Article

An Analysis of the Impact of Personality Traits towards Augmented Reality in Online Shopping

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Abstract: The Internet as a shopping and purchasing medium has become an extensively researched topic. Augmented realty, in particular, allows consumers to explore their options and make personalised changes while shopping online. Our study aims to analyse the symmetry between the attitudes towards using the traditional electronic online shopping and the electronic commerce that uses augmented reality. We also investigate the effects of personality traits and the attitudes towards the Internet on the two electronic commerce forms. Our results show that the buying intention in online shopping is significantly higher in the case of augmented reality. Our results also reveal associations between personality traits and online buying behaviours, i.e., neuroticism and the openness to experiences being associated with the willingness to buy online. On the other hand, personality traits are proved to predict buying impulsiveness, the highest weight being represented by low emotional stability and high external locus of control. Further research should also include other dimensions, such as the perceived risks associated with online purchasing, self-efficacy or anxiety towards technology.

Keywords: augmented reality; symmetry; online shopping; buying intention

1. Introduction

Today buyers do not always simply go to the nearest store to purchase certain products, but use the digital devices they have at hand. Because of this, the ecosystem of online retail is evolving rapidly, as revealed by recent studies [1,2]. The worldwide retail e-commerce sales amounted in 2019 to 3.53 trillion US dollars and revenues are projected to grow to 6.54 trillion US dollars in 2022.

Besides buying habits, the whole retail experience changes. Today's consumers use digital technology throughout the buying process, starting from finding online opinions about the products they want to buy and continuing with using smartphones as personal shopping assistants in physical stores [3].

Adapting the technology for specific purposes and improving infrastructure for bringing more services online provide familiarity and comfort for the users [1,4,5]. However, today there is much uncertainty about the convergence between online and off-line buyer behaviour and how this can increase profitability in both online and offline environments. This is reflected especially in e-commerce, which is still largely a national business [6], where retailers primarily address customers in their own country. However, buyers are increasingly looking for products outside their country, with a recent study [1] showing that more than half of the online respondents who had purchased online in the previous six months had also bought from a foreign retailer.

However, whether it is about shopping abroad or in one's own country, a great challenge arises along with the huge opportunity offered by the online purchasing of goods. With more options available than ever for consumers, the shopping experience is a key differentiator. Optimising this experience begins with a deep understanding with respect

to the local market (including local perceptions), the delivery infrastructure, the adoption and use of technology, the financial and monetary systems, and regulatory and customs requirements. In addition, retailers must ensure that products meet quality standards, that prices are reasonably set, that the logistics systems are efficient, and the after-sales services offered are optimised for both customer and seller [6].

There is not much information in the literature about the symmetries between the types of electronic commerce (traditional and using augmented reality technology) and between electronic and physical commerce. We believe that the analysis of these symmetries can lead to changes and implicitly to influence the online buying decision.

To show that the buying intention in online shopping was significantly higher in the case of the augmented reality, and also considering the impact of personality traits, we used structural equation modelling (SEM) and partial least squares (PLS) to analyse data using SmartPLS 3.0 [7]. The hypotheses were tested with bootstrapping of 5000 resamples. To analyse the mediation effects, the recommendation of bootstrapping in [8] was used, and interpretation of the results was carried out using these guidelines.

In the context of ongoing major changes with regard to both online consumer behaviour and the technologies that help consumers reach the desired products, on the one hand, and companies provide the required products, while on the other hand, and considering that the role of social sciences and especially psychology in electronic commerce is a fact beyond doubt, our research makes a significant contribution in the field by conducting a study focusing on the online customers' perception towards using augmented reality (AR) technologies as compared to traditional/standard electronic commerce [5]. Studying the role of personality traits leads to important information about users that could influence their online buying behaviour, but also aspects regarding how the users perceive the applications used for online shopping, with user experience and system usability being important determinants of buying decision [6].

In this context, the paper is organised as follows: the next section provides a literature review, taking into account augmented reality in online commerce, buying intention and buying behaviour, and personality antecedents regarding online buying behaviour. Based on the literature review, we develop a research model (Section 2.4. Model Development), followed by a section describing the methodology applied in gathering data and its analysis using SmartPLS. The Results section describes how we predicted attitudes towards online shopping and buying intention, and this is followed by a Discussion section, where we cover theoretical and practical implications, together with the limitations of the study.

2. Development of Theory and Research Propositions

2.1. Augmented Reality in Online Commerce

Given the progress in IT technologies over the last two decades, e-commerce has become very important in a company's relationships with customers and in its marketing strategies. In the study of the technologies underlying e-commerce, there is also an increasing need for models based on consumer behaviour in the online environment.

Many studies have shown that, for retailers, the long-term key to success is based on online consumer confidence. The risks associated with online products and retailers significantly determine consumer confidence [6], while customers are easily influenced by innovations from online shopping sites [9]. For this reason, we believe the use of innovative technologies such as Augmented Reality (AR) and virtual reality (VR) in electronic commerce can increase online sales, being also influenced by lower prices and the increased quality of needed devices of AR/VR.

With the increasing number of smart devices and of the number of people with access to the Internet, the use of AR also increases. For this reason, the need arises to better understand its impact on consumer behaviour [10]. AR, as a new marketing and sales tool, allows a more engaging viewing experience and the ability to create more interactive advertising, while permitting consumers to experience products and places in new ways [11].

The most relevant media characteristics of augmented reality are [12]: interactivity, virtuality, geolocation, mobility, synchronisation of virtual and physical/real elements (augmentation). With regard to AR interactivity, it comes as a complement to the currently used web technologies, bringing consumers more information. Virtuality is less present in AR applications, causing an absence of responses that are associated with interactive social engagement [11]. Geolocation is typical for AR, providing personalised or convenient customer service. Research shows that this translates into a greater desire for future use and positive attitude, as it was the case with mobile technology [10]. AR technologies are often used on smart devices and large interactive screens in retail. AR applications used on smart devices allow customers to see products located in the virtual environment (such as virtual furniture in a physical room) [10]. Mobility, in terms of portability and wearability, means that the user is not encouraged to walk around. Instead, the user navigates through the environment. Whatever the technology, the result is that the user stays in one place in the real world [13]. This technology is also related to the synchronisation of the virtual and the physical, creating complete experiences that direct attention to real-world classical creative activities, while offering engaging and exciting digital enhancements.

A research of the Point-of-Purchase Advertising Institute reveals that 70% of the buying decisions are made in the store [14–16]. Consequently, a modern e-commerce shop must trigger impulse buying decisions. Augmented reality based on interactivity, virtuality, mobility and synchronisation use both virtual and physical elements [16] and these could trigger the impulse buying decision [12].

Before creating an AR system, marketers formulate their campaign objectives by defining the target audience and communication objectives. Based on this information, it will be decided how AR is triggered and how it is completed with content. Then, marketers determine the ways in which technology is integrated with the social/physical world. To optimize the marketing campaign, it is important to understand and address the dynamics between the various active and passive AR components in order to maximize consumer participation and create immersive experiences. [11]. Thus, the central element of a marketing campaign around the AR is the engagement of consumers and the dimensions it drives, like affordance, sociability, and artefacts [12].

2.2. From Online Buying Intention to Online Buying Behaviour

What motivates consumers to buy consumer goods on-line? The short answer is that it depends. For consumer goods, the most important is that there is no single factor for success. Consumers buy from online stores for a variety of reasons [17–19]: convenience (saving time and effort shopping), wide range of products (they can access more options than those available locally), decisions based on good information (getting information and reviews helps in making the best choice), finding the best price, and specific characteristics such as managing online shopping lists and shopping carts.

Successful online retailers use a combination of tools such as discounts, bonuses, loyalty cards, special offers to keep shoppers happy, so that they should come back. The most important fact is that traders need to understand user behaviour and what makes the user go into a particular online shop, or which fact turns a simple user into a buyer and, eventually, a supporter of the respective online store brand [20].

