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The Impact of Using Smart Fashion Mirrors on Perceived Customer Satisfaction in Fashion Retailing Stores

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Abstract: New technologies of Internet-of-Things such as smart mirrors gained a great attention from retailers in fashion industry. The aim of this study is to explore such an impact using technology acceptance model, i.e., perceived usefulness and perceived ease to use smart fashion mirrors on retailers' intention to use such a new technology, and hence on customer satisfaction. Using a questionnaire to gather data from a sample of retailers of fashion stores, the results, which was elucidated via IBM SPSS AMOS software, indicate the retailers' perceived usefulness and perceived ease to use have significant impact on their intention to use smart fashion mirrors, which in turn significantly impacts perceived customer satisfaction. The study provides empirical results on using smart fashion mirrors and its impact on customer satisfaction from retailers' perspectives.

Keywords: Smart fashion mirrors, perceived usefulness, perceived ease to use, intention to use, customer satisfaction, cloth retail stores

1 Introduction

Digital transformation has become a necessary success factor for retailing industry. In line with smart technology innovations such as Internet-of-Things, numerous new technologies are emerged such as smart mirrors. This technology represents an example of augmented reality advanced technology, which characterizes an integration of physical environment into virtual elements such as information and images [1,2,3].Augmented reality help customers adding virtual images to try out products in an online environment [4,5]. The global market of smart mirrors is expected to increase 10 percent each year to reach 4.4 billion dollar in 2023 [6].

Fashion retailers like those in other retailing industries try to increase their sales using innovation-based techniques. A new trend in this regard is smart fashion mirrors, however, research on using smart fashion mirrors in cloth retailing stores us still little as such a new technology is still limited, particularly, in developing countries. Therefore, this paper contributes to the literature through highlighting cloth retailers' perspectives on their intention to use smart fashion mirrors based on the acceptance technology model [7], in which users' intention to use new technologies is a function of two factors; perceived usefulness and perceived ease to use [8].

Retailers' intention to use smart fashion mirrors is not an ultimate aim in itself, but it should be linked to customer outcomes. In the current study, it was assumed that retailers' intention to use smart fashion mirrors will have a significant impact on customer satisfaction. Such a link was confirmed by some previous researchers (e.g., [9,10,11] who found that using smart fashion mirrors in cloth stores results in numerous positive impacts such as improving service quality, enriching customer experience, enhancing customer satisfaction, and hence sales volume.

Totally, the study seeks to investigate retailers' perceived usefulness of smart fashion mirrors, retailers' perceived ease to use smart fashion mirrors, and their impacts on retailers' intention to use this new technology. Moreover, the study tries to examine the impact of retailers' intention on customer satisfaction as perceived by cloth retailers based on their experience on customers.

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The study is structured as follows. The next section presents literature review and hypotheses development, followed by research methodology, data analysis and results, discussion and implication, as well as limitations and conclusion in the last section.

2 Literature review and hypotheses development

2.1 TAM

TAM is a model as suggested by [7] indicates that customers' behavioral intention to use a technology is determined by usefulness and ease to use such a technology from their perceptions. TAM refers to the model that developed to assess users' acceptance of using information technologies in business environment as it explores the effect of usefulness and ease to use such technologies as perceived by users on their intention to use it [6]. Hence, the model encompasses two dimensions: perceived usefulness, and perceived ease e to use. Perceived usefulness refers to "the extent to which a person believes that using the system will enhance his or her job performance" and perceived ease of use has been defined as "the extent to which a person believes that using the system will be free of effort" [8]. TAM has been implemented by numerous studies for different purposes such as adoption of information technology systems [8], users' acceptance of Internet-of-Things technologies [12,13], social media usage [14], acceptance of mobile library applications [15], e-learning social media [16], and smart mirrors acceptance [6,17,18]. Therefore, TAM was used for the purpose of the current study.

