International Entrepreneurship Review

2024, Vol. 10, No. 4

10.15678/IER.2024.1004.08

Gender in acceptance of augmented reality in e-commerce: An international perspective

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ABSTRACT

Objective: The objective of the article is to answer research questions about the role of gender in the significance of factors (motives and risks) affecting the acceptance of augmented reality (AR) technologies by young international e-commerce consumers.

Research Design & Methods: The primary research method was a qualitative study based on six focus groups conducted in three economically, technologically, and culturally diverse countries: Poland, South Korea, and the United States. For the qualitative analysis, we used MAXQDA software.

Findings: Regarding the role of gender in impacting the motives and risks connected with consumers' use of AR technology in online shopping decisions, gender differentiates both motivation and risks.

Implications & Recommendations: Regarding theoretical application, the findings show the significant role of gender and cultural factors as moderators in models concerning the acceptance of new technologies on the international market. Regarding the practical implications, it should be emphasised that adapting to the preferences of different demographic groups concerning gender can increase the effectiveness of marketing efforts and improve sales performance.

Contribution & Value Added: The study stands out because it analyses a combination of factors that indicate gender, young international consumers, and the acceptance of AR technology.

Article type: research article

Keywords: gender; augmented reality; young consumers; e-commerce; international markets

JEL codes: J11; M30; O30

Received: 15 May 2024 | Revised: 31 August 2024 | Accepted: 22 September 2024

Suggested citation:

Bartosik-Purgat, M., & Rakowska, W. (2024). Gender in acceptance of augmented reality in e-commerce: An international perspective. *International Entrepreneurship Review,* 10(4), 113-127. https://doi.org/10.15678/IER.2024.1004.08

INTRODUCTION

New technologies are revolutionising many areas of life, including individual consumer decisions and business strategies (Andrzejewski & Dunal, 2021; Dogra *et al*., 2023; Korzynski *et al*., 2023; Wei *et al*., 2023). They play a significant role in retail, particularly in e-commerce, which is gaining more and more traction with consumers, particularly after the Covid-19 pandemic (Rauschnabel, 2021; Song *et al*., 2022; Riar *et al*., 2023; Wei *et al*., 2023; Borges *et al*., 2023). The e-commerce industry is constantly looking for solutions to provide customers with experiences we know from traditional shopping, such as the ability to interact directly with a product (Song *et al*., 2022; Xu *et al*., 2024). The search for such solutions is unsurprising, given that the most common source of dissatisfaction among e-commerce customers is buying the wrong product (Riar *et al*., 2023; Zheng & Li, 2023; Qin *et al*., 2024). Being unable to touch the product physically, try on clothes or shoes or check the material's texture is still a considerable barrier to e-commerce development.

Augmented reality (AR) is a game-changing technology in e-commerce (Rauschnabel, 2021; Jayaswal & Parida, 2023; Chen *et al*., 2024). It lets consumers preview a product before the purchase

(Poushneh, 2018; Jayaswal & Parida, 2023; Nadeem *et al*., 2024). This breakthrough not only overcomes the challenge of not interacting with the product physically but also provides a more immersive and engaging online shopping experience (Bonnin, 2020; Çalışkan *et al*., 2023; Xu *et al*., 2024).

Furthermore, AR allows for adding computer-generated elements to the image captured by the camera and built into a smartphone, tablet, or laptop. Unlike virtual reality, AR does not create a new world but bridges the gap between the smartphone screen and the real world interactively (Rauschnabel, 2021). It integrates images, animation, or other virtual elements on the screen with real objects in real-time (Javornik, 2016; Poushneh, 2018; Alesanco-Llorente *et al*., 2023). Moreover, AR can improve consumers' experiences by placing virtual content in a natural environment (Rese *et al*., 2017; Jayaswal & Parida, 2023; Riar *et al*., 2023).

In other words, AR has the potential to bridge the gap between physical and online shopping, offering a new and hopeful direction for e-commerce (Rauschnabel, 2021; Chen *et al*., 2024). One example of the use of AR in e-commerce is virtual fitting rooms, which can also be applied to cosmetic and fashion products, *i.e.* where realism and the ability to visualise one's appearance in new clothes, glasses, jewellery or shoes are essential (Jiang *et al*., 2023; Wei *et al*., 2023). Augmented reality is a revolutionary tool in e-commerce. It empowers customers to make informed decisions by providing a better product evaluation before purchase. This reduces returns and complaints and enhances customer satisfaction, as customers can accurately visualise and comprehend their purchases (Iisnawati *et al*., 2022).

