Using chatbots in e-retailing – how to mitigate perceived risk and enhance the flow experience

Abstract

Purpose – Chatbots represent an undeniable player between online retailers and customers as they boost operational efficiency and bring cost savings to businesses while offering convenience for customers in terms of timing and immediacy. However, as chatbots represent a new-born online touchpoint in retailing, especially when it comes to online pre-purchase and purchase experience, this study examines whether and how effort expectation, facilitating condition, performance expectancy, social influence, trust, perceived risk, and flow affect consumers' intention to use chatbots for online shopping.

Design/methodology/approach – A total of 226 respondents participated in an online survey. Participants were asked to try a new online service and interact with a chatbot designed using Chatfuel, a platform within the Facebook Messenger setting. Structural Equation Modelling was used to test the proposed research model regarding the intention to use chatbots.

Findings – This study discusses the importance of offering useful and trustworthy conversational agents for online shopping and argues and explains the insignificant paths among other studied factors and intention to use chatbots concluding with the need to explore more drivers for such contemporary technologies. Moreover, the findings indicate that trust turns out to be an important predictor of behavioural intention towards chatbots, in addition to its role in mitigating perceived risk and enhancing flow experience.

Originality – Given the lack of empirical evidence related to chatbots applied for business purposes, this paper fills a gap in this research field and provides a deeper understanding of what leverages consumers' intention to use chatbots for online shopping.

Keywords: Chatbots, E-Retailing, Flow, Social Influence, Trust, Perceived Risk

Introduction

Chatbots are interactive, virtual agents that engage in verbal interactions with humans through the usage of natural language (Przegalinska *et al.*, 2019). These conversational systems have become increasingly popular (Cao, 2021; Chopra, 2019). The numerous platforms and frameworks available to easily build chatbots, the substantial developments in Artificial Intelligence (AI), and the increased usage of messaging apps are the main factors pushing the chatbot industry forwards (Chen *et al.*, 2021; De Cicco *et al.*, 2020).

Thanks to their ability to mimic interpersonal interactions, chatbots have grabbed the attention of a growing number of researchers within a wide range of contexts, including customer and information service, food service, health, education, and transportation (e.g., Araujo, 2018; Kuberkar and Singhal, 2020; Soares *et al*., 2022; De Cicco *et al*., 2021; Zarouali *et al.*, 2018). Due to their ability to address problems and deficiencies in e-retailing, chatbots can also mitigate the impersonal nature and risks related to online purchasing (Chen *et al.*, 2021). Thus, their role shifted from acting as an information source (i.e., passively answering questions), to performing other tasks like conducting bank transactions (Mogaji *et al.*, 2021), managing payment and administrating technical support (McLean *et al.*, 2020), or even resembling an interviewer collecting primary data through storytelling narrative interviews (Sidaoui *et al.*, 2020).

AI instigates the customer's next move helping in the redefinition of the overall experience (Vlacic *et al*., 2021; Rana *et al*., 2021). This turn them into crucial enhancers of Customer Experience (CX) and particularly of Online Customer Experience (OCE). Conversational agents, in particular, add quality to interaction and maximize customer engagement (Adam *et al*., 2021; Wang *et al*., 2022), reducing the complexity of purchase patterns and consumer activities (Rana *et al*., 2021), improving online convenience (Duarte *et al*,, 2018), and ultimately stimulating shopping satisfaction and repurchase intention (Rose *et al.*, 2012).

Despite their widespread usage in different stages of the customer journey, knowing what are the main factors that affect users' perceptions and use of chatbots for an online purchasing experience

remains understudied (Zarouali *et al.*, 2018). The rapid and widespread usage of chatbots requires a better understanding to avoid pitfalls, throughout the whole stages of the CX. Hence, the present study addresses this research gap by identifying the variables that matter most in suiting customers' expectations and leveraging their adoption of chatbots to buy online.

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a widely validated model and one of the most complete to predict users' acceptance and usage of technologies. This model considers performance expectancy, effort expectancy, social influence, and facilitating conditions as antecedents of behavioural intention, hence, technology usage (Venkatesh *et al.*, 2003). Previous studies have applied this model to understand the acceptance of several technologies used as marketing tools like online banking products (Thaker *et al.*, 2021), self-service parcel services for last-mile delivery (Zhou *et al.*, 2020), food service retailing (De Cicco *et al.*, 2021), tourist and travel applications (Ahmad *et al.*, 2021; Gupta *et al.*, 2018), and hospitality social network sites (Herrero *et al.*, 2018). At the level of conversational agents, UTAUT was used in several contexts, for example, to explain the acceptance of humanoid robots in the case of an academic writing course (Guggemos *et al.*, 2020), or to illustrate how consumers engage with banking chatbots (Mogaji *et al.*, 2021). As for shopping purposes, though, previous research applying acceptance models on chatbots did not consider UTAUT but relied on the original Technology Acceptance Model (TAM), which is a less explanatory model that considers only perceived usefulness and ease of use as drivers of attitude and adoption of technology (Rese *et al.*, 2020; Kasilingam, 2020). However, chatbots represent a par excellence tool for establishing social relationships and bonds with customers (Przegalinska *et al.*, 2019) in the purchasing stage of CX. So, we aim at testing if UTAUT could explain the use of chatbots for shopping purposes, thus filling the gap that exists at this online touching point.

Besides, to better understand the psychological and social determinants impacting chatbots' adoption (Chen et al, 2021), we understand three constructs at the heart of online transactions should be further investigated: trust, perceived risk, and flow. Trust has been always a major issue at the level of consumer-technology interaction (Maseeh *et al.*, 2021; Park *et al.*, 2021; Pappas *et al.*, 2014),

but regarding chatbots, few studies considered this factor, and the main context was investigating customer service chatbots (Nordheim *et al.*, 2019), namely supporting customer financial decision making (Hildebrand and Bergner, 2021). Perceived risk, which was found to have a negative impact on acceptance and adoption of new technologies (Gong *et al.*, 2021; Chiu *et al*., 2010), like trust, is less investigated at the level of chatbots (Kasilingam, 2020). Finally, the customers' proclivity to be interested or engaged in the activity is described by flow (Mirvis, 1991), which is an experience that enhances both consumption and customer satisfaction and helps consumers to stay focused on the performed task (Valinatajbahnamiri and Siahtiri, 2021). Flow was found to have an impact on advertisement effectiveness (Van den Broeck *et al.*, 2019), to contribute to community engagement and word-of-mouth intention (Zhang et *al.*, 2017) and in online gaming (Holsapple & Wu, 2008). However, there is no previous study that investigated the effect of flow on chatbots usage for shopping purposes. This study aims to advance the knowledge regarding chatbots use for shopping purposes, and to help retailers creating effective bots that attract customers, engage, and sell.

