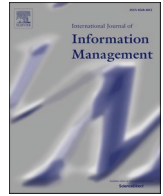




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The effect of positive TRI traits on centennials adoption of try-on technology in the context of E-fashion retailing

Zainah Qasem

Marketing Department, Jordan University Business School, The University of Jordan, Amman, Jordan

ARTICLE INFO

Keywords:

UTAUT2

Technology Readiness Index

Centennials

Generation

ABSTRACT

To provide a more realistic experience, e-retailers have implemented virtual try-on systems. It is, therefore, important to examine the variable that influences customers' intention to use try-on technologies when online shopping for apparel. The main aim of the current study is to identify and examine the design and individual characteristics that influence centennials to adopt virtual try-on systems. Factors extracted from the UTAUT2 model and technology readiness were proposed in the current study model, which was empirically validated based on data collected from 315 participants. The main results of structural equation modeling largely supported the significant role of "optimism" and "innovativeness" in performance expectancy and price value. Behavioral intention was also predicted by all the factors of UTAUT2 apart from effort expectancy. These results provide a guideline for online retailers on how to communicate with their centennial customers to influence them to adopt try-on technology.

1. Introduction

Apparel and fashion e-retailing is an increasingly booming sector. It is expected that the worldwide revenue of this sector will achieve a stable yearly growth rate from \$481.2 billion in 2018 to \$712.9 billion by 2022 (Orendorff, 2018). Low barriers have enabled more retailers to start selling their fashion products globally. In recent years, exclusively online apparel and fashion vendors, such as ASOS, have emerged (Wood, Coe, Watson, & Teller, 2019). Customers are progressively perceiving the internet as an additional channel for purchasing different types of products, including apparel and fashion products (Petit, Velasco, & Spence, 2019; Sebald & Jacob, 2018).

However, the online apparel and fashion retail sector is not growing as fast as other sectors, such as retailers of sporting equipment, technology, and DIY products (Customers, 2020). This is attributed to apparel being a high-involvement product (Blázquez, 2014). The inability to directly experience the product – by touching it and feeling it, and by trying it on – prevents customers from answering the critical questions about whether the item suits and fits (Moroz, 2019; Pachoulakis & Kapetanakis, 2012); this, in turn, negatively affects the purchase decision (Pantano, Reese, & Baier, 2017). Hence, it is a priority for apparel and fashion e-retailers to help customers answer these questions and to create a positive and enriched customer experience.

Advances in internet-related technology have provided retailers with

various solutions that can reshape their practices and allow consumers to experience shopping differently (Souiden, Ladhari, & Chiadmi, 2019). Retailers have utilized different technologies, among which are virtual try-on technology and virtual online fitting rooms, to overcome the online environment's limitations and enrich the shopping experience (Zhang, Wang, Cao, & Wang, 2019).

One example of this technology is three-dimensional virtual try-on systems (Moroz, 2019), which can be incorporated in platforms, such as retailers' website pages and mobile apps, to enable consumers to experiment with clothing in a virtual way (Sánchez-Ferrer, Pérez-Mendoza, & Shiguihara-Juárez, 2019). Using this technology, shoppers can adjust the angle from which to view the item, change the focus to zoom in on item features, and view the item in diverse colors (Yim, Chu, & Sauer, 2017), all on a 3D avatar that resembles the customer's body. Try-on technology has the potential to influence the shopping experience significantly by improving consumers' sensory perceptions (Yaoyuneyong, Foster, Johnson, & Johnson, 2016). It allows consumers to more realistically experience and gather sufficient information about retailers' products, to try on clothes virtually, to enjoy the shopping experience, and ultimately to have a very similar experience to that of trying the product in the physical store (Cho & Schwarz, 2012).

Some retailers such as Macy's and Gap have already invested in 3D virtual try-on technology and enabled their customers to investigate how the item looks on them by dressing an avatar representing the

E-mail address: z.qasem@ju.edu.jo.

<https://doi.org/10.1016/j.ijinfomgt.2020.102254>

Received 2 March 2020; Received in revised form 28 September 2020; Accepted 28 September 2020

Available online 22 October 2020

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customer. However, this technology is new to customers (Klarna, 2018; Moroz, 2019) and retailers. In Europe, retailers have described the process of adopting 3D virtual reality (VR) technology as a slow process; however, they have also shown great enthusiasm for investing in such as technologies (Sabanoglu, 2019). In the US, on the other hand, about 50 % of consumers have stated a lack of interest in using VR while shopping (O'Connell, 2020). Thus, there is a need to understand the factors that influence customers' decisions to adopt try-on technology.

Papahristou and Bilalis (2016) stated that try-on technology is not the future since it is already here. Hence, it is vital that researchers and practitioners understand virtual try-on technology and investigate how, through using the technology, utilitarian and hedonic value can be delivered to consumers, leading to the creation of rich shopping experiences (Lee & Kim, 2018). Furthermore, due to the crucial role that virtual try-on technology is anticipated to play in e-retailing, this study also investigates the variables that might affect customers' intention to adopt and use 3D virtual try-on technology when making online purchases of apparel and fashion in emerging markets such as Jordan and Gulf countries.

To explain the adoption of try-on technology, previous studies have commonly built on theories, such as the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT), and have focused on factors that represent computer system design (e.g., Kim & Forsythe, 2008), while ignoring individual differences and their role in technology adoption. Among these individual characteristics are personality traits like technology readiness, which could play a considerable role in shaping customer perception, intention, and behavior toward new technologies.

UTAUT2 was developed primarily to explain technology adoption in the consumer context (Venkatesh, Thong, & Xu, 2012). Therefore, the present study builds a model based on an extensive analysis of prior literature on information systems and digital marketing to investigate technology readiness, alongside other factors derived from UTAUT2, in relation to "Generation Z" consumers. Generation Z is described as a generation that values individual identity (Fontein, 2019), so studying individual differences, such as technology readiness role in adopting technology, is important when investigating try-on technology.

This research occurs during the Covid-19 pandemic, which has resulted in a significant (and often forced) shift towards e-retailing. Therefore, this research is expected to provide both the literature and the industry with insights into how to communicate with their future consumers, specifically the millennials who constitute the present and the future of e-retailing.

The rest of this paper is organized as follows. In Section 2, we discuss the literature relating to the main research question of this paper. The literature review will consider e-fashion shopping and e-fashion retailing, virtual reality and its relationship to fashion e-shopping, and the relevant theories of technology adoption. In Section 3, we introduce the developed research framework and the hypotheses. The research methodology and the analytical results are described in Sections 4 and 5. The findings are discussed from a theoretical standpoint in Section 6, while Section 7 presents limitations and suggestions for future research.

