



Article

Assessing Antecedents of Behavioral Intention to Use Mobile Technologies in E-Commerce

Anca Antoaneta Vărzaru ¹, Claudiu George Bocean ^{2,*}, Claudia Cristina Rotea ³
and Adrian-Florin Budică-Iacob ²

¹ Department of Economics, Accounting and International Business, University of Craiova, 200585 Craiova, Romania; anca.varzaru@edu.ucv.ro

² Department of Management, Marketing and Business Administration, University of Craiova, 200585 Craiova, Romania; adrian.budica@edu.ucv.ro

³ Faculty of Mechanics, University of Craiova, 200585 Craiova, Romania; cristina.rotea@edu.ucv.ro

* Correspondence: claudiu.bocean@edu.ucv.ro; Tel.: +40-72629-9522

Abstract: The last decades have seen continuous increases in electronic commerce (e-commerce) and particularly mobile commerce (m-commerce). These sharp increases, especially during the COVID-19 pandemic, have led companies to become aware of the potential of this trade channel. This paper investigates the effects of antecedents on behavioral intention in m-commerce and the role of consumer satisfaction in the buyer decision process. In our investigation, we used the modified technology acceptance model (TAM). The research was conducted through a survey based on a self-administered questionnaire, with the data being analyzed by structural equation modeling and cross-tabulation. Following the investigation, we found that perceived usefulness (PU) and perceived ease of use (PEU) positively influence behavioral intention. Consumer satisfaction also plays a significantly positive role in m-commerce actual use, influencing future behavioral intention. The results also showed that generational and gender differences strongly affect behavioral intention, with younger generations and male respondents being more inclined to use m-commerce.

Keywords: m-commerce; e-commerce; behavioral intention; antecedents; consumers' satisfaction; actual usage; generational approach; gender approach



Citation: Vărzaru, A.A.; Bocean, C.G.; Rotea, C.C.; Budică-Iacob, A.-F. Assessing Antecedents of Behavioral Intention to Use Mobile Technologies in E-Commerce. *Electronics* **2021**, *10*, 2231. <https://doi.org/10.3390/electronics10182231>

Academic Editor: Miquel Oliver Riera

Received: 24 August 2021

Accepted: 10 September 2021

Published: 11 September 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The development of technology has a significant impact on human life, including in business. Today, many economic activities are carried out using technology. Companies can no longer ignore technology, and the Internet is ubiquitous in various business areas. M-commerce, and e-commerce, are some of the results of technological development in recent decades, which has involved implementing Internet technology in commercial transactions [1]. If in the 1990s (exclusively) and the 2000s (partially) e-commerce was developed using desktop computers, in the last decade, e-commerce has begun to develop mobile features, due to the spread of mobile devices and the increasing the number of Internet users [2].

E-commerce is the process of buying and selling products and services through the Internet using online tools. E-commerce has a broad scope, including online stores, banking, travel services, and digital content shopping. M-commerce is a form of commerce that includes online transactions using a portable device, such as a phone or tablet. Most e-commerce platforms have adapted their content to be easier to use on mobile devices, so that the experience offered by m-commerce is friendlier than that provided by e-commerce [3]. In addition, mobile devices have the advantage of being available to the user for much longer than other online commerce tools, facilitating the purchase of products and services in terms of time and space. Many areas have flourished due to e-commerce and m-commerce, such as warehousing services, delivery services, supply chain

management, online customer relationship management, e-marketing, and software solutions development [4]. Dumanska et al. [5] note a relatively rapid transition of consumers to e-commerce, and chiefly m-commerce, due to technological development, globalization, liberalization of international trade, and changes in consumption habits; phenomena that have fundamentally influenced the evolution of global commerce from traditional forms to online practices. Due to the prolonged growth of the COVID-19 pandemic, economic and social life after the pandemic will no longer be the same, due to health rules and traffic restrictions, which have led to changes in consumer behavior, influencing the growth of e-commerce and especially m-commerce [6,7].

Given these dynamic and rapid changes in consumer behavior in the m-commerce area, companies must assess the effects of antecedents on behavioral intention and the role of consumers' satisfaction in the buyer decision process. The research question was posed in this context: What are the antecedents of behavioral intention to use mobile technologies in e-commerce, and how do these antecedents influence the actual use. To investigate the influence of antecedents on behavioral intention, we used a modified technology acceptance model (TAM), with the data being analyzed by structural equation modeling and cross-tabulation. The originality of this research derives from the introduction of the modified TAM model of the variable of consumer satisfaction. Thus, consumer satisfaction becomes the antecedent of the future intention to use, joining the classic antecedents of the TAM model. In addition, an intergenerational analysis of the use of e-commerce adds to the originality of the paper.

The structure of the paper is divided into six sections. After the introduction and literature review, we describe the research design, the hypotheses, the selected sample, and the research methods used. The following two sections give the research results and the discussions. The last section is dedicated to the conclusions.

2. Literature Review

Today, e-commerce is booming, as most organizations that traditionally sell goods and services have focused on expanding their target customer range using online sales tools. In addition, the widespread use of smartphones and tablets for various activities, chiefly in recent years, including m-commerce, has led to increased e-commerce. As a result, the literature has addressed a wide range of e-commerce issues, from technical problems, such as transaction security [8,9], data security, and software issues [1], to economic ones, such as marketing [2] and successful e-commerce drivers [3].

M-commerce is characterized by its convenience and ubiquity, being a commercial activity derived from e-commerce. Kwon and Sadeh [10] showed that m-commerce is a subset of e-commerce, considering that the following factors can play a significant role in its success: security and trust, customization and location, and user convenience. Chantzaras et al. [11] considered that security and trust are the most important factors contributing to the success of m-commerce. Varshney and Vetter [12] saw m-commerce as an integrated framework that runs on four levels: commercial applications, applications linking the operating system to commercial applications (middleware), user hardware to access wireless networks, and network operators' hardware needed to operate wireless networks. Balasubramanian et al. [13] showed that mobility is the main feature of m-commerce applications; offering online services without time and position restrictions. As mobile devices have developed and acquired new features, m-commerce has become operational and cost-effective.

Multiple studies have attempted to identify the key factors that have led consumers to accept this new trade technology [14–23]. Zhang et al. [18] argued that culture underpins the adoption of m-commerce, with their empirical research based on structural equation modeling. Ettis and Abidine [21] highlighted other factors: individual perceptions, consciousness, psychological factors, and a complex environment. Lopez-Nicolas et al. [24–27] showed the positive influence of the social environment on the perceived utility of mobile devices' use. Singh et al. [28] demonstrated that social influence is the primary vector

that determines if customers adopt m-commerce, positively influencing intentions for involvement. McLean et al. [29] investigated the influence of customer experience on the perception of customer satisfaction using mobile applications for commercial transactions, and not limited to these variables. Ngubelanga and Duffett [30] investigated the antecedents of customer satisfaction following the use of m-commerce applications by consumers; showing that confidence, social influence, mobility, involvement, and innovation positively influence usefulness and ease of use. Other research has shown that social influence is the main factor in adopting mobile devices and their use as an e-commerce channel [31–37].

Several studies have highlighted the need for further research due to uncertainties about some vectors that cause customers to engage in m-commerce, customer perceptions of the benefits offered by m-commerce, the post-purchase experience, and how benefits are perceived compared to other channels [30,38–43]. Kalinic et al. [40] and other researchers [43–46] believed that empirical studies are needed on the evolution of consumers' adoption of this channel and the factors influencing customers' attitudes in opting for m-commerce. All researchers who have studied the evolution of this channel agree that trade operators must consider m-commerce in order to understand that the lifestyle of customers and the increasingly advanced features of mobile devices can revolutionize the evolution of trade. New research areas, such as social trade and cross-border trade [47–49], have emerged. Social marketing applied in m-commerce generates additional profit for companies [50,51]. Other authors [52] mentioned technical issues and software tools as constraints on mobile processes.

