [19]. While certain retailers have managed to quickly transform their omnichannel in grocery retail [20], other grocery retail chains with large physical stores that also offer remote services are competing with their own network [21].

As the pandemic influenced the online grocery-shopping determinants [11], once this situational factor is eliminated, retailers should account for the optimal marketing mix elements' weight by leveraging customers' engagement and improving sales channels' availability [22].

In a post-COVID-19 context, retailers are trying to improve resilience by leveraging smart technologies focusing primarily on AI [14,23], and researchers propose different designs for improving MGSAs with the use of AI [24,25] to overcome the industries' specific challenges and boost the mobile grocery-shopping experience.

M-shopping through applications is a dominant feature in a highly digitalised economy and, given the higher acceptance rate among smartphone users, researchers have begun to analyse the reported issues and identify the main categories of problems encoun-

tered by customers [26–28], as these data not only guide possible future users but also serve as a channel of communication with the companies. From this dialogue, it is evident that users' reviews can change [29].

Users' review comments represent a precious source of data that developers can leverage as more companies are constantly trying to improve their applications. Therefore, given the volume of data provided in review comments, researchers [27,30–33] have started to propose new solutions for automating feedback collection in terms of categorising, clustering, and prioritising the challenges encountered by users.

Several researchers have examined the factors that influence the intention of ordering [34] and reordering groceries online [35], highlighting that habitual purchases, perceived usefulness, perceived time pressure, innovativeness, relationship drivers, enjoyment, the perceived ease of use, and performance expectations are the main drivers. The cultural component of consumption [36], along with different attitudinal, situational, demographic factors [37], and personality traits [38], influence the consumers' choice regarding the shopping channels. Since the pandemic determined changes in users' preferences, new factors directly influence the choices. Before the pandemic, individuals who opted for online shopping were driven by a series of perceived benefits, such as saved time, greater accuracy, the better monitoring of spending, and easier comparisons [39]; however, afterwards, more emphasis was placed on physical distancing and social norms [40].

The prevalence of mobile grocery-shopping applications (MGSAs) increased exponentially as a response to the sanitary restrictions implemented almost worldwide, and researchers have focused on understanding the main predictors of acceptance [40], including not only COVID-19-related aspects, but also subjective norms, the ease of use, and perceived usefulness. The results suggest that the MGSAs' users can be retained even in a post-pandemic context if the applications' features match the customers' expectations. Moreover, the prior literature [19,41] has highlighted that m-applications' adoption is also determined by other users' opinions regarding the quality and features provided; thus, the users' experience plays a vital role. Therefore, our paper aims to investigate how grocery retailers can leverage MGSAs by, firstly, analysing relevant review comments to increase the understanding of the main challenges that might determine the intention of using m-applications for grocery shopping, and proposing strategies for continuing the adoption trend and improving the individuals' intention to use MGSAs in a post-pandemic context.

3. Materials and Methods

This study sought answers to the following research questions:

- RQ1. What were the main challenges encountered by customers while using MGSAs?
- RQ2. What strategies can retailers adopt to increase the customers' overall satisfaction and attract more new users?
- RQ3. What MGSAs challenges should retailers overcome so that m-commerce can proliferate in a post-pandemic context?

3.1. Research Design

To achieve the pursued objectives, we conducted a qualitative cross-sectional archival research by analysing the users' review comments for the three most popular MGSAs available in Romania in the Google Play market, with delivery coverage in the majority of counties. The current study has been designed within an interpretivism research paradigm, as this approach leads to the creation of "new, richer understandings and interpretations of social worlds and contexts" ([42], p. 149), which is a suitable research approach when investigating different business realities such as the experience of MGSAs' users.

As the central objective of this study is to examine the main challenges encountered by MGSAs' users, this qualitative method offers an efficient way of conducting an in-depth analysis. In terms of the approach deployed for theory development, the research is inductive in nature, as the objective of this paper is to explore a phenomenon and generate a conceptual framework based on the data collected using a mono-method qualitative study.

Figure 1 presents the study design that was adopted to conduct our research. The first phase consisted of selecting MGSAs deployed by grocery retailers with a significant market share in Europe. The data collection process focused on analysing the users' review comments and eliminating the items that did not provide a sufficient level of detail in terms of understanding the main challenges encountered by customers or exceeded the objective of the study. The data collection process refers to separating each relevant review comment into statements, identifying the main categories and subcategories of issues, and allocating the statements into categories and subcategories.
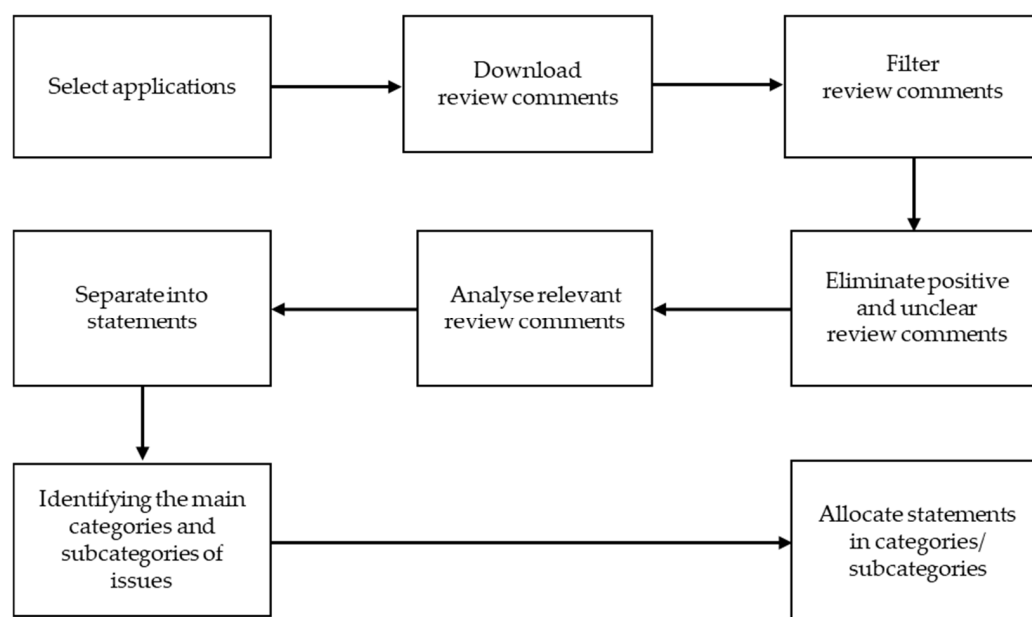

Figure 1. Study design. Source: own construction.