2. Literature review

2.1. Virtual reality context

VR technology is a form of interactive image technology that produces an experience similar to that of reality and stimulates innovative thinking and imagination (Yang & Xiong, 2019). VR technology allows consumers to view products in different colors and from different angles, and to change the zoom view (Zhang, Lv, Chen, & Jiang, 2020). Generally, there are two forms of VR. The first is the two-dimensional form that represents a 2D photograph of the outfit. The second is the three-dimensional form, which is also known as the 3D mannequin (Moroz, 2019). Virtual-try-on technology is defined as those platforms,

such as retailers' website pages and mobile apps, that allow the consumer to experiment with clothing in a virtual representation of the consumer (Sánchez-Ferrer et al., 2019). Virtual try-on technology is, therefore, considered a 3D form of VR.

Van Kerrebroeck, Brengman, and Willems (2017) stated that using VR increases the engagement of the human senses. Hence, interacting with objects in an immersive virtual environment provides customers with a similar experience to interacting with objects in the physical environment.

In the early twenty-first century, e-commerce has utilized VR to create an efficient and more realistic shopping experience by providing websites with VR interfaces (Brusilovski et al., 2000; Pizzi, Scarpi, Pichierri, & Vannucci, 2019). In this study, we focus on 3D try-on technology as an application of VR in apparel e-retailing.

2.2. Try-on technology within the fashion e-shopping context

Online apparel shopping provides customers with an efficient shopping experience in comparison to traditional shopping; however, it also deprives them of physical apprehension of products. To overcome this problem, e-retailers have resorted to virtual try-on technology (Ayush, Jandial, Chopra, Hemani, & Krishnamurthy, 2019). Such technology is used by many retailers to enhance the customer experience, advance product visualization, and offer sensory input to fashion e-shopping (Kim & Forsythe, 2008). It enables customers to use images of themselves and to dress virtual models with apparel and accessories (Baier, Rese, & Schreiber, 2015; Daponte, De Vito, Picariello, & Riccio, 2014; Rese, Baier, Geyer-Schulz, & Schreiber, 2017). Hence, the experience will become more meaningful and the customer will have sufficient information to enhance product evaluation and minimize associated risk.

Three-dimensional virtual modelling of clothing is the traditional method for providing precise control, geometric transformations, and physical constraints of clothing material (Ayush et al., 2019). However, according to another study, virtual fitting is not that easy, and 3D virtual prototyping in the apparel industry has been slow and complex. Recent image-based virtual try-on systems provide a more economical solution without resorting to 3D information, and they have shown promising results by reformulating the problem as one of conditional image generation (Papahristou & Bilalis, 2017). Also, factors such as privacy and security expectancies, previous experience with technology, and consumer innovativeness have affected customer intention to accept and use new technology (Margulis, Boeck, & Laroche, 2019). The slow movement and complexity of 3D virtual try-on technology in apparel context indicates a need to further investigate variables that affects adoption of this technology.

Yim et al. (2017) used two fashion products – sunglasses and watches – to assess how effective virtual try-on is as an e-commerce tool. Their results showed that virtual try-on positively influenced purchase intention by producing higher novelty, immersion, enjoyment, and usefulness, and that it enhanced the attitude toward online shopping for fashion products. Beck and Crié (2018) studied the effect on the intention to purchase resulting from try-on fitting rooms embedded on retailers' websites. They found that virtual try-on fitting rooms increased customers' intention to purchase products both online and offline. As the virtual try-on technology becomes more popular, more research is needed to understand what factors influence customers' intention to adopt this technology.

Rese et al. (2017) measured consumer acceptance of virtual try-on in marketing and retailing by using a basic TAM. The results reinforced the validity of the basic TAM. It also emphasized that both perceived ease-of-use and perceived usefulness influence online shoppers' intention to use virtual-try on technology.

Kim and Forsythe (2008) investigated customers' use of virtual try-on to decrease the risk of purchasing apparel and increase enjoyment when online shopping for apparel. The researchers applied a modified

TAM to understand the virtual try-on technology adoption process. The results of the proposed model showed that perceived ease-of-use and perceived usefulness have a positive effect on attitudes toward using virtual try-on technology, which in turn positively influenced attitudes toward using virtual try-on technology in the fashion context. Moreover, the positive attitude was reported to influence their intention to use virtual try-on favorably. Kim and Forsythe (2008) also emphasized the importance of consumer traits, such as technology innovativeness, which may directly affect intention to use virtual try-on irrespective of the shopper's attitude toward using it.

More recently, Zhang et al. (2019) demonstrated a relationship between customers' attitudes toward virtual try-on technology and their intention to purchase apparel online. The results of the proposed model, which incorporated TAM2 and perceived privacy risk, also supported a positive relationship between perceived usefulness, perceived enjoyment, and perceived privacy risk of using virtual try-on technology.

Huang and Qin (2011) examined user acceptance and adoption of virtual try-on technology by using an extensive model that combines the UTAUT model and perceived risk. Their results confirmed a significant effect of performance expectancy, effort expectancy, social influence, and perceived risk on online customers' intention to use virtual try-on technology. Like previous research on technology acceptance, Huang and Qin (2011) did not consider individual traits, focusing only on technology-related aspects.

2.3. Technology readiness and UTAUT2

Several models and frameworks have been developed to explain user acceptance by introducing factors that can affect user acceptance and adoption of new technologies (Taherdoost, 2018). Examples include the diffusion of innovation theory (Rogers, 2003) and the model of PC utilization (Thompson, Higgins, & Howell, 1991). However, a significant share of technology acceptance research has been built on TAM, TAM extensions (TAM2), and UTAUT (Maillet, Mathieu, & Sicotte, 2015; Qasem, 2014; Taherdoost, 2018).

While TAM has a very high prediction of technology acceptance and adoption in mandatory settings, it does not have the same significance in voluntary settings. Therefore, TAM2 was introduced with the inclusion of different constructs. For example, social constructs (e.g., subject norms), cognitive constructs (e.g., result demonstrability), and emotional constructs (e.g., enjoyment) were incorporated as antecedents to perceived ease-of-use and perceived usefulness to advance the predictive power of the model in voluntary settings (Taherdoost, 2018). However, the incorporated variables did not consider individual differences and their role in technology acceptance.