Regarding the generational approach of studies on m-commerce consumer experience, various studies focused on Generation Z, known as Millennials, or Generation Y [30,53–56], with relatively few studies investigating intergenerational effects on m-commerce consumer experience [57].

To analyze the influences of antecedents on behavioral intention in m-commerce and the role of consumer satisfaction in the buyer decision process, we used the technology acceptance model (TAM) proposed by Fred Davis in 1985 [58]. This model has had general use in terms of the acceptance of computer-based information systems, both in the workplace and in private life. Such a model for testing users' acceptance of the technology could provide helpful information about the probability of success of the proposed technologies. Currently, the TAM model facilitates the interpretation and anticipation of consumer behavior of products or services that incorporate technology. Davis et al. (1989) afterward improved the model by showing that the variables, perceived ease of use (PEU) and perceived usefulness (PU), were directly and positively associated with consumers' attitudes toward technology use, technology intent, and effective use [59]. In 2000, the model was revised by Venkatesh and Davis [60] and updated by taking into account antecedents of the two variables (PEU and PU), namely "subjective rules, image, job relevance, output quality, and result demonstrability" [60] (p. 188). A further extension of the model, by Venkatesh and Bala [61], offered the following categories of antecedents of the two variables (PEU and PU): "individual differences, system characteristics, social influence, and facilitating conditions" [61] (p. 276). Subsequently, multiple types of research have added other variables, and several studies have applied the TAM model in the m-commerce and e-commerce fields [27,30,31,37,62–71].

3. Materials and Methods

3.1. Research Design and Hypothesis

Based on the conclusions of Chhonker et al. [65], which pointed out that most studies have used the theoretical framework TAM model (almost 70% of 200 studies analyzed), we used a modified TAM model in our investigation. In empirical research, most TAM-based studies use the following antecedent variables for the two variables (PEU and PU): confidence, innovation, mobility, enjoyment, and social influence [30–32,66–71]. Some studies used customer satisfaction as a variable in TAM to determine the influence on

consumer adoption of m-commerce [29–31,35–45,72–78]; exploring consumer behavioral intent and customer satisfaction. Our study used a simplified TAM model, in which consumer satisfaction influences behavioral intention. The two main variables (PEU and PU) that influence the behavioral intention to use have eight exogenous variables as antecedents: trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment. Behavioral intention to use influences actual usage. After use, consumer satisfaction affects both behavioral intention and future usage. This paper aims to identify and evaluate the influences on behavioral intention in m-commerce of exogenous factors, customers' satisfaction, and generational and gender differences. Figure 1 shows the model used in the research.

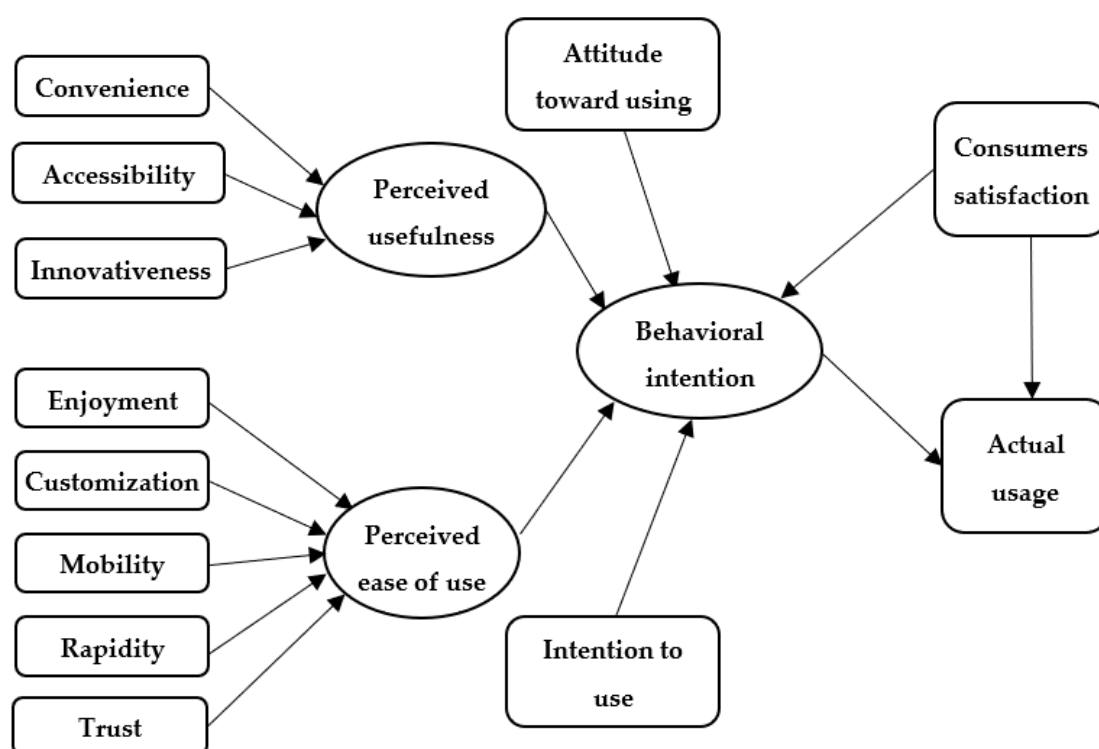


Figure 1. Conceptual structural model. Source: own construction based on [10,11,29–45,66–78].

Based on the proposed conceptual model, we developed four hypotheses that test the relationships between variables and identify and evaluate influences between the model variables.

In almost all studies using the TAM model, since its formulation in 1985, the two main variables that influence intention to use have been PEU and PU. Depending on the domain in which the TAM model is applied, these two main variables are influenced by domain-specific external variables. Our research used the external variables (antecedents) of trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment; variables identified and used in multiple other studies [10,11,29–45,66–78]. Our theoretical model defines PEU and PU as latent variables influenced by external variables. The first hypothesis of the research concerns the antecedents of the two variables (PEU and PU), to be tested based on data collected in the investigation based on a self-administered questionnaire.

Hypothesis 1 (H1). *External variables (trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment) represent valid factors influencing variables PEU and PU.*

Ever since the initial model was proposed by Fred Davis in 1985 [58], the variables PEU and PU have influenced attitude towards use and thereby the behavioral intention to use technology. This procedural sequence was also preserved in further studies [59–61]. Moreover, the authors who applied the TAM model in m-commerce have shown a successive relationship between PEU, PU, and the behavioral intention to use m-commerce [27,30,31,37,62–71]. The proposed theoretical model defines the behavioral intention of consumers as a latent exogenous variable. Thus, consumer behavioral intention is represented by the external observable variables: attitude toward using and intention to use. Given the successive procedural relationship between PEU, PU, and behavioral intention underlined by other authors in the TAM model [27,30,31,37,62–70], we propose a second hypothesis that describes this relationship:

Hypothesis 2 (H2). *Perceived ease of use (PEU) and perceived usefulness (PU) positively impact the consumer's behavioral intention in m-commerce.*

Based on a series of studies that used customer satisfaction as a variable in the TAM [29–31,35–45,71–77], we included in our research an exogenous variable, consumer satisfaction, measured in parallel with the extent of use of m-commerce. Stated satisfaction and extent of use are exogenous observable variables that characterize endogenous latent variables: consumer satisfaction and actual usage. A third hypothesis of the study aims to investigate the relationships among consumer satisfaction and the variables of behavioral intention and actual usage:

Hypothesis 3 (H3). *Consumer satisfaction in m-commerce positively influences future behavioral intention and actual usage.*

The fourth hypothesis emerged from the research regarding generational and gender differences in the observable exogenous variables, attitude toward using and intention to use. We used the classification from a McKinsey study [78] to segment the age variable into three generations with different characteristics (Generation X, Generation Y, and Generation Z) for the generational approach. As a result, the fourth hypothesis is formulated as follows:

Hypothesis 4 (H4). *Generational and gender differences have a significant impact on future behavioral intention.*

3.2. Data Collection and Sample Selection

Data collection was carried out through a survey based on a self-administered questionnaire. This questionnaire was sent to 938 people in Romania, from urban areas and with higher education or involved in higher education; 206 questionnaires were returned by the respondents, 8 of them with incomplete information. After eliminating the invalid questionnaires (incomplete), we obtained 198 valid questionnaires that constituted the research database. In order to comply with GDPR, no information was requested regarding the identity of the survey participants, ensuring confidentiality regarding the information provided.

