

Effects of Attitude towards Use, Subjective Norm, and Perceived Behavioral Control on Intention to Use Chatbots Moderated by Perceived Usefulness and Perceived Ease of Use

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Abstract

Chatbots can be considered intelligent virtual assistants that initiate chat conversations via text or voice messages. Today, these software programs help people with many tasks from connecting to and controlling home appliances to simplifying routine works. Chatbots are increasingly used in developed countries as special virtual assistants; however, these programs and related variables have not been properly explained in developing countries. This correlational survey aimed to examine variables affecting intention to use chatbots in shopping. The study population consisted of all online buyers in Baghdad, Iraq. Due to the infinity of the population, the Krejcie and Morgan table was used to select the sample ($n = 384$). The data were collected using the field (questionnaire) method. The researchers assessed and confirmed the face and construct validity and reliability of the data collection tool. Only a handful of studies have been carried out on chatbots and the behavior of customers interacting with these programs, and no researcher has so far investigated the moderating role of perceived usefulness and perceived ease of use of chatbots. Attitude towards use, subjective norm, and perceived behavioral control had significant positive effects on intention of online buyers to use chatbots. In addition, perceived usefulness and perceived ease of use of chatbots were found to moderate these relationships.

Keywords: Chatbot, Purchase intention, Perceived ease of use, Perceived usefulness, Attitude towards use, Subjective norm, Perceived behavioral control

1. Introduction

Today, chatbots are considered conversational agents, intelligent assistants, and virtual assistants that initiate chat conversations via text or voice messages. These software programs help people with many tasks from connecting to and controlling home appliances to simplifying routine works (Lo *et al.*, 2018). Chatbots can be beneficially used by employees, sellers, and consumers of services and goods. For example, Gartner (2019) predicted that a large portion of workers and employees will use these systems for conversational purposes by 2022 (Burns, 2020). Different groups may accept these systems differently. For example, people may have different reasons for accepting these systems in corporate environments (Schlögl *et al.*, 2019). In fact, these systems can be used as auxiliary systems to help individuals with their daily activities (Dwivedi *et al.*, 2021).

Today, mobile e-commerce is constantly developing and updating, as mobile trading is widely used for buying and selling things in e-commerce environments. Mobile chatbots are smart virtual agents that can substantially transform the foundation of mobile e-commerce. According to the American Marketing Association (AMA), chatbots are the future of marketing. These

systems can be integrated with messaging applications such as Facebook, WhatsApp, and Skype; thus, they can easily replace mobile shopping applications. Consumers can interact with chatbots through user interfaces using written or spoken commands. The use of social networks and sites has increased sharply since the last quarter of 2015 (DMU, 2018). This increasing growth can guarantee the entry of new technologies into marketing.

Mansouri Deh-Shoeibi *et al.* (2021) stated that a chatbot is a subset of artificial intelligence (AI) that creates a new information, communication, and transaction channel in order to enable businesses to reach their target audiences through messaging applications, improve the productivity of service sectors, increase customer satisfaction, and reduce related costs. Belali *et al.* (2020) argued that chatbots are an advanced type of technology programmed with AI to fulfill different purposes. According to Roudani *et al.* (2021), issues such as mutual communication, entertainment, modishness, and customizability influence the use of chatbots. Yanya *et al.* (2022) stated that although human resources and frontline employees are more useful in the provision of qualitative and experiential services and products, chatbots can more effectively offer functional products. In fact, perceived information quality, perceived waiting time, and positive emotions are major determinants of customer satisfaction (Yanya *et al.*, 2022). The higher the certainty of needs, the more willing consumers are to accept AI chatbots (Yimin *et al.*, 2022). For search products, higher certainty of needs increases consumers' acceptance of AI chatbots, while for experience products, certainty has no significant effect on consumers' acceptance of AI chatbots. According to Achaporn *et al.* (2022), chatbots are used for customer service mainly to meet customer demands without the need for any conversation. However, the main challenge facing sustainable acceptance of innovations is removing barriers that prevent the development of innovations (Achaporn *et al.*, 2022). Chatbots have a significant positive effect on service quality, and this is considered the main functional purpose of chatbots. In fact, chatbots can potentially be utilized in customer service sectors (Chiara *et al.*, 2022). Today, chatbots are widely used in the frontline to improve customer services; however, customers have not yet completely accepted chatbots or AI technology (Qian *et al.*, 2022).

The present study investigated factors affecting intention of customers to use chatbots in shopping. Chatbots are conversational mobile app interfaces that interact with users and help them analyze, review, and search for various products, compare different products, checkout available coupons, purchase products, keep up with orders, and receive rewards. In this research, the researchers used theories such as the theory of diffusion of innovations, the theory of planned behavior, and the technology acceptance model (Mitchell, 1996).