The success of TAM and TAM2, as well as that of other models and theories, in explaining technology acceptance and adoption behavior encouraged Venkatesh, Morris, Davis, and Davis (2003) to unify the IT acceptance literature and develop UTAUT as a holistic model that integrates the primary influencers of eight different models and theories to comprehend the factors influencing the adoption and use of technology (Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016). UTAUT consists of four fundamental variables – performance expectancy, effort expectancy, social influence, and facilitating conditions – that mirror TAM's main constructs of perceived usefulness and perceived ease-of-use (Holden & Karsh, 2010), as well as four moderating variables of gender, age, experience, and voluntariness of use. Like TAM, UTAUT contains constructs that focus on individual perception of a system's usefulness and its ability to increase productivity, as well as the ease by which an individual can learn to use the system in the work environment (Maillet et al., 2015). However, UTAUT failed to explain variables considered to be of high importance for the assessment of technology success, such as user satisfaction (Merhi, Hone, & Tarhini, 2019). To overcome these limitations, and to understand the voluntary use of new technology in the consumer context, Venkatesh et al. (2012) developed UTAUT2 as an extension to the original UTAUT. The new model

incorporates price value, hedonic motivation, and habit as additional constructs to the main model.

UTAUT2 was designed to deliver a rigorous framework for explaining technology acceptance and use, primarily in the consumer context (Venkatesh et al., 2012). UTAUT2 inspects the effect of external factors on an individual's cognitive response, affective response, and intention to accept and adopt new technology (Maillet et al., 2015). Compared to UTAUT, UTAUT2 improved the predictivity of behavioral intention and actual use of new technology (Rasmi et al., 2018), indicating that the theory is solid and well validated. Due to UTAUT2 being a robust and well-established theory that can predict individuals' acceptance and use of technology in a consumer voluntary setting, this paper will adopt UTAUT2 as the main theory to explain consumer acceptance and adoption of virtual try-on technology.

Compared to TAM and UTAUT, UTAUT2 does not consider the role that individual differences have on technology acceptance and adoption. The literature provides evidence supporting the active effect of individual traits and psychological factors. For example, Pramartari and Theotokis (2009) posited that individual traits, such as technology anxiety, affect an individual's attitude toward new technology. Kim and Shin (2015) also reported the importance of affective qualities (e.g., mood, emotions, feelings) as determinants of individual perceptions, cognitions, and behaviors. Hence, ignoring the personality traits and their effect on technology adoption may lead to a poor understanding of how people adopt the technology.

Technology readiness (TR) is a personality trait that measures an individual's orientation to technologies (Wang, So, & Sparks, 2017). Parasuraman (2000) introduced the Technology Readiness Index (TRI) as a multiple-item scale that can be used to evaluate and assess an individual's readiness to embrace and use new technologies for accomplishing goals in different contexts (e.g., home life, work life). To measure technology readiness, the TRI uses four personality traits that act as motivators and inhibitors: optimism, innovativeness, discomfort, and insecurity. Optimism refers to "a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives"; innovativeness relates to "a tendency to be a technology pioneer and thought leader"; discomfort refers to "a perceived lack of control over technology and a feeling of being overwhelmed by it"; and insecurity relates to "distrust of technology and skepticism about its ability to work properly" (Parasuraman, 2000, p. 311).

TRI motivators (optimism and innovativeness) represent variables that contribute to an individual's technology readiness; on the other hand, inhibitors (discomfort and insecurity) represent variables that weaken an individual's technology readiness (Parasuraman & Colby, 2015). Thus, individuals' openness to technology is determined by the relative strength of motivators and inhibitors. The stronger the individual score on motivators, the more he/she shows comfort using the technology, whereas the stronger the individual score on inhibitors, the less he/she shows comfort using the technology (Walczuch, Lemmink, & Streukens, 2007). However, each dimension is distinct, and individuals have varying combinations of these traits (Mishra, Maheswarappa, & Colby, 2018).

The association between TRI constructs and other acceptance models has been investigated in the context of work. For example, Walczuch et al. (2007) explored the relationship between TRI constructs and TAM constructs in the context of services, reporting a positive relationship between service employees' optimism, perceived ease-of-use, and perceived usefulness. Walczuch et al. (2007) also found a negative relationship between innovativeness and perceived usefulness. In more recent work, Alsyouf and Ishak (2017) emphasized the need to investigate the effect of TRI constructs on technology adoption in the medical context. In their conceptual paper, they proposed TRI variables as antecedents to effort expectancy and performance expectancy in UTAUT.

Following the literature, we propose incorporating TRI and UTAUT2 to improve the understanding of variables that affect VR acceptance and adoption. However, our research will not look at the negative aspect of

the TRI index (discomfort and insecurity). This is because millennials are aware of technology and very comfortable around it (Singh & Dangmei, 2016), so we assume that they have no discomfort or insecurity traits related to technology.

2.4. Centennials' characteristics

Centennials, also known as "Generation Z" (Llopis-Amorós, Gil-Saura, Ruiz-Molina, & Fuentes-Blasco, 2019), have distinctive characteristics that differentiate them from other generational cohorts. It is a digitally native generation that feels natural and at ease around technology (Singh & Dangmei, 2016). As a result, centennials extensively use communication technology and are constantly connected to the world (Priporas, Stylos, & Fotiadis, 2017) using different devices and technologies. With easy access to information, and having grown up around technology and technological innovations, centennials are characterized as impulsive and new challenge seekers. Hence, centennials are described as innovative (Wood et al., 2019) and as experience seekers who have a need to feel safe and to escape reality temporarily (Priporas et al., 2017).

Centennials are fashion-oriented and keen on customized fashion. However, they are also described as price-sensitive (Muralidhar, 2019). They are considered to be difficult customers who expect retailers to provide products at their comfort, but without showing any tendencies to be loyal customers (Priporas et al., 2017). Therefore, there is an added pressure on retailers to find a suitable way to cater to this cohort's needs. Centennials represent potentially important present and future customers of e-retailers. In particular, centennials' concerns about adopting shopping technology makes it very important for e-retailers and researchers to understand the personal and external variables that influence this generation's decision to adopt virtual try-on technology.

3. Conceptual model and hypotheses

Given the increasing call to investigate the effect of merging models with a focus on both computer system design and individual characteristics in the consumer context, this study provides a holistic model that combines personality-based and cognitive antecedents (Alsyof & Ishak, 2017) to explain centennials' adoption of try-on technology. To achieve our goal, we integrate both UTAUT2 and TRI to investigate consumer adoption of try-on technology in the apparel retailing context. The legitimacy of this integration has two foundations. First, UTAUT2 was developed from UTAUT to explicate customers' acceptance of new technology in the consumer context (Venkatesh et al., 2012); similarly, TRI was intended to explicate people's perception of technology in several fields (Alsyof & Ishak, 2017; Parasuraman, 2000). Second, Pocius (1991) stated that both computer system design and users' characteristics mediate the human-computer interaction.