An analysis of the literature on factors influencing consumer acceptance of AR includes various aspects, among others, psychological, *e.g.* perceived performance and enjoyment; demographic, *e.g.* age, gender, education level; technological, *e.g.* usability, ease of use, interactivity, engagement; social, *e.g.* social impact, market trends, *etc.* (Dogra *et al*., 2023; Huang, 2023; Al Halbusi *et al*., 2024; Chen *et al*., 2024). Determinants influencing the acceptance of AR in e-commerce have a positive context and may also be associated with certain risks regarding using this technology (Mombeuil, 2020; Çalışkan *et al*., 2023; Zheng & Li, 2023; Qin *et al*., 2024). Even though AR is usually seen as a tool to improve the user experience, it can lead to a lower willingness to complete a purchase. A study by Zheng and Li (2023) shows that AR online shopping reduces consumers' purchase intention. One of the determinants that may impact consumers' positive and negative AR perception and use is gender diversity. Understanding women's and men's needs, expectations, attitudes, and behaviours is crucial for companies and technology designers to effectively introduce AR across different product categories to the market and maximise its adoption.

Moreover, to the best of our knowledge, few studies on the acceptance of AR in e-commerce consider gender differences (*e.g.* Abed, 2021; Iisnawati *et al*., 2022; Alesanco-Llorente *et al*., 2023). The article's main objective is to answer research questions (RQs) about the influence of gender on the significance of factors (motives and risks) affecting the acceptance of AR technologies by young international e-commerce consumers. The primary research method was a qualitative study based on focus groups conducted in three economically, technologically and culturally diverse countries: Poland, South Korea, and the United States. Moreover, our study stands out because of its focus on young international consumers. Combining these factors constitutes a novelty and contributes to expanding theoretical concepts in this area.

The article consists of the following parts: first, we present a literature review and theory development concerning the acceptance of new technologies. Next, we describe the materials and methods used for the primary research. The next part of the article is dedicated to the qualitative analysis of the findings. Conclusions and implications are then presented and finally, study limitations and suggestions for future research are explained.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

One of the primary and frequently used tools in empirical research to understand differential characteristics' impact on users' acceptance of new technologies is the technology acceptance model (TAM) by Davis (1985). However, this model was based on Fishbein's (1967) and Fishbein and Ajzen's (1975) models of analysing the determinants of technology acceptance. The author and other researchers

have modified the TAM model several times for empirical measurements (*e.g.* Jiang *et al*., 2023; Wang *et al*., 2022; Oyman *et al*., 2022; Zhang & Yao, 2023; Nadeem *et al*., 2024). Moreover, Venkatesh and Davis (2000) extended TAM to TAM2, where factors influencing positive or negative user perceptions of technology are presented. Next, there was also an extension to TAM3 (Venkatesh & Bala, 2008; Wang *et al*., 2022), where factors influencing perceived ease of use are included in addition to determinants influencing user-perceived usefulness.

The unified theory of acceptance and use of technology (UTAUT) was developed to predict the degree to which a user would use a particular technology. This comprehensive model draws from various theories, among others, including TAM (Davis, 1985), the theory of planned behaviour (D'Sousa, 2022), and the innovation diffusion theory (Rogers *et al*., 2014). Meanwhile, the social cognitive theory (Venkatesh *et al*., 2003) was the basis for our version of TAM. In the UTAUT, determinants such as performance expectancy, effort expectancy, social influence, and facilitating conditions are further modelled by moderators characterising the user himself, *i.e.* gender, age, experience, and voluntariness of use (Venkatesh *et al*., 2003). The following extension led to UTAUT2, which added three new factors in addition to the four original factors from UTAUT, *i.e.* hedonic motivation, price value and habit (Venkatesh *et al*., 2012). Moreover, UTAUT2 retains the same moderators but adds additional ones, such as the context of technology use, which allows for a more detailed understanding of the differences in technology acceptance (Venkatesh *et al*., 2012; Huang, 2023).

Next, the other authors who used the technologies' acceptance models identified positive determinants impacting the users' attitudes (*e.g.* Sahli & Lichy, 2024; Nadeem *et al*., 2024) and factors that may influence them negatively (*e.g.* Martins *et al*., 2013; Yang *et al*., 2016; Zheng & Li, 2023). One such factor is perceived risks. In the context of AR use in e-commerce, we may connect it with dissatisfaction with the product purchased in an online store evaluated using AR (AR-driven purchase risk) (Bonnin, 2020; Mombeuil, 2020; Kumar, 2022; Qin *et al*., 2024). Another dimension of perceived risk is vulnerability regarding the possible loss of consumers' personal information (data privacy risk). Other perceived risks are potential threats and vulnerabilities associated with the unauthorised access, misuse, or loss of consumers' personal information when they use a particular technology (data privacy risk) (Gao *et al*., 2015; Dacko, 2016; Qin *et al*., 2024).