This research examined the effects of variables of attitude towards use, subjective norm, and perceived behavioral control on intention to use chatbots through the moderating role of perceived ease of use and perceived usefulness.

2. Theoretical framework and hypothesis development

2.1 Chatbots

Chatbots have dramatically attracted the interest of researchers in the last few years; however, these products were first introduced in the 1960s, when Weisenbaum published a study on natural interaction with ELIZA, a computer program developed to imitate the responses of a psychotherapist in a therapy session. Current interest in chatbots is probably due to considerable advances in computing technology and the broad use of mobile messaging applications in recent years. First, recent advances in AI and machine learning have stimulated the recent interest in chatbots. These advances promise enormous developments in natural language interpretation and

prediction capabilities (*e.g.*, improvements in machine translation). Furthermore, recent advances in conversational modeling suggest that predictions based on recurrent neural networks and sequence-to-sequence models will outperform rule-based conversational modeling that is often used for traditional robots. Second, the growing use of mobile internet and messaging platforms has increased the acceptance of chatbots, as mobile messaging platforms enable chatbots to interact with a large portion of online populations. According to Business Insider (2016), about 3 billion people worldwide use mobile messaging applications such as Facebook, Telegram, WeChat, Skype, Slack, Kik, and Viber. Natural language is expected to be a promising business opportunity for users of these services through online interactions, automated marketing, and customer service (Petter *et al.*, 2017).

2.2 Attitude towards use and intention to use

Sykes *et al.* (2009) argued that behavioral intention is influenced by attitude towards behavior. Behavioral intention is also regarded as a major determinant of intention to use (Davis, 1989). Attitude towards use refers to the amount of effort a user puts in to perform a specific behavior (Ajzen *et al.*, 1980). In the context of technological innovation, attitude is potentially a key driver for actual intention to use. Therefore, attitude towards use is assumed to constitute an important part of the research model. Researchers have conducted numerous studies on consumers' attitude towards use and their intention to use various services and products. An individual's attitude towards an item can significantly influence his/her intention to use it. Jeongyeon *et al.* (2022) found that consumers' attitude can change their intention to use services and products. The fact that people use different services, products, and even produces is probably due to differences in their individual attitudes and social norms; hence, one can argue that attitude influences people's intention to use (Muhammad Zudhy *et al.*, 2022). Accordingly, positive attitude of people towards the use of chatbots can influence their intention to use these intelligent systems. The following hypothesis is proposed based on the research literature and the above discussion:

H1: Attitude towards the use of chatbots has a significant positive effect on intention to use them.

2.3 Subjective norm and intention to use

Subjective norms reflect an individual's perception of his/her environment, thereby substantially influencing his/her decisions. In addition, those norms that support a particular scenario contribute to the development of a behavioral intention (Venkatesh *et al.*, 2020). Wade *et al.* (2020) concluded that behaviors displayed in social media environments are influenced by norms, and Yang *et al.* (2017) demonstrated the positive effect of subjective norms on smart home devices. Subjective norms are key factors in the process of selecting the desired behavior. Even an individual's initial unfavorable intention towards the use of a system probably changes over time, as individuals typically tend to comply with the behavior of others (Morris *et al.*, 2000). The following hypothesis is proposed based on the above discussion:

H2: Subjective norm about chatbots has a significant positive effect on intention to use them.

2.4 Perceived behavioral control and intention to use

Perceived behavioral control refers to the degree to which a user believes that he/she has control over external and internal behavioral factors. These factors can either prevent a person from doing an action or prepare the ground for performing a behavior. According to Ajzen (1991),

perceived behavioral control is associated with behaviors over which people have incomplete voluntary control. Therefore, behavioral control is directly associated with an individual's ability to engage in a specific behavior (Ajzen, 1991). Du *et al.* (2007) found that different levels of perceived behavioral control lead to different perceptions of risks, which in turn result in different decisions. In virtual communities, perceived behavioral control is considered a determinant of behavioral intention (Tsai *et al.*, 2014). The following hypothesis is proposed with regard to the importance of perceived behavioral control in marketing, its impact on intention to use, and the research literature:

H3: Perceived behavioral control of chatbots has a significant positive effect on intention to use them.