Table 1 renders the sample structure according to demographic variables.

The questionnaire was structured in three sections: demographic variables, antecedents of the TAM model, and exogenous variables. Table 2 shows the structure of the questionnaire, the items, and the potential answer options.

Table 1. Frequencies and descriptive statistics.

Variable	Cases	Frequency	Percent	Standard Deviation	Skewness	Kurtosis
Gender	Male	92	46.5	0.500	−0.143	−2.000
	Female	106	53.5			
Age	Generation Z (18–25 years)	65	32.8	0.500	−0.143	−1.419
	Generation Y (26–40 years)	73	36.9			
	Generation X (41–56 years)	60	30.3			

Source: Own analysis using SPSS v.20.

Table 2. Questionnaire design (constructs and items).

Structure	Items	Answer Options
Demographic variables	Gender Age	Male, Female 18–25 years, 26–40 years, 41–56 years
TAM antecedents	Trust Convenience Customization Innovativeness Rapidity Accessibility Mobility Enjoyment	On a scale of 1 to 5 (1—not at all important, 5—very important)
Exogenous variables	Attitude toward using Intention to use Extent of use Consumer satisfaction	On a scale of 1 to 5 (1—very poor, 5—very good) On a scale of 1 to 5 (1—very low, 5—very high) On a scale of 1 to 5 (1—minimal extent, 5—considerable extent) On a scale of 1 to 5 (1—very low, 5—very high)

Source: own construction based on [10,11,30–45,66–76].

3.3. Methods

To test the validity of the H1 to H3 hypotheses, we applied structural equation modeling [79,80], which allows determining the mediation effects among the selected variables. The formula used is (1):

$$\eta_i = \alpha_\eta + B\eta_i + \Gamma\zeta_i + \zeta_i \quad (1)$$

η, ζ —endogenous and exogenous latent variables vectors, B —matrix of regression coefficients relating the latent endogenous variables to each other, Γ —matrix of regression coefficients relating the endogenous variables to exogenous variables, ζ —disturbance, and i —cases in the sample.

To test the validity of the H4 hypothesis, we used descriptive statistics performing chi-square tests and cross-tabulation.

4. Results

The proposed theoretical model (modified TAM) was tested using partial least square equation modeling (PLS-SEM) using SmartPLS v.3 software. Following the analysis of Figure 2, we found that hypothesis H1 is valid. All the external variables (trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment) represent valid factors influencing PEU and PU. All items met the validity requirement for loading of observable external variables (a value above 0.7) (Figure 2).

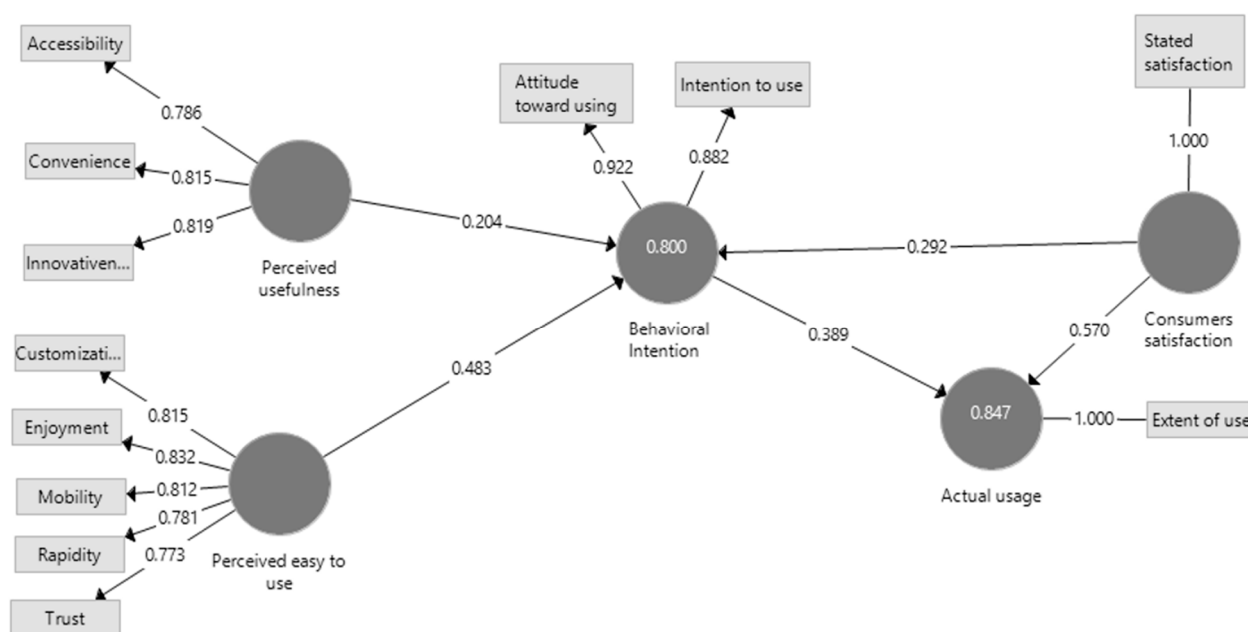


Figure 2. Modified TAM model for m-commerce. Source: own construction developed using SmartPLS v.3.

The applied model presents good fit measures. The standardized root mean square residual (SRMR) is 0.79, while the normed fit index (NFI) registers the value 0.953. According to Hu and Bentler [81], a value less than 0.08 is considered a good fit, and according to Lohmöller [82], NFI values above 0.9 usually represent an acceptable fit. In addition, the reliability and validity of the model are good (Table 3). All latent variables record values above 0.7 of the Alpha Cronbach coefficient, values above 0.8 of the reliability composite coefficient, and values above 0.6 of the AVE (average variance extracted). According to Hair et al. [83,84], these minimum values prove the model's reliability and validity.

Table 3. Model reliability and validity.

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Behavioral intention	0.774	0.795	0.897	0.814
Actual usage	1	1	1	1
Consumer satisfaction	1	1	1	1
Perceived easy to use (PEU)	0.863	0.873	0.9	0.644
Perceived usefulness (PU)	0.733	0.733	0.848	0.651

Source: own construction developed using SmartPLS v.3.

The evaluation of discriminant validity is a condition that the model must meet in order for the relationships between latent variables to be valid. For structural equation modeling (using SEM-PLS type models), the Fornell–Larcker criterion is one of the dominant approaches for assessing discriminant validity. Table 4 shows the Fornell–Larcker matrix, in which on the main diagonal is the square root of the AVE. Below are the values of the intercorrelation coefficients of the latent variables.

Table 4 shows that all the values of the intercorrelation coefficients for the latent variables are below the values on the main diagonal (square root of the AVE), which indicates the good validity of the model.

The bootstrapping procedure results applied to the built model show that when using a two-tailed *t*-test (5% significance level) all the path coefficients are statistically significant (because *T*-statistics are larger than 1.96 and *p*-Values are 0.000). Table 5 shows the path coefficients and significance levels.

Table 4. Assessment of discriminant validity using the Fornell–Larcker criterion.

	Behavioral Intention	Actual Usage	Consumer Satisfaction	Perceived Easy to Use	Perceived Usefulness
Behavioral intention	0.902				
Actual usage	0.865	1			
Consumer satisfaction	0.834	0.895	1		
Perceived easy to use (PEU)	0.851	0.897	0.822	0.803	
Perceived usefulness (PU)	0.717	0.765	0.717	0.631	0.807

Source: own construction developed using SmartPLS v.3.

Table 5. Path coefficients and significance in the bootstrapping procedure.