The determinants (motives and risks) identified in the models described above formed the basis for the research on the acceptance and willingness of young consumers to use AR technology during e-commerce. Within the framework of motives, the following were examined: performance expectancy, effort expectancy, and hedonic motivation (Adeb, 2021; Arghashi, 2022; Kumar, 2022; Dogra *et al*., 2023; Huang, 2023; Pathak & Prakash, 2023; Xu *et al*., 2024; Sahli & Lichy, 2024). Within the framework of risks, we examined the following: AR-driven purchase risk and data privacy risk (Mombeuil, 2020; Zheng & Li, 2023; Qin *et al*., 2024).

One of the moderators considered in the theoretical models highlighted above was gender. However, it is not a common determinant studied by authors concerning AR acceptance in e-commerce. Slyke *et al*. (2010) indicated gender differences concerning the use of e-commerce platforms. At that time, women perceived online shopping as riskier. Women were also more sensitive compared to men to privacy and security issues. Conversely, men focused more on the functional benefits and convenience of online shopping (Slyke *et al*., 2010). Interestingly, almost 1.5 decades later, some studies show similar results related to the role of gender in the acceptance of AR in online shopping. One of the latest studies in which gender is the primary variable that differentiates consumer attitudes was conducted by Alesanco-Llorente *et al*. (2023). In the study, the authors seek to answer whether men and women differ in their acceptance and use of mobile AR technologies in showrooming (*i.e.* viewing products in physical shops and then purchasing them online with the support of mobile technologies such as AR). The research shows significant differences between the groups of men and women surveyed. Women may be more inclined to use AR in showrooming if the technologies are easy to use and offer clear benefits. On the other hand, men can be more interested in the technological aspects of AR and its innovation (Alesanco-Llorente *et al*., 2023).

In another study of Indonesian consumers, Iisnawati *et al*. (2022) indicated that men may be more willing to experiment with new technologies and appreciate the innovative aspects of AR. On the other

hand, women may be more focused on the practical benefits of using AR, such as seeing a product in more detail before purchasing. Women may be more interested in using AR to try on clothes or test cosmetics, allowing them to better understand and evaluate products before purchase (Iisnawati *et al*., 2022).

The author of another study on the effect of gender on Saudis' acceptance of AR technology reached similar conclusions (Abed, 2021). Women are more focused on the practical benefits of using AR, such as trying on clothes or testing cosmetics, which allows them to see more thoroughly, evaluate the product before buying, and decide accordingly. Conversely, men are likelier to experiment with new technologies and appreciate AR's innovative aspects (Abed, 2021). Similarly, a study by Dogra *et al*. (2023) shows that gender has a significant effect on the relationship between technology anxiety and attitudes towards e-commerce sites using AR among consumers in India. Women show more significant technology anxiety, which negatively affects their attitudes towards AR, while this effect is less pronounced in men.

To achieve the purpose of our article and study, we formulated research questions rather than hypotheses, and the theoretical basis was the variables presented in the theoretical models (*e.g.* UTAUT2) in this article's literature review and theoretical part in the context of gender differentiation.

RQ1: Does gender influence the motives of young consumers' acceptance of AR in e-commerce?

RQ2: Does gender influence the risks of young consumers' acceptance of AR in e-commerce?

RESEARCH METHODOLOGY

We used a qualitative research method, *i.e.* focus group interviews (FGI), to answer the research questions related to theoretical models' variables and gender. We organised six focus groups (two interviews in each country: men and women) with a short experiment in February-April 2024. The participants of the focus groups were young consumers (18-25 years old) from Poland, South Korea, and the United States, whom we selected purposively (Quinlan *et al*., 2019). We selected the participants with the help of university teachers from particular countries. The selection process did not allow for the results' generalisation. The number of participants within the focus groups was from 4 to 6 people. The tested product was glasses. Both women and men may buy this category of product. The study's authors achieved permission from the Ethical Commission at the university where we conducted the research.

We conducted the focus interviews via Zoom. This allowed us to gather participants from geographically distant countries. After a short introduction, a moderator asked the participants to enter the website where they could try on glasses with AR technology. Then, the attendees started discussing their experiences, feelings, motives, and threats. After completing the interviews, we prepared transcripts and then conducted coding using the MAXQDA qualitative analysis tool, which considered the motives, risks, and gender identified in the theoretical part.

During the coding process, we used the thematic analysis method proposed by Braun and Clarke (2006), which includes six main steps: 1) familiarisation with the data both transcriptions and recordings; 2) initial coding process; using deductive coding approach 3) generating main thematic themes: grouping codes into potential themes based on their interconnection 4) validity & reliability of themes: checking whether the identified themes are coherent and distinct 5) defining and naming themes: precisely describing each theme to clarify what it encompasses and represents; 6) interpreting & reporting. Each author repeated the process, and we compared the coding results to ensure maximum agreement. This iterative approach helped to maintain consistency and reliability in the analysis, ensuring that the findings were robust and credible.

We segmented the transcripts and analysed them based on the interviewees' gender and country of origin and then we appropriately coded them. Ultimately, we created six coding groups, which we further divided into categories and subcategories (Figure 1; Figure 2).

