

# Virtual Try-On Technology Acceptance in the Clothing Sector: the Moderating Role of Brand Type

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## Abstract

Advancements in e-shopping continue to introduce novel approaches and technologies to engage customers and enhance their experiences. Virtual Reality (VR) stands out as an emerging technology with promising applications that can enable tailored products and services, personalized marketing, and advertising strategies ultimately fostering customer satisfaction. Building upon the electronic Technology Acceptance Model (e-TAM) framework, this study investigates Virtual Try-On (VTO) technology's potential by exploring its effect on consumers' willingness to buy online. Our findings highlight that a higher acceptance of VTO technology strengthens positive attitudes toward VTO technology, thereby increasing online purchase willingness. Our study stresses the role of brand type in this relationship, suggesting a weaker e-TAM to attribute toward the VTO link for luxury brands compared to ordinary brands. This research charts avenues for future research and provides practical insights for managers and marketers in the retail and e-commerce sectors. It illuminates the multifaceted landscape of Virtual Try-On (VTO) technology's integration into the clothing sector, shaping trajectories for its effective utilization.

**Keywords:** Virtual Try-On Technology; Technology Acceptance Model; Ordinary Brand; Luxury Brand; Clothing Sector.

## 1. Introduction and hypotheses development

Digital Transformation (DT) represents a fundamental shift in how businesses operate and interact with their customers by leveraging cutting-edge technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data Analytics, Virtual Reality (VR), and Augmented Reality (AR). These technologies are instrumental in driving Business Model Innovations (BMIs) that can redefine entire industries and activities (Liu *et al.*, 2021; Schneider *et al.*, 2020).

From the internal perspective, DT catalyzes structural changes within organizations. According to Van Veldhoven and Vanthienen (2022), digital technologies foster a more dynamic organizational architecture, including flattening hierarchies and enhancing data-driven decision-making. Such transformations are crucial for faster response times and increased agility in business operations, enabling companies to better adapt to changing market conditions. Externally, DT enhances customer engagement and satisfaction by improving the digital customer experience. Lin and Lin (2023) emphasize that integrating advanced digital solutions, such as personalized AI-driven recommendations or IoT-enabled customer service, significantly enhances user interactions and service delivery, making experiences more seamless and responsive. More broadly, DT encourages the creation of innovative business models and new revenue streams. Woerner and Wixom (2015) highlight how digital platforms facilitate unique value propositions, like subscription models or on-demand services, that were not feasible before the digital era. These models not only diversify income but also provide customers with more flexibility and choice, thus enhancing business sustainability.

The practical application of these technologies is evident in the retail and e-commerce sectors. For instance, Amazon's introduction of the AR View feature, utilizing Apple's ARKit<sup>1</sup>, significantly enhances online shopping, by allowing customers to visualize products in their own space before making a purchase, thus overcoming the limitation of not physically interacting with products. Furthermore, collaborations like that between Amazon and Snapchat for virtual try-ons, as well as widespread adoption of Virtual Try-On (VTO) technologies by the cosmetics industry (e.g., Lancome, Maybelline), underscore how AR is revolutionizing the shopping experience. These innovations not only increase customer confidence in products but also drive sales (Yahong, 2021).

Moreover, these digital technologies enhance user experience and decision-making (Marcon *et al.*, 2022), also generating valuable insights into consumer preferences and behaviors, thus enabling tailored products and services, personalized marketing and advertising strategies ultimately fostering customer satisfaction and loyalty (Müller *et al.*, 2018).

Among these new digital technologies, Virtual Try-On (VTO) technology has received considerable attention from researchers (e.g., Zhang *et al.*, 2019; Bialkova & Barr, 2022; Chidambaram *et al.*, 2024). The previous literature defines Virtual Try-On technology as “interactive technologies that used 3D virtual simulation techniques to offer

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<sup>1</sup> <https://developer.apple.com/augmented-reality/>

*rotational properties, mix-and-match functionality, and 3D product display*” (Batool & Mou, 2023, p.2). According to Lee *et al.* (2020), these 3D virtual simulations create a comprehensive virtual reality, thus immersing individuals in virtual models within a computer-mediated setting (Lee & Xu, 2020).