	Path Coefficients	T-Statistics	p-Values	f ²
Behavioral intention → Actual usage	0.389	8.147	0.000	0.302
Consumer satisfaction → Behavioral intention	0.292	5.37	0.000	0.11
Consumer satisfaction → Actual usage	0.57	12.019	0.000	0.648
Perceived easy to use → Behavioral intention	0.483	9.239	0.000	0.374
Perceived usefulness → Behavioral intention	0.204	4.997	0.000	0.1

Source: own construction developed using SmartPLS v.3.

Table 5 and Figure 2 contain path coefficients for relationships to be established within the model. It can be seen from both Figure 2 and Table 5 that there are positive influences of PEU and PU on behavioral intention, which validates the H2 hypothesis. Furthermore, an analysis of total effects and size effects (f^2) indicates that perceived ease of use has a strong influence on behavioral intention (total effects 0.483; size effects 0.374), while perceived usefulness has a relatively small impact on behavioral intention (total effects 0.204; size effects 0.1). Another aspect that emerges from Figure 2 and Table 5 concerns the positive influences of consumer satisfaction on behavioral intention and actual usage, which validates the H3 hypothesis. An analysis of total effects and size effects (f^2) indicates that consumer satisfaction has a strong influence on current use (total effects 0.57; size effects 0.648) and an average influence on behavioral intention (total effects 0.292; size effects 0.11). Furthermore, the model shows that behavioral intention strongly influences current usage (total effects 0.389; size effects 0.302).

To test the validity of the H4 hypothesis, we investigated the association between the socio-demographic variables selected in the research (gender and age) and the behavioral intention (described by exogenous observable variables, attitude toward using, and intention to use).

The Chi-square test resulted in a significant association between the gender variable and the variables attitude towards using ($\chi^2 = 34,105$, $df = 4$, $p = 0.000 < 0.05$) and intention to use ($\chi^2 = 38.625$, $df = 4$, $p = 0.000 < 0.05$). Table 6 shows the number of respondents and the percentages recorded by attitude towards using and intention to use, depending on gender.

Most male respondents have a favorable attitude towards the use of m-commerce (71.7% of respondents have a good or very good attitude). In contrast, less than a third of all female respondents have a favorable attitude towards the use of m-commerce (31.2% of respondents have a good or very good attitude). Regarding intention to use, the gender differences are smaller, with most men and women expressing a high or very high intention to use m-commerce. The Chi-square test resulted in a significant association between the age variable and the attitude towards using variables ($\chi^2 = 62,068$, $df = 8$, $p = 0.000 < 0.05$) and intention to use ($\chi^2 = 42,957$, $df = 8$, $p = 0.000 < 0.05$). Table 7 shows the number of respondents and the percentages recorded by attitude toward using and intention to use, depending on age.

Table 6. The association between the variable gender and the variables attitude toward using and intention to use.

Attitude toward Using					Intention to Use				
Scale of 1 to 5 (1—Very Poor, 5—Very Good)		Sex		Total	Scale of 1 to 5 (1—Very Low, 5—Very High)		Sex		Total
		Male	Female				Male	Female	
1	Count	0	2	2	1	Count	0	2	2
	% within Attitude toward using	0.0%	100.0%	100.0%		% within the Intention to use	0.0%	100.0%	100.0%
	% within Gender	0.0%	1.9%	1.0%		% within Gender	0.0%	1.9%	1.0%
2	Count	7	22	29	2	Count	1	13	14
	% within Attitude toward using	24.1%	75.9%	100.0%		% within Intention to use	7.1%	92.9%	100.0%
	% within Gender	7.6%	20.8%	14.6%		% within Gender	1.1%	12.3%	7.1%
3	Count	19	49	68	3	Count	12	33	45
	% within Attitude toward using	27.9%	72.1%	100.0%		% within Intention to use	26.7%	73.3%	100.0%
	% within Gender	20.7%	46.2%	34.3%		% within Gender	13.0%	31.1%	22.7%
4	Count	43	18	61	4	Count	44	50	94
	% within Attitude toward using	70.5%	29.5%	100.0%		% within Intention to use	46.8%	53.2%	100.0%
	% within Gender	46.7%	17.0%	30.8%		% within Gender	47.8%	47.2%	47.5%
5	Count	23	15	38	5	Count	35	8	43
	% within Attitude toward using	60.5%	39.5%	100.0%		% within Intention to use	81.4%	18.6%	100.0%
	% within Gender	25.0%	14.2%	19.2%		% within Gender	38.0%	7.5%	21.7%
Total	Count	92	106	198	Total	Count	92	106	198
	% within Attitude toward using	46.5%	53.5%	100.0%		% within Intention to use	46.5%	53.5%	100.0%
	% within Gender	100.0%	100.0%	100.0%		% within Gender	100.0%	100.0%	100.0%

Source: own construction developed using SPSS v.20.

Table 7. The association between the variable age and the variables attitude toward using and intention to use.

Attitude toward Using						Intention to Use					
Scale of 1 to 5 (1—Very poor, 5—Very Good)		Age (Generation)			Total	Scale of 1 to 5 (1—Very Low, 5—Very High)		Age (Generation)			Total
		Z	Y	X				Z	Y	X	
1	Count	0	1	1	2	1	Count	0	0	2	2
	% within Attitude toward using	0.0%	50.0%	50.0%	100.0%		% within Intention to use	0.0%	0.0%	100.0%	100.0%
	% within Age	0.0%	1.4%	1.7%	1.0%		% within Age	0.0%	0.0%	3.3%	1.0%
2	Count	0	8	21	29	2	Count	0	7	7	14
	% within Attitude toward using	0.0%	27.6%	72.4%	100.0%		% within Intention to use	0.0%	50.0%	50.0%	100.0%
	% within Age	0.0%	11.0%	35.0%	14.6%		% within Age	0.0%	9.6%	11.7%	7.1%
3	Count	17	33	18	68	3	Count	8	17	20	45
	% within Attitude toward using	25.0%	48.5%	26.5%	100.0%		% within Intention to use	17.8%	37.8%	44.4%	100.0%
	% within Age	26.2%	45.2%	30.0%	34.3%		% within Age	12.3%	23.3%	33.3%	22.7%
4	Count	20	23	18	61	4	Count	28	41	25	94
	% within Attitude toward using	32.8%	37.7%	29.5%	100.0%		% within Intention to use	29.8%	43.6%	26.6%	100.0%
	% within Age	30.8%	31.5%	30.0%	30.8%		% within Age	43.1%	56.2%	41.7%	47.5%

Table 7. Cont.

Attitude toward Using						Intention to Use					
Scale of 1 to 5 (1—Very poor, 5—Very Good)		Age (Generation)			Total	Scale of 1 to 5 (1—Very Low, 5—Very High)		Age (Generation)			Total
		Z	Y	X				Z	Y	X	
5	Count	28	8	2	38	5	Count	29	8	6	43
	% within Attitude toward using	73.7%	21.1%	5.3%	100.0%		% within Intention to use	67.4%	18.6%	14.0%	100.0%
	% within Age	43.1%	11.0%	3.3%	19.2%		% within Age	44.6%	11.0%	10.0%	21.7%
Total	Count	65	73	60	198	Total	Count	65	73	60	198
	% within Attitude toward using	32.8%	36.9%	30.3%	100.0%		% within Intention to use	32.8%	36.9%	30.3%	100.0%
	% within Age	100.0%	100.0%	100.0%	100.0%		% within Age	100.0%	100.0%	100.0%	100.0%

Source: own construction developed using SPSS v.20.

Most Generation Z respondents have a favorable attitude towards the use of m-commerce. Moreover, 73.9% of Generation Z respondents have a good or very good attitude, while only 42.5% of Generation Y respondents have a good or very good attitude regarding the use of m-commerce. Only one-third of all Generation X respondents have a favorable attitude towards the use of m-commerce (33.3% of respondents have a good or very good attitude). Generational differences are apparent regarding the intention to use, especially regarding Generation Z commerce (77.7% of the respondents have a high or very high intention to use m-commerce). There is also a high degree of differentiation between Generations Y and Z (high or very high percentages of intention to use m-commerce of 66.2% and 51.7%, respectively). Investigating the validity of the H4 hypothesis led us to conclude that generational and gender differences significantly influence behavioral intention; Generation Z and male respondents being the most inclined segments to use m-commerce.