Theoretical background and conceptual framework

New and updated technological tools (Dieck and Han, 2022), such as chatbots, are redefining and revolutionizing e-retailer's website (Rose et al, 2012). These are principally used to increase website interaction quality and to enhance customer engagement (Mogaji *et al*., 2021). Chatbots add to OCE by interpreting and processing users' phrases or words and providing an instant answer using AI to map and analyse experiential data and improve performance during the next interaction (Sidaoui *et al*., 2020). The assessment of OCE goes further than the usual combination of price and quality and includes affective and cognitive experiential state variables (Rose *et al.,* 2012), necessary for its constant improvement in competitive sectors, such as service and retail (Bobalca *et al.,* 2021). Chatbots can play a relevant role in improving this digital experience (Gentsch, 2019). Hence, uncovering the factors leading to enhancing behavioural intention towards the use of chatbots throughout the journey can be considered capital in this overall assessment.

UTAUT and online customer experience

Based on UTAUT, behavioural intention (BI) and, ultimately, usage behaviour result from the effect of four constructs: Performance expectancy (PE), which refers to the extent to which an individual believes that using a particular technology will enhance his/her performance; Effort expectancy (EE) that relates to the extent of ease connected with the use of a system; Social influence (SI) that refers to the extent to which the individual's technology usage is affected by others' opinions; and, finally, facilitating conditions (FC) that represents the degree to which an individual believes that infrastructures exist to support the use of the system (Venkatesh *et al.*, 2003).

UTAUT has been widely employed as a theoretical lens to investigate users' intentions and behaviour (Tamilmani *et al.*, 2021; Williams *et al.*, 2015) toward numerous technologies, also in highly interactive scenarios (e.g., Vega *et al.*, 2019), as are the ones involving chatbots. Mogaji *et al.* (2021) found the UTAUT four constructs to explain the use of banking chatbots when conducting a bank transaction, in the same way, Sreejesh *et al.* (2022) use them to enhance patients' experience when using hospital e-service facilitators like chatbots. Kuberkar and Singhal (2020) found the same constructs to influence public transportation chatbot's adoption intention. We cab assume these building blocks to be able to influence users' acceptance and use of shopping interactive touchpoints such as chatbots. We thus propose:

H1. PE positively influences BI towards shopping chatbots.

H2. EE positively influences BI towards shopping chatbots.

H3. SI positively influences BI towards shopping chatbots.

H4. FC positively influence BI towards shopping chatbots.

According to Baptista and Oliveira (2015), despite providing a good model for predicting acceptance and use of technologies, new constructs need to be added in the understanding of chatbots' adoption due to their peculiarities as interaction enablers.

Trust

Building trusting relationships between consumers and technologies is a difficult task (Balakrishnan and Dwivedi, 2021; Pallant *et al.*, 2022). This has been noted in studies in different fields: mobile payments (Maseeh *et al.*, 2021), facial recognition payments (Moriuchi, 2021), online stores (Oh *et al.* 2009), airline websites (Kim *et al.*, 2009), AI service robots (Park *et al.*, 2021), fashion sales robots (Song and Kim, 2021), conversational robot advisors (Hildebrand and Bergner, 2021). In the chatbot context, Hildebrand, and Bergner (2021) found that affective trust toward financial robot advisors enhances benevolence attribution toward financial services firms and portfolio choice, whereas Eren (2021) found it impacts customer satisfaction when using a banking app chatbot. Lei *et al.* (2021) indicated that customers with higher trust levels have a higher tendency to reuse hospitality app chatbots, while Przegalinska *et al.* (2019) suggested trust as a central construct for successful HCI in a study linking neuroscientific methods, text mining, and deep learning. Yet, authors called for further research to investigate the relationship between trust and chatbots in several contexts. Based on that, we offer:

H5. Trust positively influences BI towards shopping chatbots.

Perceived risk

When the security of the infrastructure for safeguarding personal information is not validated, consumers sense risk (Moriuchi, 2021). Perceived risk represents the potential for loss in the pursuit of the desired outcome and, for such reason, has a major role in the overall adoption decision (Featherman and Pavlou, 2003; Laroche *et al.* 2005). Technology users are concerned about their data, the level of data protection, and who has access to these data (Faqih, 2015). Perceived risk can damp customer service adoption in several technological contexts like internet shopping (Bhatnagar and Ghose, 2004), internet banking (Martins *et al.*, 2014), and mobile payment adoption (Lu *et al.*, 2011). For example, Adapa *et al.* (2020) found that the perceived risk of using smart retail technology influences the value perceived from the use of this technology, which in turn impacts intentions to

use it, and retail store loyalty. Similarly, in a mobile shopping application context, perceived risk is found to negatively influence both the satisfaction and intention to use the app (Natarajan *et al.*, 2017). Thus, we propose:

H6. Perceived risk negatively influences BI towards shopping chatbots.

At the level of internet shopping, trust is found to impact perceived risk and mitigate its negative effect on BI (Hung *et al.*, 2012). In fact, individuals show fewer risk concerns when they perceive the technology as trusted. In this case, they are more likely to adopt it and reveal personal information (Groß, 2016; Slade *et al.* 2015). On the other hand, untrusted technologies are likely to lessen the intention to use and disclose information (Dinev and Hart, 2005). Trust has a negative impact on perceived risk in mobile shopping (Marriott and Williams, 2018) and specifically in mobile payments (Lu *et al.*, 2011). This we propose:

H7. Trust negatively influences perceived risk towards shopping chatbots.