In this context, the Technology Acceptance Model (TAM, Davis, 1989) remains the predominant model of user acceptance (e.g., Venkatesh, 2000; Hsiao & Yang, 2011). As stated by Davis (1989), the TAM considers two user perceptions as predictors of intention to use a given technology, namely the perceived usefulness (PU) and the perceived ease of use (PEOU) of the technology. Specifically, perceived usefulness relates to “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p.320); while perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p.320). The original TAM was adapted for an online context (e.g., Web site) by proposing the electronic Technology Acceptance Model (e-TAM) framework (Van der Heijden, 2000), which adds the perceived entertainment/enjoyment (PE) construct to explain the role of intrinsic motivation in the adoption of new technology (Davis *et al.*, 1992; Van der Heijden, 2004). As shown by Zhang *et al.* (2017) these three essential e-TAM components - perceived usefulness, perceived ease of use, and perceived enjoyment - significantly influence consumer attitudes and intentions towards online retailers.

Previous research has identified additional variables of the e-TAM. Kim and Forsythe (2008a), aiming to investigate the ability of online apparel shoppers’ use of VTO to reduce product risks and increase enjoyment in online shopping, added two relevant external variables - innovativeness and technology anxiety - to the original e-TAM. Through quali-quantitative research, the authors showed that both factors significantly moderate the relationship between attitude toward using VTO and intended use of VTO technology. Additionally, they provided evidence that there was no significant gender difference in the overall adoption process for VTO. Zhang *et al.* (2019) explored the impact of VTO technology on online consumers’ purchasing decisions and demonstrated that consumers’ attitudes toward VTO technology significantly influence their intentions to purchase clothing online, with effects moderated by perceived usefulness, enjoyment, and privacy risks. Hwangbo *et al.* (2020), focusing on the clothing sector, investigated the impact of VTO technology on online sales by using actual data in a case study on L Brands<sup>2</sup>, collecting customer data and sales data from June 1, 2017 to August 13, 2017. They found that the use of VTO increases the average sales value per customer and significantly reduces return rates, presumably by filtering out incorrect size and fit choices (Hwangbo *et al.*, 2020).

Finally, recent research (e.g., Chidambaram *et al.*, 2024) adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. According to the literature (e.g., Venkatesh *et al.*, 2003; Chang, 2012), the UTAUT framework proposes four principal factors affecting the intention and usage of new technology: *i*) performance expectancy, assessing the perceived benefit in job performance from using the technology; *ii*) effort expectancy, gauging the ease of technology use; *iii*) facilitating conditions, evaluating organizational and technical support for technology use; *iv*) social influence, measuring the perception of others’ encouragement to adopt the new technology. Using the UTAUT to explain consumers’ technology adoption, Chidambaram *et al.* (2024) provided evidence that attitudes towards VTO act as a mediator between perceived usefulness and consumers’ online shopping behavior. Additionally, they also demonstrated that perceived risk and enjoyment respectively negatively and positively moderate the impact of perceived usefulness on c attitudes toward VTO. Despite significant attention to the above-mentioned constructs, to our knowledge, there is a lack of empirical evidence on the role of brand type in the relationship between e-TAM and consumers’ behavior. Thus, this study attempts to bridge this gap by answering the following research question:

**RQ:** *what role does the type of brand (luxury vs. ordinary) play in the relationships between the electronic Technology Acceptance Model (e-TAM) and consumers’ behavior?*

Previous literature often distinguishes between luxury and ordinary brands, by referring to aspects such as status, exclusivity, aspiration, quality, and experience (Phau & Prendergast, 2000; Atwal & Williams, 2009; Kapferer, 2017). Vickers and Renand (2003) conceptualized these brand types across operational, experiential, interactional, and symbolic dimensions. Consequently, the concept of luxury brands and their impact on consumption have been an interesting research topic (Sharma *et al.*, 2020), with studies investigating consumer behavior (e.g., Tynan *et al.*, 2010; Godey *et al.*, 2016) and purchase intention (Park *et al.*, 2021). Specifically, regarding online shopping, Rahman *et al.* (2023) suggested that luxury brands should leverage AI-powered digital assistance technologies, such as chatbots, machine learning, and voice recognition, to enhance consumer responses. However, no studies have yet considered what happens when VTO technology is used. Therefore, based on previous evidence, we maintain that the three