Often, the variable online purchase intention has been selected as the basis of purchasing behavior study, various studies showing that user intention is the main predictor of any behavior, being considered the key predictor of actual user behavior [21]. Intentions replace at the pre-purchase stage. Also, intentions affect the motivational aspects influencing the customer behavior [22]. In order to predict consumer behavior, research show that it is important to analyze the attitudes, assessments, and internal factors that generate the intention of purchase [23]. In addition to the psychological aspects mentioned above, there are also technical aspects related to, for example, the usability of the e-commerce site or the user experience, with research showing that, for example, users leave a site if the site does not load in 3 s, or that a 1 s delay means a decrease in user satisfaction of 16% [24].

Nevertheless, usability is the second level in user experience, coming after utility, and before desirability and brand experience [25], but all affecting user behaviour with respect to buying intention. This is also supported by [26], who defined an internet-based model that takes into account the influence of external factors regarding the website and sociocultural environment or psychological elements of consumer behaviour while purchasing online [27].

Since the beginning of electronic commerce, information systems and market researchers have sought the basics applicable in this environment. Starting from the first studies [28,29], research in e-commerce has continued mainly with reference to specific retail issues [30,31], hedonic and utilitarian motivations [32], and consumer habits and values [33]. Among the recent studies on consumer behaviour online, we mention those conducted by [34], who suggested that the use of gamification in the online retail sales process could help by generating a deeper level of consumer engagement and by repositioning the shopping cognitive experience as a form of entertainment.

Ref. [34] focused on the time spent by the new online shoppers in online groceries. They concluded that online shoppers do not behave differently from those offline in terms of the time and effort spent. Online shoppers in grocery stores, at least, seemed to reflect primarily a desire for efficiency in terms of the time spent. They concluded that online shopping seems very similar to shopping in traditional stores.

Ref. [35] tried to characterise, model and predict the purchasing behaviour based on data extracted from emails, combined with consumer demographic information. They analysed consumer behaviour in different age and sex groups, finding interesting patterns that can be used to improve ad targeting systems [36]. For example, they show that the amount of money spent on online increases sharply with age, reaching a peak in individuals 30 years old, while rich buyers tend to purchase more expensive items and buy them more often. They also found weekly and daily behaviour based on behavioural patterns that are influenced by social connections, as well as by temporal dynamics. Ref. [37] showed how individuals determine to spend their available resources (time, money or effort) for consumer things. They attempted to identify important clues for purchasing decisions and explained various models of purchasing decisions from the marketing and consumer psychology literature: how consumers think, what they feel, what are the reasons for their decisions, how they are influenced by the environment, by one's behaviour, by the skills or knowledge of information processing etc.

Other models of consumer purchasing decision regard different orientations and perspectives by means of the way consumers approach the market and why they behave as they do. Over time, various models were proposed, emphasizing the consume purchasing decision for different types of products or services, researchers trying to identify the direction of scheduled or unscheduled purchasing decisions.

Among the essential research models based on [37] and [38], we find the following: The Marketing Spiral model (2007), which assumes that consumer behaviour is similar to a spiral that starts with an interaction opposite to communication. The spiral is amplified as the consumer engagement increases [39]; McKinsey's dynamic model of the consumer decision journey (2009) is more circular than sequentially, with four primary phases: initial consideration, active evaluation, the search for potential goods and the post-shopping phase [40]; and the FFF model (2012) describes the factors that affect and motivate online services, representing a combination of internal and external factors. External factors are beyond consumer control, while internal factors are elements of individual psychological and behavioural traits. After the first step, the client faces some obstacles, named filtering components (security, privacy, trust), based on which the refined buying motives evolve. Then the customer proceeds through the online purchase process [41]

Related to AR, a study by [12] showed that an integrated AR system received higher scores after the application of the subjective questionnaires regarding system usability and user experience, compared with traditional e-commerce sites. Therefore, an AR-based

online shopping system helps customers increase their efficiency and satisfaction when shopping online. Thus, we propose the following research propositions:

RP 1. Attitudes towards online shopping have an impact on online buying intention.

RP1a. System usability and user experience have positive direct effects on attitudes towards online shopping.

RP1b. Attitudes towards online shopping, system usability and user experience have positive direct effects on buying intentions.

2.3. Personality Antecedents of Online Buying Behaviour

Personality traits as determinants or antecedents of buying behaviour have lately become an important topic of research. The Big Five model of personality seems to be the most used model, offering a subset of elemental traits efficient in predicting buying behaviours [42]. Ref. [43] defined the Big Five personality traits as follows: neuroticism refers to the tendency to experience unpleasant emotions easily; extraversion refers to the degree of sociability, activity, assertiveness, and positive emotionality that a person experiences; openness to experience refers to the willingness to engage in new imaginative and intellectual activities, pursuing a variety of interests; high openness reflects higher levels of creativity and preference for novelty; agreeableness is the tendency to be compassionate and cooperative, complying with rules established by others; conscientiousness is the intensity with which a person pursues his goals, showing self-discipline and acting dutifully.Research showed that there are significant positive relationships between online shopping frequency and openness to experience [44], agreeableness [45], extraversion [45] or negative associations for the neuroticism [44]. More specifically, conscientiousness was associated with the possibility of buying cheap products [46]. On the other hand, the associations with conscientiousness were not be significant, because more conscientious individuals tend to avoid online buying in order to avoid risks [47]. The negative association with neuroticism is explained by the tendency of neurotic individuals to evaluate whether the purchase will attract the attention of others, and by the tendency to be more motivated by the utility of the online buying experience. With regard to extraversion, openness to experience and agreeableness, researchers agreed that high levels of these traits would lead to a higher frequency of online buying behaviour or to a more favourable attitude towards online buying [45].

Personality traits were also associated with impulsive buying behaviour, with conscientiousness having negative effects and neuroticism positive effects on excessive buying [48]. The impulsive buying tendency represents a consumer trait explaining behaviours such as buying spontaneously and unreflectively [49]. Online buying impulsiveness was considered a situational trait, impulsive people being emotionally attracted to objects, seeking immediate gratification in the online environment and having difficulties in handling the pressure of inhibiting factors [49]. Improvements in information technologies have led to a higher frequency of online shopping activities, which could explain the expansion of impulsive buying behaviours, as website quality is very important for consumers' online buying impulsiveness [50,51].

The locus of control is another personality dimension associated with buying behaviours. The locus of control is the degree to which people believe that they have control over the outcome of events in their lives, as opposed to external forces beyond their control. The consumers' need for control positively influences their purchase decision making [52]. The locus of control could influence the consumer's purchase intentions, with more internal consumers being more organised and purposive in the act of shopping [53–55]. Based on the above, we propose the following research propositions:

RP2. Personality traits affects online shopping for each of the two electronic commerce forms.

RP2a. Extraversion and openness have positive effects on both buying intention and attitudes towards online shopping.

RP2b. Neuroticism has negative effects on both buying intention and attitudes towards online shopping.

RP2c. Internal locus of control has negative effects, while external locus of control has positive effects on both buying intention and attitudes towards online shopping.

RP2d. Buying impulsiveness has positive effects on buying intention.

RP2e. Attitudes towards online shopping mediate the effects of personality traits (extraversion, neuroticism, openness, and locus of control) on buying impulsiveness.

All the hypothesised effects on both attitudes and buying intentions were analysed for two contexts—traditional electronic online shopping, and using electronic commerce that uses augmented reality—aiming to identify the symmetry between them.