Flow

Flow is as a mental state of operation in which a person is fully immersed in what he/she is doing, obtaining mental gratification as a result of full involvement and focus; it reflects a holistic positive state of consciousness that people feel when they act with total involvement (Csikszentmihalyi, 1988). It has been regarded as a relevant aspect in the understanding and the delivering of convincing experiences to consumers when using computer-mediated services (Valinatajbahnamiri and Siahtiri, 2021). According to Zhou (2013), this construct includes three dimensions: perceived enjoyment (users' fun derived by using the technology), perceived control (users' feelings of control over the activity and their surrounding environments), and attention focus (users' concentration and immersion in the activity). Flow has been already applied to study users' experience with communication technologies, confirming its effect as an optimal experience on user behaviour (Rese et al., 2020; De Cicco et al. 2021). Given the interactive one-to-one nature of chatbots, which

positions this channel differently from other shopping channels such as e-commerce websites, it is important to understand how interacting with chatbots can impact customers' flow experience and how this, in turn, affects CX. A recent study investigated how customers' flow experience with chatbots could accelerate the communication quality between customers and organisations, and improve customer satisfaction (Baabdullah et al., 2022). Prior chatbot studies have mainly focused on customers' intention, adoption, and satisfaction with such systems, but the flow experience was not included as a possible determinant. This study provides a first step into providing new horizons to dimensions that have not been addressed by prior studies investigating chatbots. In fact, there is a lack of studies addressing the impact of the interactive nature of chatbots on customers' flow experience and how this affects OCE, as well as business outcomes. Thus, the success of the chatbot system seems to rely heavily on CX, which is determined by a cognitive component that is the users' concentration/attention focus, and an affective component which is the sense of enjoyment while interacting with such a system (Rose *et al.,* 2022; Kushwaha *et al.,* 2021). Thus:

H8. Flow positively influences BI towards shopping chatbots.

Zhou (2012) found that trust has a positive effect on the flow experience. Trust in technology is needed to have a good customer experience and achieve a higher level of the flow dimensions of perceived enjoyment and perceived control (Valinatajbahnamiri and Siahtiri, 2021). Trust provides the feeling of achieving satisfactory results and allows the users to enjoy the online shopping experience (Kushwaha *et al.*, 2021; Gefen *et al.* ,2003). Thus:

H9. Trust positively influences the flow towards shopping chatbots.

Our research model is depicted in Figure 1.

*****Insert Figure 1 here*****

Method

Sampling procedure

The link to the experiment was shared on social media (Facebook and LinkedIn),using the snowball sampling technique. Data from 226 European participants, from 18 to 62 years old, 42.0% women, was collected (see Table 1).

*****Insert Table 1 here*****

Participants were asked to try a new online service launched by a pizzeria and instructed to interact with a chatbot designed using Chatfuel, a platform within Messenger, which was chosen due to the mass use and popularity of this chatbot type. After interacting with the bot and having chosen a pizza (see the conversational design and an example of the interaction in Figures 2 and 3), participants were asked to answer questions about their chatbot's usage experience.

*****Insert Figure 2 here*****

*****Insert Figure 3 here*****

Measures

The studied factors were measured by adapting existing scales (see Table 2). As for flow, all the dimensions were included (perceived enjoyment, perceived control, and attention focus) to provide insights from a more comprehensive measure.

*****Insert Table 2 here*****

Common method bias (CMB)

A statistical procedure using the post hoc Harman single-factor approach was to test that the data variance was not explained by one single factor (Babin *et al.*, 2016). The 8 factors were then loaded into a single factor. The unrotated factor solution showed that the one-factor solution accounted for 36.129 per cent of explained variance, which was less than the 50 per cent threshold (Podsakoff *et al.* 2003). This result indicated that CMB was unlikely to be an issue.

Data analysis

To estimate the measurement and structural models, Partial Least Square Structural Equation Modeling (Hair *et al.*, 2017) through Smart PLS 3.2.8 software was used. We use the heterotrait-monotrait criterion for testing discriminant validity (Hair *et al.*, 2019).

Results

Assessment of the measurement model

Reliability analysis was carried out. Cronbach's alpha values range from 0.841 to 0.955 exceeding the threshold of 0.70 (Netemeyer et al. 2003). Moreover, internal reliability and convergent validity were respectively assessed by composite reliability (CR) and average variance extracted (AVE) tests, following Fornell and Larcker's (1981) criteria. CR and AVE exceeded the minimum cut-off of 0.5. The extent to which a set of measured items reflects the theoretical latent construct was ensured, with evidence of the model's sufficient construct validity (see Table 3).

*****Insert Table 3 here*****

The criterion of Fornell and Larcker (1981) where each composite's AVE square-root value was compared with the correlations between the different composites of the model (See Table 4) was used. Discriminant validity was also assessed by the Heterotrait-Monotrait ratio of correlations because of its superior performance compared to more traditional methods (Henseler *et al.* 2015). All values were below the threshold of 0.90 (see Table 5). These results suggest a satisfactory discriminant validity for all constructs.

*****Insert Table 4 here*****

*****Insert Table 5 here*****

The degree of multicollinearity was also assessed through the value of the Variance Inflation Factor (VIF). Two items were removed (T2 and T3) from the trust scale due to high VIF, to avoid Collinearity issues (Hair et al., 2017).

Assessment of the structural model

The hypotheses were tested using 2000 bootstraps resamples (see Table 6). Results show that H1 is supported as PE is positively related to BI ($\gamma = 0.256$, $p < 0.01$; it is worth mentioning that the effect size is small; $f^2 = 0.051$). EE, SI and FC (respectively $\gamma = -0.101$, $p = 0.614$; $\gamma = -0.138$, $p = 0.185$; and $\gamma = 0.063$, $p = 0.729$) are not significantly related to BI, thus H2, H3, and H4 are not supported. Trust ($\gamma = 0.582$, $p < 0.01$) is positively related to BI, providing support to H5, while perceived risk ($\gamma = 0.049$, $p = 0.677$) was not found to be significantly related to BI, hence, H6 is not supported. However, trust was negatively related to perceived risk ($\gamma = -0.535$ $p < 0.001$), therefore, H7 is supported. Regarding flow, H8 was not supported, as flow is not significantly related to BI ($\gamma = 0.147$, $p = 0.164$). However, trust was also found to be positively related to flow ($\gamma = 0.606$, $p < 0.001$) offering support to H9.