2.5 Perceived usefulness as a moderator

Perceived usefulness is a major determinant of intention to use, as it persuades customers to reuse a service or product (Phan *et al.*, 2011). Perceived usefulness refers to the degree to which people embrace a new technology as they believe that it will improve their performance (Ching *et al.*, 2006). In fact, people must understand and accept perceived usefulness of buying products with smartphones. Research shows that usefulness can greatly affect the purchase of high-technology products (Lu *et al.*, 2009), because these technologies help customers save their precious time, compare various products, and receive useful promotional information (Yang *et al.*, 2010). Perceived usefulness can positively influence the attitude of users, customers, and consumers (Mathias *et al.*, 2021). This variable can also substantially affect the subjective norm and perceived behavioral control of consumers (Jingyi *et al.*, 2022; Precious *et al.*, 2022).

The following hypotheses are proposed based on the above discussion:

H4: Perceived usefulness of chatbots moderates the effect of attitude towards their use on intention to use them.

H5: Perceived usefulness of chatbots moderates the effect of subjective norm about chatbots on intention to use them.

H6: Perceived usefulness of chatbots moderates the effect of perceived behavioral control of chatbots on intention to use them.

2.6 Perceived ease of use as a moderator

In information systems, perceived ease of use is defined as the degree to which a person believes that he/she can use a particular technology without much mental effort (Davis, 1989). According to Davis, ease of use is an indicator of technology acceptance. Consumers are more likely to accept mobile shopping with chatbots if the necessary technical infrastructure for shopping is provided. The infrastructure includes online mobile applications, user-friendly interfaces, and messaging applications that are compatible with different cellphones. Consumers tend to accept technologies that are easily understood and those that enable them to simply download and use traditional messaging apps such as WhatsApp, Facebook, and Skype. According to Davis *et al.* (1989) and Jan (2011), technology users have presumptions about how easy or difficult it would be for them to use a technology. Therefore, studying users' perceived ease of use helps researchers understand user expectations. In addition, perceived ease of use has been found to hugely affect users' perception of technological devices (Wu *et al.*, 2005; Khalifa *et al.*, 2008). In this regard, Natarajan *et al.* (2018) observed that perceived ease of use influences people's intention to use mobile shopping apps.

Ease of use can affect citizens' attitudes towards the use of open government data (Ariel Antônio *et al.*, 2022). This variable also has an impact on subjective norm of people (Wendy *et al.*, 2022). Furthermore, Jared *et al.* (2018) found a positive relationship between perceived ease of use and perceived behavioral control.

The following hypotheses are proposed based on the above discussion:

H7: Perceived ease of use of chatbots moderates the effect of attitude towards chatbots on intention to use them.

H8: Perceived ease of use of chatbots moderates the effect of subjective norm about chatbots on intention to use them.

H9: Perceived ease of use of chatbots moderates the effect of perceived behavioral control of chatbots on intention to use them.

3. Research method and data collection process

The study population consisted of all people who purchased various goods from online stores with chatbot systems in Baghdad, Iraq. Due to the infinity of the population, the Krejcie and Morgan table was used to select the study sample ($n = 384$). The data were collected using the questionnaire method, and the researchers confirmed the face and construct validity and reliability of the data collection tool. The face validity of the questionnaire was confirmed based on expert opinions, while its construct validity was assessed using SmartPLS (results are presented in the appendix section). Descriptive statistics were used to analyze demographic characteristics of the participants and to assess all research variables and their dimensions in SPSS 23. Inferential statistics were used to analyze the data for hypothesis testing, validity and reliability assessment, and model fit evaluation in SmartPLS3.

Table 1: Research variables

Variable	Reference(s)
Perceived behavioral control	Martin <i>et al.</i> (2022)
Attitude towards use	Fumei <i>et al.</i> (2018)
Subjective norm	Abdullah <i>et al.</i> (2014)
Intention to use	Dharun <i>et al.</i> (2020)
Perceived usefulness	Dharun <i>et al.</i> (2020)
Perceived ease of Use	Dharun <i>et al.</i> (2020)

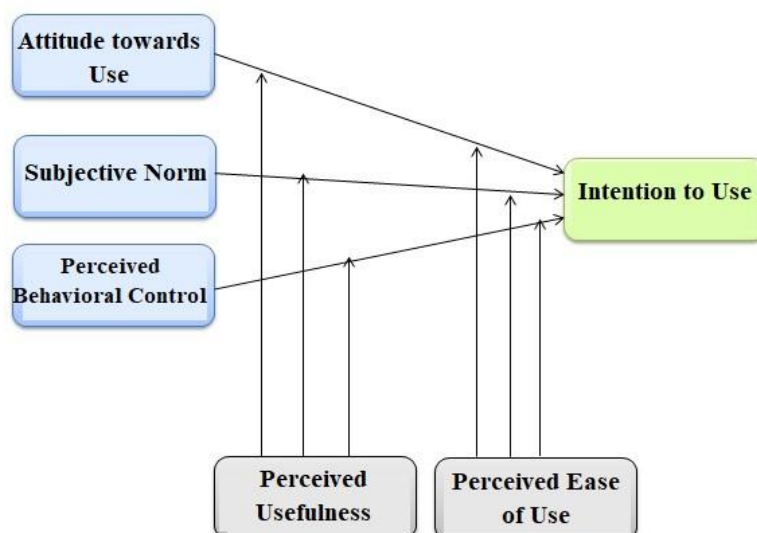


Figure 1: Conceptual research model (Source: authors)