3.2. Selecting the Applications

The selection of the applications was conducted based on the number of installations and reviews to ensure the reliability of the dataset. Each of these applications has been installed more than one million times. The Google Play market was selected, as most Romanian users' smartphones employ Android as an operating system [43]. Since the number of m-applications that primarily focus on grocery ordering and delivery is limited, as per the emerging nature of e-commerce in Romania, few popular options were available for mobile orders with consistent coverage at the national level. All the applications selected are related to major grocery retailers operating mainly in Europe, as presented in Figure 2, but also in other continents. The applications selected were as follows: Auchan Romania, part of the Auchan Retail Group; Bringo, taken over by the French retailer Carrefour; and Mega Image, part of the Koninklijke Ahold Delhaize group.

With the exception of Bringo, which has been taken over by the French retailer Carrefour, the other retailers created their own m-applications. The Bringo application is used by customers primarily for m-grocery shopping from Carrefour; although it also delivers from other shops and some restaurants, a significant portion of users order from the French retailer. The reason behind the selection of these MGSAs was that at the time when this study was conducted, not all major grocery retailers in Romania had developed MGSAs. The other leading grocery retailers (Kaufland, Lidl, Penny, and Profi) have applications in the form of digital loyalty programs, which do not enable in-app purchases, while Cora's application was developed as a shopping assistant for in-store purchases.
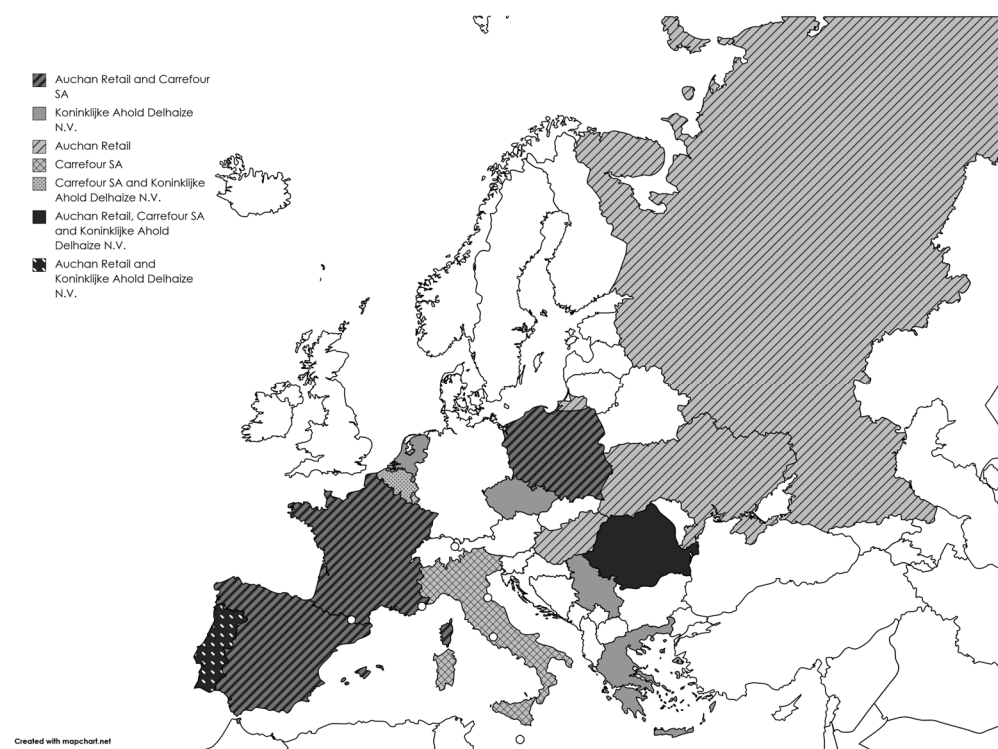
Figure 2. Retailers' presence in Europe. Source: own construction using MapChart.

3.3. Data Collection

The data source is represented by users' review comments posted for the applications in the Google Play review sections. Since the reviews (the "star" rating and the review comments) are public and details such as the date were available, we selected only those posted between March 2020, when the pandemic restrictions started to be applied, and December 2021, when several restrictions were cancelled. A user who reviews an application must provide a rating; however, a review comment is optional. In order to identify the main issues encountered by users, we have selected the review comments of customers rating the app with four or fewer "stars" as these are most likely to refer to user complaints, thus excluding the five-star reviews that are usually positive assessments. All review comments have been collected manually. The details of the MGSAs analysed are presented in Table 1.

Table 1. Details of the MGSAs analysed.

Mobile Application	Main Retailer	Release Date	Total Number of Reviews *	Number of Retrieved Review Comments	Average Rating (All Reviews)	Review Comments Analysed by Rating (no. of "Stars")			
						1	2	3	4
Auchan	Auchan Retail România	23 July 2020	22.366	588	4.5	325	54	53	156
Bringo	Carrefour Romania SA	18 September 2015	5.397	467	3.1	325	48	42	52
Mega Image	Mega Image SRL	22 May 2018	4.447	311	4.6	212	22	30	47

Source: elaborated by the authors. * As of 15 March 2022.

In total, we retrieved 1366 review comments from the above-listed applications. Most of the items focused on the MGSAs' issues encountered; however, there were also positive reviews (12.01%) such as "Ok", "Pretty good", "Super", or "All went perfectly". In the

case of review comments such as "Ok" or "Pretty good", the user might not have been willing to detail the MGSA's issues encountered, if any; however, for the other kind of strongly positive reviews (e.g., "Super"), it is most likely that the users providing these positive review comments have accidentally rated the application with four or fewer stars. Two hundred twenty-one items did not indicate a specific issue (16.18%), leaving comments such as "Bad experience", "Terrible", or "Disappointed"; hence, it was not possible to identify the challenges faced by the users. Along with the unclear and positive review comments, we also eliminated the items that did not focus on the MGSAs, such as order processing, delivery, business policies, and promotions, as the aim was to examine exclusively the application-related issues.

