Classification of Mobile App Users in Multi-Channel Retail—an Exploratory Analysis

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Abstract—The retail industry is facing the challenge of digitization. On the one hand, the share of online shopping in total retail sales is increasing. On the other hand, consumers increasingly expect digital services. At the same time, the spread of smartphones and therefore also mobile apps has been growing for years. More and more retailers are therefore offering mobile apps, which as multi-channel apps combine aspects of online shopping and stationary retail. While the acceptance and use of mobile apps has already been extensively researched, there is little knowledge about the users themselves and user-types. This explorative research classifies users of mobile apps in multi-channel retail. Based on a survey of 101 consumers who were asked to assess the personal relevance of various app functions in a multi-channel retail context, four user types can be identified with the help of a cluster analysis. The results provide practitioners with important information for the future development of mobile apps in retail.

Keywords—mobile apps, multi-channel retail, user classification, cluster analysis, taxonomy

1 Introduction

Not just since the SARS-CoV-2 pandemic, but for several years now, the retail sector—especially brick-and-mortar retail—has been under pressure worldwide. On the one hand, more and more retail space is available [1]. At the same time, the retail trade is experiencing in some cases severe sales declines [2]. This effect is also reinforced by the increasing online share of total retail sales [3]. As a result, sales area productivity in terms of sales per square meter decreases [4].

Parallel to that, digitization is proceeding and more and more retailers are offering an online store or digital services for local shopping [5], [6]. On the customer side, smartphones and subsequently mobile apps are becoming increasingly relevant [7]–[9]. Many retailers therefore try to use mobile apps for their business purposes [10]: Mobile apps serve as a digital bridge between stationary retail and the internet [11].

The acceptance of mobile apps in general has already been extensively researched. Corresponding findings also exist for the retail sector in particular. However, little is known about the different types of users in the context of mobile apps in multi-channel retail. At the same time, existing research on apps and app usage indicates that different user types might exist:

In multi-channel retail, apps can be differentiated according to whether they function primarily as an online store or as a digital shopping assistant for stationary shopping [12], [13]. Other distinctions also exist, such as between money-saver apps, shopping-convenience apps, and loyalty apps [14]. Richter [15] notes a connection between lifestyle and app use. Children's use of mobile devices appears to be related to the socio-demographic environment in which they grow up [16]. In the field of education, there are calls to consider different user types in app development to better meet user expectations [17].

Therefore, this research project aims to develop a taxonomy for users of mobile apps in multi-channel retail by means of an explorative approach. First, existing findings on mobile apps in retail and classifications in the mobile app context are considered. Subsequently, a cluster analysis is carried out on the basis of a consumer survey. Thereby different types of users will be identified and presented. The work closes with implications for practice and identifies potential research gaps.

2 Literature review

2.1 Consumers using mobile apps in retail

The use of mobile apps in retail by consumers has been extensively researched in the past. Selected findings are presented below.

In principle, the use of mobile apps by consumers in retail depends on many factors. It should be mentioned that not only the app itself but also the context in which it is used plays a decisive role: mobile apps are used particularly in high involvement product categories or by young men preferably when shopping [18].

A key factor in determining willingness to use mobile apps is the extent to which consumers can achieve time savings or practical benefits [19]. For example, app users expect individualized offers via the app [20]. In addition, not only the functionality of the app itself, but also the service offered by a retailer, for example, plays a role [21]. Thus, the perceived ease of use of an app per channel—online shopping or stationary retail—also affects channel preferences and future purchasing intentions [22].

The influence of the retailer itself or its offered services as researched by Rosa [21] is also emphasized by further research results: Among other things, the image of a retailer is also identified as a driver for app adoption and app usage [23]–[25].

On the other hand, the influence of innovative functionalities is highly controversial: On the one hand, there are consumers who enjoy trying out innovations in an app context [26]. Furthermore, augmented reality technologies, for example, can provide added value for app users [27]. Nevertheless, a pure focus on innovative functionality for the sake of innovation is not sufficient: the focus must be on efficiency gains and convenience from app users [28], [29].