4. Findings

4.1 Descriptive and inferential findings

In total, 29.7% of the participants were in the 20–30 years-old age group, 44% were in the 31–40 years-old age group, and 26.3% were in the +40 age group. The majority of the participants were female (53.9%). In addition, 19.5% had associate degrees, 36.5% had bachelor degrees, 31.3 % had master degrees, and 12.8 % had Ph.Ds. or higher degrees.

Table 2: Testing normality of the data distribution

Variable	Total	Perceived usefulness	Intention to use	Perceived ease of Use	Attitude towards use	Subjective norm	Perceived behavioral control
Z	0.185	0.089	0.145	0.132	0.096	0.107	0.125
Sig.	0.094	0.000	0.000	0.000	0.000	0.000	0.000
Result	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal

As shown in Table 2, the significance level of all research variables is < 0.05 ; thus, the data obtained for all variables are not normally distributed. Therefore, the data must be analyzed in SmartPLS. In addition, given the inclusion of moderator variables (including perceived usefulness and perceived ease of use) in the research model, SmartPLS is a good choice for data analysis.

Since factor loadings obtained for all research variables were > 0.5 , it can be said that the model had good overall validity. Moreover, Average Variance Extracted (AVE) and Heterotrait-Monotrait Ratio of Correlations (HTMT) values were calculated to assess the convergent and discriminant validity of the questionnaire, respectively. AVE values obtained for all variables were > 0.5 ;

therefore, the convergent validity of the research model was acceptable. The validity of the scale was confirmed because all the variables had larger loadings on their respective construct than the cross loadings on other constructs. Furthermore, since HTMT values obtained for all variables were < 0.90 ; the discriminant validity of the model was also confirmed.

Cronbach's alpha method is traditionally used to assess the reliability of observed variables. Cronbach's alpha values show the internal consistency of questionnaire items. The obtained Cronbach's alpha values for all subscales were acceptable (> 0.7). In addition, the reliability of the whole questionnaire was calculated as 0.937 in SPSS 23, indicating desirable reliability of the measurement tool. The use of composite reliability (CR) is superior to Cronbach's alpha method, because Cronbach's alpha method requires the inclusion of observed variables with equal weights in the measurement model, but in CR, various items and variables can have different relative weights. CR values > 0.7 indicate good internal consistency and desirable reliability of a measurement model (Mohsenin and Esfidani, 2017). The reliability of the measurement model was confirmed because CR values obtained for all variables were > 0.7 .

Table 3: Cronbach's alpha and composite reliability values

Variable	Cronbach's alpha	CR
Perceived ease of Use	0.852	0.895
Perceived usefulness	0.781	0.849
Intention to use	0.805	0.872
Attitude towards use	0.740	0.828
Subjective norm	0.736	0.788
Perceived behavioral control	0.730	0.832

The t-test was used in path coefficient analysis by considering a significance level of 0.05. In this method, a t-value > 1.96 indicates that the examined relationship is significant; otherwise, the effect of the predictor variable on the dependent variable is negligible (Mohsenin and Esfidani, 2017).

Figure 2 presents the respective t-value calculated for each research variable. Based on these values, the researchers will either confirm or reject each hypothesis at 95% confidence level.