UTAUT2 is notable for using system-related variables to explain customer adoption of new technology, whereas TRI focuses on personality characters to assess an individual's orientation to technologies. Hence, combining the models is expected to give a more holistic view of new technology adoption. Additionally, the association between TRI constructs and other TAMs has been investigated in the working context (e.g., Walczuch et al., 2007). Therefore, it is theoretically suitable to merge UTAUT2 with TRI to create a single model of empirical investigation to examine consumers' acceptance and adoption of try-on technology in the online apparel shopping context.

UTAUT2 proposes seven independent core variables: performance expectancy (PE), effort expectancy (EE), social influence (SI), price value (PV), hedonic motivation (H), habit (HB), and facilitating conditions (FC) (Venkatesh et al., 2012). However, in this study we focus on only four of these variables: PE, EE, PV, and HM.

Three UTAUT2 variables have been excluded: FC, SI, and HB. In both UTAUT and UTAUT2, FC is proposed in a model that considers the actual users and adopters of new technology, and the relationship and impact

of FC directly relates to actual adoption. The current study was conducted on potential users and examined the relationship of different variables on intention to adopt try-on as a new technology. Also, the main participants in this study were potential adopters who had not formulated an experience with the facilities, the technical support, or the tools pertaining to try-on technology. Hence, we decided to exclude FC from the proposed model.

The relationship between SI and behavioral intention has repeatedly been reported as insignificant in studies on technology acceptance in Jordan (e.g., Alalwan, Dwivedi, & Rana, 2017; Alalwan, Dwivedi, Rana, & Algharabat, 2018). One reason for this result is the vast experience of using technology among Jordanians. As Jordanians have become more experienced and familiar with technology, they are showing less interest in other people's opinions regarding adopting a new technology (Tahini, Alalwan, Al-Qirim, & Algharabat, 2018). As this study's sample is centennials who are native to technology, it is expected that SI has no impact on intention to adopt try-on technology. In addition, try-on technology is a self-service technology, so it is expected that people who would like to use it will largely depend on their own experience rather than on other people's experiences. In light of this, SI was excluded from the proposed model.

"Habitual" indicates that individual has already formed a habitual behavior in using the system. The present study's sample consisted of potential adopters who had not been validated as having formed such behavior. Venkatesh et al. (2012) reported a relationship between habitual behavior and actual behavior. Given this, the current study was conducted on potential users and examined the relationship of different variables on intention to adopt try-on as a new technology. Hence, HB was excluded from the proposed model.

Impact of UTAUT2 main constructs on the intention to use try-on technology in online fashion shopping

Performance expectancy is defined in UTAUT2 as an individual's belief that the new technology will aid him or her to achieve job performance (Venkatesh et al., 2003). It is expected that individuals who perceive new technology as beneficial will intend to adopt the new technology. Venkatesh et al. (2003) conceptualized performance expectancy as depending on related factors such as perceived usefulness (Davis, Bagozzi, & Warshaw, 1989) and relative advantage (Rogers, 2003). This construct has steadily been shown as a valid and strong predictor of behavioral intention (BI) in different fields (Alalwan et al., 2017; Lee & Wan, 2010; Qasem, 2014; Venkatesh et al., 2003, 2012). Try-on technology allows customers to try the outfit on an avatar that represents their own body, which will help customers to judge if they like the outfit and aid them in making the decision and eliminating any mistakes they might make when buying apparel and fashion products online (Van Kerrebroeck et al., 2017). This, in turn, makes users of such systems feel more productive and efficient in their shopping process, and it improves the retailer's sales efficiency.

Therefore, we assume a positive relationship between performance expectancy and the adoption of virtual try-on technology:

H1. Performance expectancy is positively related to the intention to adopt try-on technology in the fashion context.

UTAUT2 also postulates that effort expectancy – which is defined as the level at which individuals perceive the system as easy to use (Venkatesh et al., 2003) – has a positive relationship with intention to adopt and use new technology. The definition of effort expectancy suggests that the easier it is to learn how to use a specific technology, the higher the intention to adopt the new technology. Effort expectancy has similarities with TAM's ease of use construct (Venkatesh et al., 2003); hence, it also represents individuals' perceptions of how easy it is to invest effort in using the technology (Li & Xu, 2020). Generation Z is native to technology, so it is expected that they have dealt with similar technology in a different context (e.g., games and e-learning: Persada, Miraja, & Nadlifatin, 2019). As a result, it is expected that they only need to put minimal effort into learning how to use the try-on technology.

Hence, we assume a positive relationship between effort expectancy and intention to adopt try-on technology:

H2. Effort expectancy positively influences intention to adopt try-on technology in the fashion context.

In UTAUT2, hedonic motivation is conceptualized as the fun or pleasure that individuals experience from interacting with a technology (Venkatesh et al., 2012). Venkatesh et al. (2012) introduced hedonic motivation as a variable that, specifically in the customer context, impacts an individual's intention to perform a behavior. Apparel and fashion customers are expected to enjoy the process of using try-on technology (Erra, Scanniello, & Colonnese, 2018). For example, customers are expected to enjoy virtually trying on and comparing multiple outfits. Try-on technology in Jordan is considered a unique and novel application that can create an outstanding shopping experience and heighten the customer's experience of pleasure in using such an application. Therefore, it could be expected that customers who use try-on technology are more likely to have such a hedonic sense, and hence that they will be more motivated to use it.

Hedonic motivation has been reported to significantly affect behavioral intention in studies conducted in diverse contexts, such as m-shopping (e.g., Alalwan, 2020), mobile banking (e.g., Alalwan et al., 2017), and online shopping (e.g., Brown & Venkatesh, 2005; Van der Heijden, 2004). Hence, we hypothesize that there is a positive relationship between hedonic motivation and behavioral intention:

H3. Hedonic motivation positively influences intention to adopt try-on technology in the fashion context.

Price value is defined as individuals' rational trade-off between the expected benefit of using the system and the financial cost of using it (Venkatesh et al., 2012). In the consumer context, the financial cost has an important role in influencing the willingness of customers to adopt and accept new technology (Mallat & Tuunainen, 2008; Venkatesh et al., 2012). A recent study conducted by Alalwan (2020) found the significant impact of price value in the customer experience satisfaction with mobile food ordering applications.

Try-on technology is expected to lower online purchase risk, particularly when a customer explores how the item will look on him/herself before purchase. Therefore, we hypothesize that there is a positive relationship between perceived price and behavioral intention:

H4. Price value positively influences intention to adopt try-on technology in the fashion context.