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<sup>2</sup> <https://www.lb.com/>

principal dimensions of the e-TAM (i.e., perceived usefulness, perceived ease of use, and perceived enjoyment) collectively positively influence consumers' behavioral intentions with attitude towards VTO technology acting as a mediator. Moreover, we argue that brand type (luxury vs. ordinary) negatively moderates the relationship between the e-TAM and attitude towards VTO technology. According to signaling theory (e.g., Spence, 1978) and costly signaling theory (e.g., McAndrew, 2021), individuals are often willing to pay a premium price for conspicuous products, such as luxury brand-labeled clothing, because these products signal social status. Building upon the evidence of Nelissen and Meijers (2011) regarding the importance of social status and social interaction in consuming luxury brand-labeled clothes, we believe this aspect also extends to the purchase phase of luxury products. While the use of VTO technology generally improves the online shopping experience, its impact may be less pronounced for luxury brands, where the social signal during purchase also holds significant importance. Specifically, we maintain that for luxury brands, the positive relationship between the e-TAM and attitude toward VTO technology is weakened; conversely, for ordinary brands, this relationship is more significantly positive. Formally:

**H<sub>1</sub>:** e-TAM is positively related to consumer's willingness to buy.

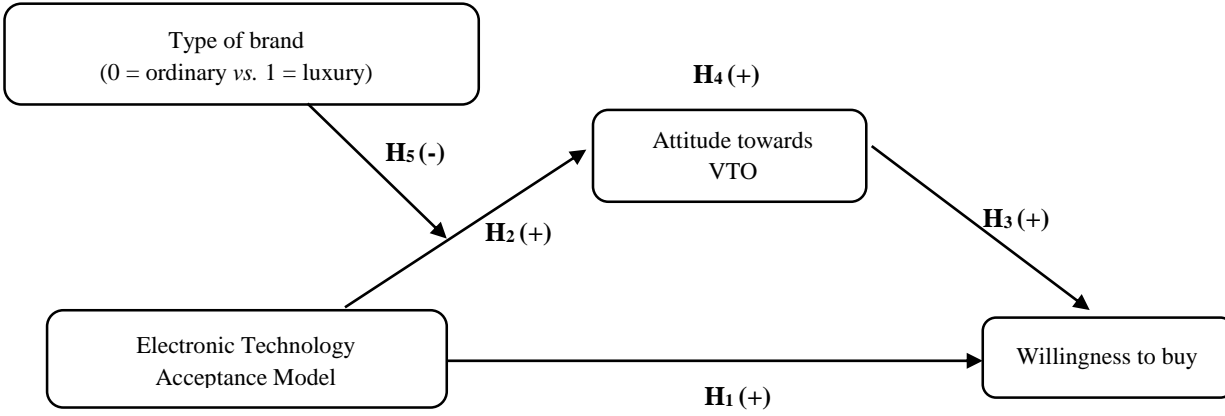
**H<sub>2</sub>:** e-TAM is positively related to attitude towards VTO technology.

**H<sub>3</sub>:** Attitude towards VTO technology is positively related to consumer's willingness to buy.

**H<sub>4</sub>:** Attitude toward VTO technology mediates the relationship between e-TAM and consumer's willingness to buy.

**H<sub>5</sub>:** Brand type (ordinary vs. luxury) negatively moderates the relationship between the e-TAM and attitude towards VTO technology.

The conceptual model showing these relationships is presented in Figure 1.



**Figure 1.** Conceptual model

## 2. Methodology, sample, and measures

Quantitative data were collected through an online survey on the Qualtrics software platform from a convenience sample. A total of 234 Italian participants (55.6% female,  $M_{age}=38.38$ ,  $SD_{age}=14.78$ ) took part in a 2 (Brand type: ordinary vs. luxury)  $\times$  1 single factor between-subjects experimental design. In particular, by considering the clothing sector, participants were randomly assigned to one of two experimental conditions representing one stimulus for the ordinary brand (i.e., Zara®), and the other for the luxury brand (i.e., Valentino®).