The adjusted coefficient of determination value (R^2) for BI is 0.547, while the determination value for flow and perceived risk is, respectively, 0.364 and 0.277, which represent a good value for behavioural research (Hair *et al.*, 2017). We used the blindfolding procedure to evaluate the relevance of exogenous variables to model performance. This technique examines each construct predictive relevance by computing changes in the criterion estimates (Q^2) (Hair *et al.*, 2017). Our results of Stone-Geisser's blindfolding technique (Q^2) show that BI ($Q^2 = 0.415$) has satisfactory predictive relevance since its value is far above 0 (Thakur, 2018). The same applies to flow ($Q^2 = 0.174$) and perceived risk ($Q^2 = 0.170$).

*****Insert Table 6 here*****

Importance-performance map analysis (IPMA)

This study employs the IPMA as an advanced approach in PLS-SEM by using the BI to use the chatbot as the target variable. The employment of IPMA approach provides more insights into the understanding of PLS-SEM findings and allows the identification of key areas of improvement (Ringle and Sarstedt, 2016). As an alternative for only measuring the path coefficients (i.e., "importance measure"), IPMA takes into account the average value of latent variables and their

indicators (i.e., “performance measure”) (Al-Saedi *et al.*, 2020) (see Figure 2). The importance and performance of all the independent variables (i.e., PE, EE, FC, SI, perceived risk, trust, and flow) were measured. Concerning the importance measure, trust is found to be the most important factor for predicting the BI to use the chatbot, followed by, respectively, PE, flow, FC, EE, perceived risk, and lastly, SI. In terms of the performance measure, FC have the highest value, respectively followed by EE, PE, trust, perceived risk, flow, and lastly again, SI.

The IPMA results provide evident support to the structural model results. In that, trust was found to be the most influential variable that predicting BI in terms of importance measure, which in turn, supports the results provided in Table 6 above, in which trust was shown to have the highest standard beta value.

By focusing on a key target construct, the importance-performance analysis identifies constructs that should receive the highest priority for performance improvement, thereby, the performance of the key target construct also increases (Ringle and Sarstedt, 2016). Although we did not see a very low performance, SI and flow showed a lower score, when compared to other factors indicating room for improvement of these constructs in the future (see Figure 4).

*****Insert Figure 4 here*****

Discussion and Conclusion

Chatbots have become extraordinarily popular in recent years owing to significant advances in machine learning and other underlying technologies like natural language processing. Thus, it is crucial to identify the main factors that affect customer BI towards these conversational agents in the whole CX. The current study grounded on an extended UTAUT model to empirically assess the factors that influence the intention to use chatbots in an online fast-food purchasing context.

Although the four main antecedents of the UTAUT model show a significant impact on technology use in several previous studies (e.g., Guggemos *et al.*, 2020), in the current study, at the level of online shopping chatbots, out of these four factors, only PE was found to have a statistically

significant positive effect on the intention. Thus, the level to which an individual believes that interacting with the chatbot will help them improve their performance is the most important attribute to consider, while the perception of the ease of technology usage (EE) does not affect intention to use, in line with other studies where this construct mostly yielded non-significant results (Duarte and Pinho, 2019; Liu, 2012). Moreover, our results regarding H1 and H2 are highly supported by a meta-analytic evaluation of UTAUT in which the path from PE to BIs was considered the most utilized path with the most significant values, while the path from EE to BI was found to be the least significant and questioned (Tamilmani *et al.*, 2021). We explain these two results by the fact that chatbots have a very low complexity level, and customers are not expecting any difficulty in using them; hence ease of use seems not to be an issue.

The current study also finds that FC do not generate significant effects on BI. This suggests that individuals do not associate importance with the FC in HCI such as instructions or high internet bandwidth: they do not find it difficult to interact with the chatbot, in the same way, they do not consider infrastructures as an issue that might cause slowdown or frustration given the multichannel properties and flexibility of these systems. So, despite that the FC have been proven as a stimulus for the customer to benefit from IT innovation in several studies (Dwivedi *et al.*, 2019; Patil *et al.*, 2020), with such easy-going technology, this construct does not reveal to be a crucial determinant. Moreover, this study suggests that SI does not have a significant impact on BI. Hence, the concern of judgments from other individuals already using the technology, is not a strong predictor of the intention to use online shopping chatbots. This may be explained by the fact that when UTAUT model was initially introduced, it was meant to measure users' technology acceptance in the organizations' context where the influence of co-workers was more relevant, and new technology use was often mandatory (Cimperman *et al.*, 2016). Now, younger users tend to disregard the influence of societal pressure, image, and social status and tend to pursue more emotionally meaningful goals. Hence, we believe that SI would play an important role when the use of specific technology can improve the social or professional image of the individual, like mastering an accounting program. However, when it comes

to shopping technologies, it is less likely to consider the opinion of others, especially for chatbots, as people most often use them without the presence of other individuals.

Among the additional constructs combined with the original UTAUT model, trust was the only significant predictor of BI, which is in line with previous findings (Oh *et al.*, 2009), and willingness to share information with the service provider/retailer (Pallant *et al.*, 2022; Song and Kim, 2021). In addition to BI, we also found that trust has a negative effect on perceived risk and a positive effect on flow. The negative path from trust to perceived risk means that the more the chatbot is believed to work reliably, by evoking a feeling of confidence during the service encounter, the less risky this should be perceived (Marriott and Williams, 2018). These results are relevant not only because these artificial agents often deal with user-sensitive data (Chattaraman *et al.*, 2019), but also because many users have a general aversion to algorithms and AI (Wirtz, 2018). Concerning the positive link between trust and flow, we see that trust mitigates risk perceptions and allows people to enjoy the experience more, as found by Zhou (2012). However, although trust was found to impact perceived risk and flow, the latter two do not significantly influence the BI towards the studied chatbot. The cause for this might be reasonably ascribed to the fact that being a simulated condition, participants, going beyond the novelty of the channel involved, did not truly and fully perceive all the risks involved in an online transaction. Another explanation is that we are testing this relation at the level of online food shopping chatbots and the money involved would be low; at the level of another type of purchase, the negative effect of perceived risk on intention to use could be more significant due to the nature of risks concerning high-value transactions. Furthermore, the time of conducting a food order transaction for one customer might not be enough to engage in what could be considered a flow experience.