3.4. Data Analysis

Once we cleaned the collected data by eliminating the review comments presented above, we started coding them in order to identify the different types of challenges faced by the users and created categories of issues. Miles and Huberman describe data analysis as a reduction process of "selecting, focusing, simplifying, abstracting and transforming the data that appear in written-up field notes or transcriptions" ([44], p. 10). Moreover, Saunders et al. [42] state that this approach allows for greater flexibility for analysing new findings that were not initially considered to test. This iterative-coding process allows for an inductive approach for identifying the main patterns and relationships, and it is a common approach when analysing a large number of non-standardised data [42]. Since a review comment can be used to evaluate different aspects of the experience, we examined each statement individually, yielding a total of 660 observations focusing on the MGSAs' encountered issues.

After examining all the review comments and separating the statements, if necessary, we assigned each observation into a category. If appropriate, we also created subcategories for some of the main categories to highlight the challenges identified. The main categories and subcategories are presented in Table 2.

Table 2. Categories of MGSAs' identified issues.

Category	Subcategory	Number of Statements
General functionality	Connectivity	30
	General errors	167
	Language	3
	Log-on and user registration	176
	Permissions	2
	Push notifications	2
	Updates	29
Interface design	Interface design	3
Specific functionality	Customer support function	2
	Missing features	10
	Order history	5
	Order placement	139
	Payment	22
	Products' availability and cataloguing	36
	Search function	26
User-friendliness	User-friendliness	8

Source: elaborated by the authors.

4. Results and Discussion

To analyse the main challenges encountered by the MGSAs' users, we allocated the statements in the above-presented categories, and, in this section, we will detail the emphasised issues and propose solutions for improving the processes. Moreover, for each type of challenge encountered, we considered it appropriate to present at least one relevant review comment.

4.1. Applications' General Functionality

When deploying an m-application, regardless of the professional field, the general functionality of the application represents a vital aspect of the business's continuity. As presented in the methodology, we identified several subcategories of issues affecting the general functionality of the analysed MGSAs, as highlighted by the users, which are presented in Figure 3.
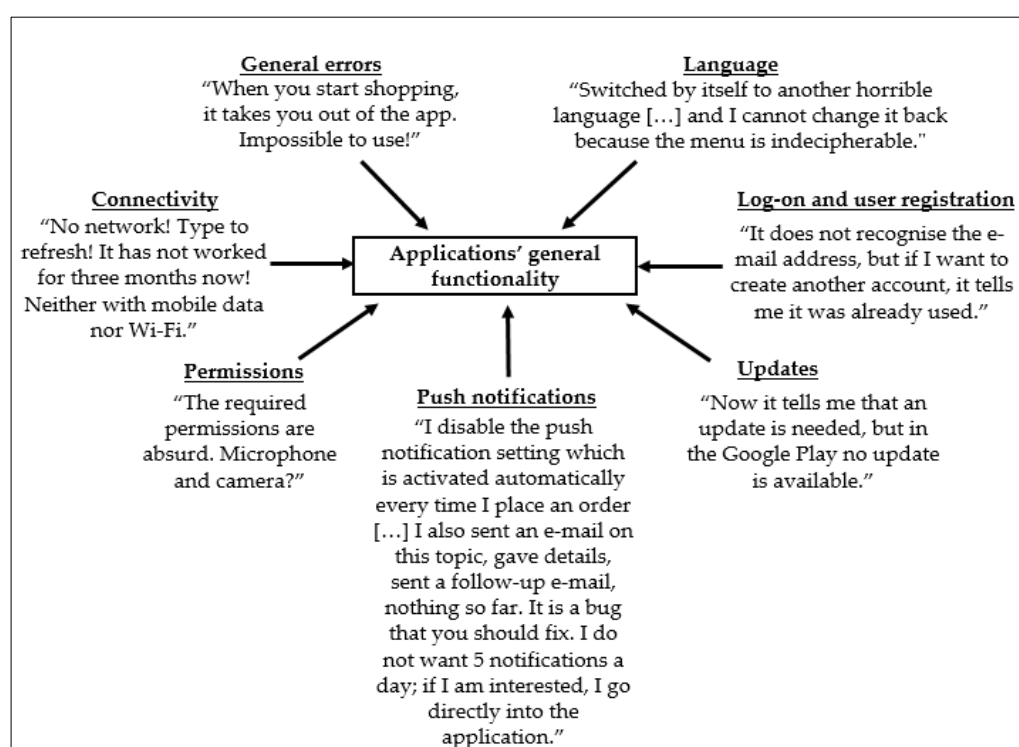

Figure 3. Examples of review comments focusing on general functionality challenges. Source: elaborated by the authors based on the data collected.

1. Connectivity—This refers to connection issues of the applications. Although the users were connected to a network, the application failed to recognise the connection as functional. This type of error can occur due to several issues, such as an unstable internet connection, errors related to the device used, data savers, or network settings. MGSAs have a wide range of permissions that are generally highly energy-consuming and, thus, due to restrictions meant to optimise energy consumption [45], the internet connection might be affected. However, following the dates and companies, this issue affected multiple customers in the same period, which might imply an internal issue of the applications or servers hosting the applications.
2. General errors—In this subcategory, we included all the statements regarding the limited functionality of the application, lags, unresponsiveness, splash screen loops, and crashes. This outcome is in line with previous studies [26,46], which have highlighted that functional errors represent one of the main issues that determines a user's propensity to complain. Nevertheless, not addressing these issues in a timely manner could lead to a decrease in the sales' volume and can also impact the reputation of

the retailers deploying the MGSAs, as it might determine a decrease in the perceived usefulness [40].

3. Language—These review comments refer to the automatic change of the applications' language and to the impossibility of manually changing the language displayed by the application. Although limited, these issues have great importance, clearly highlighting that the m-shopping experience is not enjoyable and, as previous research emphasised, enjoyment directly impacts the users' behaviour intention [34]. Therefore, this kind of issue can contribute significantly to a decrease in the applications' usage and customers' engagement.

4. Log-on and user registration—The main issue encountered in our research was represented by the logon errors generated by the fact that the servers did not recognise the account's credentials as valid; the e-mail address, delivery address, or phone number were not considered legitimate; and/or the verification code was sent with significant delays or was not recognised as valid. As it can be noticed, account registration and logon represent a current issue encountered in all the analysed applications. Although there is a chance that customers forgot the e-mail or the password used for registration, these issues were quite frequent and might pinpoint a functional error caused by a lack of response from the servers hosting the applications or a constraint implemented for some e-mail addresses from a particular domain. As in the previous case, the review comments highlight that the m-shopping experience is far from enjoyable, a fact that might reflect in a decrease in the intention of continuing to use the applications.