3.1. TRI variables and UTAUT2

A person who possesses an optimistic belief toward technology thinks that new technologies are more controllable, flexible, and efficient (Parasuraman, 2000). The literature has established a relationship between optimism and functional factors such as perceived ease of use and usefulness of technology (e.g., Wang et al., 2017). Lu, Wang, and Hayes (2012) have stated that optimism positively affects technology functionality in consumer to consumer platforms.

Performance expectancy is defined as the individual's belief that the new technology will aid him or her to achieve job performance (Venkatesh et al., 2003). As a new advanced system, try-on technology is more likely to be perceived as a novel technology that enjoys a high degree of convenience and customization. Optimism also pertains to the customer's feelings that new technology could give him/her more flexibility in carrying out the shopping process at time and place of convenience (Pham, Nguyen, & Luse, 2018).

In the e-payment context, Acheampong et al. (2017) reported a positive relationship between optimism and perceived usefulness. Similarly, a positive relationship has been reported between optimism and perceived usefulness in passengers' adoption of airport self-service systems (Kim & Park, 2019). Accordingly, it could be argued that

customers with an adequate degree of optimism are more likely to perceive try-on technology as more efficient. Hence, we hypothesize a positive relationship between optimism and performance expectancy:

H5.1. Optimism has a positive influence on performance expectancy of try-on technology in the fashion context.

Effort expectancy represents the degree of ease the user associates with using a system (Venkatesh et al., 2003). Consumer behavior and reaction toward new systems are largely shaped by the extent to which the customer believes that the systems can provide more controllability of the shopping experience (Meuter, Ostrom, Roundtree, & Bitner, 2000; Parasuraman, 2000). Pham et al. (2018) stated that optimism affects how people perceive technology in terms of its ease-of-use. Jeong and Ha (2020) reported a positive relationship between optimism and ease of use in the individual's intention to use retail service robots. As a new advanced system, try-on technology is more likely to be perceived as more controllable and novel by optimistic individuals who tend to think that they can easily learn how to use it. Accordingly, it could be argued that customers with an adequate degree of optimism are more likely to perceive try-on technology as easy to use and expect to put less effort in using try-on technology. Hence, we hypothesize a positive relationship between optimism and effort expectancy:

H5.2. Optimism has a positive influence on effort expectancy of try-on technology in the fashion context.

Similar to many activities conducted in the online environment, online shopping is identified as a risky situation (Yıldırım, Arslan, & Barutçu, 2016). Individuals are expected to develop a level of stress while shopping online. This stress might be attributed to the risk of choosing an item that does not fit their figure or spending too much time on a failure purchase.

However, optimistic individuals are expected to cope with stress and decrease pessimism in general situations (Nguyen et al., 2018; Pathak & Lata, 2018). Several studies have reported a significant and positive relationship between optimism and positive feelings in various situations. Nguyen et al. (2018) and Pathak and Lata (2018) found that optimism allows individuals to cope with stress and to decrease pessimism in general situations. Similar results were reported by Mittal (2016) who found that optimistic individuals show fewer signs of stress while shopping online. Optimism has also been linked to experiencing a higher amount of positive emotions, such as happiness (Pacheco & Kamble, 2016). Therefore, we hypothesize a positive relationship between optimism and hedonism:

H5.3. Optimism has a positive influence on perceived hedonism while using try-on technology in the fashion context.

The financial cost of adopting a new technology is a significant concern for individuals when considering whether to adopt a new technology. Venkatesh et al. (2012) introduced price value as the consumer's reasoning about the perceived benefit of adopting a new technology and the financial cost of using it. Try-on technology is expected to lower the financial cost of online shopping. When using try-on technology, individuals are expected to save the money that would otherwise be spent on traveling to physical retail shops, to lower the risks of buying an apparel that does not fit and of losing time, effort, and money.

Optimism plays a dominant role in how people identify situations as risky (Schaupp & Carter, 2010). It is expected that an optimistic individual does not think that he/she is at risk, which indicates that cost is minimized and value is maximized; thus, it is expected that an optimistic individual will perceive price positively. Optimistic individuals are expected to perceive try-on technology as a means to lower the financial risks associated with choosing the wrong item (such as fees to return the item) as well as the costs of traveling. Therefore, we hypothesize a positive relationship between perceived price and optimism:

H5.4. Optimism has a positive influence on perceived price while

using try-on technology in the fashion context.

Innovativeness represents an individual's willingness to be a technology pioneer and to try new technologies (Parasuraman, 2000). It is expected that individuals who enjoy a high level of innovativeness are more likely to positively value the technology systems in terms of usefulness. Performance expectancy concerns the individual's perceived benefit of using a technology (Venkatesh et al., 2003). Innovative individuals tend to link not being able to use a new technology with losing potential benefit; hence, they value the usefulness of new technology (Walczuch et al., 2007). Try-on technology offers a number of utilitarian benefits, such as saving traveling time and effort. It also provides the flexibility of shopping at a convenient time. Hence, it is expected to be perceived as useful. Several studies have reported a positive relationship between innovativeness and perceived usefulness. Lin, Shih, and Sher (2007) found that innovativeness resulted in a higher perceived usefulness of e-services. Acheampong et al. (2017) reported a positive and significant relationship between innovativeness and usefulness in the e-payment sector. Since performance expectancy represents the functional part of UTAUT2 and resembles perceived usefulness of technology, we hypothesize a positive relationship between innovativeness and performance expectancy:

H6.1. Innovativeness has a positive influence on performance expectancy of try-on technology in the fashion context.

People with the trait of innovativeness have more flexible beliefs about new technology (Karahanna, Straub, & Chervany, 1999). Effort expectancy represents the extent to which customers perceive a new technology as simple and effortless (Venkatesh et al., 2003). Hence, it is expected that innovative individuals are more likely to perceive new technology as simple and to expect to invest less effort in learning how to operate the new technology. Although try-on technology is considered new to Jordanian centennials, they are experienced and knowledgeable in using technology in general. Hence, it is expected that innovative individuals will perceive try-on technology as easy to use. A number of studies have reported a positive relationship between innovativeness and ease of use. For example, Chen and Lin (2018) reported a positive relationship between innovativeness and perceived ease-of-use of healthy eating apps. Acheampong et al. (2017) found a positive and significant relationship between innovativeness and perceived

ease-of-use in the e-payment sector. Since effort expectancy represents the functional part of UTAUT2 and resembles perceived ease-of-use, we hypothesize a positive relationship between innovativeness and effort expectancy:

H6.2. Innovativeness has a positive influence on effort expectancy of try-on technology in the fashion context.