2.4. Model Development

To test the effects of personality traits on attitudes and buying intention, we used the mediation analysis, in both cases: traditional and augmented reality (Figure 1) [56]. The exogenous variables were the Big Five personality traits, and the internal and external locus of control. Buying impulsiveness was also included both as predictor and mediator between the Big Five personality traits and shopping behaviour. The Big Five personality traits and the locus of control were considered as elemental traits, whereas buying impulsiveness was considered a surface trait [42]. As a surface trait, according to the Category-Specific surface traits theory, buying impulsiveness occurs as a result of person, situation and product category interactions and could be highly predictive of attitudes and buying intention.
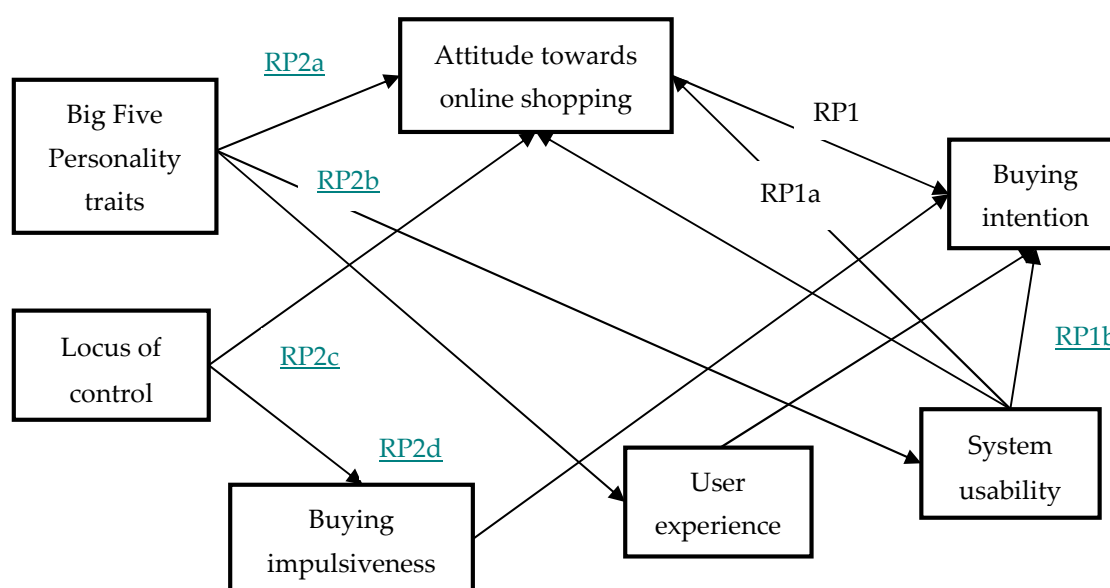

Figure 1. Model development.

Attitudes towards online shopping were also considered as mediators in the relationship between personality traits and the buying intention. System usability and user experience were also considered mediators between extraversion and buying intention and also predictors for the attitude towards the online shopping.

3. Methodology

3.1. Research Instruments

A cross-sectional correlation research design combined with a quasi-exprimental design was used for this study. Based on this, we prepared the following set of instruments:

(1) Personality traits were measured with the International Personality Item Pool scales IPIP, which consist of 50 items measuring the Big Five personality factors: extraversion,

agreeableness, conscientiousness, neuroticism and openness to experience on a 5-point Likert scale from 1 (very inaccurate) to 5 (very accurate).

(2)　Locus of control was assessed with The Levenson Multidimensional Locus of Control Scale [57], consisting of 24 items distinguishing between multiple dimensions within the external and the internal side of the Locus of Control continuum. The Levenson scale consists in three subscales, internal locus of control, powerful others and chance. Thus, the scale can differentiate between three factors: Internality, Powerful others and Chance. Powerful others and the Chance represent Externality.

(3)　The purchase intention was measured through the buying intention scale [58]. The three items (I would purchase the item, I would consider buying the item at the price listed, the probability that I would consider buying is high) were measured on a 5-point Likert scale.

(4)　Buying impulsiveness was measured with the Buying Impulsiveness Scale [49]. The nine-item scale can measure the tendency of consumers to buy spontaneously, without analysis, but only stimulated by physical proximity to the desired product, based on emotional attraction and obtaining instant satisfaction.

(5)　To examine the level of attitudes towards online shopping activities, the Attitude towards Online Shopping Activities Scale [59] was used, including items such as: Online shopping is a good idea, it is easy to choose and make a comparison with other products while shopping online, the idea of using the Internet to buy a product or service is appealing. A 5-point Likert-type scale score 1 (strongly disagree) to 5 (strongly agree) was used for all the questions.

(6)　The System Usability Scale [60,61] consists of 10 items measured on a five-point Likert scale and evaluates a wide range of products or services, including: websites, mobile devices, hardware, software or applications. For our research, we used SUS for the evaluation of both the electronic traditional commerce and the augmented reality system. Previous research has shown that the scale can be either unidimensional or bi-dimensional, measuring two factors, usability (eight items) and learnability (two items) [62,63]. However, the exploratory factor analysis run on our sample did not reveal a two-dimensional version: a single latent factor was found for all items, and therefore we used only the total score.

(7)　The user experience was assessed with The User Experience Questionnaire (UEQ) [64], consisting of 26 items measured on a semantic differential seven-stage scale, the items being represented by two terms with opposite meanings. For each item, the order of the terms is random, half of the articles on a scale start with a positive term and the other half of the articles start with a negative term. The user experience questionnaire measures six dimensions: attractiveness, referring to the general impression towards the product (Do users like or dislike the product?), efficiency, referring to the possibility to use the product fast and efficiently (Does the user interface look organised?), perspicuity, measuring the facility to understand how to use the product (Is it easy to get familiar with the product?), dependability, referring to the feeling of being in control of the interaction (Is the interaction with the product secure and predictable?), stimulation, measuring interest and excitement to use the product (Does the user feel motivated to further use the product?) and novelty, referring to the innovation and creativity of the product (Does the product grab user's attention?). We used UEQ for the evaluation of the electronic traditional commerce and the augmented reality system.

3.2. Participants, Design and Procedure

The participants were 121 students, 85% female. The mean age was 23 (SD = 5.6, Xmin = 18, Xmax = 48). The participation was voluntary, and all the participants included in the study gave their informed consent.

Ethics approval was also obtained on February 8, 2019 from the Council of the Faculty of Psychology and Educational Sciences from Transilvania University of Brasov, Romania.

For this study, the quasi-experimental design was based on the Zugara application [65,66]. We chose a browser-based instrument for the AR dressing room because of its ease of use and that there were no associated costs for its use. This tool allowed our participants to visualise virtual garments on themselves in our simulated environment, at the same time allowing users to use hand motions to navigate the software via a motion capturing system while away from their computers.

The questionnaires were administered during class time. Informed consent was obtained from all individual participants included in the study. The questionnaires and the intervention were administered in the following order:

1. The students were invited to take part in an online survey and those who agreed received an online invitation via e-mail to fill in several questionnaires measuring personality aspects (measured only once, because personality traits are relatively stable), locus of control, Big Five personality traits and buying impulsiveness. These were administered before the intervention.

2. Several indicators of the buying behaviour were administered twice, before and after the intervention: intention to buy online, attitude towards online shopping, perceived difficulty of online shopping and attitude towards online shopping using a semantic differential scale (administered in two different contexts: regular online shopping, augmented reality).

3. The intervention consisted of a presentation followed by a demonstration of using augmented reality. The participants had the opportunity to test the augmented reality system created by Zugara using a laptop and a webcam.

4. After testing the application, the participants were administered a second set of questionnaires measuring buying intention and attitude towards online shopping.

5. The third set of questionnaires focused on the perceived difficulty of online shopping and on the semantic differential scale, administered twice: firstly, in the context of the regular online shopping ("Think of regular electronic commerce and answer the following questions") and secondly in the context of the augmented reality ("Think of electronic commerce that uses augmented reality and answer the following questions").

Zugara is an interactive marketing agency that aims toward creating more natural computer interactions. The e-commerce application developed by Zugara uses gestures, voice and AR technology to create compelling sales, being identified as the most important commercial virtual fitting room.

The application allows the use of AR technology by any potential customer, largely simulating the testing of clothes in the traditional store. The application uses a static image for clothes to try on top of the body superimposed on the real image provided by the customer's webcam [67–69]. Unlike other similar applications (e.g., De Beers or Shisedio Makeup Mirror), where it is necessary to upload a static image representing the customer, this application uses the webcam to detect human configuration and position, adjusting the superimposed clothing accordingly. In addition, the application control does not require the keyboard or the mouse, the control being ensured through buttons that can be touched by the movements of hands.

Because clothes are really just an overlay on top of the body, without any attention paid to the client's clothing measurements, the application provides only approximate, general information, and not very personal ones. However, the application can be used for checking the combination of clothes, colours and patterns that look good together, as it can be hard to match them only in the imagination. Zugara also uses a social component, allowing friends to connect and help with the selection in real time.