The registration process represents the first contact with a mobile or web store, wherein users can self-assess their skilfulness, which directly affects the perceived usefulness [34]. From the dataset, we identified 48 observations that targeted the issues encountered by users at the registration stage, in which most of them were related to the verification code, efficiency, and the easiness of the process. Some companies included in their enrolment policies a verification of the data inputted by the user, checking the accuracy of the e-mail address provided or the phone number. By doing so, retailers enhance the security of their online and mobile services [47] and prevent the creation of fake accounts. However, given the limited digital literacy of some of the users, this process has proven to be considered unnecessary and time-consuming. In some cases, the verification code was not received by the users; in other cases, it has been received after a considerable time, which led to its expiration.

As many customers started using the MGSAs for the first time out of necessity and less out of curiosity, the user registration process was important, as it represented the initial contact with the services. Not receiving the verification code or receiving it late might be caused by functionality errors of the device, as some SMSs can be blocked, or due to some problems on the retailer's end. Therefore, companies should try to educate users by providing adequate support and information to better understand the necessities behind the registration policies and how such issues can be solved.

5. Permissions—Each m-shopping application has a set of permissions that companies can leverage to increase customers' engagement [48]. Nevertheless, developers should not include permissions that might be considered intrusive. As the digital literacy of some users might not be that developed, companies should state in their policies the reason behind using these permissions, ensuring, in this manner, a better level of acceptance.

6. Push notifications—These issues have been raised only for one application where, according to the user, in the first case, the push notifications reactivated automatically after placing the order, while the second user highlighted that these notifications are too frequent. Push notifications have proven to be an efficient marketing tool for re-engaging users [49]; however, they might be annoying for some individuals. Moreover, mobile devices can also be used to track customers' behaviour in the application and the location so that companies may target users more easily at an opportune time [50]. More recent Android versions have battery-saving features that

prevent push notifications from the least-used applications; thus, forcing automatic reactivation might not be considered an appropriate practice.

7. Updates—Complaints regarding the frequency of the updates or update issues have been identified for all the applications. Understandingly, applications are updated to provide new features and solve previous issues; however, given the frequency of the statements identified, recurrent updates or update errors can negatively influence the customers' perception regarding the quality of the application. Li et al. [51] propose a sentiment–statistical approach based on customer reviews that developers can use to analyse problematic updates in a timelier manner and address the highlighted issues.

4.2. Interface's Design

Review comments are a helpful tool used by developers to improve m-applications' interface designs. The interface's quality directly influences the enjoyment of the experience [52] and the users' first impression is mainly influenced by the aesthetics of the application [53]. Previous research, focusing on the contributions of users' reviews to enhancing the interface design of applications and online platforms, emphasised that the acceptance factor has a significant influence on the creation process. Moreover, by deploying this approach, the applications can fulfil the users' needs in a dynamic market [54,55], as their involvement constitutes a critical characteristic [56], and a user-centred design represents a key aspect in most (if not all) applications.

In the analysed dataset, we identified only three statements focusing on the interface design ("prices are hardly visible" and "the application's graphics are very cheap, the titles too large and bold, I understand the intention for people with poor eyesight, but I think it was a bit exaggerated"). These two review comments were written for different applications and managed to capture opposite perceptions and experiences. Although not a frequent feature, developers can include additional options in the menu where the users can select the appropriate visualisation font. These perspectives highlight the need for applications to have a higher level of personalisation that can satisfy individual needs; previous research [50] considered this approach as an appropriate strategy for improving marketing performance.

4.3. Specific Functionality

During the pandemic, the number of MGSAs' users increased significantly, and the majority of new customers placed their orders via an MGSA as a result of sanitary constraints. Furthermore, people who tested positive for COVID-19 had to stay indoors for several days and many of them relied heavily on these services to purchase the necessary groceries. In addition to the general functionalities of the m-applications, several specific functionality issues of the analysed MGSAs emerged, as shown in Figure 4.
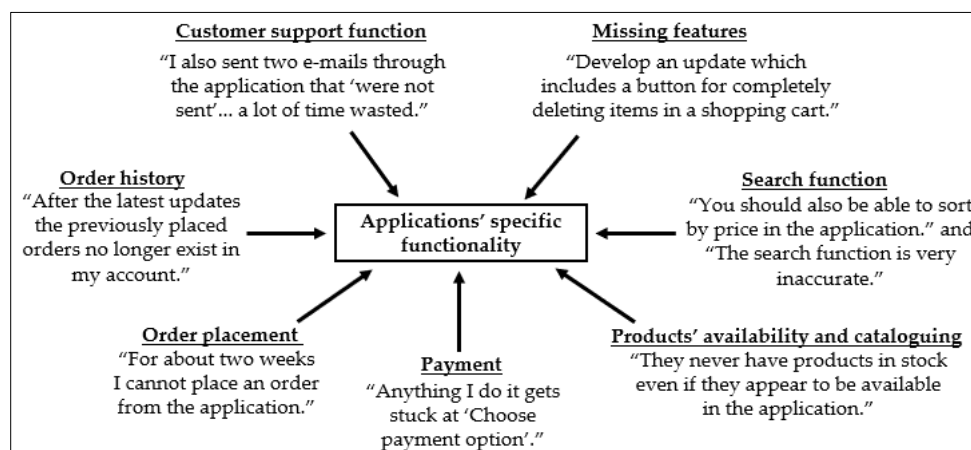

Figure 4. Examples of review comments focusing on specific functionality challenges. Source: elaborated by the authors.

1. Customer support function—The users complain that there were functional errors affecting the support function and their requests have not been sent from the application. As in the case of connectivity issues, this might have been a network problem or an application error. Nevertheless, companies should leverage the use of conversational agents (chatbots), which have begun to represent a vital component of digital marketing [57], as customers expect to have real-time support.

2. Missing features—In this subcategory, we allocated the missing features highlighted by users to improve the efficiency of the application and the overall m-shopping experience. The newly proposed features focus on:

   - order monitoring options;
   - a section for filling out complaints;
   - a facility to zoom-in on products;
   - collective offer activation;
   - the inclusion of new controls;
   - new review options.

   Although the number of statements is limited, companies should not disregard this kind of input from users, as, in this competitive environment, a client-centred approach can be a key differentiator [54].