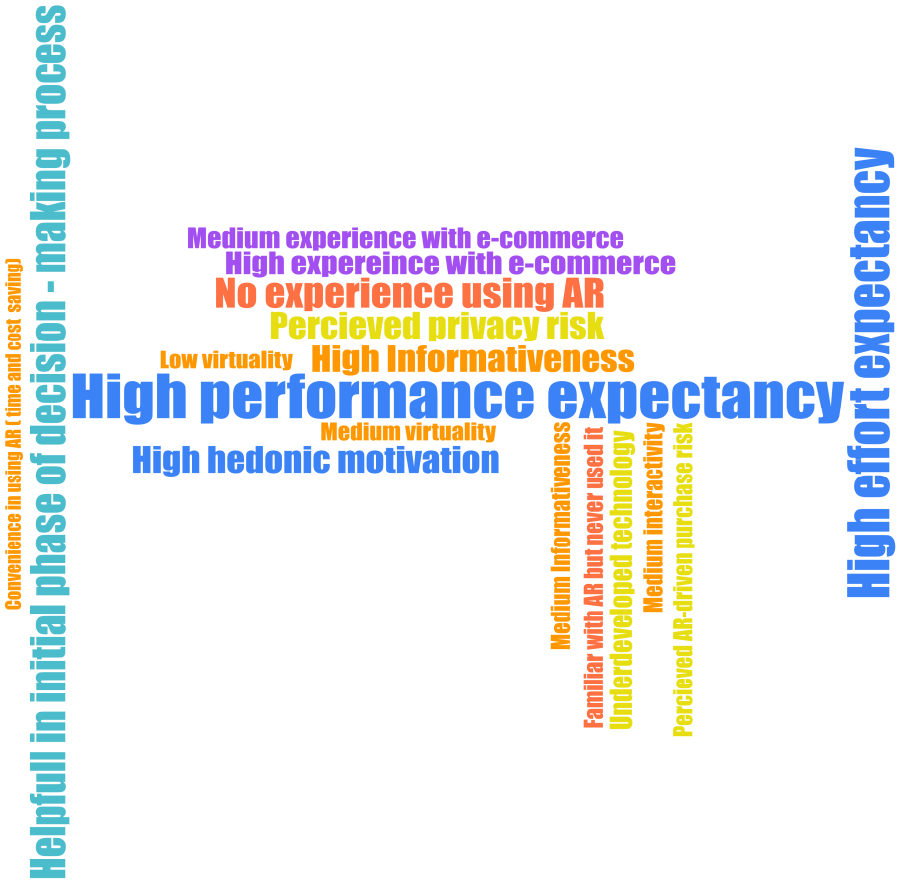

Figure 1. Code Cloud based on Men's Statements
Source: own elaboration in MAXQDA software.

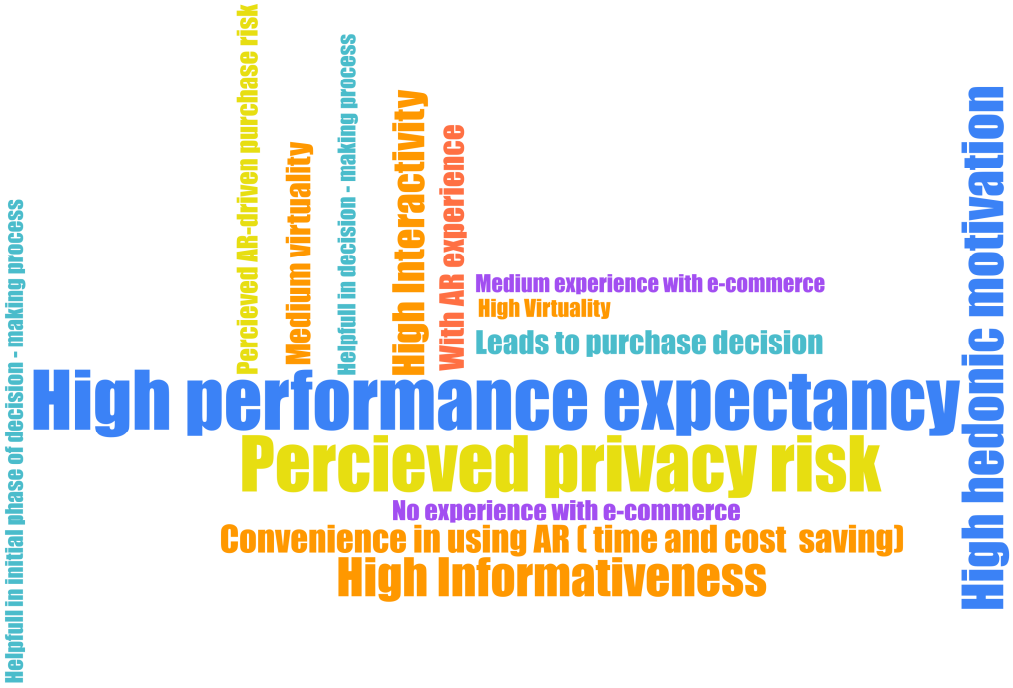

Figure 2. Code cloud based on women's statements
Source: own elaboration in MAXQDA software.