This application allows very easy testing without the need for installation and integration in an electronic store. Testing can be done very easily online, requiring only a web browser and a webcam. Through its simplicity of use, it allowed us to exemplify the functioning of our study group. In conclusion, we chose this application because it was representative and easy to use (see Scheme 1).
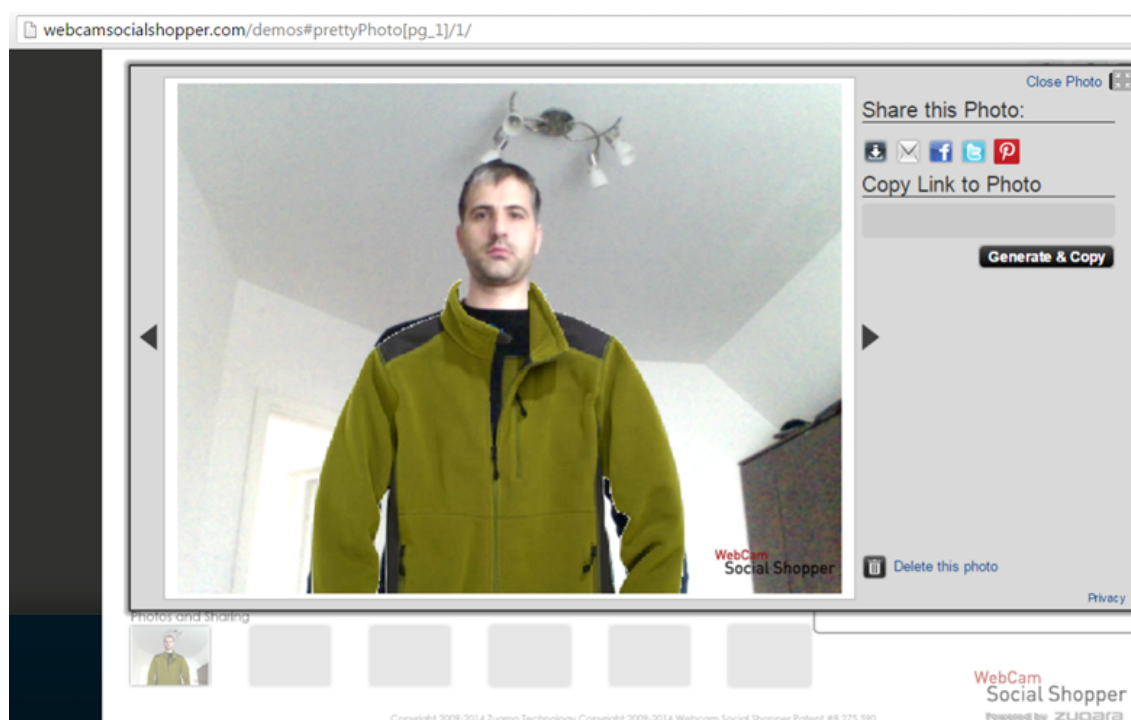
Scheme 1. Testing Zugara.

3.3. Statistical Methods

The present study employed structural equation modelling (SEM) and partial least squares (PLS) to analyse the data using SmartPLS 3.0 [7]. The hypotheses were tested with bootstrapping of 5000 resamples. To analyse the mediation effects, we used the recommendation of bootstrapping found in [70,71], and interpretation of the results was carried out using the guidelines recommended by [8,72,73]. The analysis of VIF values (the variance inflation factor) for the assessment of multicollinearity showed VIF values lower than 4, suggesting that collinearity is not an issue. All the dimensions were considered reflective. Conscientiousness and agreeableness were eliminated from the models given their non-significant effects for both models and for all the predicted variables. Independent t tests were also used to compare several variables related to the online shopping attitudes and behaviours.

3.4. Validity of the Measurement Model

The model specified in this study has ten constructs with reflective measurements. The path model was estimated using Smart-PLS 3.0. Table 1 shows the assessment of the measurement model. The composite reliability for each construct was 0.506 and above and showed satisfactory levels of internal consistency and composite reliability. In assessing convergent validity at the construct level, the average variance extracted for all the constructs were between 0.339 and 0.838, and composite reliability lower than 0.95 satisfying the requirement for convergent validity. The values of indicator loadings were all above 0.62, demonstrating adequate convergent validity for the constructs measured.

Table 1. Assessment of the measurement model.

	Regular Online Shopping			Augmented Reality Shopping		
	α	CR	AVE	α	CR	AVE
Attitude towards online shopping	0.943	0.954	0.722	0.929	0.943	0.676
Buying impulsiveness	0.852	0.888	0.534	0.852	0.888	0.534
Buying intention	0.785	0.875	0.700	0.903	0.940	0.838
Extraversion	0.858	0.882	0.458	0.858	0.884	0.462
External locus of control	0.609	0.714	0.348	0.609	0.701	0.339
Internal locus of control	0.644	0.763	0.450	0.644	0.738	0.423
Neuroticism	0.866	0.892	0.480	0.866	0.893	0.483
Openness	0.777	0.842	0.475	0.777	0.842	0.475
System usability	0.703	0.804	0.456	0.850	0.883	0.561
User experience	0.933	0.947	0.748	0.962	0.970	0.821
Dependability	0.890	0.615	0.526	0.891	0.610	0.570
Novelty	0.788	0.652	0.580	0.778	0.856	0.750
Perspicuity	0.831	0.506	0.524	0.810	0.510	0.689
Stimulation	0.690	0.702	0.601	0.702	0.701	0.662
Attractiveness	0.742	0.635	0.624	0.753	0.623	0.593

Note: α = Cronbach's alpha, CR = composite reliability, AVE = average variance extracted.

For all the scales, Cronbach's alpha coefficients were acceptable, ranging between 0.609 and 0.943 (Table 1). All previous research regarding the locus of control scale show good values for Cronbach' alpha values for scale [74], showing that the instrument has a high internal consistency. Consequently, we decided to continue using the instrument, provided that the relatively small number of participants could explain the lower values for our sample.

Concerning the model fit, we obtained the following values (Table 2):

Table 2. Model fit indices.

	Regular Commerce		AR Commerce	
	Value	HI95	Value	HI95
SRMR	0.093	0.081	0.095	0.081
d_ULS	17.067	12.923	18.909	13.621
d_G	6.33	11.772	14.905	15.342

SRMR = Standardised Root Mean Square Residual; d_ULS = Squared Euclidean distance; d_G = Geodesic distance.

These values should be interpreted with caution, as stated by the authors of SMART PLS. According to them, these criteria should not usually be reported and used for PLS-SEM results assessment [75]. Although the SRMR values are higher than 0.08, as previous research has stated, there is little evidence as to whether this threshold also applies to PLS (partial least square) [8]. Additionally, according to [76], we may conclude that the model fits because the test for the overall model fit is preferred (d_G in our case), since it is based on inference and non heuristic rules.

4. Results—Prediction of Attitudes towards Online Shopping and Buying Intention

To test the hypothesis, we ran several multiple mediation analyses, using the Big Five personality as antecedents, buying impulsiveness, attitudes towards online shopping, user experience and system usability as mediators, and buying intention as the predicted variable. The total variance explained was 59% for buying intention, 26% for attitudes towards online shopping, 18% for buying impulsiveness, 14% for system usability and 11% for user experience in the augmented reality shopping condition. The total variance explained was 51% for buying intention, 25% for attitudes towards online shopping, 19%

for buying impulsiveness, 8% for system usability and 12% for user experience in the regular online shopping condition.