3. Order history—Issues regarding the order history have been identified in the case of one application where users highlighted that the transactions history was no longer available. These review comments were posted during a six-month period, and as there are only few of them, it is not clear whether this is an account backup issue or an error caused by the device used. Wang et al. [7] found that users tend to continue purchasing habitual products; thus, having an order history available decreases the time spent searching for a particular product and enhances the overall shopping experience.

4. Order placement—This was another subcategory with numerous complaints regarding the errors encountered during the entire ordering process and it manages to capture the main MGSAs' specific functionality errors, such as order placement, adding or deleting products, the removal of the cart content, and errors when filling out the delivery address. These types of issues have been identified for all the analysed applications and might be caused by functionality problems. In addition, the removal of the cart content might be an implementable feature in applications that will clear the cart after an idle time or logon. However, these incidents influence the client's satisfaction with the service as they can become time consuming and thoroughly unenjoyable.

5. Payment—The analysed applications provide an option to pay by card at checkout and some users encountered issues when trying to pay for the order. During the pandemic, the general recommendation was to avoid cash payments as much as possible and, when users encounter payment issues and have to pay for delivery, they might not feel safe; some companies have implemented a "no contact policy", where users pay in the application and the order is left at the door. As satisfaction with mobile payments significantly impacts users' continuance intention [58], developers should keep in mind that these kinds of incidents decrease users' satisfaction with the overall m-shopping experience and contribute to a decrease in trust.

6. Products' availability and cataloguing—For this subcategory, we identified three main issues: the stock of products was not updated and, thus, the customers ordered products that were no longer available; misleading categories of products; and a missing list of ingredients. From the issues presented, the incorrect stock problem represented the main concern for customers. Although companies present this information in the terms and conditions of the applications, users seem to be disappointed with this approach. The dissatisfaction expressed by the customers is in line with previous

research [59] and this has also been increased by the anxiety caused by many products' unavailability at the beginning of the pandemic.

7. Search function—The majority of the review comments allocated into this category focus on the irrelevant results provided, while other users consider that the filtering and sorting options are limited. These findings are consistent with previous concerns raised by researchers [60], who propose a new querying approach based on previous users' interactions after performing similar queries and, thus, decreasing the limitations regarding the number of terms used. As these MGSAs are supposed to reduce the time allocated for shopping, relevant results and more filtering/sorting options might be a key factor.

4.4. User-Friendliness

In the pandemic context, these applications were a more convenient alternative to in-store grocery shopping; however, the digital literacy of some of the new users is less than average and there is a greater need for user-friendliness [61]. In the analysed dataset, we identified eight statements focusing on the applications' complexity and counterintuition. Some representative review comments are as follows: "Hard to use, you should take a look at [another application name] to get inspired" and "Very poorly, more hassle to access a store than to go straight there to buy by myself". The degree of user-friendliness and intuition contribute to the creation of the perceived ease of use, which directly influences the intention to use [62]; thus, the MGSA's developers should consider these factors when developing and improving such solutions.

The pandemic that acted like an accelerator for MGSAs has started to diminish and retailers should rethink their strategies for attracting new customers and increasing the engagement of current users. As the determinants of the intention to use are changing, companies should leverage the users' newly developed behaviours and improve their mobile grocery-shopping experience. A significant number of new MGSAs' users had little to no experience with this new way of grocery shopping; now that they have gained sufficient skills, retailers should leverage this by improving the m-shopping experience with the help of smart technologies, especially AI.

In a post-pandemic context where physical-distancing rules start to fade, customers may return to shopping in-store. As the previous literature emphasizes [21], retailers that run both remote and online (either mobile or web-based) stores compete with their own network, and if the objective is to increase the number of mobile customers, new incentives should be provided. Even though the majority of MGSAs, in general, advertise less time spent while grocery shopping, due to both general and specific functionality errors, it seems that sometimes users spend more time and thus the process seems to be less enjoyable and more purposeless. As emphasised several times by users, some MGSAs do not provide a set of tools that will lead to a decrease in the time spent while shopping. Understandably, the time spent shopping can lead to additional purchases [63]; however, this marketing strategy should not be used when a reduced time is actively promoted, and mainly by high-income shoppers, who seem to value their time to a greater extent, thus spending less time shopping [64]. Considering the increase in global inflation, low-income consumers might try to avoid any unnecessary additional costs, such as delivery fees, while a significant portion of MGSAs' users could be represented by high-income consumers, as this category spends more while m-shopping [65].

Although the literature focusing on the impact of Industry 4.0 continues to present the benefits of the adoption of digital technologies for enhancing customer service strategies [66,67], in the analysed applications, even though they are deployed by retailers with a significant market share in Europe, it seems that companies are not fully grasping the technological advancements so as to increase the applications' ease of use. Another related, significant aspect observed during the collection process of the review comments was the fact that retailers do not leverage the application platforms in order to assist the users that faced some of these challenges. As some users might not have the required digital

skills to properly utilise the MGSAs, it may seem that the retailers were not providing sufficient guidance.

Convenience represented an important determinant in the adoption of m-shopping applications before the pandemic, and possibly to a greater extent during its course, as users value the search, access, and service recovery convenience that m-applications offer to a greater extent [3]. However, in a post-pandemic—but inflationary—context, this determinant might fade. Therefore, retailers should increase the level of convenience of the applications so that it will exceed the economic challenges. By using smart technologies, users can benefit from personalised offers and promotions based on their habitual purchases.

Although this research focused on the challenges identified by MGSAs' users deployed by major retailers in Europe, these results should be interpreted with some caution, as certain highlighted issues might be a result of the retailers' implementation of business policies aimed to improve their operational efficiency.

5. Conclusions

Our study sought to investigate the main challenges encountered by MGSAs' users between March 2020 and December 2021, as almost worldwide, a significant portion of the new customers started using MGSAs out of necessity due to the imposition of mobility restrictions, despite their poor digital literacy.

The study has identified several categories of issues related to MGSAs encountered by users that might negatively impact the m-shopping experience. In terms of frequency, the most recurrent challenges are related to the general functionalities of the analysed MGSAs, focusing on subsets of issues directly impacting the perceived ease of use and decreasing the overall shopping experience. As prior research emphasised [11], the perceived ease of use is a key determinant—especially for new users. In a post-pandemic context where retailers' strategy focuses on attracting new customers and increasing the engagement of current users, retailers should include in their resilience approach new methods for identifying such issues in a timely manner by leveraging AI-driven malfunction detection solutions.