Hedonic value is defined as the pleasure and enjoyment resulting from using a technology (Brown & Venkatesh, 2005; Venkatesh et al., 2012), and it has been proven to impact intention to adopt new technology, especially in the case of hedonic systems that are described as creative and unique, such as mobile banking (Alalwan et al., 2017) and virtual try-on technologies.

Innovativeness has been found to be an antecedent of hedonic value (Hong, Lin, & Hsieh, 2017). Customers described as innovative are expected to possess fewer complicated beliefs about new technology (Karahanna et al., 1999). People with high technology innovativeness are more likely to accept and enjoy using new technology (Yi, Tung, & Wu, 2003), especially try-on technology which is expected to have a hedonic side to it. Hence, we hypothesize a positive relationship between perceived hedonism and innovativeness:

H6.3. Innovativeness has a positive influence on perceived hedonism while using try-on technology in the fashion context (Fig. 1).

Innovativeness is considered a stable trait that is manifested in inquisitive behavior and in the individual's belief that he/she can use technology and overcome the uncertainty associated with the usage of new technologies (Agarwal & Prasad, 1998; Walczuch et al., 2007). With the minimization of uncertainty, the associated risk is also minimized, which indicates that cost is minimized and value is maximized. Try-on technology is a new type of technology, particularly for Jordanians who are not yet familiar with it. However, this study's sample is centennials who are native to technology and considered to be an innovative generation. By possessing these traits, this group are expected to be able to overcome the uncertainty associated with try-on technology and, consequently, to perceive this technology as less risky and less costly. Thus, it is expected that an innovative individual will perceive price positively:

H6.4. Innovativeness has a positive influence on perceived price while

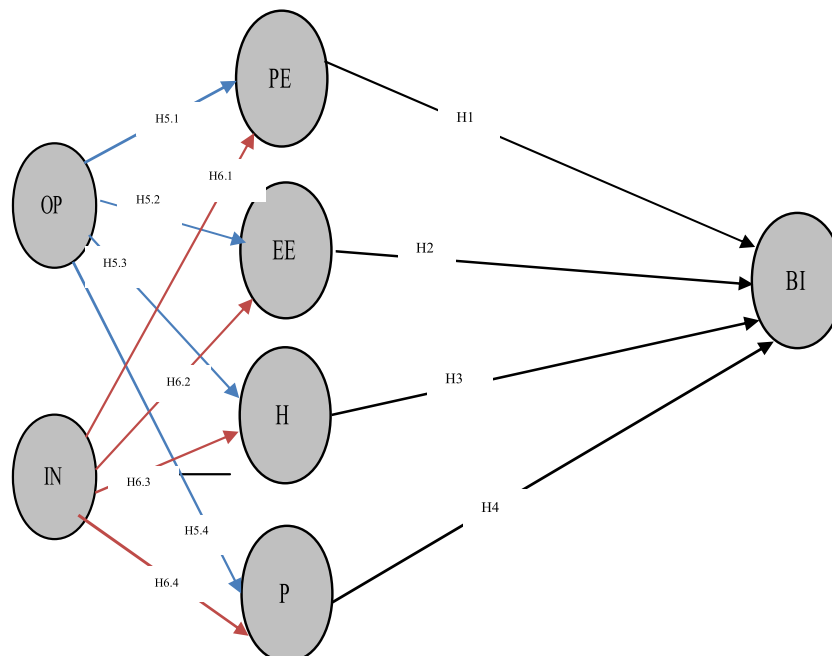


Fig. 1. Research model adapted from Venkatesh (2012) and Parasuraman (2000).

using try-on technology in the fashion context.

4. Methodology

Jordan was selected for data collection for this study because it is one of the seven Middle Eastern frontier markets ([MSCI Frontier Markets Index, 2019](#)). Hence, we can generalize the results of this study to other markets.

The data was collected using a convenience sampling approach. To validate the proposed conceptual model, empirical data was collected by distributing 400 self-administered questionnaires among Jordanian centennials, of which 315 were eligible for further analysis. The questionnaires were distributed in places where the potential targets were available, such as universities and cafes. The questionnaire aimed at generating answers regarding Jordanian centennials' technology readiness, and their insights into the variables relating to intention to use try-on technology.

Notably, the primary variables of UTAUT2 (PE, EE, H, PV, and BI) were measured using scales adapted from [Venkatesh et al. \(2012\)](#). Technology readiness was measured by items taken from [Parasuraman \(2000\)](#). To measure the participants' responses on the primary variables of UTAUT2, a five-point Likert scale ranging from strongly agree to strongly disagree was adopted. As for technology readiness, this study used the item from TRI to measure optimism and innovativeness; participants specified the degree to which they agreed or disagreed with each of the items on a five-point Likert scale.

The questionnaire concluded with six closed-ended questions aiming to collect demographic data (age, gender, income, educational level, try-on technology experience, and marital status). The questionnaire was first developed in English. However, to minimize the impact of language differences, the questionnaire was translated into Arabic. Professional back-translation was performed to validate translation ([Brislin, 1970](#)).

5. Data analysis and results

5.1. Respondents' profile and characteristics

Males accounted for 38 % of participants and females for 62 % of participants. Most respondents (73 %) were aged between 20 and 25 years, and the age group of 26–30 accounted for 19.7 % of participants.

Of the participants, 95 % had achieved at least a bachelor's degree, and 97.2 % reported that they had used computers and the Internet for more than three years. However, 61 % of respondents reported having no experience with using try-on technology ([Table 1](#)).

5.2. Structural equation modeling analysis

To validate the proposed model and test the hypotheses, a two-step approach was followed ([Anderson & Gerbing, 1982](#)). First, confirmatory factor analysis was run to ensure a suitable level of model fitness, as well as the validity and reliability of the constructs; secondly, the hypotheses were tested (structural model).

5.2.1. Measurement model: confirmatory factor analysis

To preserve satisfactory sample size-to-parameter ratios, the measures were separated into two subgroups of variables based on their theoretical relationship ([Morgan, Kaleka, & Katsikeas, 2004](#)). The first group included UTAUT2 variables; the second subset included TRI dimensions. To ensure the reliable production of an unbiased estimate, we performed the elliptical reweighted least-squares estimation procedure ([Yuan, Bentler, & Chan, 2004](#)).

The preliminary measurement fit indices of the first subgroup were as follows: CMIN/DF = 3.987; incremental fit index (IFI) = 0.877; root mean square error of approximation (RMSEA) = 0.08; goodness-of-fit index (GFI) = 0.832; normed-of-fit index (NFI) = 0.847; comparative fit index (CFI) = 0.877.

Table 1

Demographic characteristics.