Then, after stimuli exposure, we administered our variables. Specifically, constructs were measured on a seven-point Likert scale ("1"=strongly disagree; "7"=strongly agree) using validated scales from previous studies. The principal dimensions of e-TAM were captured by Kim and Forsythe's scale (2008b). Specifically, perceived usefulness (PU) was measured using four items scale (reliability coefficient Cronbach's alpha of .94). Perceived ease of use (PEOU) was assessed through a three items scale ( $\alpha=.91$ ). Perceived enjoyment (PE) was measured using four items scale ( $\alpha=.95$ ). Attitude towards VTO was measured through a four items scale by Chidambaram *et al.* (2024), with a Cronbach's alpha of .87. Finally, consumer's willingness to buy was measured using three items scale by Dodds *et al.* (1991 - "1"=very low; "7"=very high), with alpha of .92 (see Table 1 for details). Consistent with common practices in the literature (e.g., Diamantopoulos *et al.*, 2012), scores of each construct were averaged to derive a unidimensional value, including an average e-TAM score ( $\alpha=.81$ ).

**Table 1.** Measurement items, sources, and reliability of study instrument

Variables	Measurement Items	Source	Cronbach Alpha
Perceived usefulness of VTO (PU)	VTO improves my online shopping productivity.	Kim & Forsythe (2008b)	$\alpha = .94$
	VTO enhances my effectiveness when shopping online.		
	VTO is helpful in buying what I want online.		
	VTO improves my online shopping ability.		
Perceived ease of use of VTO (PEOU)	Using VTO is clear and understandable.	Kim & Forsythe (2008b)	$\alpha = .91$
	Using VTO does not require a lot of mental effort.		
	VTO is easy to use.		
Perceived entertainment value of VTO (PE)	Shopping with VTO is fun for its own sake.	Kim & Forsythe (2008b)	$\alpha = .95$
	Shopping with VTO is exciting.		
	Shopping with VTO is enjoyable.		
	Shopping with VTO is interesting.		
Attitude towards the VTO (ATT)	VTO would be of good experience	Chidambaram et al. (2024)	$\alpha = .87$
	VTO would be of superior feel		
	VTO would be of pleasant shopping environment		
	VTO would be interesting and worthwhile		
Willingness to buy (WTB)	The likelihood of purchasing this product is	Dodds et al. (1991)	$\alpha = .92$
	The probability that I would consider buying the product is		
	My willingness to buy the product is		
Electronic Technology Acceptance Model (e-TAM)	Perceived usefulness of VTO (PU)	Authors' proposal	$\alpha = .81$
	Perceived ease of use of VTO (PEOU)		
	Perceived entertainment value of VTO (PE)		

### 3. Results

To test the direct hypotheses ( $H_1$ ,  $H_2$ , and  $H_3$ ) and the mediation hypothesis ( $H_4$ ), we employed Hayes (2017) PROCESS MACRO (Model 4). The analysis yielded a significant total effect of e-TAM on consumers' willingness to buy ( $\beta=.64$ ,  $t=7.41$ ;  $p<.000$ ) with a 95% bias-corrected confidence interval (BCCI) from .47 (LLCI) to .81 (ULCI). The model explains 55.3% of the variance in the consumers' willingness to buy because of e-TAM ( $R^2=.553$ ;  $F(2,231)=143.16$ ;  $p<.000$ ), thus supporting Hypothesis 1. Similarly, e-TAM significantly and positively influenced attitude toward VTO ( $\beta=.85$ ;  $t=20.56$ ;  $p<.000$ ). The model explains 64.6% of the variance ( $R^2=.646$ ;  $F(1,232)=422.58$ ;  $p<.000$ ), supporting Hypothesis 2. Hypothesis 3, that attitude towards VTO is positively related to consumers' willingness to buy, was supported by a significant positive regression coefficient ( $\beta=.25$ ;  $t=3.10$ ;  $p<.001$ ). Finally, also hypothesis 4 was confirmed, showing that attitude towards VTO mediates the relationship between e-TAM and consumers' willingness to buy. The indirect effect was .22, with a 95% bias-corrected bootstrap confidence interval based on 5,000 resamples of [.09; .36]. These results reinforce the previous literature by demonstrating that a greater acceptance of VTO technology enhances consumers' purchase intentions through a more positive attitude toward VTO technology.