The mediation analysis showed symmetry for the two conditions—regular online shopping, and Augmented Reality shopping—although the discrepancies were not high (Table 3—see Table S1 in Supplementary Materials for complete data). For the direct effects, the results showed that personality traits do not have significant direct effects on buying intention. The only difference was found for neuroticism, which had a negative effect on buying intention in the augmented reality condition, while buying impulsiveness had a direct positive effect on buying intention in the regular online shopping condition. Probably the lack of interaction with the clothing items explains the higher tendency to buy online when buying impulsiveness is higher. On the other hand, low neuroticism could explain the lower propensity to buy online when augmented reality is used. Favourable perspectives on user experience showed significant direct effects on buying intention in both conditions. Openness had a direct positive effect on the attitudes towards online shopping, with the more extraverted individuals showing more favourable attitudes toward online shopping, while extraversion had positive effects on system usability and user experience. Individuals with higher external locus of control had also more favourable attitudes toward the online shopping and were more prone to buying impulsiveness. Higher tendencies for buying impulsiveness were also found for individuals with high levels of neuroticism. Extraversion had direct positive effects on system usability, with more extracted individuals having a more favourable perception of the use of online or augmented reality shopping systems, as seen in Figure 2.
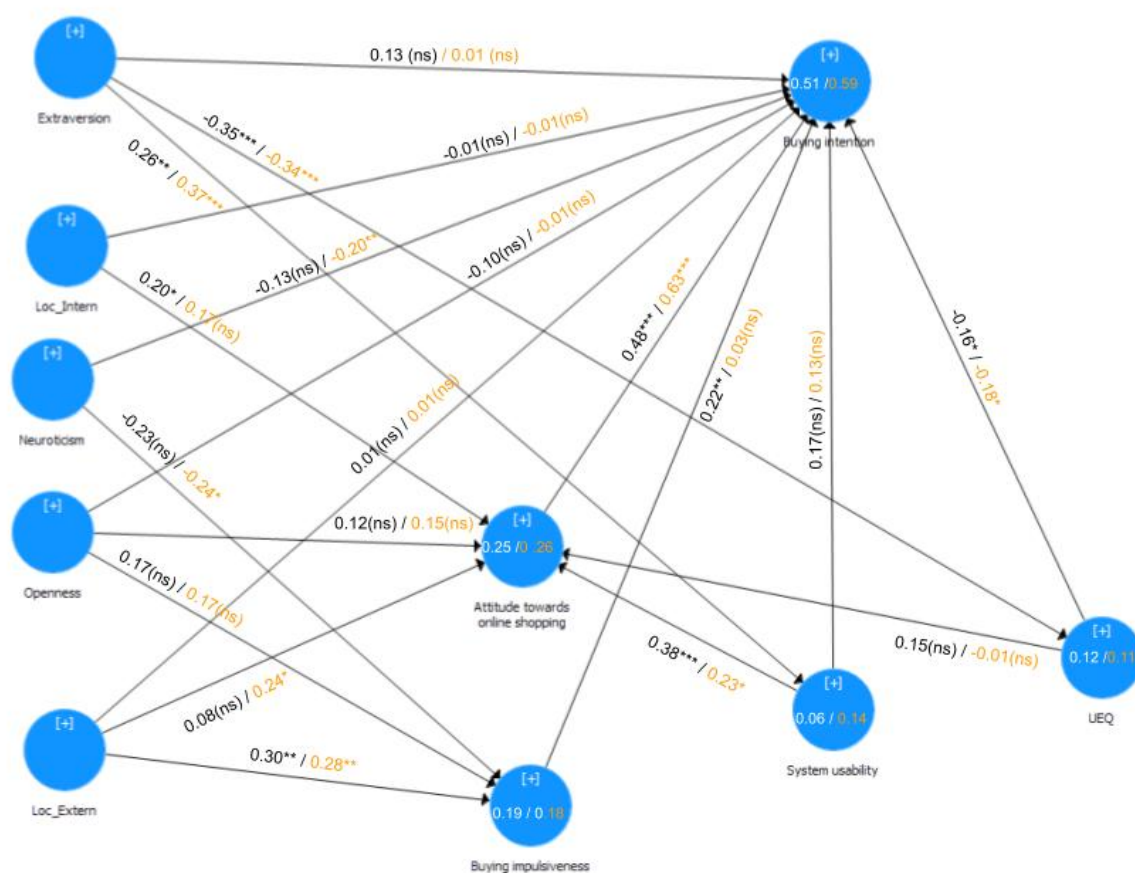

Figure 2. Results of the structural model. Note: * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001, Orange colour: Augmented reality, Black: Regular online shopping.

Table 3. Direct, indirect and total effects for the two conditions: regular online shopping and augmented reality.

Path	Regular Online			Augmented Reality			Effect
	Coeff.	*t*	*p*	*Coeff.*	*t*	*p*	**Effect**
Effects on Buying intention							
Neuroticism → Buying intention	−0.132	10.479	0.140	−0.205	20.672	0.008	Direct
Buying impulsiveness → Buying intention	0.221	20.731	0.007	0.030	0.409	0.682	Direct
Attitude TOS → Buying intention	0.487	50.532	<0.001	0.631	70.963	<0.001	Direct
User experience → Buying intention	−0.161	10.972	0.050	−0.188	20.130	0.034	Direct
External locus → Attitude TOS → Buying intention	0.043	0.663	0.508	0.157	20.085	0.038	Indirect
Internal locus → Attitude TOS → Buying intention	0.097	10.910	0.057	0.111	10.764	0.079	Indirect
System usability → Attitude TOS → Buying intention	0.186	20.860	0.005	0.151	20.196	0.029	Indirect
External locus -> Buying impulsiveness → Buying intention	0.067	20.054	0.041	0.008	0.379	0.705	Indirect
Extraversion → Buying intention	0.126	20.366	0.019	0.174	30.381	0.001	Indirect
Extraversion → Buying intention	0.261	20.653	0.008	0.189	20.131	0.034	Total
Neuroticism → Buying intention	−0.183	20.012	0.045	−0.212	20.759	0.006	Total
External locus → Buying intention	0.128	10.721	0.086	0.182	20.327	0.021	Total
System usability → Buying intention	0.362	30.879	<0.001	0.282	20.686	0.008	Total
Effects on Attitude towards online shopping							
Internal locus → Attitude TOS	0.200	20.065	0.040	0.176	10.783	0.076	Direct
External locus → Attitude TOS	0.088	0.679	0.498	0.248	20.141	0.033	Direct
System usability → Attitude TOS	0.381	30.674	<0.001	0.238	20.287	0.023	Direct
Extraversion → System usability → Attitude TOS	0.100	20.088	0.038	0.090	10.887	0.060	Indirect
Extraversion → Attitude TOS	0.044	0.878	0.381	0.094	20.349	0.019	Indirect
Effects on User experience							
Extraversion → User experience	−0.357	50.001	<0.001	−0.344	30.992	<0.001	Direct
Effects on System usability							
Extraversion → System usability	0.263	20.816	0.005	0.377	40.197	<0.001	Direct
Effects on Buying impulsiveness							
Neuroticism → Buying impulsiveness	−0.231	10.945	0.053	−0.242	20.340	0.020	Direct
External locus → Buying impulsiveness	0.301	20.986	0.003	0.283	20.648	0.009	Direct

The only significant indirect effects were found for two paths: for the regular online shopping condition, buying impulsiveness mediates the association between external locus of control and buying intention, while for the augmented reality condition, the same association was mediated by the attitudes towards online shopping. In addition, for both conditions, the associations between system usability and buying intention was mediated by the attitude towards online shopping. The total indirect effects of system usability on buying intention were also significant. Despite the not significant direct effects of extraversion on buying intention, our analysis revealed that extraversion had positive indirect total and total effects on buying intention for both conditions. Neuroticism seemed also to have total significant effects on buying intention, while external locus of control kept his effects only in the augmented reality condition. Concerning locus of control, interesting results were found for the prediction of the attitude towards the online shopping: while internal locus of control predicts more favourable attitudes towards online shopping for the regular online shopping condition, external locus of control significantly predicts favourable attitudes towards online shopping for the augmented reality shopping condition. We also found an indirect effect significant for the traditional condition, and a

marginal one for the augmented reality condition, for the association between extraversion and attitudes, when system usability is included as mediator.