Another important category of issues highlighted in the review comments was represented by the specific functionalities of the MGSAs, focusing on the ordering process of mobile grocery shopping. The items from this category could directly negatively impact perceived usefulness, leading to a decrease in usage behaviour [9,34].

While the other two main categories only included sporadic challenges addressed by only several users, both contribute to a decline in the users' enjoyment. Previous research [68] identified that although there is only an indirect relationship between shopping enjoyment and shopping intention, this construct affects both usefulness and ease-of-use perceptions. As the main situational factor (COVID-19) starts to diminish, there would, therefore, seem to be a definite need for researchers to reassess the importance of these determinants so that retailers can leverage MGSAs for improving users' m-shopping intention. However, with a small sample size, some caution must be applied, as the findings might not be easily generalizable.

Several challenges from various categories can be addressed by retailers through teaching their customers to use their applications more efficiently. Although, in general, almost all MGSAs provide some tutorials for new users that might lack experience with the m-applications, this approach seems to be incomplete. Moreover, this research revealed that despite the users' below-average level of digital literacy, customers are trying to use these applications efficiently and are proposing different areas of improvement, such as the design, the functionality of the applications, and other factors regarding the business model of companies (e.g., the selection of products and in-application discounts).

As most MGSAs promote reduced time spent as their main advantage, several statements highlighted that users might actually spend more time placing the order than actually shopping in-store. This finding suggests that retailers should consider this issue, as in a post-pandemic context in which the necessity of using these applications will signifi-

cantly decrease, the customers will use these services less if the highlighted problems are not resolved.

The findings of this research can provide insights for both researchers and retailers, as they manage to capture a diverse variety of challenges that could be adequately studied and addressed. As qualitative, inductive research, this study may contribute to a better understanding of customers' perceptions and behaviours in the context of mobile grocery shopping.

Furthermore, given the level of detail captured in this study, the findings might be leveraged by any other retail company that deploys m-shopping applications, as several categories identified do not exclusively target the grocery market but general m-shopping applications' functionalities.

The main limitation of this study is related to the limited number of popular MGSAs available in Romania. However, the selected applications are deployed by important multinational retailers, and they should act as a benchmark for the overall grocery retail industry. As a future research direction, these issues should be observed longitudinally and comparatively between Android and iOS users.

References

1. World Economic Forum. E-Commerce Is Globalization's Shot at Equality. 2020. Available online: https://www.weforum.org/agenda/2020/01/e-commerce-sme-globalization-equality-women/ (accessed on 17 July 2022).
2. World Economic Forum. Is the E-Commerce Trend Coming to an End? 2022. Available online: https://www.weforum.org/agenda/2022/03/pandemic-s-e-commerce-surge-proves-less-persistent-more-varied (accessed on 17 July 2022).
3. Almarashdeh, I.; Jaradat, G.; Abuhamdah, A.; Alsmadi, M.; Alazzam, M.B.; Alkhasawneh, R.; Awawdeh, I. The difference between shopping online using mobile apps and website shopping: A case study of service convenience. *Int. J. Comput. Inf. Syst. Ind. Manag. Appl.* **2019**, *11*, 151–160.
4. Ahn, J.; Williamson, J.; Gartrell, M.; Han, R.; Lv, Q.; Mishra, S. Supporting healthy grocery shopping via mobile augmented reality. *ACM Trans. Multimed. Comput. Commun. Appl.* **2015**, *12*, 1–24. [CrossRef]
5. McLean, G.; Wilson, A. Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Comput. Hum. Behav.* **2019**, *101*, 210–224. [CrossRef]
6. Yang, S.; Lee, Y.J. The dimensions of M-interactivity and their impacts in the mobile commerce context. *Int. J. Electron. Commer.* **2017**, *21*, 548–571. [CrossRef]
7. Wang, R.J.H.; Malthouse, E.C.; Krishnamurthi, L. On the go: How mobile shopping affects customer purchase behavior. *J. Retail.* **2015**, *91*, 217–234. [CrossRef]
8. Shukla, A.; Sharma, S.K. Evaluating consumers' adoption of mobile technology for grocery shopping: An application of technology acceptance model. *Vis. J. Bus. Perspect.* **2018**, *22*, 185–198. [CrossRef]
9. Driediger, F.; Bhatiasevi, V. Online grocery shopping in Thailand: Consumer acceptance and usage behavior. *J. Retail. Consum. Serv.* **2019**, *48*, 224–237. [CrossRef]
10. Blanke, J.; Billieux, J.; Vögele, C. Improving food shopping behaviour: A model-based review of mobile applications to assist with healthy and sustainable grocery shopping. *Comput. Hum. Behav. Rep.* **2021**, *4*, 100147. [CrossRef]
11. Tyrväinen, O.; Karjaluoto, H. Online grocery shopping before and during the COVID-19 pandemic: A meta-analytical review. *Telemat. Inform.* **2022**, *71*, 101839. [CrossRef]

12. Eurostat. Household Consumption by Purpose. 2021. Available online: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Household_consumption_by_purpose#COVID-19_pandemic_impacts_on_data_in_2020 (accessed on 17 July 2022).

13. Weber, A.N.; Badenhorst-Weiss, J.H.A. The last-mile logistical challenges of an omnichannel grocery retailer: A South African perspective. *J. Transp. Supply Chain. Manag.* **2018**, *12*, a398. [CrossRef]

14. John, J.; Thakur, R. Long term effects of service adaptations made under pandemic conditions: The new "post COVID-19" normal. *Eur. J. Mark.* **2021**, *55*, 1679–1700. [CrossRef]

15. Brusset, X. Guest editorial: Building resilience in retail for the post COVID world–marketing and operations perspectives. *Int. J. Retail. Distrib. Manag.* **2022**, *50*, 897–899. [CrossRef]

16. Roggeveen, A.L.; Sethuraman, R. How the COVID-19 pandemic may change the world of retailing. *J. Retail.* **2020**, *96*, 169–171. [CrossRef]

17. McKinsey & Company. How European Shoppers Will Buy Groceries in the Next Normal. 2021. Available online: https://www.mckinsey.com/industries/retail/our-insights/how-european-shoppers-will-buy-groceries-in-the-next-normal (accessed on 15 October 2022).