Theoretical implications

The theoretical contributions of this study are threefold. First, this study extends and verifies UTAUT. At the level of shopping chatbots, and in addition to the four main antecedents of UTAUT,

this paper considers trust, perceived risk, and flow, moreover, it considers the effect of trust on both perceived risk and flow. These factors and the relations among them were missing in UTAUT and UTAUT2 (Venkatesh *et al*., 2003; 2012). Second, we contribute to the literature on chatbots, which, though being recently addressed by the academic attention (Araujo, 2018; De Cicco *et al.*, 2020; Soares *et al*., 2022; Rese *et al.*, 2020), still lacks a thorough understanding of the factors driving the usage of this technology. Then, the current study tests the enriched version of the UTAUT showing good validity and exploratory power, suggesting that the added antecedents increase its explanatory power when addressing the intention of use. This improved version of the model strengthens previous studies where these factors were added to UTAUT in other research fields (Slade *et al.*, 2015; Oliveira *et al.*, 2014).

Moreover, this study, specifically, suggests that PE and trust are the main studied factors that influence BIs to use chatbots designed for online shopping purposes, mitigating risk. Besides supporting the examination of both emotional and cognitive responses, the results also support the inclusion of the Flow Theory (Nakamura and Csikszentmihalyi, 2009) in a more integrated theoretical framework. This support is based on our findings regarding trust and its positive effect on enhancing the flow experience when using the chatbot. Finally, this study, by applying IPMA, defines potential room to improve two constructs like SI and flow. We believe these require improvements at the level of scale items to suit an easy-going technology like a chatbot, especially regarding the social factor.

Managerial implications

Many retailers adopt more updated technological approaches in the online domain to gain a competitive advantage, appeal to their consumer base, and ultimately thrive economically (Kasililngam, 2020). But, in most cases, they do not have the possibility and the resources to research and understand to what extent their customers benefit from the new technologies or how to improve them. From this perspective, this study offers interesting insights for practitioners willing to, or already applying, chatbots in their online marketing strategies, proposing a holistic understanding of

various drivers. The significant impact of PE on BI indicates that advertising messages should address the usefulness of interacting with chatbots, for example, by saving time and receiving immediate responses. Chatbots should offer the best possible user experience and go beyond expectations, not only focusing on the utility of the system but also on the value added to its use. If chatbots easily acquire an optimal level of simplicity and easiness, flow would be activated and more consumers would be attracted to use such systems. Security and reliability should also be guarateed. A reliable chatbot enhances BIs. Moreover, it mitigates perceived risk and enriches the flow experience. To build trust, retailers could convey transparency, and consider features and/or restrictions, making it clear that all the information revealed to the chatbot is private and data protected.

Limitations and future research directions

User behaviour is dynamic and notoriously difficult to measure. So, it is recommended that future research take a longitudinal approach, which would enable the examination of the effect of BI on user behaviour. Additionally, given the exploratory nature of this study, future research should address validity concerns with a larger and more representative sample. As the study mainly targeted young users, who although representing a target of interest for companies, are quite different from other cohorts in their online purchasing experience and use of new technologies, results should be cross-validated among other user age groups. Then, besides the three factors added to the original model, there surely exist others affecting the intention to use chatbots for purchasing. In this vein, models like TAM and UTAUT, developed at the level of organizations and more complex technologies, might have some limitations in examining drivers of contemporary consumer technologies like chatbots (Belk *et al.*, 2021), in which these technologies are not seen any more as uncommon or distinctive, but inculcated in people´s minds, as a habitual part of daily life. Based on that, we suggest that future studies may investigate more futuristic determinants of technology adoption. In the case of online shopping chatbots, design, playfulness, and social presence may be important drivers of acceptance. Furthermore, future research should collect more psychographics

and demographic (e.g., user-based use motives, lifestyles, and values) to provide more robust and explanatory results. Finally, the chatbot developed for this study belongs to a specific context – i.e., food ordering and purchasing – which implies a CX that might differ from other contexts (for example a bank assistant or a post-purchase assistant) in specific attributes (i.e., personalization, perceived benefits, skills). Future studies could delve into these aspects and look at how their impact on intentions varies depending on the context and the different touchpoints analised.

References

Adam, M., Wessel, M. and Benlian, A. (2021), "AI-based chatbots in customer service and their effects on user compliance", *Electronic Markets*, Vol. 31 No. 2, pp. 427–445.

Adapa, S., Fazal-e-Hasan, S. M., Makam, S. B., Azeem, M. M. and Mortimer, G. (2020), "Examining the antecedents and consequences of perceived shopping value through smart retail technology", *Journal of Retailing and Consumer Services*, Vol. 52, pp. 101901.

Ahmad, W., Kim, W. G., Choi, H. M. and Haq, J. U. (2021), "Modeling behavioral intention to use travel reservation apps: A cross-cultural examination between US and China", *Journal of Retailing and Consumer Services*, Vol. 63, pp. 102689.

Araujo, T. (2018), "Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions", *Computers in Human Behavior*, Vol. 85, pp. 183–189.

Baabdullah, A. M., Alalwan, A. A., Algharabat, R. S., Metri, B., & Rana, N. P. (2022). Virtual agents and flow experience: An empirical examination of AI-powered chatbots. *Technological Forecasting and Social Change*, 181, 121772.

Babin, B. J., Griffin, M. and Hair Jr, J. F. (2016), "Heresies and sacred cows in scholarly marketing publications", *Journal of Business Research*, Vol. 69 No. 8, pp. 3133–3138.

Balakrishnan, J. and Dwivedi, Y. K. (2021), "Role of cognitive absorption in building user trust and experience", *Psychology & Marketing*, Vol. 38 No. 4, pp. 643–668.

Baptista, G. and Oliveira, T. (2015), "Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators", *Computers in Human Behavior*, Vol. 50, pp. 418–430.

Belk, R., Weijo, H. and Kozinets, R. V. (2021), "Enchantment and perpetual desire: Theorizing disenchanted enchantment and technology adoption", *Marketing Theory*, Vol. 21 No.1, pp. 25–52.