5. Discussion and Conclusions

5.1. Theoretical Implications

The results showed that the buying intention is significantly higher in the case of augmented reality than in the case of traditional electronic commerce, showing that a higher attractiveness of the system could lead not only to a more favourable attitude towards online shopping, but also to a more intense intention to buy online [10]. Our results confirmed previous research in the field regarding the associations between personality traits and online buying behaviours. Extraversion and neuroticism were associated with the willingness to buy online [44]. However, in our study, we did not find strong associations for neuroticism, but we were able to find several effects for extraversion, showing that more extraverted individuals have more favourable attitudes towards online shopping and a higher willingness to buy online. Our mediation model is supported by previous research, showing that personality traits are elemental traits and buying impulsiveness is a surface trait [42], and together, they could augment attitudes and the buying intention. The total effects of extraversion could be explained by the high sociability and flexibility of extraverts, who are more receptive to change, to new things and ideas [45], which is highly significant for enhancing the standard electronic commerce by means of augmented reality. In addition, research also showed positive associations between extraversion and computer use [8], which is particularly suitable, taking into consideration the fact that our study measured the online shopping dimension. Research showed that conscientiousness does not have effects on online buying, a possible explanation being the precaution to avoid the perceived risk of buying online [45].

The personality traits were also associated with the buying impulsiveness and compulsive buying [47,48,74,75]. Our study revealed that neuroticism had negative effects on the buying impulsiveness, similar results being reported in the literature [50]. Although recent research has shown that conscientiousness, too, predicts impulse buying [77], our study did not reveal effects of this dimension. The buying impulsiveness also had direct effects on the buying intention in the context of online buying, as other researchers had previously demonstrated [78].

Unexpectedly, we did not find associations between the user experience dimensions (e.g., novelty, attractiveness, etc.) and impulsive buying, in contradiction to [50], who stated that the website quality could predict consumer's online buying impulsiveness. This could be explained by the fact that participants were students in computer science programs, and for them, using a different online application is not something new. Additionally, we could take into account they are Millennials, being permanently connected and experiencing online applications daily.

Future research will also include other personality traits, such as risk propensity, to overcome this limitation, by adding variables concerning the perceived risk of online shopping activities. Previous research has revealed that while perceived risk online was inversely related to attitudes online, attitudes online were directly related to intentions to purchase online [79,80].

Concerning the locus of control, the results partially confirmed previous research on the field. Previous research revealed the importance of the locus of control in predicting consumers' Web behaviour [80]; more specifically, the purchase decisions of externally controlled consumers tended to be more impulsive [81].

We emphasise that our study compared regular online commerce with AR shopping, which is a new approach in the study of consumer behaviour. Studying the role of personality traits adds relevant information about individual symmetry which could influence the online buying decision. Furthermore, the user experience instrument (UEQ) has not previously been used in studying online shopping using AR. The study at hand applies PLS-SEM in IS research for modelling buying intention using latent variables, enabling

both scholars and professionals to ask research questions regarding the usefulness of online tools by combining various IS attributes with personality traits.

5.2. Managerial and Practical Implications

In [73], it is stated that in 2019, approximately 1.92 billion people purchased goods or online services. In the same year, online retail sales exceeded 3.5 trillion US dollars worldwide and, according to the latest calculations, the growth of e-commerce will accelerate even more in the future. At the moment, we see that e-commerce has become an essential part of the global retail framework and can be considered an indispensable part. In terms of the retail landscape, we are witnessing a series of substantial transformations as a result of the advent of the Internet and, thanks to the continuous digitalisation of modern life. Thus, consumers around the world trade online. It is clear that there is a direct link between the use of the Internet and the development of ecommerce, with the number of digital shoppers around the world continuing to grow each year [74,75].

Today, individual consumers are being offered a growing number of digital possibilities. One of the most visible trends in the world of e-commerce is the unprecedented use of mobile devices. In 2019, smartphones accounted for more than 60 percent of all retail site visits worldwide [1–3,73].

Considering the impact of personality in the use of e-commerce sites, we find it appropriate for organisations to be able to make predictions using data gathered about their customers in order to predict customer behaviour or potential customers and reuse their intentions. This could lead to a positive user experience, which will indirectly lead to increased sales.

At the level of the clothing trade, we consider that the use of AR applications in the sales process offers, for the moment, this competitive advantage. However, it is clear that the benefits of using AR in the sale of clothing products will make more and more managers choose these technologies, and there may be situations when the use of AR no longer necessarily brings a competitive advantage, but is only a natural adaptation to market requirements [75]. Thus, it is possible that in the not-too-distant future, all stores that sell clothing products will use AR technology to promote products as a standard.

The result of this study is a valuable reference for online marketers that are using AR when they try to optimize their experience in online environments. AR leads to a reduction in the cognitive risk arising from the uncertainty of not testing their products or product combinations. In addition, the virtual interaction before the online purchase process can provide information about the desired products, which are similar to the information obtained from the physical examination of the product, simulating a more realistic representation of the product. This issue conducts to lower costs for returning products [82,83].

5.3. Limitations and Future Research Directions

Some limitations should also be mentioned. One limitation of the research could be the low external validity, because the participants could have a different behaviour under real-world conditions from those during the experiment [76,77]. Our experiment was completed without making the purchase, thus having no financial implications. In this research, the participants involved were curious, but in reality, their buying behaviours could be different when the risks are more rationally evaluated. Being only a hypothetical situation, the responses for the self-report measures could be biased. In a real-life situation, price and also product rating could have major impacts on the buying decision [78].

Additionally, in future we will try to identify whether the value of the purchased product has a moderating role on the relationship between the use of technology and the purchase decision. At this time, we suspect that the participants were very interested in using the technology and had little interest in the products sold. Additionally, our participants were very open to technology. In future research, we will follow the behaviour for other age groups [79]. However, despite the convenience student sample, the participants

in this study could be considered an appropriate audience of target customers, as other authors have also stated. Future research should also consider a wider range of product types and prices, following the behaviour in the purchase decision.

Given the context of the research, it is possible that the participants involved in the tasks were curious, but in reality, their buying behaviours could be different when the risks are more rationally evaluated. Being only a hypothetical situation, the responses for the self-report measures could be biased.

Further research should also include other dimensions, such as the perceived risks associated with online purchase, self-efficacy or anxiety towards technology. A major limitation of our study is related to the non-randomised sample and the majority female participants. Finally, a future research study might test the actual behaviour (actual online purchases) as the outcome variable, rather than a simulated behaviour and self-report measures for the online buying behaviour, to ensure a higher external validity of the study.

References

1. Retail e-Commerce Sales Worldwide from 2014 to 2023. 2021. Available online: https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/ (accessed on 8 January 2021).
2. Global Ecommerce Sales (2017–2023). 2021. Available online: https://www.oberlo.com/statistics/global-ecommerce-sales (accessed on 8 January 2021).
3. eMarketer, Global Ecommerce Update 2021. 2021. Available online: https://www.emarketer.com/content/global-ecommerce-update-2021 (accessed on 8 January 2021).
4. Guo, Y.; Wang, M.; Li, X. An Interactive Personalized Recommendation System Using the Hybrid Algorithm Model. *Symmetry* **2017**, *910*, 216. [CrossRef]
5. Victor, V.; Joy Thoppan, J.; Jeyakumar Nathan, R.; Farkas Maria, F. Factors Influencing Consumer Behavior and Prospective Purchase Decisions in a Dynamic Pricing Environment—An Exploratory Factor Analysis Approach. *Soc. Sci.* **2018**, *7*, 153. [CrossRef]
6. Kim, E.; Urunov, R.; Kim, H. The effects of national culture values on consumer acceptance of E-commerce: Online shoppers in Russia. *Procedia Comput. Sci.* **2016**, *91*, 966–970. [CrossRef]
7. Ringle, C.M.; Wende, S.; Becker, J.M. SmartPLS. 2015. Available online: https://www.smartpls.com (accessed on 8 January 2021).
8. Chin, W.W. How to Write Up and Report PLS Analyses. In *Handbook of Partial Least Squares. Springer Handbooks of Computational Statistics*; Esposito Vinzi, V., Chin, W., Henseler, J., Wang, H., Eds.; Springer: Berlin/Heidelberg, Germany, 2010. [CrossRef]
9. Lee, K.C.; Chung, N. Empirical analysis of consumer reaction to the virtual reality shopping mall. *Comput. Hum. Behav.* **2008**, *24*, 88–104. [CrossRef]

10. Javornik, A. Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behavior. *J. Retail. Consum. Serv.* **2016**, *30*, 252–261. [CrossRef]

11. Scholz, J.; Smith, A.N. Augmented reality: Designing immersive experiences that maximize consumer engagement. *Bus. Horiz.* **2016**, *59*, 149–161. [CrossRef]

12. Wang, C.-H.; Chiang, Y.-C.; Wang, M.-J. Evaluation of an Augmented Reality Embedded On-line Shopping System. *Procedia Manuf.* **2015**, *3*, 5624–5630. [CrossRef]

13. Azuma, R. A survey of augmented reality. *Presence Teleoperators Virtual Environ.* **1997**, *6*, 355–385. [CrossRef]

14. Point-of-Purchase Advertising Institute. Available online: https://www.warc.com/data/consumer/time-spent-by-medium.data (accessed on 20 December 2020).