5. Discussion

As the exponential expansion of wireless networks and mobile devices has taken place, consumers have paid increasing attention to m-commerce [23]. As a result, mobile device users and the mobile technology market have sharply increased in recent years. Furthermore, 4G communication technologies and 5G networks have attracted even more mobile device users interested in accessing the Internet for various purposes [23,85,86].

M-commerce is the simplest form of e-commerce, as mobile devices are available to individuals all the time, and applications are straightforward to use. For practical reasons, individuals access mobile devices more often than computers, regardless of where they are. Today, mobile use provides comfort and convenience in consumer transactions, giving them a pleasant experience, which is used as an excuse to turn this into a new consumer habit [85]. Globally, there is an indisputable social phenomenon that concerns the time spent by individuals in the company of their mobile devices. In addition to the communication function and the entertainment function, the purchasing goods and services function is among the most frequently used on mobile devices.

Furthermore, mobile devices have increased the accessibility and mobility of information, offering the advantages of convenience, rapidity, and ease of use [87]. As a result, the m-commerce environment has generated new patterns and facilitated new technologies in e-commerce. Given the rapid development of this segment of e-commerce, it is necessary to research the various variables that influence behavioral intention to use m-commerce in order to understand the cognitive mechanisms that determine if consumers use this technology to purchase goods and services. To investigate the influences of antecedents on behavioral intention, we used a modified technology acceptance model (TAM), considering several external variables that influence PEU and PU (trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment). We selected these exter-

nal variables following extensive exploratory research of the literature [27,30,31,37,62–70]. Our research confirmed the relevance of these variables and their significant influence on PEU and PU (Hypothesis H1). Recent studies that have used modified versions of extended TAM have indicated the variables used in our conceptual model and tested in practice as relevant antecedents of behavioral intention to use mobile technologies in e-commerce. [63,69,70,74]. In addition to this variety of antecedents, in terms of behavioral intentions, adoption, and usage behavior, our study also introduces customer satisfaction as a result of using m-commerce.

In turn, as the TAM model theorizes [58–61], the variables PEU and PU are essential determinants of behavioral intention, which are then reflected in the extent of use of m-commerce. Following the investigation conducted in the selected sample, we found that PEU and PU variables positively influence behavioral intention (Hypothesis H2). Likewise, studies that applied TAM in m-commerce have revealed relationships among PEU, PU, and intention to use [27,30,31,37,62–70]. Starting from the results of the Hypothesis H2 research, with application of the modified TAM model, we found, similarly to Gbongli et al. [87], Marinkovic and Kalinic [31], and Vahdat et al. [37], that PEU proves to be the most important predictor, followed by PU, in terms of the influence on behavioral intention to use. Therefore, m-commerce providers need to consider the ease and accessibility of m-commerce and user-centeredness.

Based on some studies that used customer satisfaction as a variable [29–31,35–45,75–77] and exploring the behavioral intention of consumers and actual usage, we have introduced the variable consumers' satisfaction into the proposed conceptual model (TAM modified). Our research has shown that consumers' satisfaction significantly influences the extent of m-commerce use and future behavioral intention. Furthermore, the satisfaction gained from consumer experience in m-commerce is an essential factor in purchasing intention and future use of m-commerce (H3 hypothesis), as other authors have stated [31,35]. Marinkovic and Kalinic [31], Singh et al. [36], Do et al. [75], and Humbani and Wiese [76] reported positive correlations between perceived utility and consumer satisfaction in the process of adoption of e-commerce and mobile payments. Although several studies [64,70,72] have reported a strong correlation between perceived utility and m-commerce use, they did not focus on customer satisfaction.

By researching the generational and gender differences regarding behavioral intent, we found a significant influence on the two variables that determined behavioral intention (attitude towards using and intention to use). Several studies have shown that Generation Z and male respondents are the most inclined segments towards m-commerce use (H4 hypothesis) [20,30,53–57,88,89]. Similarly to Ngubelanga and Duffett [30] and Kim et al. [90], we consider that Generation Z is the most innovative category of consumers by age, being dependent on mobile devices, which they use continuously. Although they do not have the greatest purchasing power, consumers of Generation Z have a tremendous power of influence within the family. Therefore, as managerial and marketing implications, we believe that companies need to improve the customer experience, especially those of Generation X and Y and female customers, to facilitate positive satisfaction and to encourage a more frequent use of m-commerce.

6. Conclusions, Limitations, and Further Research

The fourth industrial revolution has generated technological advances that global companies cannot ignore. The continuous expansion, both in mobile devices and mobile applications, has caused companies to raise awareness of the potential of m-commerce. M-commerce and e-commerce are channels of trading with a solid upward trend, and which may rapidly become prevalent in the context of technological developments.

The crisis generated by the COVID-19 pandemic has accelerated m-commerce and e-commerce by changing transaction patterns and consumption habits from a traditional type to the online type. M-commerce has provided consumers with quick and easy access to a wide range of goods, even under mobility restrictions. This has allowed organizations to

continue to operate in the context of the COVID-19 pandemic crisis. Transactions that have been the subject of m-commerce in many countries (especially in developing countries) have partly translated from luxury goods and services to goods and services needed in the daily routine, which has broadened the segment of customers who turn to m-commerce. Some of these changes affecting m-commerce will be long-term changes, given the potential for new waves of the COVID-19 pandemic, the fixation in the consumer mentality of new purchasing habits, and the advantages offered to companies by new sales channels, which allow broadening the customer base.

6.1. Theoretical Implications

In this paper, we assessed the effects of antecedents on behavioral intention and the role of consumers' satisfaction in the buyer decision process. For empirical research, we used a modified technology acceptance model (TAM). The influences, interrelationships, and effects were evaluated using SmartPLS v.3 software. Following the research, we found that external factors such as trust, convenience, customization, innovativeness, rapidity, accessibility, mobility, and enjoyment positively influence behavioral intention through perceived usefulness and perceived ease of use. In addition, the proposed model also considers consumers' satisfaction, which significantly affects the extent of m-commerce and future behavioral intention based on consumer experience. In the investigation, we also found that generational and gender differences exert consistent effects on behavioral intention, with younger generations (Generation Z, mainly) and male respondents being more inclined to use m-commerce.

6.2. Managerial Implications

The upward evolution of m-commerce, especially against the background of the crisis generated by the COVID-19 pandemic, has caused retailers to increasingly turn to m-commerce. The results of our research can be helpful for retailers who use m-commerce to sell products and services, by identifying the antecedents of consumers' behavioral intention. Implementation of the modified TAM model of consumer satisfaction offers retailers the opportunity to achieve a virtuous quality improvement cycle. The proposed model goes beyond the study of the initial antecedents, in considering what happens in the after-sales phase.

6.3. Limitations and Further Research

Our paper has made a modest contribution to the analytical research of consumer experience through m-commerce; proposing a research model (TAM modified) that considers consumer satisfaction, among other antecedents of behavioral intent, that may influence future intention to use m-commerce. Among the limitations of our research that are worth mentioning, is the focus on respondents who belong only to three generations (Z, Y, and X, from 18 to 56 years), who live in urban areas, and those having a higher level of education or who are in a form of higher education. Another limitation results from the fact that the study was conducted in a single country, Romania. Behavioral intention and actual usage might differ to some extent, especially among the older generations, depending on the culture of each country. Potential future research directions might expand the study to a more significant number of antecedents and include variables with a mediation or moderation role; influencing behavioral intention in m-commerce concerning other variables. The research model could also be developed by including other vital variables, such as engagement, experience, and social influence.