Category	Count	%
Gender		
Male	119	37.8
Female	196	62.2
Total	315	100.0
Age (in years)		
0–19	23	7.3
20–25	230	73
26–30	62	19.7
31–35	0	0
36–40	0	0
46–50	0	0
Total	315	100.0
Income in JOD		
0–500	163	51.7
501–1,000	75	23.8
1,001–1,500	36	11.4
>1,500	40	12.7
5	1	.3
Total	315	100.0
Educational level		
High school	9	2.9
Diploma	3	1.0
Bachelor's	301	95.6
Postgraduates	2	0.6
Total	315	100.0
Experience with virtual try-on technology		
Yes	122	38.7
No	193	61.3
Total	315	100.0

The preliminary measurement fit indices of the second subset were as follows: CMIN/DF = 2.87; IFI = 0.910; RMSEA = 0.059; GFI = 0.901; NFI = 0.93; CFI = 0.961.

5.2.2. Construct reliability

To confirm the reliability and validity of the constructs, composite reliability (CR) and average variance extracted (AVE) were used in this study ([Anderson & Gerbing, 1982](#)). The CR values for all constructs were above 0.70 ([Fornell & Larcker, 1981](#)). The CR results recorded the highest value for optimism and the lowest value for social influence. All constructs had an acceptable AVE value higher than 0.50 ([Fornell & Larcker, 1981](#); [Hair, Tatham, Anderson, & Black, 2010](#)). The highest AVE value was for perceived hedonism, while the lowest value was for insecurity (see [Tables 2](#) and [3](#)).

5.2.3. Structural model

The second step of the two-step approach investigated the adequacy of the conceptual model and tested the hypotheses relating to it. Results of running the structural model were within the acceptable levels: GFI =

Table 2

Discriminant validity.

Correlations							
	Op	IN	PE	EE	H	P	BI
OP	0.94						
NI	.433	0.93					
PE	.519	.625	0.87				
EE	.485	.337	.227	0.93			
H	.246	-.006	.162	.396	0.90		
P	.250	.268	.559	.207	.387	0.90	
BI	.243	.357	.589	.311	.464	.752	0.89

Note: Diagonal values are squared roots of AVE; off-diagonal values are the estimates of intercorrelation between the latent constructs.

Table 3
Constructs' reliability.

Variable	Cronbach's alpha (α)	Composite reliability (CR)	Average variance extracted (AVE)
OP	.77	.91	.84
IN	.70	0.94	0.81
PE	.79	0.95	0.86
EE	.72	0.93	0.76
H	.82	0.95	0.87
P	.75	0.96	0.89
BI	.79	0.95	0.86

0.90; CFI = 0.95; NFI = 0.924; IFI = 0.923; and RMSEA = 0.061 (Hair et al., 2010; Tabachnick, Fidell, & Ullman, 2007). The proposed model was found to predict a satisfactory portion of the variance in the actual use of behavior, with an R^2 value of 0.62. The predictive validity of the current study model is, therefore, supported (Table 4).

6. Discussion

Online fashion and apparel retail businesses are booming, yet they still lag behind other online retailing businesses such as sporting equipment, technology, and DIY products (Customers, 2020). This lag has been attributed to the nature of apparel, which requires the customer to feel and try the product before making the purchase decision (Blázquez, 2014). To provide a more realistic experience, e-retailers have resorted to virtual try-on systems. Hence, it is vital to explore the factors affecting customers' intention to use try-on technologies when online shopping for apparel.

Centennials were chosen as the focus of this study because they are innovative, optimistic about technology, and represent major customers for online retailers. Centennials are also native to technology, so, to answer the main research question, we proposed and tested a model that incorporated factors from UTAUT2 and TRI so that the study focused on both computer system design and individual characteristics.

The factors that influence the intention to adopt try-on technology were based on the UTAUT2 model. Out of four factors considered in this research, three of them positively influenced the behavioral intention that leads to the adoption of virtual try-on technology. The results indicated a positive relationship between performance expectancy, perceived hedonism, and price value on behavioral intention to use virtual try-on technology.

Performance expectancy was found to have a positive relationship with centennials' intention to accept try-on technology in the context of purchasing fashion online. This result matches previous research results that reported a strong relationship between performance expectancy and intention to adopt technology in different contexts, including that of online shopping (e.g., Dwivedi et al., 2016; Lian & Yen, 2014; Venkatesh et al., 2012). Centennials, who spend significant time shopping online, are looking for an efficient shopping experience (Bruno, 2020); hence, it is expected that they will use try-on technology to shop online.

Table 4
Results of standardized estimates of structural model.

Hypothesized path	SE	t-value	P	Significance? [YES/NO]
PE \leftarrow OP	.068	5.995	0.0001	yes
EE \leftarrow OP	.034	.675	0.4999	yes
H \leftarrow OP	.093	4.405	0.0001	yes
P \leftarrow OP	.98	2.525	0.0118	yes
PE \leftarrow IN	.061	9.952	0.0001	yes
EE \leftarrow IN	.010	.651	0.5152	no
H \leftarrow IN	.078	-1.928	0.0542	no
P \leftarrow IN	.086	3.630	0.0003	yes
BI \leftarrow PE	.051	5.250	0.0001	yes
BI \leftarrow EE	.030	.616	0.5381	no
BI \leftarrow H	.043	4.845	0.0001	yes
BI \leftarrow P	.043	12.323	0.0001	yes

The results show a significant relationship between hedonic motivation and centennials' intention to adopt try-on technology in the fashion context. This result matches previous research that found a significant relationship between hedonic motivation and behavioral intention to adopt new technology in different contexts, including online shopping (Brown & Venkatesh, 2005; Van der Heijden, 2004) and mobile and internet banking (e.g., Alalwan et al., 2017, 2018). Centennials are described as an experience-seeking cohort who want to temporarily escape reality (Priporas et al., 2017). Therefore, they are expected to show an intention to adopt technology that enhances their sensory experience and provides them with a similar experience to shopping in the physical environment.

Effort expectancy was found to have no influence on the intention to adopt virtual try-on technology. Although this result was unexpected, the definition of effort expectancy resembles that of perceived ease-of-use, and similar results have been found between perceived ease-of-use and behavioral intention (Venkatesh et al., 2003). The insignificant relationship could be due to centennials' high level of experience in using technology. Being well acquainted with technology, centennials find using new technology effortless and easy to learn, so effort expectancy does not affect their intention to use it.

Optimism was revealed to have the strongest impact on performance expectancy. This result is consistent with previous results reported in different contexts (e.g., Koloseni & Mandari, 2017). Possession of the optimism trait indicates that individuals have a positive perception of technology (Napitupulu, Pamungkas, Sudarsono, Lestari, & Bani, 2020). Hence, it is expected that individuals will perceive technology as an aid in the process of shopping online.