We coded the transcripts based on six coding groups that defined the interviewees' experience with e-commerce and AR, the main motivations, risks, and benefits of using AR, and the impact of AR on the decision-making process. During the coding process, we established categories and subcategories. The code cloud illustrates the codes used to analyse focus group interviews. The size of each word reflects its frequency of occurrence, with larger words indicating more frequent mentions.

RESULTS AND DISCUSSION

Performance Expectancy

Performance expectancy is perceived as the technology's expected usefulness and benefits (Venkatesh *et al*., 2003; Paulo *et al*., 2018; Adeb, 2021). If the user should be convinced of the effectiveness of a particular technology in their operations, then they will be more likely to use it. Performance expectancy is often a factor used concerning user acceptance testing of AR technology, *e.g.* Wu and Lai (2021); Oyman *et al*. (2022); Dogra *et al*. (2023); Ebrahimabad *et al*. (2024).

Polish women participating in the survey said that AR is helpful in online shopping because by trying on products, you can see if a particular colour or cut fits you (Table 1) (similarly to Iisnawati *et al*., 2022; Abed, 2021; Ebrahimabad *et al*., 2024). The use of AR among Polish women was also viewed through the prism of saving time. On the other hand, Polish men were more likely to emphasise

Table 1. Performance expectancy and AR's use in online shopping: Study results

Performance expectancy		
Country	Women	Men
Poland	PW5: "I think it's beneficial that we can already, at least virtually, adjust the shape of the frame and answer the question of whether we want one or the other." PW2: "I agree that virtual fitting is helpful in this first choice." PW1: "I agree that it's essential to save time…" PW5: "It was a time-saver. Even if we went to a stationary shop after trying them on virtually, we would already know what kind of glasses we wanted and wouldn't waste time." PW1: "It would be nice if there were such an opportunity to see ourselves if, for example, a certain colour suits us, if it suits our complexion if the colours aren't too strong or too bright, so I think it's a very cool opportunity to try things on online."	PM4: "I think I would probably use it sooner or later because, with glasses, I always have this problem that I have to try on quite a few pairs before I find a good one." PM2: "I think it's important to see how you look in glasses, so this technology is helpful in the decision-making process. However, for me, it will be an add-on. I am unlikely to make a final purchase decision based on the benefit of trying them on."
South Korea	KW2: "…It's not perfect, but it definitely helps me decide. You can see if the frame is the type you want." KW1: "For me, convenience means not having to go out of my way and being able to save time since I don't have to go out." KW3: Yeah, I think it is convenient and doesn't need to be costly.	KM1: "Looks good; I like it. They look like normal sunglasses." KM2: "I'd like to use this tool for sunglasses, clothes, etc. Being able to try them on virtually is really beneficial." KM1: "I find it convenient because instead of going to the shopping mall to try on sunglasses, I can use AR technology at home."
The United States	AW1: "For me, I want to make sure that it's going to match my skin tone and that it's going to fit my face shape." AW3: "Yeah, for me, I would say the benefit of probably using this approach to purchase glasses would be saving time, not having to run to the store to sit there [and] wait…"	AM2: "…it's just that it would save you lots of time from, say, like, going to the store and trying, like, getting things for yourself."

Abbreviations, *e.g.* PW1 – participant no. one in the Polish focus group of women, etc.; KW2 – participant no. two in the Korean focus group of women; AW1 – participant no. one in the American focus group of women; PM4 – participant no. four in the Polish focus group of men; KM1 – participant no. one in the Korean focus group of men; AM2 – participant no. two in the American focus group of men.
Source: own study.

convenience (as Slyke *et al*., 2010) and the lack of need to leave the house to shop for items that fit their needs (interestingly, Polish women indicated this feature as a concern and a risk that AR would contribute to people stop leaving the house). Polish men also indicated that AR is a useful option, but they would be more likely to make the final decision in a stationary store when searching for products.

Korean women pointed to the convenience of not leaving home (as did Polish men) and the low cost of using AR online (Table 1) (as Slyke *et al*., 2010). On the other hand, Korean men emphasised that the glasses they tried on look like standard glasses and that AR can benefit clients (Ebrahimabad *et al*., 2024). Like Polish men, Korean men also indicated that using AR was beneficial because they did not have to leave their homes. American women (like Polish women) emphasised that by using AR, they expected to see if a product (such as glasses) would fit their face, skin colour, etc. (similarly to Iisnawati *et al*., 2022; Abed, 2021). American men indicated time-saving as one of the motivators for using AR in online shopping.