2.2 Smart fashion mirrors

Internet-of-Things-based smart mirrors can be used in many settings such as fashion retail stores and homes for various purposes such as trying out clothes, and monitoring the health of elderly people [19]. Depending on radio frequency identification (RFID) technology, a smart mirror can be used to exhibit previous products that a customer previously bought of the same brand, and provide the customer an opportunity to realize colors and sizes of products [6,20,21]. For Gaur et al. (2017), benefits of smart mirrors for retailers include enhancing customer experience, evaluating products acceptability, and increasing sales [22]. A smart fashion mirror is one of the innovative applications of smart technologies, i.e., Internet-of-Things [19,23,24]. It is used in retailing stores such as clothing stores or accessory shops to try a product without wearing it, which means that customers are able to try out several products in less time [10]. Importance of using smart fashion mirrors can be seen through ensuring customer satisfaction via quick and easy access to products [6].

2.3 Perceived customer satisfaction

Providing customers with exceptional values will results in improving their satisfaction, therefore, firms are required understand their customer expectations [25,26,27,28,29]. Bakti et al. (2020) defined customer satisfaction as "emotional (feeling) state that results from their evaluation on the discrepancy between their expectations with service provider's performance" [30]. Such a definition emphasized that customer satisfaction is a state a customer reached after his or her evaluation of product/service performance in regard to his or her expectations. Customer satisfaction cab ne perceived by others based on their experience with their customers [31,32,33]. Perceived customer satisfaction in this regard refers to the expectations of customer emotional state that emerged in light of the difference between his or her expectations and actual performance. For the current study, perceived customer satisfaction was assessed from fashion retailers' perspectives who have prior experiences with their customers.

2.4 Perceived usefulness and intention to use smart fashion mirrors

Usefulness of technologies as perceived of customers play a crucial role in their intention to use these technologies. Using the components of technology acceptance model (subjective norms, perceived usefulness, perceived ease to use, and intention to use). Aksoy and Semiz (2020) examined customers' intention to use smart mirrors and found a positive effects of subjective norms, perceived usefulness, perceived ease to use on customers' intention to use smart mirrors [6]. Pillai et al. (2020) explored the factors that affect customers' intention to shop from automated retail stores by artificial intelligence and revealed that perceived usefulness is one of the most significant predictors of customers' intention in this regard [34].

H1: *Perceived usefulness of smart fashion mirrors will have a significant and positive impact on retailers' intention to use such a technology.*

2.5 Perceived ease to use and intention to use smart fashion mirrors

The impact of adopting a new system or technology is basically affected by users' perceived ease to use that system. In the context of adopting smart mirrors, some previous works found that ease to use as perceived by users play a significant role in boosting their behavioral intentions to use smart mirrors. Example of these works include [6] who pointed out a significant effect of customer perceived ease to use on intention to use smart mirrors, and [34] who regarded users' perceived ease to use as a significant predictor of user intention. Similar results were asserted by [18] who indicate that perceived ease to use and perceived usefulness are significant factors that affects customer's behavioral intention to use. Therefore, the following hypothesis was proposed:

H2: *Perceived ease to use smart fashion mirrors will have a significant and positive impact on retailers' intention to use such a technology*.

2.6 Intention to use smart fashion mirrors and customer satisfaction

There is a significant effect of users' intention to use smart fashion mirrors and customer satisfaction as found in previous related works. Based on data collected by interviews and field observations. Ogunjimi et al. (2021) explored the relationship between using smart mirror fashion technology, service quality and customer satisfaction and found that using such a technology in clothing retail chains boosts service quality and customer satisfaction [9]. According to Jayaram (2017), as a new technology, smart fashion mirrors increase customer satisfaction and, therefore, sales volume [10]. Kim et al. (2017) added that one benefit of smart mirrors in fashion retail stores is that it provides customers with an interactive method to try on clothes [11]. It is expected that there is a significant link between retailers' intention to use smart mirrors and customer satisfaction. Hence, the following hypothesis was assumed:

H3: *Intention to use smart fashion mirrors will have significant and positive impact on customer satisfaction*.