In multi-channel retailing, this means that an app should offer more functionality than pure online shopping [13], [30]. There is evidence that consumers want to use mobile apps in retail as digital shopping assistants [12]. [31] state in this regard that a mobile app in multi-channel must be more than just a sales channel. For example, they suggest retail-related services that should be able to be used or purchased via a mobile app.

In summary, the literature to date shows that some consumers expect a mobile app in retail to be primarily an online store, while others seem to expect an app that also helps them with their stationary retail purchases, for example through services or special offers [12], [30]–[32]. Still other users seem to enjoy trying out innovative functionality [26], [27]. These findings indicate that user expectations of mobile apps in retail and multi-channel retail are quite heterogeneous. There seem to be different types of users.

2.2 Classifications in the mobile app context

Based on the existing findings on mobile apps in retail, it can be said that there seem to be different types of usage. This raises the question to what extent users have already been classified according to usage types. In the following, existing literature will therefore be examined to what extent corresponding classifications have already been considered in the mobile app context.

With regard to the analysis of mobile app traffic, the evaluation of 142 million events using unsupervised clickstream clustering yields several clusters of usage types: For example, dormant users and hostile chatters are identified for a social mobile app [33].

App reviews in the major app marketplaces have also been frequently classified: For example, text mining methods can be used to identify critical reviews [34]. Based on such classifications, appropriate labels can be assigned to prioritize app reviews for further processing [35]. Such classifications can also be useful for extracting user requirements for app development: insights into on-functional requirements can be extracted from app reviews [36], [37].

Classification methods are also used to classify apps themselves: In the educational context, 177 apps affiliated with Australian universities are divided into different categories, including study management, navigation apps, augmented reality apps [38]. A clustering approach of mobile apps in retail in the German market identifies three different types of mobile apps. Based on an analysis of the functions of 25 mobile retail apps, these are grouped into money-saver apps, shopping-convenience apps and loyalty apps using a cluster analysis [14].

Particularly relevant for this presentation are the identification of clusters in the context of users and usage: Smartphone users can be divided into consumers with no specific motives, function pursuing consumers and other conscious consumers [39]. Similar findings can be made for the use of apps: Users of the Dating App Tinder can be divided into four psychological clusters—regulated, regulated with low sexual desire, unregulated-avoidants, unregulated-highly motivated [40]. In the context of an alcohol-harm reduction mobile app, for example, trackers, cut-downers and noncomitters can be distinguished [41]. A classification of mobile app usages styles comes to the

conclusion that the type of app usage is influenced by the lifestyle of the respective user [15].

In summary, the research results also indicate that there are probably different user classifications for mobile apps in multi-channel retail. At the same time, no findings on specific clusters appear to be available so far.

3 Material and methods

3.1 Survey design

There's only little knowledge about the existence different user types of mobile apps in multi-channel retail. Therefore, this paper uses an explorative approach, trying to identify different types of app users in multi-channel retail. For this purpose, a survey among consumers will be conducted. Bases on their answers, consumers will then be divided into different groups based on how they rate the relevance of different app functionalities.

The survey first collects the usage habits of the respondents asking about the frequency of internet use, smartphone use and internet use on mobile devices as well as affinities to online shopping and online shopping via mobile devices in particular.

Secondly, the consumers should rate the following functionalities of mobile apps in multi-channel retail by their perceived relevance:

- Online shopping and delivery
- Online shopping and pick-up in-store
- In-store shopping and delivery
- Notifications with discounts and special offers
- Viewing current advertising brochures
- Mobile payment in-store
- In-app loyalty card deposit
- Digital shopping list
- In-store navigation
- Product availability check

In order to avoid the tendency to the centre, a scale from 1 to 6 is employed to grade the importance per functionality [42, p. 330f.]. The list the functionalities is based on currently typical features of the most popular mobile apps from the multi-channel retail context and has already been used to classify mobile apps in retail [14]. The online survey is conducted in the first half of 2020. A total of 101 participants answer the survey in full.

3.2 Methodology

The answers of the survey participants will be used in the following to classify the participants into different groups. The goal is to use this classification to form several groups that are as heterogeneous as possible. At the same time the groups should be as homogeneous as possible with regard to their given answers. Therefore a cluster

analysis is performed [43]. Cluster analysis has a long history in psychology and sociology, especially in explorative contexts [44]–[46]. The analysis is based on Ward's linkage [47]. The measurement of the distances is based on the L2 dissimilarity measure. For the cluster analysis only the answers regarding the functionalities are used, but not those regarding the general usage habits. However, in the later description of the clusters, these general usage habits are also used again to describe the individual clusters. In this way, different types of users can be determined empirically and described for further research and application in practice.