18. Alaimo, L.S.; Fiore, M.; Galati, A. Measuring consumers' level of satisfaction for online food shopping during COVID-19 in Italy using POSETs. *Socio-Econ. Plan. Sci.* **2022**, *82*, 101064. [CrossRef]

19. Kim, H. Use of Mobile Grocery Shopping Application: Motivation and Decision-Making Process among South Korean Consumers. *J. Theor. Appl. Electron. Commer. Res.* **2021**, *16*, 2672–2693. [CrossRef]

20. Eriksson, E.; Norrman, A.; Kembro, J. Understanding the transformation toward omnichannel logistics in grocery retail: A dynamic capabilities perspective. *Int. J. Retail. Distrib. Manag.* **2022**, *50*, 1095–1128. [CrossRef]

21. Risberg, A.; Jafari, H. Last mile practices in e-commerce: Framework development and empirical analysis of Swedish firms. *Int. J. Retail. Distrib. Manag.* **2022**, *50*, 942–961. [CrossRef]

22. Altay, B.C.; Okumuş, A.; Adıgüzel Mercangöz, B. An intelligent approach for analyzing the impacts of the COVID-19 pandemic on marketing mix elements (7Ps) of the on-demand grocery delivery service. *Complex Intell. Syst.* **2022**, *8*, 129–140. [CrossRef]

23. Agarwal, P.; Swami, S.; Malhotra, S.K. Artificial Intelligence Adoption in the Post COVID-19 New-Normal and Role of Smart Technologies in Transforming Business: A Review. *J. Sci. Technol. Policy Manag.* **2022**. [CrossRef]

24. Albuquerque, D.D.; Bhavani, G.; Gaur, B.; Kuttipravan, S. A Smart Mobile Application to Boost Grocery Shoppers Experiential Marketing. In Proceedings of the 2021 International Conference on Computational Intelligence and Knowledge Economy (ICCIKE), Dubai, United Arab Emirates, 17–18 March 2021; pp. 213–218. [CrossRef]

25. AbdulMalik, A.H.H.; Yousif, M.J. Smart Online Grocery Shopping App Development. *Artif. Intell. Robot. Dev. J.* **2021**, *1*, 93–102. [CrossRef]

26. Khalid, H.; Shihab, E.; Nagappan, M.; Hassan, A.E. What do mobile app users complain about? *IEEE Softw.* **2014**, *32*, 70–77. [CrossRef]

27. Panichella, S.; Di Sorbo, A.; Guzman, E.; Visaggio, C.A.; Canfora, G.; Gall, H.C. How can I improve my app? Classifying user reviews for software maintenance and evolution. In Proceedings of the 2015 IEEE International Conference on Software Maintenance and Evolution, Bremen, Germany, 29 September 2015–1 October 2015; pp. 281–290. [CrossRef]

28. Groen, E.C.; Kopczyńska, S.; Hauer, M.P.; Krafft, T.D.; Doerr, J. Users-the hidden software product quality experts?: A study on how app users report quality aspects in online reviews. In Proceedings of the 2017 25th IEEE International Requirements Engineering Conference, Lisbon, Portugal, 4–8 September 2017; pp. 80–89. [CrossRef]

29. Hassan, S.; Tantithamthavorn, C.; Bezemer, C.P.; Hassan, A.E. Studying the dialogue between users and developers of free apps in the google play store. *Empir. Softw. Eng.* **2018**, *23*, 1275–1312. [CrossRef]

30. Phong, M.V.; Nguyen, T.T.; Pham, H.V.; Nguyen, T.T. Mining user opinions in mobile app reviews: A keyword-based approach (T). In Proceedings of the 2015 30th IEEE/ACM International Conference on Automated Software Engineering, Lincoln, NE, USA, 9–13 November 2015; pp. 749–759. [CrossRef]

31. Saidani, I.; Ouni, A.; Ahasanuzzaman, M.; Hassan, S.; Mkaouer, M.W.; Hassan, A.E. Tracking bad updates in mobile apps: A search-based approach. *Empir. Softw. Eng.* **2022**, *27*, 81. [CrossRef]

32. Villarroel, L.; Bavota, G.; Russo, B.; Oliveto, R.; Di Penta, M. Release planning of mobile apps based on user reviews. In Proceedings of the 2016 IEEE/ACM 38th International Conference on Software Engineering, Austin, TX, USA, 14–22 May 2016; pp. 14–24. [CrossRef]

33. Yu, L.; Wang, H.; Luo, X.; Zhang, T.; Liu, K.; Chen, J.; Zhou, H.; Tang, Y.; Xiao, X. Towards Automatically Localizing Function Errors in Mobile Apps with User Reviews. *IEEE Trans. Softw. Eng.* **2022**. [CrossRef]

34. Saprikis, V.; Markos, A.; Zarmpou, T.; Vlachopoulou, M. Mobile shopping consumers' behavior: An exploratory study and review. *J. Theor. Appl. Electron. Commer. Res.* **2018**, *13*, 71–90. [CrossRef]

35. Van Droogenbroeck, E.; Van Hove, L. Adoption and usage of E-grocery shopping: A context-specific UTAUT2 model. *Sustainability* **2021**, *13*, 4144. [CrossRef]

36. Walczak, S.; Gregg, D.G. Factors influencing corporate online identity: A new paradigm. *J. Theor. Appl. Electron. Commer. Res.* **2009**, *4*, 17–29. [CrossRef]

37. Brand, C.; Schwanen, T.; Anable, J. 'Online Omnivores' or 'Willing but struggling'? Identifying online grocery shopping behavior segments using attitude theory. *J. Retail. Consum. Serv.* **2020**, *57*, 102195. [CrossRef]

38. Hermes, A.; Riedl, R. Influence of Personality Traits on Choice of Retail Purchasing Channel: Literature Review and Research Agenda. *J. Theor. Appl. Electron. Commer. Res.* **2021**, *16*, 3299–3320. [CrossRef]

39. Morganosky, M.A.; Cude, B.J. Consumer Response to Online Grocery Shopping. *Int. J. Retail. Distrib. Manag.* **2000**, *28*, 17–26. [CrossRef]

40. Al Amin, M.; Arefin, M.S.; Hossain, I.; Islam, M.R.; Sultana, N.; Hossain, M.N. Evaluating the determinants of customers' mobile grocery shopping application (MGSA) adoption during COVID-19 pandemic. *J. Glob. Mark.* **2021**, *35*, 228–247. [CrossRef]

41. Shankar, A.; Jebarajakirthy, C.; Ashaduzzaman, M. How do electronic word of mouth practices contribute to mobile banking adoption? *J. Retail. Consum. Serv.* **2020**, *52*, 101920. [CrossRef]

42. Saunders, M.; Lewis, P.; Thornhill, A. *Research Methods for Business Students*; Pearson: Harlow, UK, 2019; ISBN 978-1-292-20878-7.