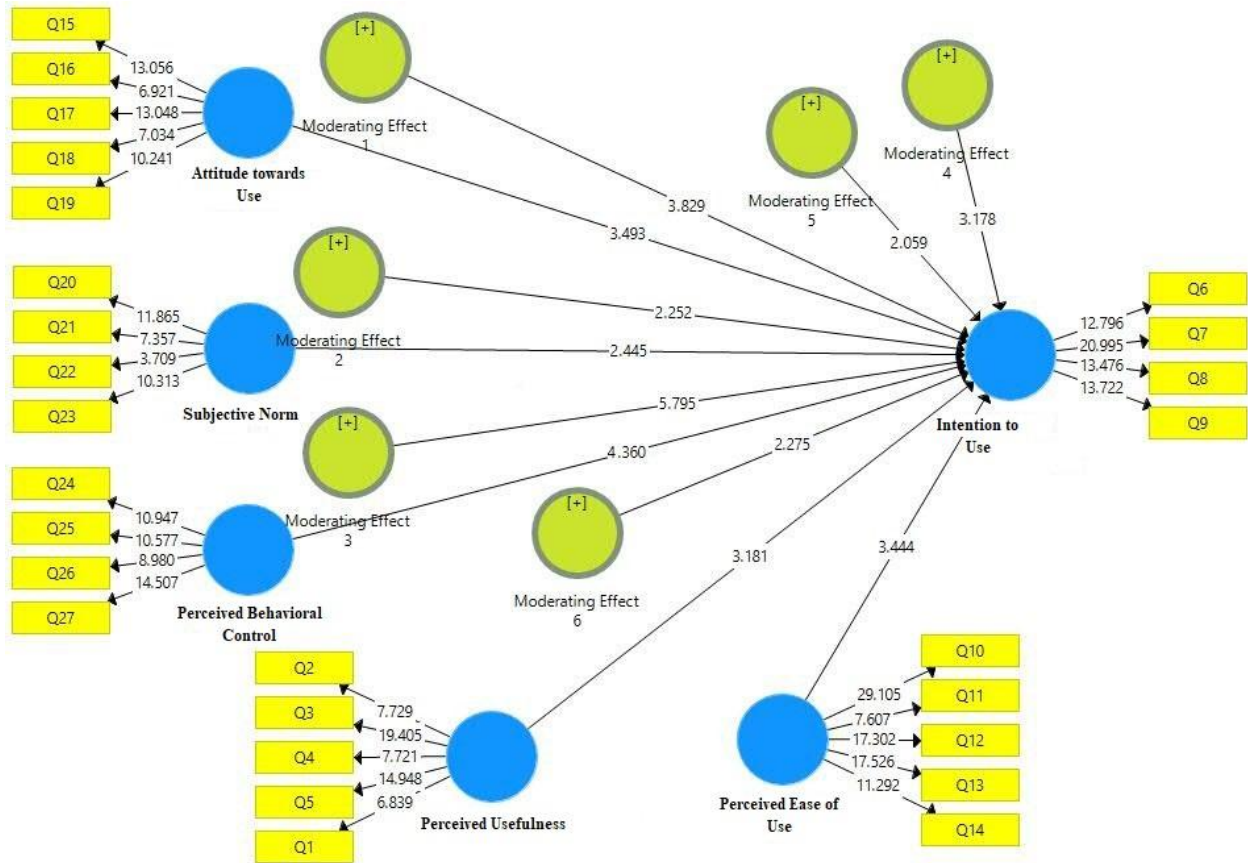


Figure 2: Path coefficients (t-statistics)

Figure 3 shows the path coefficients of the structural research model. In linear regression analysis, path coefficients are standardized beta (β) coefficients. Positive β coefficients indicate direct relationships between the endogenous and exogenous latent variables. On the other hand, negative β coefficients indicate inverse relationships between the endogenous and exogenous latent variables (Seyed Abbaszadeh *et al.*, 2014).