Author Contributions: Conceptualization, C.G.B., A.-F.B.-I., C.C.R. and A.A.V.; methodology, A.A.V. and C.G.B.; validation, C.G.B., A.-F.B.-I., C.C.R. and A.A.V.; formal analysis, C.C.R.; investigation, A.A.V.; resources, C.C.R.; data curation, A.A.V.; writing—original draft preparation, A.A.V. and C.G.B.; writing—review and editing, C.G.B., A.-F.B.-I., C.C.R. and A.A.V.; visualization, A.A.V., and C.G.B.; supervision, C.G.B.; project administration, C.G.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Kaabi, S.; Jallouli, R. Overview of E-commerce Technologies, Data Analysis Capabilities and Marketing Knowledge. In Proceedings of the International Conference on Digital Economy, Beirut, Liban, 15–18 April 2019; pp. 183–193. [\[CrossRef\]](#)
2. Katsikeas, C.; Leonidou, L.; Zeriti, A. Revisiting international marketing strategy in a digital era. *Int. Mark. Rev.* **2019**, *37*, 405–424. [\[CrossRef\]](#)
3. Fouskas, K.; Pachni-Tsitiridou, O.; Chatziharistou, C. A Systematic Literature Review on E-Commerce Success Factors. *Strateg. Innov. Mark. Tour.* **2020**, 687–694. [\[CrossRef\]](#)
4. Pantelimon, F.-V.; Georgescu, T.M.; Posedaru, B.-S. The Impact of Mobile e-Commerce on GDP: A Comparative Analysis between Romania and Germany and how COVID-19 Influences the e-Commerce Activity Worldwide. *Inform. Econ.* **2020**, *24*, 27–41. [\[CrossRef\]](#)
5. Dumanska, I.; Hrytsyna, L.; Kharun, O.; Matviets, O. E-commerce and M-commerce as Global Trends of International Trade Caused by the COVID-19 Pandemic. *WSEAS Trans. Environ. Dev.* **2021**, *17*, 386–397. [\[CrossRef\]](#)
6. Kim, E.-A. Social Distancing and Public Health Guidelines at Workplaces in Korea: Responses to Coronavirus Disease. *Saf. Health Work* **2020**, *11*, 275–283. [\[CrossRef\]](#)
7. Sardjono, W.; Selviyanti, E.; Mukhlis, M.; Tohir, M. Global issues: Utilization of e-commerce and increased use of mobile commerce application as a result of the Covid-19 pandemic. *J. Phys. Conf. Ser.* **2021**, *1832*, 012024. [\[CrossRef\]](#)
8. Kaushik, D.; Gupta, A.; Gupta, S. E-Commerce Security Challenges: A Review. In Proceedings of the International Conference on Innovative Computing & Communications (ICICC), SSRN, New Delhi, India, 7 May 2020; p. 3595304.
9. Khan, S.W. Cyber Security Issues and Challenges in E-Commerce. In Proceedings of the 10th International Conference on Digital Strategies for Organizational Success, SSRN, Gwalior, India, 5–7 January 2019. [\[CrossRef\]](#)
10. Kwon, O.B.; Sadeh, N. Applying case-based reasoning and multi-agent intelligent system to context-aware comparative shopping. *Decis. Support Syst.* **2004**, *37*, 199–213. [\[CrossRef\]](#)
11. Chantzaras, A.; Dimitrios, N.K.; Vlachos, D.S. *Mobile Commerce and Success Factors. Simulation and Modeling of the Problem*; Springer: Cham, Switzerland, 2017; pp. 349–355. [\[CrossRef\]](#)
12. Varshney, U.; Vetter, R. Mobile Commerce: Framework, Applications and Networking Support. *Mob. Netw. Appl.* **2002**, *7*, 185–198. [\[CrossRef\]](#)
13. Balasubraman, S.; Peterson, R.A.; Jarvenpaa, S.L.; Balasubramanian, S. Exploring the Implications of M-Commerce for Markets and Marketing. *J. Acad. Mark. Sci.* **2002**, *30*, 348–361. [\[CrossRef\]](#)
14. Venkatesh, V.; Ramesh, V.; Massey, A.P. Understanding usability in mobile commerce. *Commun. ACM* **2003**, *46*, 53–56. [\[CrossRef\]](#)
15. Deng, Z.; Lu, Y.; Wang, B.; Zhang, J.; Wei, K.K. An empirical analysis of factors influencing users' adoption and use of mobile services in China. *Int. J. Mob. Commun.* **2010**, *8*, 561–585. [\[CrossRef\]](#)
16. Hung, C.L.; Chou, J.C.L.; Dong, T.P.; Chung, R. A cross-cultural study on the mobile commerce acceptance model. In Proceedings of the 2010 IEEE International Conference on Management of Innovation & Technology, Singapore, 2–5 June 2010; pp. 462–467. [\[CrossRef\]](#)
17. Chong, A.Y.-L.; Chan, F.T.; Ooi, K.-B. Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia. *Decis. Support Syst.* **2011**, *53*, 34–43. [\[CrossRef\]](#)
18. Wang, C.; Zhang, P. The Evolution of Social Commerce: The People, Management, Technology, and Information Dimensions. *Commun. Assoc. Inf. Syst.* **2012**, *31*, 5. [\[CrossRef\]](#)
19. Martín, S.S.; López-Catalán, B.; Ramón-Jerónimo, M. Factors determining firms' perceived performance of mobile commerce. *Ind. Manag. Data Syst.* **2012**, *112*, 946–963. [\[CrossRef\]](#)
20. Faqih, K.M.; Jaradat, M. Assessing the moderating effect of gender differences and individualism-collectivism at individual-level on the adoption of mobile commerce technology: TAM3 perspective. *J. Retail. Consum. Serv.* **2015**, *22*, 37–52. [\[CrossRef\]](#)
21. Ettis, S.A.; Abidine, A.B.Z.E.; Lee, I.; Pelet, J. Consumer Behavior in M-Commerce: Literature Review and Research Agenda. *Mob. Platf. Des. Apps Soc. Commer.* **2017**, 264–287. [\[CrossRef\]](#)
22. Sun, J.; Chi, T. Key factors influencing the adoption of apparel mobile commerce: An empirical study of Chinese consumers. *J. Text. Inst.* **2017**, *109*, 785–797. [\[CrossRef\]](#)
23. Du, S.; Li, H. The Knowledge Mapping of Mobile Commerce Research: A Visual Analysis Based on I-Model. *Sustainability* **2019**, *11*, 1580. [\[CrossRef\]](#)
24. Lopez-Nicolas, C.; Molina-Castillo, F.-J.; Bouwman, H. An assessment of advanced mobile services acceptance: Contributions from TAM and diffusion theory models. *Inf. Manag.* **2008**, *45*, 359–364. [\[CrossRef\]](#)
25. Son, H.; Park, Y.; Kim, C.; Chou, J.-S. Toward an understanding of construction professionals' acceptance of mobile computing devices in South Korea: An extension of the technology acceptance model. *Autom. Constr.* **2012**, *28*, 82–90. [\[CrossRef\]](#)
26. Lu, J.; Yao, J.E.; Yu, C.-S. Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. *J. Strat. Inf. Syst.* **2005**, *14*, 245–268. [\[CrossRef\]](#)
27. Xia, M.; Zhang, Y.; Zhang, C. A TAM-based approach to explore the effect of online experience on destination image: A smartphone user's perspective. *J. Destin. Mark. Manag.* **2018**, *8*, 259–270. [\[CrossRef\]](#)