4 Results

Figure 1 shows the results of the cluster analysis. The dendrogram is limited to the top 15 branches for clarity.

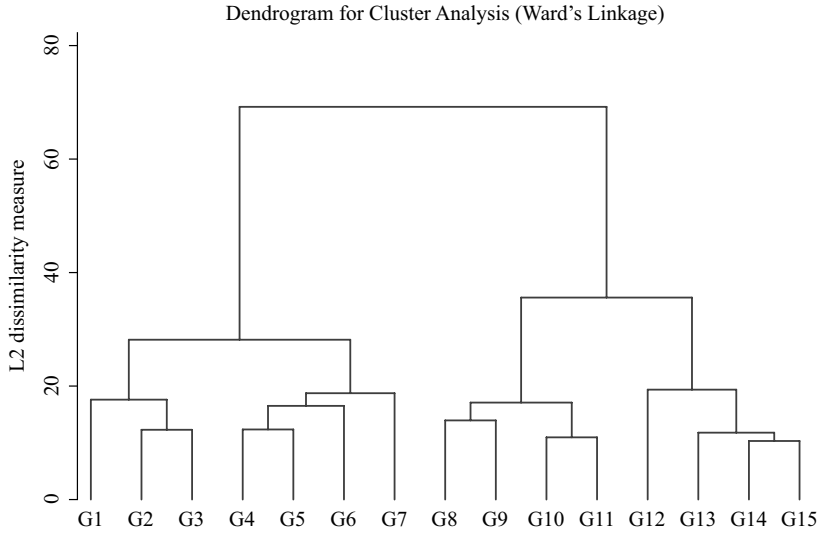

Fig. 1. Dendrogram of cluster analysis, limited to top 15 branches

Based on the dendrogram, a total of four clusters are identified. In the following the descriptive statistical data per cluster are presented. Additionally, the app users belonging to each cluster are described.

Table 1 shows the results for the first cluster. The first cluster has particularly high values for Internet and mobile Internet usage and smartphone usage. In terms of functionalities, online shopping and delivery, loyalty card deposit and checking product availability play a particularly important role. These users of mobile apps in multi-channel retail can be characterized accordingly as technology-open shopping with higher online affinity and low interest in advertising.

Table 1. Descriptive data of cluster 1 (N = 23)

Variable	Mean	Std. Dev.
Frequency		
Internet use	5.61	.77
Mobile phone	5.65	.88
Mobile internet	5.26	1.42
Internet shopping	4.39	1.27
Mobile shopping	3.57	1.65
Functionalities		
Online shopping & delivery	5.13	1.01
Online shopping & store pick-up	3.83	1.59
In-store shopping & delivery	3.00	1.48
Discount & offer notifications	3.61	1.31
Viewing advertising brochures	3.57	1.67
Mobile payment in-store	3.61	1.47
In-app loyalty card	5.00	.74
Digital shopping list	4.04	1.55
In-store navigation	3.91	1.59
Product availability check	5.35	.78

The descriptive data for the second cluster are shown in Table 2. These app users have a high affinity for discount notifications and advertising, but are not very technology enthusiasts, who mainly shop locally. They make heavy use of the Internet and cell phones. In addition, they attach great importance to discount notifications, digital advertising brochures and checking product availability.

Table 2. Descriptive data of cluster 2 (N = 36)

Variable	Mean	Std. Dev.
Frequency		
Internet use	5.39	1.08
Mobile phone	5.31	1.14
Mobile internet	4.97	1.18
Internet shopping	3.58	1.68
Mobile shopping	3.19	1.83
Functionalities		
Online shopping & delivery	4.61	1.36
Online shopping & store pick-up	4.39	1.27
In-store shopping & delivery	2.94	1.60
Discount & offer notifications	5.11	.89
Viewing advertising brochures	5.33	.86

(Continued)

Table 2. Descriptive data of cluster 2 (N = 36) *(Continued)*

Variable	Mean	Std. Dev.
Mobile payment in-store	2.53	1.38
In-app loyalty card	4.89	1.01
Digital shopping list	4.50	.94
In-store navigation	2.19	1.09
Product availability check	5.06	1.01

The third cluster is shown in Table 3. These users can be summarized as typical online shoppers. It includes users who show particularly high average values for internet use, mobile phone use, mobile internet use and online shopping & delivery. The values for mobile payment, loyalty card deposit and in-store navigation are rather low. Such features of mobile apps in multi-channel retail would be particularly relevant when shopping in a physical store.