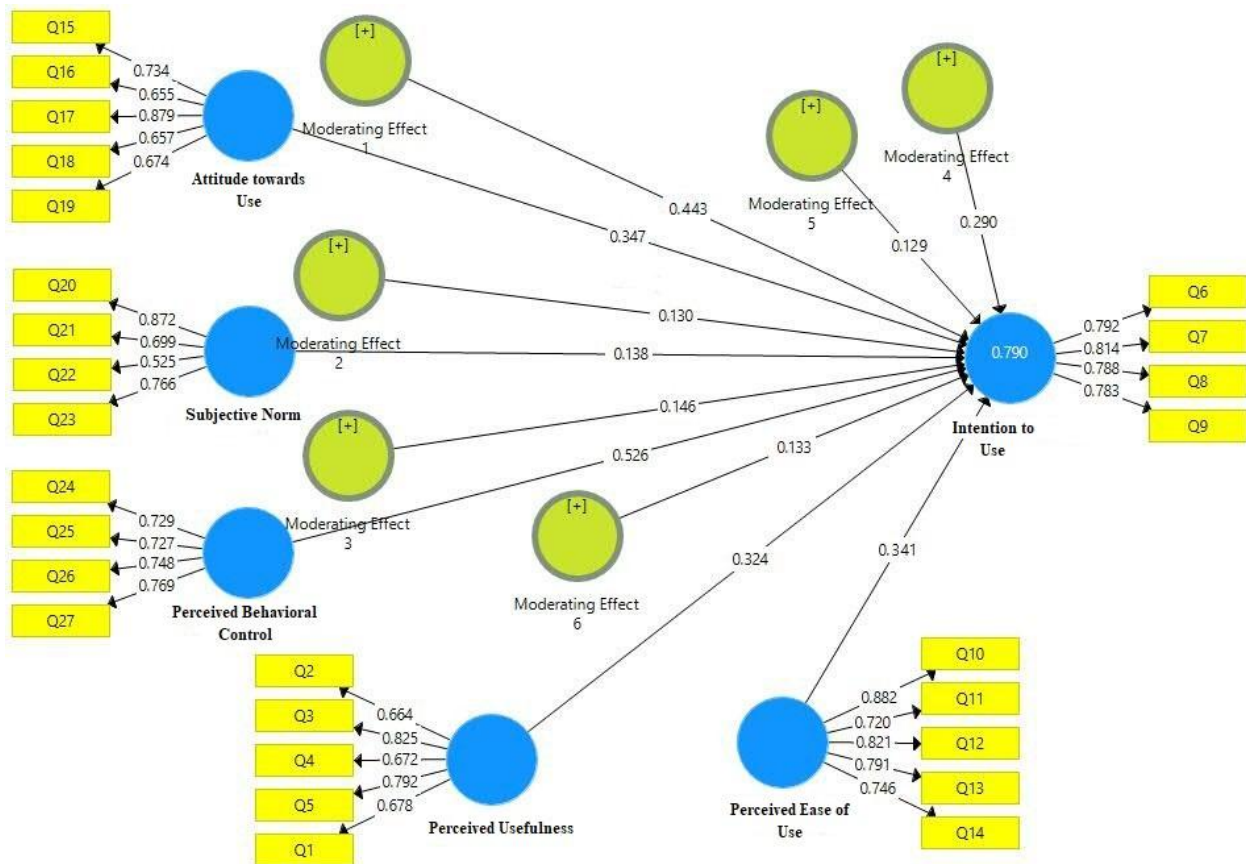


Figure 3: Path coefficients of the structural model

H1: Attitude towards the use of chatbots has a significant positive effect on intention to use them.

As shown in Figure 3, the respective path coefficient ($\beta = 0.347$) is positive; hence, it can be stated that attitude towards the use of chatbots has a direct effect on intention to use them. As presented in Figure 2, the respective t-statistic (3.493) is greater than 1.96; therefore, the first research hypothesis is confirmed at 95% confidence level, and it can be argued that attitude towards the use of chatbots significantly influences intention to use them.

H2: Subjective norm about chatbots has a significant positive effect on intention to use them.

As presented in Figure 3, the respective path coefficient ($\beta = 0.138$) is positive; hence, it can be argued that subjective norm about chatbots has a direct effect on intention to use them. According to Figure 2, the respective t-statistic (2.445) is greater than 1.96; therefore, the second research hypothesis is confirmed at 95% confidence level, and it can be stated that subjective norm about chatbots significantly influences intention to use them.

H3: Perceived behavioral control of chatbots has a significant positive effect on intention to use them.

As presented in Figure 3, the respective path coefficient ($\beta = 0.226$) is positive; hence, it can be argued that perceived behavioral control of chatbots has a direct effect on intention to use them. According to Figure 2, the respective t-statistic (4.36) is greater than 1.96; therefore, the third

hypothesis is confirmed at 95% confidence level, and it can be stated that perceived behavioral control of chatbots significantly affects intention to use them.

H4: Perceived usefulness of chatbots moderates the effect of attitude towards their use on intention to use them.

As shown in Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.443$) is positive; hence, it can be argued that an increase in perceived usefulness of chatbots increases the effect of attitude towards their use on intention to use them. Moreover, according to Figure 2, the respective t-statistic (3.829) is greater than 1.96; therefore, the fourth hypothesis is confirmed at 95% confidence level, and it can be stated that perceived usefulness of chatbots moderates the effect of attitude towards their use on intention to use them.

H5: Perceived usefulness of chatbots moderates the effect of subjective norm about chatbots on intention to use them.

As shown in Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.130$) is positive; thus, it can be argued that an increase in perceived usefulness of chatbots increases the effect of subjective norm about chatbots on intention to use them. In addition, as presented in Figure 2, the respective t-statistic (2.252) is greater than 1.96; therefore, the fourth research hypothesis is confirmed at 95% confidence level, and it can be stated that perceived usefulness of chatbots moderates the effect of subjective norm about chatbots on intention to use them.

H6: Perceived usefulness of chatbots moderates the effect of perceived behavioral control of chatbots on intention to use them.

According to Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.526$) is positive; hence, it can be argued that an increase in perceived usefulness of chatbots increases the effect of perceived behavioral control of chatbots on intention to use them. Furthermore, as shown in Figure 2, the respective t-statistic (5.795) is greater than 1.96; therefore, the sixth hypothesis is confirmed at 95% confidence level, and it can be stated that perceived usefulness of chatbots moderates the relationship between perceived behavioral control of chatbots and intention to use them.