Bobalca, S. C., Ţugulea, O., Ifrim, M. and Maha, L.-G. (2021), "Analysing the predictors of the young buyers' satisfaction in the e-retailing apparel sector", *International Journal of Retail & Distribution Management*, Vol. 49 No. 12, pp. 1597–1620.

Cao, L. (2021), "Artificial intelligence in retail: applications and value creation logics", *International Journal of Retail & Distribution Management*, Vol. 49 No. 7, pp. 958–976.

Chattaraman, V., Kwon, W. S., Gilbert, J. E. and Ross, K. (2019), "Should AI-Based, conversational digital assistants employ social-or task-oriented interaction style? A task-competency and reciprocity perspective for older adults", *Computers in Human Behavior*, Vol. 90, pp. 315–330.

Chen, J.-S., Le, T.-T. and Florence, D. (2021), "Usability and responsiveness of artificial intelligence chatbot on online customer experience in e-retailing", *International Journal of Retail & Distribution Management*, Vol. 49 No. 11, pp. 1512–1531.

Chiu, Y. T. H., Fang, S. C. and Tseng, C. C. (2010), "Early versus potential adopters: Exploring the antecedents of use intention in the context of retail service innovations", *International Journal of Retail & Distribution Management*, Vol. 38 No. 6, 443–459.

Chopra, K. (2019), "Indian shopper motivation to use artificial intelligence: Generating Vroom's expectancy theory of motivation using grounded theory approach", *International Journal of Retail & Distribution Management*, Vol. 47 No. 3, pp. 331-347.

Cimperman, M., Brenčič, M. M. and Trkman, P. (2016), "Analyzing older users' home telehealth services acceptance behavior—applying an Extended UTAUT model". *International Journal of Medical Informatics*, Vol. 90, pp. 22–31.

Csikszentmihalyi, M. (1988) “The flow experience and its significance for human psychology” in Optimal Experience: Psychological Studies of Flow in Consciousness, M. Csikszentmihalyi and I. Csikszentmihalyi, Eds., pp. 15–35, Cambridge University Press, Cambridge, UK.

De Cicco, R., Silva, S.C. and Alparone, F.R. (2020), "Millennials' attitude toward chatbots: an experimental study in a social relationship perspective", *International Journal of Retail & Distribution Management*, Vol. 48 No. 11, pp. 1213-1233.

De Cicco, R., Silva, S. C. and Alparone, F. R. (2021), "“It’s on its way”: Chatbots applied for online food delivery services, social or task-oriented interaction style? ", *Journal of Foodservice Business Research*, Vol. 24 No. (2), pp. 140–164.

Dieck, T. M. C. and Han, D. I. D. (2022). "The role of immersive technology in Customer Experience Management", *Journal of Marketing Theory and Practice*, Vol. 30 No. 1, pp. 108–119.

Dinev, T. and Hart, P. (2005), "Internet privacy concerns and social awareness as determinants of intention to transact", *International Journal of Electronic Commerce*, Vol. 10 No. 2, pp. 7–29.

Duarte, P. and Pinho, J. C. (2019), "A mixed methods UTAUT2-based approach to assess mobile health adoption", *Journal of Business Research*, Vol. 102, pp. 140–150.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M. and Williams, M. D. (2019), "Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model", *Information Systems Frontiers*, Vol. 21 No. 3, pp. 719–734.

Eren, B.A. (2021), "Determinants of customer satisfaction in chatbot use: evidence from a banking application in Turkey", *International Journal of Bank Marketing*, Vol. 39 No. 2, pp. 294–311.

Faqih, K. M. (2013), "Exploring the influence of perceived risk and internet self-efficacy on consumer online shopping intentions: Perspective of technology acceptance model", *International Management Review*, Vol. 9 No. 1, pp. 67–77.

Featherman, M. S. and Pavlou, P. A. (2003), "Predicting e-services adoption: a perceived risk facets perspective", *International Journal of Human-Computer Studies*, Vol. 59 No. 4, pp. 451–474.

Forbes (2019), 'Consumer Preference For Chatbots Is Challenging Brands To Think 'Bot First’', available at: https://www.forbes.com/sites/forbescommunicationscouncil/2019/08/16/consumer-preference-for-chatbots-is-challenging-brands-to-think-bot-first/ (accessed 07 January 2022).

Fornell C. and Larcker D. F. (1981), "Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics", *Journal of Marketing Research*, Vol. 18 No. 3, pp. 382–388.

Gefen, D., Karahanna, E. and Straub, D. W. (2003), "Trust and TAM in online shopping: An integrated model", *MIS quarterly*, Vol. 27 No. 1, pp. 51–90.

Gentsch, P. (2019), “Conversational AI: how (chat) bots will reshape the digital experience”, in AI in Marketing, Sales and Service, Palgrave Macmillan, Cham, pp. 81-125.

Gong, T., Wang, C. Y. and Lee, K. (2021), "Effects of characteristics of in-store retail technology on customer citizenship behavior", *Journal of Retailing and Consumer Services*, Vol. 65, pp. 102488.

Groß, M. (2016), "Impediments to mobile shopping continued usage intention: A trust-risk-relationship", *Journal of Retailing and Consumer Services*, Vol. 33, pp. 09–119.

Gupta, A., Dogra, N. and George, B. (2018), "What determines tourist adoption of smartphone apps? An analysis based on the UTAUT-2 framework", *Journal of Hospitality and Tourism Technology*, Vol. 9 No. 1, pp. 50–64.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2–24.

Hair Jr, J.F., Sarstedt, M., Ringle, C.M. and Gudergan, S.P. (2017), *Advanced issues in partial least squares structural equation modeling*, Sage publications.

Henseler, J., Ringle, C. M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115–135.

Herrero, A., San Martín, H. and Collado, J. (2018), "Market orientation and SNS adoption for marketing purposes in hospitality microenterprises", *Journal of Hospitality and Tourism Management*, Vol. 34, pp. 30–40.

Hildebrand, C. and Bergner, A. (2021), "Conversational robo advisors as surrogates of trust: onboarding experience, firm perception, and consumer financial decision making", *Journal of the Academy of Marketing Science*, Vol. 49 No. 4, pp. 659–676.