3 Methodology

3.1 Sample and data collection

The sample of the study consists of 185 persons (owners and employees) working at fashion retailing stores in Saudi Arabia. They were chosen randomly from 30 small and medium fashion stores. The members of the sample were asked to provide their perceptions about usefulness, ease to use, and intention to use new technologies such as smart fashion mirrors to enrich customer experience and to increase sales volume. Their responses were gathered using a questionnaire contains 14 items to measure research variables, i.e., perceived usefulness (4 items), ease to use (4 items), intention to use (2 items), and customer satisfaction (4 items). Returned responses were 176, from which 32 questionnaires were excluded due to incomplete answers, 21 were exclude as outliers. The final number of questionnaires that used in data statistical analysis was 123 questionnaires.
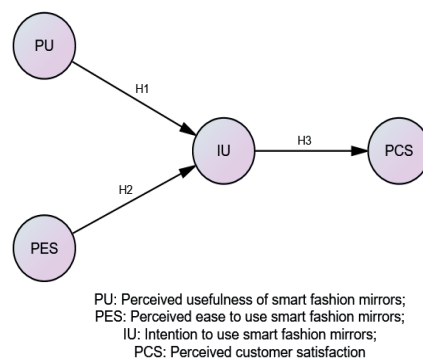
3.2 Measurements

Perceived usefulness and perceived ease to use as well as intention to use smart mirrors are measured using 10 items based on [8]. These items were adapted to reflect perceived usefulness of smart fashion mirrors, perceived ease to use smart mirrors, and intention to use smart mirrors. Customer satisfaction was measured by 4 items developed based on previous works [30, 33].

Table 1: Measurement scale of research variables

Variables	Codes	Indicators
	PU1	Using smart fashion mirrors will improve our staff performance.
Perceived usefulness	PU2	I think that smart fashion mirrors are useful for my job.
of smart fashion mirrors	PU3	Using smart fashion mirrors will increase our sales.
	PU4	Staff productivity will be increased after using smart fashion mirrors.
	PES1	I think that smart fashion mirror is easy to use.
Perceived ease to	PES2	Smart fashion mirrors require low level of mental effort.
use smart mirrors	PES3	I think smart fashion mirror is designed to allow us doing our job easily.
	PES4	Using new common technologies such as smart fashion mirror is clear.
	IU1	I predict that I would sue smart fashion mirrors.
Intention to use	IU2	I intend to use smart fashion mirrors if I have access to such a technology
smart mirrors	IU3	I think smart fashion mirrors are useful, so I will use it.
	PCS1	Smart fashion mirrors will enrich customer experience.
Perceived customer	PCS2	Customers will be delighted to use smart fashions mirrors.
satisfaction	PCS3	Using smart fashion mirrors will exceeds customer expectations.
	PCS4	Customers will be satisfied with smart fashion mirrors.

3.3 Conceptual model

The conceptual model in Figure 1 shows that the study is concerned with testing three hypotheses related to the impact of perceived usefulness of smart fashion mirrors on retailers" intention to use (H1), the impact of perceived ease to use smart fashion mirrors on retailers" intention to use (H2), and the impact of retailers' intention to use smart fashion mirrors on perceived customer satisfaction (H3). These three hypotheses are developed based on TAM as a theoretical framework and previous related works.

PU: Perceived usefulness of smart fashion mirrors;
PES: Perceived ease to use smart fashion mirrors;
IU: Intention to use smart fashion mirrors;
PCS: Perceived customer satisfaction

Fig. 1: Research first model

4 Data analysis and results

4.1 Reliability and Validity

Measurements reliability was measured by Cronbach's alpha (α) and composite reliability (CR) and measurements validity was measured by item loadings (IF) and the average variance extracted (AVE). Values of alpha coefficients and composite reliability should be higher than 0.70, while IF and AVE values should be higher than 0.50 [6,35,36]. The results in Table 2 show that measurements reliability and validity are assured as all Cronbach's coefficients are higher than 0.70, values of CR are greater than 0.70, values of IL are more than 0.50, and all values of the AVE are higher than 0.50. Based on these results, the current measurements are used to collect data from the participants of this study.

Table 2: Results of reliability and validity

Variables and indicators	α	CR	AVE
Perceived usefulness of smart fashion mirrors: (IL: 0.708-0.896)	0.876	0.887	0.665
PU1 Using smart fashion mirrors will improve our staff performance.			
PU2 I think that smart fashion mirrors are useful for my job.			
PU3 Using smart fashion mirrors will increase our sales.			
PU4 Staff productivity will be increased after using smart fashion mirrors.			
Perceived ease to use smart mirrors: (IL: 0.807-0.853)	0.912	0.906	0.708
PES1 I think that smart fashion mirror is easy to use.			
PES2 Smart fashion mirrors require low level of mental effort.			
PES3 I think smart fashion mirror is designed to allow us doing our job easily.			
PES4 Using new common technologies such as smart fashion mirror is clear.			
Intention to use smart mirrors: (IL: 0.797-0.827)	0.822	0.852	0.657
IU1 I predict that I would sue smart fashion mirrors.			
IU2 I intend to use smart fashion mirrors if I have access to such a technology			
IU3 I think smart fashion mirrors are useful, so I will use it.			
Perceived customer satisfaction: (IL: 0.877-0.941)	0.939	0.947	0.817
PCS1 Smart fashion mirrors will enrich customer experience.			
PCS2 Customers will be delighted to use smart fashions mirrors.			
PCS3 Using smart fashion mirrors will exceeds customer expectations.			
PCS4 Customers will be satisfied with smart fashion mirrors.			