H7: Perceived ease of use of chatbots moderates the effect of attitude towards their use on intention to use them.

According to Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.290$) is positive; thus, it can be argued that an increase in perceived ease of use of chatbots increases the effect of attitude towards their use on intention to use them. As shown in Figure 2, the respective t-statistic (3.178) is greater than 1.96; therefore, the seventh hypothesis is confirmed at 95% confidence level, and it can be stated that perceived ease of use of chatbots moderates the effect of attitude towards their use on intention to use them.

H8: Perceived ease of use of chatbots moderates the effect of subjective norm about chatbots on intention to use them.

As presented in Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.129$) is positive; hence, it can be stated that an increase in perceived ease of use of chatbots increases the effect of subjective norm about chatbots on intention to use them. In addition, according to Figure 2, the respective t-statistic (2.059) is greater than 1.96; therefore, the eighth hypothesis is confirmed at 95% confidence level, and it can be argued that perceived ease of use of chatbots moderates the relationship between subjective norm about chatbots and intention to use them.

H9: Perceived ease of use of chatbots moderates the effect of perceived behavioral control of chatbots on intention to use them.

As presented in Figure 3, the respective path coefficient for the moderating variable ($\beta = 0.133$) is positive; thus, it can be argued that an increase in perceived ease of use of chatbots increases the effect of perceived behavioral control of chatbots on intention to use them. As shown in Figure 2, the respective t-statistic (2.275) is greater than 1.96; therefore, the ninth research hypothesis is confirmed at 95% confidence level, and it can be stated that perceived ease of use of chatbots moderates the relationship between perceived behavioral control of chatbots and intention to use them.

Table 4: Hypothesis testing results

No.	Hypothesis	t-value	Path coefficient	Level of confidence	Result
1	Attitude towards use $\rightarrow$ Intention to use	3.493	0.347	95%	Confirmed
2	Subjective norm $\rightarrow$ Intention to use	2.445	0.138	95%	Confirmed
3	Perceived behavioral control $\rightarrow$ Intention to use	4.360	0.226	95%	Confirmed
4	Attitude towards use $\rightarrow$ Intention to use (moderated by perceived usefulness)	3.829	0.443	95%	Confirmed
5	Subjective norm $\rightarrow$ Intention to use (moderated by perceived usefulness)	2.252	0.130	95%	Confirmed
6	Perceived behavioral control $\rightarrow$ Intention to use (moderated by perceived usefulness)	5.795	0.526	95%	Confirmed
7	Attitude towards use $\rightarrow$ Intention to use (moderated by perceived ease of use)	3.178	0.290	95%	Confirmed
8	Subjective norm $\rightarrow$ Intention to use (moderated by perceived ease of use)	2.059	0.129	95%	Confirmed
9	Perceived behavioral control $\rightarrow$ Intention to use (moderated by perceived ease of use)	2.275	0.133	95%	Confirmed

4.2 Effect size of moderating variables

The effect size of a moderating variable must be examined, after ensuring that it moderates the relationship between two endogenous and exogenous variables. In other words, after researchers ensure that a t-value is significant at a desired confidence level, the effect size of the respective moderating variable (moderating power) must be calculated. The authors used Equation 4-1 to determine the effect size of the moderating variable. To calculate the effect size (f^2), coefficient of determination (R^2) values were calculated first at the absence of the moderating variable and then at the presence of the moderating variable. It should be noted that f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively (Mohsenin and Esfidi, 2017).

$$F^2 = \frac{R^2_{\text{model with moderator}} - R^2_{\text{model without moderator}}}{1 - R^2_{\text{model with moderator}}} \quad (\text{Eq. 4-1})$$

$$(\text{Effect size of Perceived usefulness}) f^2 = \frac{0.79 - 0.779}{1 - 0.79} = 0.052$$

$$(\text{Effect size of Perceived ease of use}) f^2 = \frac{0.79 - 0.772}{1 - 0.79} = 0.085$$

The obtained f^2 values indicate that the effect sizes of perceived usefulness ($f^2 = 0.052$) and perceived ease of use ($f^2 = 0.085$) are both relatively small. Therefore, although these variables significantly moderate the aforementioned relationships, the intensity of the moderating effect of perceived usefulness and perceived ease of use is relatively small.