28. Singh, N.; Srivastava, S.; Sinha, N. Consumer preference and satisfaction of M-wallets: A study on North Indian consumers. *Int. J. Bank Mark.* **2017**, *35*, 944–965. [\[CrossRef\]](#)
29. McLean, G.; Al-Nabhani, K.; Wilson, A. Developing a Mobile Applications Customer Experience Model (MACE)- Implications for Retailers. *J. Bus. Res.* **2018**, *85*, 325–336. [\[CrossRef\]](#)
30. Ngubelanga, A.; Duffett, R. Modeling Mobile Commerce Applications' Antecedents of Customer Satisfaction among Millennials: An Extended TAM Perspective. *Sustainability* **2021**, *13*, 5973. [\[CrossRef\]](#)
31. Marinkovic, V.; Kalinic, Z. Antecedents of customer satisfaction in mobile commerce. *Online Inf. Rev.* **2017**, *41*, 138–154. [\[CrossRef\]](#)
32. Liu, Z.; Ben, S.; Zhang, R. Factors affecting consumers' mobile payment behavior: A meta-analysis. *Electron. Commer. Res.* **2019**, *19*, 575–601. [\[CrossRef\]](#)
33. Hasan, A.; Gupta, S.K. Exploring Tourists' Behavioural Intentions Towards Use of Select Mobile Wallets for Digital Payments. *Paradigm* **2020**, *24*, 177–194. [\[CrossRef\]](#)
34. Schmidhuber, L.; Maresch, D.; Ginner, M. Disruptive technologies and abundance in the service sector—Toward a refined technology acceptance model. *Technol. Forecast. Soc. Chang.* **2018**, *155*, 119328. [\[CrossRef\]](#)
35. Alalwan, A. Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse. *Int. J. Inf. Manag.* **2020**, *50*, 28–44. [\[CrossRef\]](#)
36. Singh, N.; Sinha, N.; Liebana-Cabanillas, F. Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence. *Int. J. Inf. Manag.* **2020**, *50*, 191–205. [\[CrossRef\]](#)
37. Vahdat, A.; Alizadeh, A.; Quach, S.; Hamelin, N. Would you like to shop via mobile app technology? The technology acceptance model, social factors and purchase intention. *Australas. Mark. J.* **2020**, *29*, 187–197. [\[CrossRef\]](#)
38. Holmes, A.; Byrne, A.; Rowley, J. Mobile shopping behaviour: Insights into attitudes, shopping process involvement and location. *Int. J. Retail. Distrib. Manag.* **2013**, *42*, 25–39. [\[CrossRef\]](#)
39. Kuo, T.; Tsai, G.Y.; Lu, I.Y.; Chang, J.S. Relationships among Service Quality, Customer Satisfaction, and Customer Loyalty: A Case Study on Mobile Shopping APPs. In Proceedings of the 17th Asia Pacific Industrial Engineering and Management System Conference, Taipei, Taiwan, 7–10 December 2016; pp. 7–10.
40. Kalinić, Z.; Marinković, V.; Djordjevic, A.; Liebana-Cabanillas, F. What drives customer satisfaction and word of mouth in mobile commerce services? A UTAUT2-based analytical approach. *J. Enterp. Inf. Manag.* **2019**, *33*, 71–94. [\[CrossRef\]](#)
41. Thakur, R. The moderating role of customer engagement experiences in customer satisfaction–loyalty relationship. *Eur. J. Mark.* **2019**, *53*, 1278–1310. [\[CrossRef\]](#)
42. Chung, K.C. Transaction Utility Perspective of Customer Satisfaction towards M-Commerce in Taiwan. In Proceedings of the 2019 5th International Conference on E-business and Mobile Commerce, Taichung, Taiwan, 22–24 May 2019; pp. 1–5. [\[CrossRef\]](#)
43. Marinao-Artigas, E.; Barajas-Portas, K. Precedents of the satisfaction of mobile shoppers. A cross-country analysis. *Electron. Commer. Res. Appl.* **2019**, *39*, 100919. [\[CrossRef\]](#)
44. Liébana-Cabanillas, F.; Marinković, V.; Kalinić, Z. A SEM-neural network approach for predicting antecedents of m-commerce acceptance. *Int. J. Inf. Manag.* **2017**, *37*, 14–24. [\[CrossRef\]](#)
45. Veerasamy, D.; Govender, J.P. E-Communication and Customer Satisfaction: A Case of the Mobile Telecommunications Industry in South Africa. *J. Econ. Behav. Stud.* **2017**, *9*, 189–200. [\[CrossRef\]](#)
46. Pipitwanichakarn, T.; Wongtada, N. Leveraging the technology acceptance model for mobile commerce adoption under distinct stages of adoption. *Asia Pac. J. Mark. Logist.* **2019**, *33*, 1415–1436. [\[CrossRef\]](#)
47. Lu, Y.; Yang, S.; Chau, P.Y.; Cao, Y. Dynamics between the trust transfer process and intention to use mobile payment services: A cross-environment perspective. *Inf. Manag.* **2011**, *48*, 393–403. [\[CrossRef\]](#)
48. Zhang, L.; Zhu, J.; Liu, Q. A meta-analysis of mobile commerce adoption and the moderating effect of culture. *Comput. Hum. Behav.* **2012**, *28*, 1902–1911. [\[CrossRef\]](#)
49. Müller, J.; Pommeranz, B.; Weisser, J.; Voigt, K.-I. Digital, Social Media, and Mobile Marketing in industrial buying: Still in need of customer segmentation? Empirical evidence from Poland and Germany. *Ind. Mark. Manag.* **2018**, *73*, 70–83. [\[CrossRef\]](#)
50. Shankar, V.; Venkatesh, A.; Hofacker, C.; Naik, P. Mobile Marketing in the Retailing Environment: Current Insights and Future Research Avenues. *J. Interact. Mark.* **2010**, *24*, 111–120. [\[CrossRef\]](#)
51. Benou, P.; Vassilakis, C.; Vrechopoulos, A. Context management for m-commerce applications: Determinants, methodology and the role of marketing. *Inf. Technol. Manag.* **2012**, *13*, 91–111. [\[CrossRef\]](#)
52. Liu, Q.; Diao, L.; Tu, G. The Application of Artificial Intelligence in Mobile Learning. In Proceedings of the 2010 International Conference on System Science, Engineering Design and Manufacturing Informatization, Yichang, China, 12–14 November 2010; Volume 1, pp. 80–83. [\[CrossRef\]](#)
53. Vieira, J.; Frade, R.; Ascenso, R.; Prates, I.; Martinho, F. Generation Z and Key-Factors on E-Commerce: A Study on the Portuguese Tourism Sector. *Adm. Sci.* **2020**, *10*, 103. [\[CrossRef\]](#)
54. Brown, B.; Kim, Y. Understanding Millennials Mobile Shopping Behaviors: An Implication for Insurance Industry. *J. Int. Manag. Stud.* **2017**, *12*, 71–82.
55. Newman, D.; Kramer, S.; Blanchard, O. Marketing to Millennials. Futurum Premium Report. Available online: https://futurumresearch.com/wp-content/uploads/woocommerce_uploads/2017/02/report_200117.pdf (accessed on 14 June 2021).
56. Trivedi, J.P.; Kumar, S. Determinants of Mobile Commerce Acceptance amongst Gen Y. *J. Mark. Manag.* **2014**, *2*, 145–163.