4.2 Model fit

Fit of the measurement model was tested by four common indexes: Chi-square to degrees of freedom (CMIN/DF), the goodness of fit index (GFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Acceptable model fit indices assume that CMIN/df should be higher than zero and less than 3, GFI value should be between more than 0.90, and RMSEA value should be less than 0.08 [6,37,38,39]. The results as shown in Figure 2 confirm that the current model achieved the minimum cut-off values to be a fit one as CMIN/DF = 1.924, which is less than 3, GFI = 0.889, which is close to 1, CFI = 0.959, which is higher than 0.90, and RMSEA = 0.073, which is less than 0.08. Hence, the measurement model is accepted to test research hypotheses as shown in the final structural model.

4.3 Correlation matrix

The correlation matrix as depicted in Table 3 shows Pearson's coefficients between research variables (i.e., perceived usefulness of smart fashion mirrors, perceived ease to use smart mirrors, intention to use smart mirrors, and perceived customer satisfaction). It can be noted that the research variables are positively correlated at a significant level of 0.05.

Table 3: Variables' correlation matrix

Variables*	(1)	(2)	(3)	(4)
(1) Perceived usefulness of smart fashion mirrors	-			
(2) Perceived ease to use smart mirrors	0.538*	-		
(3) Intention to use smart mirrors	0.459*	0.476*	-	
(4) Perceived customer satisfaction	0.214*	0.296*	0.300*	-
* Coefficients are significant at 0.05.				

4.4 Research final model

The results of the research hypotheses testing as shown in Figure 3 and Table 4 indicate that perceived usefulness of smart fashion mirrors (PUSFM) has a significant impact on intention to use smart fashion mirrors (IUSFM) (β= 0.29, P= 0.014), perceived ease to use smart fashion mirrors (PEUSFM) has a significant impact on IUSFM (β= 0.33, P= 0.002), and IUSFM has a significant impact on perceived customer satisfaction (PCSAT) (β= 0.32, P= 0.002).
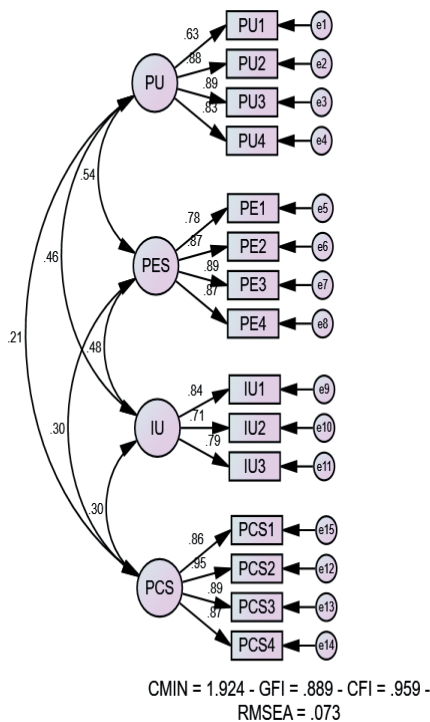
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CMIN = 1.924 - GFI = .889 - CFI = .959 -
RMSEA = .073