Holsapple, C. W. & Wu, J. 2008. Antecedents and outcomes of the flow experience: An empirical study in the context of online gaming. *Journal of International Technology and Information Management*, Vol. 17, pp. 285-306.

Hong, W., Thong, J. Y., Wong, W. M. and Tam, K. Y. (2002), "Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics", *Journal of Management Information Systems*, Vol. 18 No. 3, pp. 97–124.

Hung, M. C., Yang, S. T. and Hsieh, T. C. (2012), "An examination of the determinants of mobile shopping continuance", *International Journal of Electronic Business Management*, Vol. 10 No. 1, pp. 29–37.

Kasilingam, D. L. (2020), "Understanding the attitude and intention to use smartphone chatbots for shopping", *Technology in Society*, Vol. 62, pp. 101280.

Kim, H. B., Kim, T. T. and Shin, S. W. (2009), "Modeling roles of subjective norms and eTrust in customers' acceptance of airline B2C eCommerce websites", *Tourism Management*, Vol. 30 No. 2, pp. 266–277.

Kuberkar, S. and Singhal, T. K. (2020), "Factors Influencing Adoption Intention of AI Powered Chatbot for Public Transport Services within a Smart City", *International Journal of Emerging Technologies in Learning*, Vol. 11 No. 3, pp. 948–958.

Kushwaha, A. K., Kumar, P., and Kar, A. K. (2021). What impacts customer experience for B2B enterprises on using AI-enabled chatbots? Insights from Big data analytics. *Industrial Marketing Management*, Vol. *98*, pp. 207-221.

Laroche, M., Yang, Z., McDougall, G. H. and Bergeron, J. (2005), "Internet versus bricks-and-mortar retailers: An investigation into intangibility and its consequences", *Journal of Retailing*, Vol. 81 No. 4, pp. 251–267.

Lei, S.I., Shen, H. and Ye, S. (2021), "A comparison between chatbot and human service: customer perception and reuse intention", *International Journal of Contemporary Hospitality Management*, Vol. 33 No. 11, pp. 3977–3995.

Lu, Y., Yang, S., Chau, P. Y. and Cao, Y. (2011), "Dynamics between the trust transfer process and intention to use mobile payment services: A cross-environment perspective", *Information & Management*, Vol. 48 No. 8, pp. 393–403.

Marriott, H. R. and Williams, M. D. (2018), "Exploring consumers perceived risk and trust for mobile shopping: A theoretical framework and empirical study", *Journal of Retailing and Consumer Services*, Vol. 42, pp. 133–146.

Martins, C., Oliveira, T. and Popovič, A. (2014), "Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application", *International Journal of Information Management*, Vol. 34 No. 1, pp. 1–13.

Maseeh, H. I., Jebarajakirthy, C., Pentecost, R., Arli, D., Weaven, S. and Ashaduzzaman, M. (2021), "Privacy concerns in e-commerce: A multilevel meta-analysis", *Psychology & Marketing*, Vol. 38, pp. 1779–1798.

McLean, G., Osei-Frimpong, K., Wilson, A., and Pitardi, V. (2020), "How live chat assistants drive travel consumers' attitudes, trust and purchase intentions: the role of human touch", *International Journal of Contemporary Hospitality Management*, Vol. 32 No. 5, pp. 1795–1812.

Mirvis, P. H. (1991), "Flow: The Psychology of optimal experience", *Academy of Management Review*, Vol. 16 No. 3, pp. 636–640.

Mogaji, E., Balakrishnan, J., Nwoba, A. C. and Nguyen, N. P. (2021), "Emerging-Market Consumers' Interactions with Banking Chatbots", *Telematics and Informatics*, Vol. 65, pp. 101711.

Moriuchi, E. (2021), "An empirical study of consumers' intention to use biometric facial recognition as a payment method", *Psychology & Marketing*, Vol. 38, pp. 1741–1765.

Nakamura, J. and Csikszentmihalyi, M. (2009), "Flow theory and research". In *S. J. Lopez and C. R. Snyder (Eds.), Oxford handbook of positive psychology*, pp. 195–206, Oxford University Press.

Natarajan, T., Balasubramanian, S. A. and Kasilingam, D. L. (2017), "Understanding the intention to use mobile shopping applications and its influence on price sensitivity", *Journal of Retailing and Consumer Services*, Vol. 37, pp. 8–22.

Netemeyer, R.G., Bearden, W.O. and Sharma, S. (2003), *Scaling Procedures: Issues and Applications*, SAGE Publications, Thousand Oaks, CA.

Nordheim, C. B., Følstad, A. and Bjørkli, C. A. (2019), "An initial model of trust in chatbots for customer service—findings from a questionnaire study", *Interacting with Computers*, Vol. 31 No. 3, pp. 317–335.

Oh, S. H., Kim, Y. M., Lee, C. W., Shim, G. Y., Park, M. S. and Jung, H. S. (2009), "Consumer adoption of virtual stores in Korea: Focusing on the role of trust and playfulness", *Psychology & Marketing*, Vol. 26 No. 7, pp. 652–668.

Oliveira, T., Faria, M., Thomas, M. A., and Popovič, A. (2014), "Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM", *International Journal of Information Management*, Vol. 34 No. 5, pp. 689–703.

Pallant, J. I., Pallant, J. L., Sands, S. J., Ferraro, C. R. and Afifi, E. (2022), "When and how consumers are willing to exchange data with retailers: An exploratory segmentation", *Journal of Retailing and Consumer Services*, Vol. 64, pp. 102774.

Pappas, I.O., Pateli, A.G., Giannakos, M.N. and Chrissikopoulos, V. (2014), "Moderating effects of online shopping experience on customer satisfaction and repurchase intentions", *International Journal of Retail & Distribution Management*, Vol. 42 No. 3, pp. 187-204.

Park, S. S., Tung, C. D. and Lee, H. (2021), "The adoption of AI service robots: A comparison between credence and experience service settings", *Psychology & Marketing*, Vol. 38 No. 4, pp. 691–703.

Patil, P., Tamilmani, K., Rana, N. P. and Raghavan, V. (2020), "Understanding consumer adoption of mobile payment in India: Extending Meta-UTAUT model with personal innovativeness, anxiety, trust, and grievance redressal", *International Journal of Information Management*, Vol. 54, pp. 102144.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879– 903.