57. Silveira, P.D.; Galvão, S.; Amélia Marques, M.A. Comparing the In-Store Use of Smartphones between Shoppers of Generations X-Y-Z. 8th icCSBs The Annual International Conference on Cognitive—Social, and Behavioural Sciences. Available online: https://comum.rcaap.pt/bitstream/10400.26/30641/1/revised%20EpSBS%20_%20COMPARING%20GENERATIONS%20X-Y-Z%20USING%20SMARTPHONES%20IN%20RETAIL%20STORES.pdf (accessed on 9 June 2021).
58. Davis, F.D. A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results. Diss. Massachusetts Institute of Technology. Available online: <https://dspace.mit.edu/bitstream/handle/1721.1/15192/14927137-MIT.pdf?sequence=2&isAllowed=y> (accessed on 9 June 2021).
59. Davis, F.D.; Bagozzi, R.P.; Warshaw, P.R. User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Manag. Sci.* **1989**, *35*, 982–1003. [\[CrossRef\]](#)
60. Venkatesh, V.; Davis, F.D. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Manag. Sci.* **2000**, *46*, 186–204. [\[CrossRef\]](#)
61. Venkatesh, V.; Bala, H. Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decis. Sci.* **2008**, *39*, 273–315. [\[CrossRef\]](#)
62. Jaradat, M.; Al Mashaqba, A.M. Understanding the adoption and usage of mobile payment services by using TAM. *Int. J. Bus. Inf. Syst.* **2014**, *16*, 271. [\[CrossRef\]](#)
63. Bailey, A.A.; Pentina, I.; Mishra, A.S.; Ben Mimoun, M.S. Mobile payments adoption by US consumers: An extended TAM. *Int. J. Distrib. Manag.* **2017**, *45*, 626–640. [\[CrossRef\]](#)
64. Muñoz-Leiva, F.; Climent-Climent, S.; Liebana-Cabanillas, F. Determinants of intention to use the mobile banking apps: An extension of the classic TAM model. *Span. J. Mark.-ESIC* **2017**, *21*, 25–38. [\[CrossRef\]](#)
65. Chhonker, M.S.; Verma, D.; Kar, A.K. Review of Technology Adoption frameworks in Mobile Commerce. *Procedia. Comput. Sci.* **2017**, *122*, 888–895. [\[CrossRef\]](#)
66. Madan, K.; Yadav, R. Understanding and predicting antecedents of mobile shopping adoption. *Asia Pac. J. Mark. Logist.* **2018**, *30*, 139–162. [\[CrossRef\]](#)
67. Ghazali, E.M.; Mutum, D.S.; Chong, J.H.; Nguyen, B. Do consumers want mobile commerce? A closer look at M-shopping and technology adoption in Malaysia. *Asia Pac. J. Mark. Logist.* **2018**, *30*, 1064–1086. [\[CrossRef\]](#)
68. Natarajan, T.; Balasubramanian, S.A.; Kasilingam, D.L. The moderating role of device type and age of users on the intention to use mobile shopping applications. *Technol. Soc.* **2018**, *53*, 79–90. [\[CrossRef\]](#)
69. Chen, C.-C.; Tsai, J.-L. Determinants of behavioral intention to use the Personalized Location-based Mobile Tourism Application: An empirical study by integrating TAM with ISSM. *Future Gener. Comput. Syst.* **2019**, *96*, 628–638. [\[CrossRef\]](#)
70. Chi, T. Understanding Chinese consumer adoption of apparel mobile commerce: An extended TAM approach. *J. Retail. Consum. Serv.* **2018**, *44*, 274–284. [\[CrossRef\]](#)
71. Kamdjoug, J.R.K.; Wamba-Taguimdje, S.-L.; Wamba, S.F.; Kake, I.B. Determining factors and impacts of the intention to adopt mobile banking app in Cameroon: Case of SARA by afriland First Bank. *J. Retail. Consum. Serv.* **2021**, *61*, 102509. [\[CrossRef\]](#)
72. Cabrera-Sánchez, J.P.; Ramos-de-Luna, I.; Carvajal-Trujillo, E.; Villarejo-Ramos, Á.F. Online Recommendation Systems: Factors Influencing Use in E-Commerce. *Sustainability* **2020**, *12*, 8888. [\[CrossRef\]](#)
73. Tsourela, M.; Nerantzaki, D.-M. An Internet of Things (IoT) Acceptance Model. Assessing Consumer’s Behavior toward IoT Products and Applications. *Future Internet* **2020**, *12*, 191. [\[CrossRef\]](#)
74. Chauhan, S.; Mittal, M.; Woźniak, M.; Gupta, S.; de Prado, R.P. A Technology Acceptance Model-Based Analytics for Online Mobile Games Using Machine Learning Techniques. *Symmetry* **2021**, *13*, 1545. [\[CrossRef\]](#)
75. Do, H.-N.; Shih, W.; Ha, Q.-A. Effects of mobile augmented reality apps on impulse buying behavior: An investigation in the tourism field. *Heliyon* **2020**, *6*, e04667. [\[CrossRef\]](#) [\[PubMed\]](#)
76. Humbani, M.; Wiese, M. An integrated framework for the adoption and continuance intention to use mobile payment apps. *Int. J. Bank Mark.* **2019**, *37*, 646–664. [\[CrossRef\]](#)
77. Shang, D.; Wu, W. Understanding mobile shopping consumers’ continuance intention. *Ind. Manag. Data Syst.* **2017**, *117*, 213–227. [\[CrossRef\]](#)
78. Francis, T.; Hoefel, F. ‘True Gen’: Generation Z and Its Implications for Companies. Available online: <https://www.mckinsey.com/~media/McKinsey/Industries/Consumer%20Packaged%20Goods/Our%20Insights/True%20Gen%20Generation%20Z%20and%20its%20implications%20for%20companies/Generation-Z-and-its-implication-for-companies.pdf> (accessed on 10 October 2020).
79. Bollen, K.A.; Noble, M.D. Structural equation models and the quantification of behavior. *Proc. Natl. Acad. Sci. USA* **2011**, *108*, 15639–15646. [\[CrossRef\]](#)
80. Hew, T.-S.; Leong, L.-Y.; Ooi, K.-B.; Chong, A.Y.-L. Predicting Drivers of Mobile Entertainment Adoption: A Two-Stage SEM-Artificial-Neural-Network Analysis. *J. Comput. Inf. Syst.* **2016**, *56*, 352–370. [\[CrossRef\]](#)
81. Hu, L.-T.; Bentler, P.M. Fit Indices in Covariance Structure Modeling: Sensitivity to Underparameterized Model Misspecification. *Psych. Meth.* **1998**, *3*, 424–453. [\[CrossRef\]](#)
82. Lohmöller, J.-B. *Latent Variable Path Modeling with Partial Least Squares*; Physica: Heidelberg, Germany, 1989.
83. Hair, J.F.; Hult, G.T.M.; Ringle, C.M.; Sarstedt, M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed.; Sage: Thousand Oaks, CA, USA, 2017.

-
84. Hair, J.; Hollingsworth, C.L.; Randolph, A.B.; Chong, A.Y.L. An updated and expanded assessment of PLS-SEM in information systems research. *Ind. Manag. Data Syst.* **2017**, *117*, 442–458. [[CrossRef](#)]
 85. Alaimo, L.; Fiore, M.; Galati, A. How the COVID-19 Pandemic Is Changing Online Food Shopping Human Behaviour in Italy. *Sustainability* **2020**, *12*, 9594. [[CrossRef](#)]
 86. Thongpapanl, N.; Ashraf, A.R.; Lapa, L. The Potential Benefits of Offering Suitable Mobile Commerce Experience to Your Customers: An Abstract. In Proceedings of the Academy of Marketing Science Annual Conference, Coronado, CA, USA, 24–26 May 2017; Springer: Cham, Switzerland; p. 719. [[CrossRef](#)]
 87. Gbongli, K.; Xu, Y.; Amedjonekou, K.M. Extended Technology Acceptance Model to Predict Mobile-Based Money Acceptance and Sustainability: A Multi-Analytical Structural Equation Modeling and Neural Network Approach. *Sustainability* **2019**, *11*, 3639. [[CrossRef](#)]
 88. Liébana-Cabanillas, F.; Martínez-Fiestas, M.; Rejón-Guardia, F.; Muñoz-Leiva, F. Gender as a Moderating Element of Customer Satisfaction with Electronic Banking? An Empirical Study. *Int. J. Manag. Sci. Inf. Tech.* **2012**, *5*, 1–34.
 89. Dai, H.; Singh, R.; Iyer, L. Intention to Use Mobile Commerce: A Demographic Analysis of the Chinese Market. AMCIS 2007 Proceedings 2007, 263. Available online: <http://aisel.aisnet.org/amcis2007/263> (accessed on 15 July 2021).
 90. Kim, J.; Ma, Y.J.; Park, J. Are US consumers ready to adopt mobile technology for fashion goods? *J. Fash. Mark. Manag. Int. J.* **2009**, *13*, 215–230. [[CrossRef](#)]