Effort Expectancy

Effort expectancy refers to the degree of ease of use of a new technology as perceived by users. If a technology is easy to use, customers are more likely to accept and use it more often. In other words, effort expectancy may be perceived as the effort individuals believe they need to expend to use the technology effectively (Venkatesh *et al*., 2003; Paulo *et al*., 2018; Zhang & Yao, 2023). Polish women and men emphasised that AR in online stores is easy to use. Similarly, Korean and American women and men indicated the ease of using AR to try on glasses in an online store (Table 2).

Table 2. Effort expectancy and AR's use in online shopping: Study results

Effort expectancy		
Country	Women	Men
Poland	PW1: "Also, it's very easy to use."	PM3: "Nothing is complicated here; it is easy to use." PM1: "Everything was intuitive, easy to find, and no major problems existed." PM2: "I didn't have any problems either. It is a simple, intuitive tool." PM5: "In terms of effort, well, practically none."
South Korea	KW2: "It is quite easy to choose the glasses and try it on…"	KM1: "This saves time and effort. It motivates me to use products from companies that offer this technology."
The United States	AW3: "…Pretty much was very similar to me having to try it in person, looking in the mirror."	AM1: "It activated pretty quickly...I would say that's pretty intuitive." AM2: "…it's extremely easy to use."

Source: own study.

Hedonic Motivation

Hedonic motivation is one motive for using new technology. It is perceived as a pleasure, enjoyment, positive feeling, and satisfaction for users of new technology (Arghashi, 2022; Pathak & Prakash, 2023; Ebrahimabad *et al*., 2024). Polish women were emphasised that AR does not have a wow-effect on them, as they know and use similar filters on Instagram or Snapchat (Table 3). On the other hand, Polish men showed much more enthusiasm and amusement about using AR. Similarly, Korean women indicated that AR does not bring them much hedonic value, as they are familiar with it from other apps. However, Korean women also showed that AR can be fun with friends. Of all the focus groups, American women were the most enthusiastic about using AR technology. On the other hand, American men appeared to be the most reticent users, which may have been due to familiarity with similar social media filters (*e.g.* Snapchat).

Table 3. Hedonic motivation and AR's use in online shopping: Study results

Hedonic motivation		
Country	Women	Men
Poland	PW2: "It's less fun because we use filters often, so we're used to it. It doesn't have that wow effect, but it's fun."	PM4: "I have to say that I was generally happy when trying on the glasses because it worked very well." PM2: "I really enjoyed the opportunity to try on different glasses. Furthermore, who knows, maybe I'll get some for a present." PM5: "It was a pleasant emotion, such an element of fun. Very positive feelings."
South Korea	KW1: "I think it's fun. Not very much fun, but when I, you know, it's because I think it's because I am alone now. However, when I try it with my friends or someone more likely to enjoy it, I can enjoy more things from the AR program." KW2: I think I agree. Maybe the first pair was fun because it was like, oh, something new I could do, but then it was just normal that I could try it."	KM2: "I would consider buying a few glasses; it is fun."
The United States	AW1: "I find it fun." AW3: "Yeah, I thought it was fascinating because I've never used this approach before, and I thought it was… It worked. I was surprised by how well the technology actually worked the software." AW2: "I thought it was pretty cool."	AM3: "Yeah, it's kind of interesting, and it's like a novelty to see yourself with these glasses on, but it's not something I would probably voluntarily do." AM2: "I feel pretty normal to something like that now. Like just due to the amount of like filters and everything." AM1: "I think it's interesting. It's one of those things I've seen like going back to like most of us; we grew up around like or experienced with Snapchat when a lot of those filters first really started coming out."

Source: own study.

AR-driven Purchase Risk

We may define AR-driven purchase risk as consumers' concerns about the accuracy, reliability, and authenticity of the information provided through AR that could impact their buying decisions (Mombeuil, 2020; Bonnin, 2020; Qin *et al*., 2024). Some Polish women stressed that a product tried online may look different than it does in real life, and from this point of view, using AR in online purchasing decisions may be risky (women expressed similar concerns in the Korean and American groups) (Table 4). American men expressed a similar opinion indicating that AR may not be effective because things we like online may not fit in real life. Referring to AR-driven risk, Polish men mainly emphasised the inability to see what the product's material looks like and other technical aspects of the product. Noteworthy, Polish women indicated that using AR in online shopping may be risky in the long run, as we will stop leaving the house and become reluctant to talk to people, make new contacts, etc.

Data Privacy Risk

Scholars perceive data privacy risk as apprehensions about privacy and security, primarily related to personal data collected and used by AR during purchasing (*e.g.* Gao *et al*., 2015; Bonnin, 2020; Dacko, 2016; Qin *et al*., 2024). Women in all focus groups indicated the need to share their faces and the environment of their surroundings when using AR in e-commerce (Table 5). They also pointed to a lack of knowledge regarding what happens later with this data, how it is stored, who can use it, and how and in what way. Men in all focus groups represented a similar stance. Polish men indicated the risks of collecting shared data. As part of this risk, Korean men spoke of concern about digital crime and also emphasised the need to pay attention to the various types of consent when using AR.