Przegalinska, A., Ciechanowski, L., Stroz, A., Gloor, P. and Mazurek, G. (2019), "In bot we trust: A new methodology of chatbot performance measures", *Business Horizons*, Vol. 62 No. 6, pp. 785–797.

Rana, J., Gaur, L., Singh, G., Awan, U., and Rasheed, M. I. (2021). Reinforcing customer journey through artificial intelligence: a review and research agenda. *International Journal of Emerging Markets.* doi.org/10.1108/IJOEM-08-2021-1214.

Rese, A., Ganster, L. and Baier, D. (2020), "Chatbots in retailers' customer communication: How to measure their acceptance?", *Journal of Retailing and Consumer Services*, Vol. 56, pp. 102176.

Ringle, C.M. and Sarstedt, M. (2016), "Gain more insight from your PLS-SEM results: The importance-performance map analysis", *Industrial Management & Data Systems*, Vol. 116 No. 9, pp. 1865–1886.

Rose, S., Hair, N., and Clark, M. (2011). Online customer experience: A review of the business-to-consumer online purchase context. *International Journal of Management Reviews*, Vol. 13 No.1, pp. 24-39.

Rose, S., Clark, M., Samouel, P., & Hair, N. (2012). Online customer experience in e-retailing: an empirical model of antecedents and outcomes. *Journal of Retailing*, Vol. 88 No. 2, pp. 308-322.

Sidaoui, K., Jaakkola, M. and Burton, J. (2020), "AI feel you: customer experience assessment via chatbot interviews", *Journal of Service Management*, Vol. 31 No. 4, pp. 745-766.

Slade, E. L., Dwivedi, Y. K., Piercy, N. C. and Williams, M. D. (2015), "Modeling consumers' adoption intentions of remote mobile payments in the United Kingdom: extending UTAUT with innovativeness, risk, and trust", *Psychology & Marketing*, Vol. 32 No. 8, pp. 860–873.

Soares, A.M., Camacho, C., Elmashhara, M.G. (2022), "Understanding the Impact of Chatbots on Purchase Intention", In: Rocha, A., Adeli, H., Dzemyda, G., Moreira, F. (eds) *Information Systems and Technologies. WorldCIST 2022. Lecture Notes in Networks and Systems*, Vol. 470, Springer, Cham.

Sreejesh, S., Sarkar, J.G. and Sarkar, A. (2022), "Digital healthcare retail: role of presence in creating patients' experience", *International Journal of Retail & Distribution Management*, Vol. 50 No. 1, pp. 36–54.

Tamilmani, K., Rana, N. P. and Dwivedi, Y. K. (2021), "Consumer acceptance and use of information technology: A meta-analytic evaluation of UTAUT2", *Information Systems Frontiers*, Vol. 23 No. 4, pp. 987–1005.

Thaker, H. M. T., Khaliq, A., Mand, A. A., Hussain, H. I., Thaker, M. A. B. M. T., and Pitchay, A. B. A. (2020), "Exploring the drivers of social media marketing in Malaysian Islamic banks: An analysis via smart PLS approach", *Journal of Islamic Marketing*, Vol. 12 No. 1, pp. 145–165.

Thakur, R. (2018), "The role of self-efficacy and customer satisfaction in driving loyalty to the mobile shopping application", *International Journal of Retail & Distribution Management*, Vol. 46 No. 3, pp. 283–303.

Valinatajbahnamiri, M. and Siahtiri, V. (2021), "Flow in computer-mediated environments: A systematic literature review", *International Journal of Consumer Studies*, Vol. 45 No. 4, pp. 511–545.

Van den Broeck, E., Zarouali, B. and Poels, K. (2019), "Chatbot advertising effectiveness: when does the message get through", *Computers in Human Behaviour*, Vol. 98, pp. 150-157.

Vega, A., Ramírez-Benavidez, K. and Guerrero, L.A. (2019), "Tool UTAUT applied to measure interaction experience with NAO robot", In *International Conference on Human-Computer Interaction*, pp. 501–512, Springer, Cham.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003), "User acceptance of information technology: Toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425–478.

Vlačić, B., Corbo, L., e Silva, S. C., & Dabić, M. (2021). The evolving role of artificial intelligence in marketing: A review and research agenda. *Journal of Business Research*, *128*, 187-203.

Wang, X., Lin, X. and Shao, B. (2022), "How does artificial intelligence create business agility? Evidence from chatbots", *International Journal of Information Management*, Vol. 66, pp. 102535.

Williams, M. D., Rana, N. P. and Dwivedi, Y. K. (2015), "The unified theory of acceptance and use of technology (UTAUT): a literature review", *Journal of Enterprise Information Management*, Vol. 28 No. 3, pp. 443–488.

Wirtz, J., Patterson, P., Kunz, W., Gruber, T., Lu, V., Paluch, S., and Martins, A. (2018), "Brave new world: Service robots in the frontline", *Journal of Service Management*, Vol. 29 No. 5, pp. 907–931.

Zarouali, B., Van den Broeck, E., Walrave, M. and Poels, K. (2018), "Predicting consumer responses to a chatbot on Facebook", *Cyberpsychology, Behavior, and Social Networking*, Vol. 21 No. 8, pp. 491–497.

Zhang, M., Hu, M., Guo, L. and Liu, W. (2017), "Understanding relationships among customer experience, engagement, and word-of-mouth intention on online brand communities", *Internet Research*, Vol. 27 No. 4, pp. 839-857.

Zhou, M., Zhao, L., Kong, N., Campy, K. S., Xu, G., Zhu, G., ... and Wang, S. (2020), "Understanding consumers' behavior to adopt self-service parcel services for last-mile delivery", *Journal of Retailing and Consumer Services*, Vol. 52, pp. 101911.

Zhou, T. (2012), "Examining mobile banking user adoption from the perspectives of trust and flow experience", *Information Technology and Management*, Vol. 13 No. 1, pp. 27–37.

Zhou, T. (2013), "The effect of flow experience on user adoption of mobile TV", *Behaviour & Information Technology*, Vol. 32 No. 3, pp. 263–272.