15. Fulgoni, G.M. Omni-Channel Retail Insights and the Consumer's Path-to-Purchase: How Digital Has Transformed the Way People Make Purchasing Decisions. *J. Advert. Res.* **2014**, *54*, 377–380. [CrossRef]

16. Zhu, W.; Owen, C.; Li, H.; Lee, J. Personalized in-Store e-Commerce with the Promopad: An Augmented Reality Shopping Assistant. *Electron. J. E-Commer. Tools* **2004**, *1*, 1–19. Available online: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.83.8198&rep=rep1&type=pdf (accessed on 20 December 2020).

17. Gallagher, C.E.; Watt, M.C.; Weaver, A.D.; Murphy, K.A. 'I fear, therefore, I shop!' exploring anxiety sensitivity in relation to compulsive buying. *Pers. Individ. Dif.* **2017**, *104*, 37–42. [CrossRef]

18. Isa, A.M.; Saud, M.B.; Ismail, M.D. Examining reasons for post-purchase satisfaction in buying local brands: When local meets local. *Asia Pac. Manag. Rev.* **2016**, *21*, 48–61. [CrossRef]

19. Hwan, S.; Lee, M.; Leizerovici, G.; Zhang, S. The satisfaction and stress of being a market maven: A social network perspective. *J. Consum. Behav.* **2015**, *334*, 325–334. [CrossRef]

20. Moussa, S.; Touzani, M. The moderating role of attachment styles in emotional bonding with service providers. *J. Consum. Behav.* **2017**, *16*, 145–160. [CrossRef]

21. Montaño, D.E.; Kasprzyk, D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In *Health Behavior: Theory, Research, and Practice*; Glanz, K., Rimer, B.K., Viswanath, K.V., Eds.; Jossey-Bass/Wiley: San Francisco, CA, USA, 2015; pp. 95–124.

22. Armitage, C.; Conner, M. Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *Br. Psychol. Soc.* **2001**, *40*, 471–499. [CrossRef] [PubMed]

23. Peña-García, N.; Gil-Saura, I.; Rodríguez-Orejuela, A.; Siqueira-Junior, J.R. Purchase intention and purchase behavior online: A cross-cultural approach. *Heliyon* **2020**, *6*, e04284. [CrossRef] [PubMed]

24. Available online: https://blog.kissmetrics.com/wp-content/uploads/2011/04/loading-time.pdf (accessed on 10 September 2020).

25. Available online: https://uxpajournal.org/wp-content/uploads/sites/8/pdf/JUS_Brooke_February_2013.pdf (accessed on 10 January 2021).

26. Smith, A.D.; Rupp, W. Strategic online customer decision making: Leveraging the transformational power of the Internet. *Online Inf. Rev.* **2003**, *27*, 418–432. [CrossRef]

27. Smith, A.D.; Rupp, W. Managerial challenges of e-recruiting: Extending the life cycle of new economy employees. *Online Inf. Rev.* **2004**, *28*, 61–74. [CrossRef]

28. Alba, J.; Lynch, J.; Weitz, B.; Janiszewski, C.; Lutz, R.; Sawyer, A.; Wood, S. Interactive home shopping: Consumer, retailer, and manufacturer incentives to participate in electronic marketplaces. *J. Mark.* **1997**, *61*, 38–53. [CrossRef]

29. Li, H.; Kuo, C.; Russell, M.G. The impact of perceived channel utilities, shopping orientations, and demographics on the consumer's online buying behavior. *J. Comput. Commun.* **1999**, *5*, JCMC521. [CrossRef]

30. Gefen, D.; Karahanna, E.; Straub, D.W. Trust and TAM in online shopping: An integrated model. *MIS Q.* **2003**, *27*, 51–90. [CrossRef]

31. McKnight, D.H.; Choudhury, V.; Kacmar, C. Developing and validating trust measures for e-commerce: An integrative typology. *Inf. Syst. Res.* **2002**, *13*, 334–359. [CrossRef]

32. Childers, T.L.; Carr, C.L.; Peck, J.; Carson, S. Hedonic and utilitarian motivations for online retail shopping behavior. *J. Retail.* **2001**, *77*, 511–535. [CrossRef]

33. Pahnila, S.; Warsta, J. Online shopping viewed from a habit and value perspective. *Behav. Inf. Technol.* **2010**, *29*, 621–632. [CrossRef]

34. Anesbury, Z.; Nenycz-Thiel, M.; Dawes, J.; Kennedy, R. How do shoppers behave online? An observational study of online grocery shopping. *J. Consum. Behav.* **2015**, *15*, 261–270. [CrossRef]

35. Kooti, F.; Lerman, K.; Aiello, L.M.; Grbovic, M.; Djuric, N.; Radosavljevic, V. Portrait of an Online Shopper. In Proceedings of the Ninth ACM International Conference on Web Search and Data Mining, San Francisco, CA, USA, 22–25 February 2016; pp. 205–214.

36. Stocchi, L.; Driesener, C.; Nenycz-thiel, M. Brand image and brand loyalty: Do they show the same deviations from a common underlying pattern? *J. Consum. Behav.* **2015**, *324*, 317–324. [CrossRef]

37. Prasad, R.K.; Jha, M.K. Consumer buying decisions models: A descriptive study. *Int. J. Innov. Appl. Stud.* **2014**, *6*, 335–351.

38. Kenney, P.A.; Hogan, S.K. Understanding Consumer Shopping Behavior. 2015. Available online: https://dupress.deloitte.com/dup-us-en/industry/retail-distribution/understanding-consumer-behavior-shopping-trends.html#endnote-25 (accessed on 10 September 2020).

39. Armano, D. The Marketing Spiral. Logic + Emotion. Building Responsive and Resilient Brands in a Connected World. 2007. Available online: http://darmano.typepad.com/logic_emotion/2007/08/the-marketing-s.html (accessed on 8 January 2021).

40. Court, D.; Elzinga, D.; Mulder, S.; Vetvik, O.J. The Consumer Decision Journey. 2009. Available online: https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/the-consumer-decision-journey (accessed on 8 January 2020).

41. Kumar, V.; Dange, U. A study of factors affecting online buying behavior: A conceptual model. *SSRN Electron. J.* **2012**. [CrossRef]

42. Chen, T.; Lee, M.C. Personality antecedents of online buying impulsiveness. *J. Econ. Bus. Manag.* **2015**, *3*, 425–429. [CrossRef]

43. Costa, P.T.; McCrae, R.R. *Revised NEO Personality Inventory and New Five-Factor Inventory: Professional Manual*; Psychological Assessment Resources: Odessa, FL, USA, 1992.

44. Bosnjak, M.; Galesic, M.; Tuten, T. Personality determinants of online shopping: Explaining online purchase intentions using a hierarchical approach. *J. Bus. Res.* **2007**, *60*, 597–605. [CrossRef]

45. Tsao, W.C.; Chang, H.R. Exploring the impact of personality traits on online shopping behaviour. *Afr. J. Bus. Manag.* **2010**, *4*, 1800–1812.