Table 4. The AR-driven purchase risk and AR's use in online shopping: Study results

AR-driven purchase risk		
Country	Women	Men
Poland	PW1: "I think people will not leave the house using augmented reality. They will sit at home in front of the computer, checking everything and looking for product information. Staying at home and not having to leave the house is a bit of a threat to all of us." PW5: "I think that the one major drawback is the possibility that, for example, we might like something on the internet, and then, in reality, it might look different. And then I would be disappointed."	PM3: "The risk may be how efficient this algorithm of reading facial features is because it determines whether the product will be as it is on the visualisation." PM4: "If I'm trying on glasses, for example, the moment they're going to be the same shape and colour as the ones I'm actually going to buy, it can be a problem to represent how they shine, how the reflections look, or, for example, whether they are wooden, metal, or plastic. As far as I can see, they are not possible with such animations and the use of such computer-generated objects." PM1: "I would be afraid of the colour reproduction because I don't see a problem with white or black; it's with more green or yellow colours that it could get messy."
South Korea	KW1: "I think it's because technology has not developed so much. So there is something like I can try sunglasses on my face, but they don't fit my face at all sometimes, and they're different from reality."	—
The United States	AW1: "I think the glasses could probably make it look better than in reality. When you're looking at glasses in person, you see what you get…"	AM2: "However, it's whether or not those things will be fair or work the way you want them to. The amount of money that you would be spending on it, because if you spent on spending the money on it and you got your product and it doesn't work for fit like the way that you want it to because you, uh, things that it would just because of the image and it just yeah, I don't think it's efficient right now."

Source: own study.

Table 5. Data privacy risk and AR's use in online shopping: Study results

Data privacy risk		
Country	Women	Men
Poland	PW5: "I would like to emphasise the risks mentioned in connection with releasing our image." PW2: "The risk of sharing images from the flat might be important for someone with more valuable things." PW3: "I am at significant risk of creating dip fakes as my image will be shared."	PM4: "There is some risk… there is about the storage of these recordings". PM2: "I would identify the issue of data protection more as a challenge of this technology."
South Korea	KW2: "I think it's like with data storage… Who has access to that?" KW1: "Security things like sharing more data are not necessarily well protected."	KM2: "I think there could be issues with digital crime." KM1: "I do pay attention to the basic agreement or terms of use before agreeing to use such tools."
The United States	AW2: "I immediately thought of the risk of somebody hacking your camera, and that's what I was thinking, being safe online." AW1: "Yeah. How private is AR going to be? How can we ensure that our data, what we have in our home, our face shapes and all that isn't being used?"	AM1: "I have to look at it from more of a cybersecurity risk perspective…". AM2: "You don't know who's getting access to this and what they're doing with this information. Personally, I don't particularly appreciate using or giving access to my data to any online company when I can, so that's my biggest concern. It's just security as well."

Source: own study.

CONCLUSIONS

The AR technology has the potential to transform retail further, offering new ways to attract and engage customers. By facilitating the online shopping experience, AR can stimulate consumption and contribute to retail growth (Dogra *et al*., 2023; Xu *et al*., 2024). Companies that successfully integrate these technologies into their business models can gain a competitive advantage in the marketplace. However, the use of AR technology in e-retailing is conditioned by several determinants and also brings with it many questions and concerns related to cyber security (Kumar, 2022; Huang, 2023; Zheng & Li, 2023; Qin *et al*., 2024). Knowing the elements that positively and negatively impact AR technology's use in online shopping decisions can help companies improve it and conduct an information campaign about its capabilities and advantages among potential customers.

Referring to the main study's objective of gender influence on individual factors of AR technology use in e-commerce and based on MAXQDA and qualitative analysis, we should note that in terms of:

- performance expectancy, both genders indicated it as an essential factor. Male respondents mainly emphasised the advantage of AR: they do not have to leave home, and using AR saves them time (Korean women also indicated this advantage). Women mainly emphasised that they could check if the glasses' colour and shape fit their faces. Matching the colour scheme for women is a plus, while men may find it challenging and indicated AR-driven risks. It is also interesting to note that the lack of need to leave home for male groups is a motivator and advantage of AR use. In contrast, for Polish women, the lack of need to leave home was considered in the area of risks associated with sitting at home and losing the ability to talk and build relationships with others. This is a new aspect that has been indicated in research on the use of AR in online shopping. As part of the similarities, it should be noted that almost all groups indicated that using AR in e-commerce could save time;
- the effort expectancy, all respondents, regardless of gender and background, indicated that using AR in online shopping (using glasses as an example) is very simple and intuitive. However, men emphasised this much more clearly and emphatically;
- hedonic motivation, in the Polish and Korean groups, men generally indicated greater enjoyment from using AR and emphasised the possibility of fun. On the other hand, Polish and Korean women emphasised that they were familiar with this type of filter and that it was not great fun (Korean women emphasised that it could be fun in a group of friends but not alone). Moreover, AR can be fun for women but for the first use. On the other hand, in the American group, the situation was the opposite, with American women showing greater hedonic motivation compared to men. In addition, American women showed the most enthusiasm for AR use in online shopping among all groups, while American men showed the least enthusiasm;
- AR-driven purchase risks, the most common concern within this area was that the product purchased online using AR may, in fact, be different. This opinion was prevalent among both men and women, *i.e.* we may consider that this type of risk does not depend on gender;
- data privacy risks, all people in the surveyed groups, regardless of gender, emphasised concerns about using AR when trying on and shopping online. Nevertheless, women were much more concerned about personal data sharing, their images and photos of their houses than men. Women expressed particular concern about what would happen to the data but paid little attention to the need to read the terms and conditions. Men were more likely to pay more attention and caution to the terms and conditions we agreed to when using AR online as part of this risk.

The above conclusions respond to the research questions formulated before the empirical study. Concerning the role of gender in impacting the motives and risks connected with consumers' use of AR technology in online shopping decisions, it should be mentioned that gender differentiates motivation more than risk.

Interestingly, there was no significant difference among participants from different countries and cultures during the study, possibly due to their age (Bartosik-Purgat *et al*., 2022). The young consumer segment is often characterized by similar needs and skills regardless of which culture they come from. This is often influenced by access to the internet, social media, and mobility, through which they learn

about other countries, cultures, customs, and behaviour. However, cultural factors can influence hedonic motivation, particularly in groups of women. For example, for the American women who participated in the study, the use of AR was the most enormous fun (they spoke with great enthusiasm and joy about using AR while shopping). On the other hand, Korean women indicated the possibility of fun and positive emotions associated with using AR in a group of friends or acquaintances, not alone. On the other hand, Polish women said that this does not constitute a wow-effect for them, as they know such filters from Instagram. Cultural factors that may influence these differences relate to the indulgence-restrained and individualism-collectivism dimensions and factors, among others (Hofstede *et al*., 2010). The group and functioning within a group of friends, family, colleagues, etc., plays a particular role in collectivist cultures, of which South Korea is one. Concerning the indulgence-restrained dimension, Poles are the most pessimistic of the countries studied. At the same time, Americans view the world optimistically (Hofstede *et al*., 2010), which may be reflected in the results obtained and differences in the women focus groups.

Implications

The results obtained in the study have significant theoretical and practical implications. Regarding theoretical application, the findings show the significant role of gender and cultural factors as moderators in models concerning the acceptance of new technologies on the international market. Regarding the practical implications, we should emphasise that adapting to the preferences of different demographic groups concerning gender can increase the effectiveness of marketing efforts and improve sales performance (Alesanco-Llorente *et al*., 2023). Retailers can use these differences when implementing AR technology and planning their marketing strategies. For example, marketing campaigns targeting women can focus on the practical benefits of AR, such as time savings and shopping confidence, while campaigns targeting men can emphasise the modernity of technology and the convenience of not having to leave home while shopping.

Limitations and Future Research

The study has various limitations related to, among other things, the selection of participants and the language. The selection was purposive, considering the sampling criteria. However, this may have influenced the fact that the selected persons may not have characteristics representative of the segment. That is why the results cannot be generalised to the whole population. Furthermore, in the Korean group, we conducted the discussion in English, which may have affected the freedom of expression of the Korean participants. Moreover, we may also see the study's limitations in the context of an insufficient number of country focus groups (indeed, more interviews should have been conducted with both women and men). Any limitation of a particular study may set the stage for further, in-depth analyses. Certainly, in the case of this study, the challenge of surveying the number of focus groups in each country or expanding the spatial scope of the study to include other culturally diverse countries is worthwhile. It is recommended that random selection be used to obtain representative results that can be generalised to a specific consumer population or segment. Moreover, it would be worthwhile to try to interview each cultural group in the participants' native language, which will undoubtedly impact more detailed statements and greater participation in the discussion. We can also apply the presented research findings to quantitative representative studies in different countries and use them to prepare the research instrument.

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Acknowledgements and Financial Disclosure

This research was partially funded by the National Science Centre (Poland), grant no. 2022/47/B/HS4/00448, titled "Determinants of young consumers' acceptance of the use of augmented reality in e-commerce—a cross-cultural perspective."

This research was partially supported by funds granted by the Minister of Science of the Republic of Poland under the „Regional Initiative for Excellence" Programme for the implementation of the project "The Poznań University of Economics and Business for Economy 5.0: Regional Initiative – Global Effects (RIGE)".

Conflict of Interest

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