Optimism also has a positive impact on hedonism, because optimistic individuals can cope with stress and expect a positive outcome (Scheier & Carver, 1992). Optimism has also been linked to experiencing a higher amount of positive emotions, such as happiness (Pacheco & Kamble, 2016).

The results show that optimism has a positive impact on the perceived price. Optimism refers to an individual having a positive belief about technology, its functionality, and its efficiency (Pham et al., 2018). Therefore, it is expected that optimistic individuals will perceive associated risks as very low (Schaupp & Carter, 2010), and that, by comparing the perceived value to risk, they will start perceiving the associated price as adequate.

Innovativeness was found to positively impact performance expectancy. This can be attributed to the tendency of innovative individuals to be technology pioneers and thought leaders (Napitupulu et al., 2020). Hence, they possibly carry out substantial performance while using any new technologies (Turan, Tunç, & Zehir, 2015).

The results showed that innovativeness has no impact on perceived hedonism. This finding was not expected. However, innovativeness is divided into hedonist innovativeness (linked to the need for stimulation) and social innovativeness (linked to the need for uniqueness) (Roehrich, 2004). One possible explanation is that innovative centennials value uniqueness more than stimulation, especially when they are more familiar with the technology of augmented reality.

Innovativeness was found to positively impact perceived price. This can be attributed to the trait of innovativeness undermining the risk effect (Walczuch et al., 2007). As a result, an innovative individual perceives the price of technology as adequate.

Neither optimism nor innovativeness had any impact on effort expectancy, which was an unexpected result. However, this may have been because centennials are highly acquainted with new technologies and aware of the newest developments and possibilities to the extent that using any new technology is not perceived as a challenge.

6.1. Theoretical contributions

This study contributes to the existing literature on technology adoption in several ways. First, to the best of our knowledge, it is among

the first studies to suggest a model that focuses on both computer system design and individual characteristics in the consumer context. As such, this study proposes a model that combines variables from both UTAUT2 and TRI. Secondly, this study has mainly focused on combining these two models in the consumer context. Previous studies that had the same notion of combining models have mainly focused on studying TRI in the work context. Thirdly, this study empirically tested the proposed model and achieved reliable findings, which can be generalized to the target population. It also reports results that contradict the expected results, which provides scope for future research and further investigations on the target group. Fourthly, the choice of centennials as the population for this study is one of its main contributions due to this group's special characteristics. For example, centennials are described as techno-savvy and experts in technology, in addition to being an experience- and efficiency-oriented cohort.

6.2. Implications for practice

Virtual try-on technology provides a means to enhance online fashion and apparel retailing. Hence, fashion retail businesses should consider adopting this technology, which in turn means that they should focus on understanding the factors that will lead to customers adopting this technology.

This study is of great practical importance because it provides retailers with a guide to the factors that affect the consumer adoption process for this new technology, and it also sheds light on the importance of centennials' personality traits and their effect on the adoption of virtual try-on technology.

The special nature of apparel as a high-involvement product means that customers need to have direct experience (touching, feeling, and trying) with the item before purchasing. Try-on technology, by providing customers with a sensory-like experience, is one solution to the problem of online retailing in the fashion and apparel sector. Providing more realistic information about fashion items using virtual try-on technology will also lead customers to make more reliable decisions, which will in turn reduce the number of returned items (Joshi, 2019). An additional benefit of this technology is that it allows customers to access a wider variety of clothes than they would find in physical stores.

All of the advantages of virtual try-on technology discussed above incorporate utilitarian benefits such as saving time and effort, which is of great importance to centennials. The results of this study show a relationship between performance expectancy and the intention to adopt try-on technology. Hence, this study highlights the importance of retailers creating websites that incorporate try-on technology most efficiently.

This technology has other benefits that enable customers to try on clothes in the comfort of their own homes, and that reduce the cost of returning items that do not fit due to inadequate product evaluation before purchase (Li & Xu, 2020). This not only saves effort but also reduces the costs of transportation, parking, and other expenses. The results of this study show that, among centennials, there is a relationship between perceived price and intention to adopt try-on technology, which can be linked to centennials' price sensitivity. Therefore, e-retailers may want to focus more on creating promotional activities that encourage centennials to visit e-stores, since such activities will add to the perceived value.

The results of this study support the importance of hedonic factors provided by try-on technology. Therefore, it is recommended that retailers incorporate playful and fun elements in their websites to enhance centennials' willingness to adopt try-on technology.

6.3. Limitations and future research directions

Although this study presents important insights into the area of adoption and use of virtual try-on technology in fashion and apparel e-

retailing among centennials, it nevertheless has several limitations. For example, the sample for this study was collected in Jordan. Although centennials generally share the same generational cohort characteristics, this study did not consider cultural differences that might affect the generalizability of the findings to Western countries. This limitation suggests that there is a potential to expand this research to Western countries. A second limitation relates to the fact that try-on technology has not, to the best of our knowledge, been used yet in Jordan; hence, most of the participants had not previously used virtual try-on technology and were basing their answers on their general knowledge using a survey. Therefore, in our future agenda, we intend to use experiments to revalidate the findings of this study. Finally, future research could, in accordance with the literature, incorporate other variables, such as risk, in the model because of their significant ability to explain intention to adopt new technologies.

7. Conclusion

Virtual try-on technology represents an attractive area of research, particularly because of its potential to help a booming field such as apparel and fashion e-retailing. Taking into account the novelty of this topic and its strong ties to centennials, a generation that is native to technology, this study has revealed the necessity of investigating factors relating to systems and to personal traits that could shape centennials' intention to adopt virtual try-on technology. This research is especially important because, to the best of our knowledge, few, if any, studies have focused on all three aspects (virtual try-on technology, factors related to the system, and personal traits) and their effect on adoption among centennials.

Furthermore, two models were selected as the theoretical foundation of this study. UTAUT2 (Venkatesh et al., 2012) was extended by incorporating the positive factors from TRI. Performance expectancy, hedonic motivation, and price value were demonstrated to be significant predictors of the behavioral intention to adopt virtual try-on technology among centennials. However, the influence of effort expectancy on centennials' intention to adopt virtual try-on technology was found to be insignificant. Positive personal traits (optimism and innovativeness) were found to have a significant effect on centennials' intention to adopt new technology by influencing their perception of performance expectancy, hedonic motivation, and price value.

Author statement

This is to state that I am Zainah Qasem the only author of this paper. Therefore, I was responsible for all roles related to writing this manuscript.

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