The critical aspect of the conceptual model is testing the moderating role of brand type. A moderated-mediation analysis was performed. Results of the Hayes (2017) conditional mediation PROCESS MACRO (Model 7) showed that the direct effects model predicting consumers' willingness to buy accounted for 55.3% of the variance ( $R^2=.553$ ;  $F(2,231)=143.16$ ;  $p<.001$ ). Specifically, the results showed that e-TAM positively influenced the attitude toward VTO technology ( $\beta=.95$ ,  $p<.001$ ), which positively affected consumers' willingness to buy ( $\beta=.25$ ,  $p<.001$ ). Even when considering the attitude toward VTO technology, e-TAM still significantly influenced consumers' willingness to buy ( $\beta=.64$ ,  $p<.001$ ). Moreover, the results revealed a negative and significant interaction (e-TAM\*brand type;  $\beta=-.17$ ,  $p<.05$ ) in the direct path between e-TAM and attitude towards VTO technology. Specifically, the relationship between e-TAM and attitude towards VTO technology was stronger in the case of ordinary brands compared to luxury brands ( $\beta_{\text{OrdinaryBrand}} = .95$ ,  $t=15.22$ ,  $p<.000$  vs.  $\beta_{\text{LuxuryBrand}}=.78$ ,  $t=14.07$ ,  $p<.000$ ). These results supported Hypothesis 5. The indirect effects of e-TAM on consumers' willingness to buy via attitude towards VTO technology turned out to be statistically significant ( $\beta_{\text{OrdinaryBrand}}=.24$ ,  $SE=.07$ ,  $CI [.10; .39]$  vs.  $\beta_{\text{LuxuryBrand}}=.20$ ,  $SE=.06$ ,  $CI [.08; .32]$ ). Finally, to further verify whether the indirect effect is affected by brand type, we tested whether the bootstrapped confidence interval of the moderated mediation index contained zero. The moderated mediation effect was confirmed as significant and negative, with a confidence interval not including zero ( $\beta=-.04$ ,  $SE=.02$ ; 95% bias-corrected CI  $[-.10, -.00]$ ). Therefore, our results validate that brand type moderates how e-TAM affects consumers' willingness to buy through their attitude toward VTO technology.

### 4. Conclusion and implications

This study aims to extend the understanding of how the electronic Technology Acceptance Model of the VTO affects consumers' willingness to buy online. Consistent with prior research (e.g., Zhang et al., 2019; Hwangbo et al., 2020;

Chidambaram *et al.*, 2024), our results highlighted that a greater acceptance of VTO technology enhances attitude toward the VTO technology, thereby increasing online purchase willingness. More importantly, our study stressed the relevant role of brand type in this relationship, suggesting a weaker e-TAM-to attribute toward the VTO link for luxury brands compared to ordinary brands.

Theoretically, this study enriches the e-TAM model, widely used in studies of customer adoption of new technologies (e.g., Davis *et al.*, 1992; Van der Heijden, 2004; Zhang *et al.*, 2017) and contributes to the literature on signaling theory, particularly regarding how luxury brands convey social status (Nelissen & Meijers, 2011). From a managerial point of view, the results suggest the need for nuanced strategies in marketing luxury brands, which may benefit more from in-store experiences to enhance the shopping experience and status signaling. Conversely, the study suggests that ordinary brand retailers leverage digital strategies aligning with the enhanced online shopping experience provided by VTO technologies. This is particularly effective in boosting willingness to buy, highlighting significant opportunities for ordinary brand clothing retailers to integrate VTO technology into their online platforms. Future research endeavors could address the limitations identified in this study. Firstly, given the current study's exclusive focus on Italian participants, broadening the participant pool to include individuals from diverse cultural backgrounds could significantly enhance the generalizability of findings. Secondly, to establish causality, future investigations could benefit from a longitudinal data approach among luxury brand customers across multiple countries. Third, this study was limited to the clothing sector. Future studies may consider different sectors (e.g., furniture or cosmetics) and consider also personal variables such as consumers' need for touch (NFT – Peck & Childers, 2003; Zheng & Bensebaa, 2022). Finally, as the research solely relied on self-reported data, there is a potential for the findings to be influenced by participants' subjective perceptions. Thus, addressing this limitation might involve incorporating multiple data sources to validate self-reported information.

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