43. StatCounter. Mobile Operating System Market Share in Romania. 2021. Available online: https://gs.statcounter.com/os-market-share/mobile/romania/2021 (accessed on 13 March 2022).

44. Miles, M.B.; Huberman, A.M. *Qualitative Data Analysis: An Expanded Sourcebook*; Sage: London, UK, 1994; ISBN 0-8039-4653-8.

45. Ahmad, R.W.; Gani, A.; Hamid, S.H.A.; Xia, F.; Shiraz, M.A. Review on mobile application energy profiling: Taxonomy, state-of-the-art, and open research issues. *J. Netw. Comput. Appl.* **2015**, *58*, 42–59. [CrossRef]

46. Srisopha, K.; Phonsom, C.; Lin, K.; Boehm, B. Same app, different countries: A preliminary user reviews study on most downloaded iOS apps. In Proceedings of the 2019 IEEE International Conference on Software Maintenance and Evolution, Cleveland, OH, USA, 29 September 2019–4 October 2019; pp. 76–80. [CrossRef]

47. Diaz, J.; Arroyo, D.; Rodriguez, F.B. On securing online registration protocols: Formal verification of a new proposal. *Knowl. Based Syst.* **2014**, *59*, 149–158. [CrossRef]

48. Stanciu, V.; Rîndașu, S.M. Artificial Intelligence in Retail: Benefits and Risks Associated with Mobile Shopping Applications. *Amfiteatru Econ.* **2021**, *23*, 46–64. [CrossRef]

49. Nichifor, E.; Lixăndroiu, R.C.; Chițu, I.B.; Brătucu, G.; Trifan, A. How Does Mobile Page Speed Shape in-between Touchpoints in the Customer Journey? A Research Regarding the Most Trusted Retailers in Romania. *J. Theor. Appl. Electron. Commer. Res.* **2021**, *16*, 1369–1389. [CrossRef]

50. Tong, S.; Luo, X.; Xu, B. Personalized mobile marketing strategies. *J. Acad. Mark. Sci.* **2020**, *48*, 64–78. [CrossRef]

51. Li, X.; Zhang, B.; Zhang, Z.; Stefanidis, K. A sentiment-statistical approach for identifying problematic mobile app updates based on user reviews. *Information* **2020**, *11*, 152. [CrossRef]

52. Patel, V.; Das, K.; Chatterjee, R.; Shukla, Y. Does the interface quality of mobile shopping apps affect purchase intention? An empirical study. *Australas. Mark. J.* **2020**, *28*, 300–309. [CrossRef]

53. Guo, F.; Wang, X.S.; Shao, H.; Wang, X.R.; Liu, W.L. How user's first impression forms on mobile user interface?: An ERPs study. *Int. J. Hum. Comput. Interact.* **2020**, *36*, 870–880. [CrossRef]

54. Platzer, E.; Petrovic, O. Learning Mobile App Design from User Review Analysis. *Int. J. Interact. Mob. Technol.* **2011**, *5*, 43–50. [CrossRef]

55. Magrath, V.; McCormick, H. Marketing design elements of mobile fashion retail apps. *J. Fash. Mark. Manag. Int. J.* **2013**, *17*, 115–134. [CrossRef]

56. Oh, J.; Kim, D.; Lee, U.; Lee, J.G.; Song, J. Facilitating developer-user interactions with mobile app review digests. In Proceedings of the 2013 CHI Conference on Human Factors in Computing Systems, Paris, France, 27 April 2013–2 May 2013; pp. 1809–1814. [CrossRef]

57. Jenneboer, L.; Herrando, C.; Constantinides, E. The Impact of Chatbots on Customer Loyalty: A Systematic Literature Review. *J. Theor. Appl. Electron. Commer. Res.* **2022**, *17*, 212–229. [CrossRef]

58. Cao, X.; Yu, L.; Liu, Z.; Gong, M.; Adeel, L. Understanding mobile payment users' continuance intention: A trust transfer perspective. *Internet Res.* **2018**, *28*, 456–476. [CrossRef]

59. Peinkofer, S.T.; Esper, T.L.; Howlett, E. Hurry! Sale ends soon: The impact of limited inventory availability disclosure on consumer responses to online stockouts. *J. Bus. Logist.* **2016**, *37*, 231–246. [CrossRef]

60. Edwards, C.A.; Hernandez-Gardiol, N. Application Query Conversion. U.S. Patent 9280595, 8 March 2016.

61. Mocanu, F. Digital literacy among young adults in Romania. *Manag. Dyn. Knowl. Econ.* **2018**, *6*, 449–470. [CrossRef]

62. Rao, S.; Troshani, I. A conceptual framework and propositions for the acceptance of mobile services. *J. Theor. Appl. Electron. Commer. Res.* **2007**, *2*, 61–73. [CrossRef]

63. Grewal, D.; Ahlbom, C.P.; Beitelspacher, L.; Noble, S.M.; Nordfält, J. In-store mobile phone use and customer shopping behavior: Evidence from the field. *J. Mark.* **2018**, *82*, 102–126. [CrossRef]

64. Goldfarb, A.; Prince, J. Internet adoption and usage patterns are different: Implications for the digital divide. *Inf. Econ. Policy* **2008**, *20*, 2–15. [CrossRef]

65. Hou, J.; Elliott, K. Mobile shopping intensity: Consumer demographics and motivations. *J. Retail. Consum. Serv.* **2021**, *63*, 102741. [CrossRef]

66. Lee, S.M.; Lee, D. "Untact": A new customer service strategy in the digital age. *Serv. Bus.* **2020**, *14*, 1–22. [CrossRef]

67. Salamzadeh, A.; Ebrahimi, P.; Soleimani, M.; Fekete-Farkas, M. Grocery Apps and Consumer Purchase Behavior: Application of Gaussian Mixture Model and Multi-Layer Perceptron Algorithm. *J. Risk Financ. Manag.* **2022**, *15*, 424. [CrossRef]

68. Camoiras-Rodriguez, Z.; Varela, C. The influence of consumer personality traits on mobile shopping intention. *Span. J. Mark.* **2020**, *24*, 331–353. [CrossRef]