4.3 Quality of the reflective measurement model

A cross-validated communality (CV-Com) value measures the ability of a measurement model in predicting an observed variable based on the value of its respective latent variable. Positive CV-Com values indicate good quality of the reflective measurement model (Mohsenin and Esfidani, 2017). CV-Com values calculated for the research variables are presented in Table 4-20. The obtained values are all > 0 ; thus, the quality of the reflective measurement model is desirable.

Table 5: CV-Com values

Variable	Communality ($Q^2 = 1 - SSE/SSO$)
Perceived ease of use	0.437
Perceived usefulness	0.297
Intention to use	0.379
Attitude towards use	0.233
Subjective norm	0.159
Perceived behavioral control	0.258

4.4 Coefficient of determination (R^2)

Coefficient of determination (R^2) is the main criterion for assessing endogenous latent variables in a measurement model. R^2 shows how much of changes in endogenous variables are caused by exogenous variables. Researchers calculate R^2 values for endogenous (dependent) latent variables. R^2 values of 0.19, 0.33, and 0.67 indicate weak, moderate, and strong determination, respectively (Mohsenin and Esfidani, 2017). Table 4-21 shows R^2 values obtained for the endogenous variables in the present research.

Table 6: Coefficient of determination

Variable	R^2	Interpretation
Intention to use	0.79	Strong

4.5 Overall model fit (goodness of fit (GOF))

The goodness of fit (GOF) test was used to assess the overall fit of the measurement and structural research model. GOF values of 0.01, 0.25, and 0.36 indicate weak, moderate, and strong model fit (Mohsenin and Esfidani, 2017). This criterion was calculated manually using Equation 4-2. The mean R^2 and communality value was 0.79 and 0.293, respectively.

$$GOF = \sqrt{\text{Communality} \times \overline{R^2}} \quad (\text{Eq. 4-1}) \quad (\text{Davari and Rezazadeh, 2014})$$

$$GOF = \sqrt{0.293 \times 0.79} = 0.481$$

The obtained GOF value (0.481) shows that the research model has a desirable overall fit.

Conclusion

Today, chatbots are used as new innovative systems in marketing to facilitate and improve the relationships among consumers and providers of various services and products. This research assessed the use of these innovative intelligent systems in shopping. The study population consisted of all online buyers in Baghdad, and due to the infinity of the study population, the sample was selected using the Krejcie and Morgan table ($n = 384$). The research hypotheses ($n = 9$) were tested using structural equation modeling in SmartPLS. Three hypotheses tested the effects of independent variables (attitude towards use, subjective norm, and perceived behavioral control) on the dependent variable (intention to use), and six hypotheses assessed the role of moderating variables (perceived usefulness and perceived ease of use) in the aforementioned relationships. The research hypotheses were all confirmed. Attitude towards use, subjective norm, and perceived behavioral control, which are all constituents of behavioral marketing, had significant positive effects on the participants' intention to use chatbots. If customers ensure about the value, desirability, and functionality of innovative systems like chatbots, if they see that their friends, relatives, and acquaintances are satisfied with their digital shopping with chatbots, and if they understand that technology enables them to personally observe, examine, and purchase various goods, they will be more inclined to use chatbots; in other words, their intention to use chatbots will significantly improve. This is in line with the findings of Muhammad Zudhy *et al.* (2022), Venkatesh *et al.* (2020), and Tsai *et al.* (2014) who argued that attitude, subjective norm, and perceived behavioral control can influence consumers' intention to use. The three independent variables have been examined in previous studies; therefore, the authors used the moderating variables of perceived usefulness and perceived ease of use in order to better explore factors affecting intention to use chatbots. These two variables facilitate the acceptance of newly introduced innovations by consumers. Consumers will certainly accept and use chatbots if they understand the usefulness, speed, efficiency, and ease of use of these innovative systems and observe their numerous advantages such as price checking, product comparison, *etc.* The obtained results about the significant moderating role of perceived usefulness are consistent with the results of Phan *et al.* (2011), Mathias *et al.* (2021), and Jingyi *et al.* (2022). In addition, the findings obtained on the significant moderating role of perceived ease of use are in line with the results of Ariel Antônio *et al.* (2022), Wendy *et al.* (2022), and Jared *et al.* (2018).

All the research hypotheses were confirmed; thus, the following suggestions are offered to help online stores enhance their customers' intention to use their services:

- Chatbot platforms must provide customers with continuous support in all stages of purchasing process including product search, comparison, order, after-sales services, *etc.*
- In online stores, some staff must provide customers with comprehensive and yet simple explanations about the use of chatbot platforms.
- Various products and services are suggested to be categorized and offered to customers based on their gender, age, educational qualifications, income level, *etc.*
- Psychological issues such as attitude, subjective norm, and behavioral control must be properly integrated with marketing programs in order to substantially improve services offered by chatbot platforms.

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