Table 3. Descriptive data of cluster 3 (N=24)

Variable	Mean	Std. Dev.
Frequency		
Internet use	5.88	.45
Mobile phone	5.42	.83
Mobile internet	5.27	.92
Internet shopping	4.29	1.12
Mobile shopping	3.25	1.42
Functionalities		
Online shopping & delivery	5.33	.76
Online shopping & store pick-up	3.83	1.20
In-store shopping & delivery	4.04	1.88
Discount & offer notifications	3.67	1.49
Viewing advertising brochures	3.50	1.32
Mobile payment in-store	1.83	1.20
In-app loyalty card	2.25	1.15
Digital shopping list	3.08	1.64
In-store navigation	2.04	1.16
Product availability check	4.63	.97

Table 4 shows the fourth cluster. Despite heavy Internet usage, they do not achieve an importance of more than 3.5 for any functionality. Their affinity for online shopping is 3.0, for mobile shopping even only 1.83. These users can also be characterized as technology-averse offline shoppers.

Table 4. Descriptive data of cluster 4 (N = 18)

Variable	Mean	Std. Dev.
Frequency		
Internet use	5.11	1.28
Mobile phone	4.94	1.11
Mobile internet	4.17	1.42
Internet shopping	3.00	1.50
Mobile shopping	1.83	1.29
Functionalities		
Online shopping & delivery	2.56	1.34
Online shopping & store pick-up	2.56	1.25
In-store shopping & delivery	1.72	1.13
Discount & offer notifications	2.61	1.38
Viewing advertising brochures	1.94	1.21
Mobile payment in-store	1.50	.86
In-app loyalty card	2.28	1.41
Digital shopping list	2.44	1.34
In-store navigation	2.17	1.10
Product availability check	3.28	1.71

With regard to the dendrogram (Figure 1), a classification using more than four clusters of mobile app users in multi-channel retail is omitted. The four developed clusters provide a sufficient taxonomy for the classification of mobile app users in this context.

5 Summary and conclusion

Against the background of the ever increasing relevance of mobile apps in the digitization of the retail sector, this research aims to close an important research gap regarding the study of app usage behavior. Therefore, the goal of this research is the development of user type policies of mobile apps in multi-channel retail. Based on existing findings on mobile apps in retail in general and existing classifications in the mobile app context, it becomes clear that different user types may exist for mobile apps in multi-channel retail. By means of a survey, data of 101 consumers regarding their internet, shopping and mobile habits are collected. In addition, the respondents are asked to indicate the importance of a total of ten functionalities of mobile apps in multi-channel retail. A cluster analysis is used to identify different user types.

In summary, four different user types of mobile apps in multi-channel retail are identified and characterized:

- **Technology-open shoppers** with high online affinity and low interest in advertisement
- **Deal-searching shoppers** with local preferences and low technology enthusiasm
- **Online shoppers** with high internet and mobile usage
- **Technology-averse offline shoppers**

This development of user types in a multi-channel retail context completes existing findings on mobile apps from other areas. To the authors' knowledge, this taxonomy is a first-of-its-kind approach to classifying app users in a retail context. As a basis for distinguishing between groups of app users in the future, this classification makes an important contribution to theory and practice. In particular, from a practice perspective, the work is relevant because it simplifies the future development of apps based on different user interests, as has been called for in other contexts, such as education.

Regarding the limitations, it must be noted that the number of consumers surveyed is rather small (N = 101) and that they are exclusively from German-speaking countries. The classification approach, including its limitations, is therefore a starting point for further research projects, for example to take into account other factors such as usage habits, technology affinity, socio-demographic influences or product groups.

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