46. Chen, T. Personality traits hierarchy of online shoppers. *Int. J. Mark. Stud.* **2011**, *3*, 23–39. [CrossRef]

47. Sofi, S.A.; Nika, F.A. The Role of Personality in Impulse Buying Behavior. *Jindal J. Bus. Res.* **2016**, *5*, 26–50. [CrossRef]

48. Otero-López, J.; Villardefrancos, E. Five-Factor Model personality traits, materialism, and excessive buying: A mediational analysis. *Pers. Individ. Dif.* **2013**, *54*, 767–772. [CrossRef]

49. Rook, D.W.; Fisher, R.J. Normative influences on impulsive buying behavior. *J. Consum. Res.* **1995**, *22*, 305–313. [CrossRef]

50. Turkyilmaz, C.A.; Erdem, S.; Uslu, A. The effects of personality traits and website quality on online impulse buying. *Procedia Soc. Behav. Sci.* **2015**, *175*, 98–105. [CrossRef]

51. Wang, S.L.; Hou, Y.T.; Kankham, S. Behavior Modality of Internet Technology on Reliability Analysis and Trust Perception for International Purchase Behavior. *Symmetry* **2019**, *11*, 989. [CrossRef]

52. Hansen, T. The moderating effects of fi nancial broad-scope trust on consumer knowledge, cognitive effort, and fi nancial healthiness. *J. Consum. Behav.* **2017**, *16*, 161–175. [CrossRef]

53. Busseri, M.A.; Lefcourt, H.M.; Kerton, R.R. Locus of control for consumer outcomes: Predicting consumer behavior. *J. Appl. Soc. Psychol.* **1998**, *28*, 1067–1087. [CrossRef]

54. Kim, S.; Byramjee, F. Effects of risks on online consumers' purchasing behavior: Are they risk-averse or risk-taking? *J. Appl. Bus. Res.* **2014**, *30*, 161–172. [CrossRef]

55. Forsythe, S.M.; Shi, B. Consumer Patronage and risk perceptions in internet shopping. *J. Bus. Res.* **2003**, *56*, 867–875. [CrossRef]

56. Hernaus, T.; Pejić Bach, M.; Bosilj Vukšić, V. Influence of strategic approach to BPM on financial and non-financial performance. *Balt. J. Manag.* **2012**, *7*, 376–396. [CrossRef]

57. Levenson, H. Differentiating among internality, powerful others, and chance. In *Research with the Locus of Control Construct*; Lefcourt, H.M., Ed.; Academic Press: New York, NY, USA, 1981; Volume 1, pp. 15–63.

58. Dodds, W.B.; Kent, B.; Grewal, D. Effects of Price, Brand and Store Information on Buyers' Product Evaluations. *J. Mark. Res.* **1991**, *28*, 307–319.

59. Jin, L.Y.; Osman, A.; Romle, A.R.; Othman, Y.F. Attitude towards online shopping activities in Malaysia public university. Mediterr. *J. Soc. Sci.* **2015**, *6*, 456–462.

60. Meertens, R.M.; Lion, R. Measuring an Individual's Tendency to Take Risks: The Risk Propensity Scale. *J. Appl. Soc. Psychol.* **2008**, *32*, 1506–1520. [CrossRef]

61. Brooke, J. SUS: A 'quick and dirty' usability scale. In *Usability Evaluation in Industry*; Jordan, P.W., Thomas, B., Weerdmeester, B.A., McClelland, Eds.; Taylor & Francis Group: London, UK, 1996; pp. 189–194.

62. Lewis, J.; Sauro, J. The factor structure of the System Usability Scale. In *Human Centered Design. HCD 2009. Lecture Notes in Computer Science*; Kurosu, M., Ed.; Springer: Berlin/Heidelberg, Germany, 2009; Volume 5619, pp. 94–103.

63. Borsci, S.; Federici, S.; Lauriola, M. On the dimensionality of the System Usability Scale: A test of alternative measurement models. *Cogn. Process.* **2009**, *10*, 193–197. [CrossRef]

64. Laugwitz, B.; Held, T.; Schrepp, M. Construction and evaluation of a user experience questionnaire. In *HCI and Usability for Education and Work. USAB 2008. Lecture Notes in Computer Science*; Holzinger, A., Ed.; Springer: Berlin/Heidelberg, Germany, 2008; Volume 5298, pp. 63–76.

65. Zugara. 2017. Available online: http://zugara.com/augmented-reality-and-virtual-reality-software (accessed on 8 January 2021).

66. Ladhari, R.; Gonthier, J.; Lajante, M. Generation Y and online fashion shopping: Orientations and profiles. *J. Retail. Consum. Serv.* **2019**, *48*, 113–121. [CrossRef]

67. Becerra Rodriguez, C.A. Virtual Fitting Rooms. Available online: http://oa.upm.es/42311/1/TFM_BECERRA_RODRIGUEZ_CARLOS_a.pdf (accessed on 5 September 2020).

68. Kincaid, J. Zugara's Augmented Reality Dressing Room Is Great If You don't Care how Your Clothes Fit. 2009. Available online: https://techcrunch.com/2009/06/23/zugaras-augmented-reality-dressing-room-is-great-if-you-dont-care-how-your-clothes-fit/ (accessed on 8 January 2021).

69. Beck, M.; Crié, D. I virtually try it . . . I want it! Virtual Fitting Room: A tool to increase on-line and off-line exploratory behavior, patronage and purchase intentions. *J. Retail. Consum. Serv.* **2018**, *40*, 279–286. [CrossRef]
70. Preacher, K.J.; Hayes, A.F. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behavior Research Methods. *Instrum. Comput.* **2004**, *36*, 717–731. [CrossRef] [PubMed]
71. Pappas, N. Marketing strategies, perceived risks, and consumer trust in online buying behavior. *J. Retail. Consum. Serv.* **2016**, *29*, 92–103. [CrossRef]
72. Abugabah, A.; Cheng, X.; Wang, J. Learning Context-Aware Outfit Recommendation. *Symmetry* **2020**, *12*, 873. [CrossRef]
73. E-commerce Worldwide—Statistics & Facts Published by Statista Research Department. Available online: https://www.statista.com/ (accessed on 26 October 2020).
74. Luca, M.R.; Cazan, A.M. Involvement in Entrepreneurial Training and Personality. *Procedia Soc. Behav.* **2011**, *30*, 1251–1256. [CrossRef]
75. Hair, J.F.; 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]
76. Syamimi, A.; Gong, Y.; Liew, R. VR industrial applications—A Singapore perspective. *Virtual Real. Intell. Hardw.* **2020**, *2*, 409–420. [CrossRef]
77. Benitez, J.; Henseler, J.; Castillo, A.; Schuberth, F. How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. *Inf. Manag.* **2020**, *57*, 103168. [CrossRef]
78. Sun, L.; Zhao, Y.; Ling, B. The Joint Influence of Online Rating and Product Price on Purchase Decision: An EEG Study. *Psychol. Res. Behav. Manag.* **2020**, *13*, 291–301. [CrossRef] [PubMed]
79. Bucko, J.; Kakalejčík, L.; Ferencová, M. Online shopping: Factors that affect consumer purchasing behavior. *Cogent Bus. Manag.* **2020**, *5*, 1535751. [CrossRef]
80. Hoffman, D.L.; Novak, T.P.; Schlosser, A.E. Locus of control, web use, and consumer attitudes toward internet regulation. *J. Public Policy Mark.* **2003**, *22*, 41–57. [CrossRef]
81. Dessart, W.C.A.M.; Kuylen, A.A.A. The nature, extent, causes and consequences of problematic debt situations. *J. Consum. Policy* **1986**, *9*, 311–334. [CrossRef]
82. Bonetti, F.; Warnaby, G.; Quinn, L. Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda. In *Augmented Reality and Virtual Reality. Progress in IS*; Jung, T., tom Dieck, M., Eds.; Springer: Cham, Switzerland, 2018. [CrossRef]
83. Watson, A.; Bethan, A.; Salavati, L. The impact of experiential augmented reality applications on fashion purchase intention. *Int. J. Retail Distrib. Manag.* **2018**. [CrossRef]