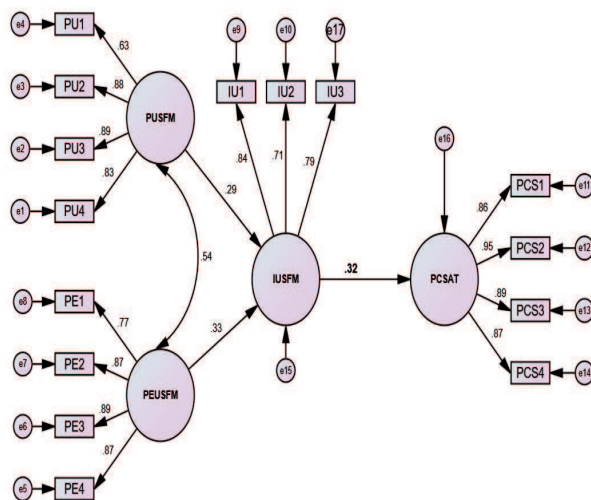**Fig. 2:** Research second model

Fig. 3: Research final model

These results indicate that the research hypotheses, i.e., H1, H2, and H3, are supported. It should be noted that the impact of PUSFM on PCSAT through IUSFM and the impact of PEUSFM on PCSAT through IUSFM were not tested in the structural model in Figure 3, however, the results of bootstrapping showed that both PUSFM and PEUSFM have significant indirect impacts on PCSAT through IUSFM (β= 0.091, P= 0.002, β= 00.106, P= 0.014, respectively).

Table 4: Results of research hypotheses testing

Hypotheses	Ind. Var.	Path	Dep. Var.	B	Sig.	Result
H1	PUSFM	→	IUSFM	0.285	0.014	Supported
H2	PESFM	→	IUSFM	0.333	0.002	Supported
H3	IUSFM	→	PCSAT	0.317	0.002	Supported

5 Discussion and implications

Adopting TAM as a theoretical framework, the present study aims at exploring predictors of smart fashion mirrors adoption in fashion retail stores from retailers' perspectives. It was designed to test three hypotheses related to the impact of perceived usefulness on retailers' intention to use (H1), the impact of perceived ease to use on retailers' intention to use (H2), and the impact of retailers' intention to use smart fashion mirrors on customer satisfaction (H3). The results pointed out that H1, H2, and H3 were accepted. That is, perceived usefulness and perceived ease to use exert significant impacts on retailers' intention to use smart mirrors, which in turn exerts a significant impact on customer satisfaction. The results concerning H1 and H2 are in line with previous works, e.g., [6, 8, 12, 18, 34], that found significant impacts of perceived usefulness and perceived ease to use on users' intention to use new technologies, e.g., smart mirrors.

In terms of the impact of retailers' intention to use smart mirrors of customer satisfaction, the results revealed that there is a significant impact of retailers' intention to use smart mirrors on customer satisfaction. This result may be due to the fact that customer satisfaction was measured based on retailers' perceptions of their customers. Retailers think that their customers will depend on usefulness of smart fashion mirrors to make their purchasing decisions. Völz et al. (2022) indicate that using smart mirrors have positive impacts such as improving customer personalized experience and at the same time have negative impacts in terms of customer privacy concerns as well as the risk that depends on customer rejection of such a smart technology [18].

6 Limitations and conclusion

The current study provides new insights on using advanced technologies such as smart fashion mirrors in cloth retailing stores. Retailers perceived such a technology as useful and easy to use and therefore have positive intentions to use it. However, retailers' intentions to use smart fashion mirrors do not promise customer satisfaction. The study was conducted using perceived usefulness and perceived ease to use smart fashion mirrors as two components of technology acceptance model, hence, retailers' intentions were investigated based on these two independent variables. Scholars in this regard are required to carry out more studies to explore retailers' perceptions about smart fashion mirrors based on other factors such as the cost of smart mirror implementation, maintenance, accuracy, availability for small cloth stores. As well, customer satisfaction was assessed from retailers' perspectives, for that reason, further studies are required to investigate customers' perceptions about using smart mirrors. On the other hand, retailers of fashion stores are requested to make their decisions on the basis of customer data regarding using smart technologies, and should not assume that customers are ready or do not ready to use smart mirrors as a key reference to make purchase decisions. The study concludes based on its results that fashion retailers have a positive behavioral intention to use smart technologies such smart fashion mirrors as they perceive these technologies useful and easy to use. However, retailers' intention to use smart fashion mirrors do not guarantee customer satisfaction after introducing it. For many fashion customers, family members, relatives and friends are their actual mirrors that reflect their acceptance of sizes, colors, and suitability of their fashion styles.

Conflict of Interest

Authors declare no conflict of interest as regards to publication of this paper.

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