RedFame

Studies in Media and Communication
Vol. 11, No. 7; December 2023
ISSN: 2325-8071 E-ISSN: 2325-808X
Published by Redfame Publishing
URL: http://smc.redfame.com

The Drivers of Customer Satisfaction in Interactions with Virtual Agents: Evidence from South Africa

Kival Dhavraj[1], Tinashe T R Ndoro[1]

[1]University of Pretoria, Department of Marketing Management, South Africa

Correspondence: Tinashe T R Ndoro, University of Pretoria, Department of Marketing Management, South Africa.

Received: September 7, 2023 Accepted: November 16, 2023 Online Published: November 28, 2023

doi:10.11114/smc.v11i7.6365 URL: https://doi.org/10.11114/smc.v11i7.6365

Abstract

The advent of the fourth industrial revolution has increased the application of artificial intelligence in various marketing related activities. Organisations are increasingly using artificial intelligence through virtual agents to aid and facilitate interactions with consumers. Clearly, virtual agents need to be capable of fulfilling customer needs. However, it raises the question of whether they should be cold and unfeeling or should imitate the most innate human qualities. This research therefore set out to examine what impact humanness, perceived agency, trust, and emotionality have on customer satisfaction in interactions with virtual agents, or, more specifically, AI chatbots. A quantitative research design was employed in the study. Data were collected by using a survey questionnaire and a total of 207 respondents were obtained. Data were analysed using IBM SPSS 28, where a linear regression was performed. The results indicate that humanness and perceived agency were significant predictors of customer satisfaction. On the other hand, emotionality and trust were not significant predictors. The results of this research have theoretical and practical implications for both practitioners and researchers.

Keywords: AI chatbots, customer satisfaction, humanness, perceived agency, trust, emotionality

1. Introduction

Digitalisation and access to web services have changed the buying and selling landscape by giving customers access to more information which informs them about the numerous choices they have in any interaction. In this vein, customers have begun to demand a personalised and timely approach to interactions with companies (Singh *et al.* 2019). Because of the progress of digitalisation, researchers have begun to focus on how it can change buying and selling processes (Mahlamäki, Storbacka, Pylkkönen & Ojala, 2020). One of the ways in which digitalisation has affected the business environment is by allowing for greater salesforce automation (Rodríguez, Svensson & Mehl, 2020).

Mahlamäki *et al.* (2020) noted that salesforce automation and its accompanying tools have become increasingly important in the value creation process for customers in order to ensure that interactions with companies are streamlined. Salesforce automation is a set of tools used to help salespeople in their activities, such as lead generation and qualifying leads (Morgan & Inks, 2001). It has also been applied to automating services by using technology to manage service operations better and to handle communications with customers more efficiently, which lead to lower costs and improved customer satisfaction (Buttle & Maklan, 2015). Chatbots are one of the tools which are increasingly being used in service automation and have begun to replace humans in service interaction; to make them more efficient, chatbots use artificial intelligence to respond in a timely and natural manner (Jang, Jung & Kim, 2021).

The use and intention to adopt Artificial Intelligence (AI) powered technologies was studied by Buttle and Maklan (2015), who note that 70% of the respondents to their survey acknowledge that AI can generate significant business value. Given this increased interest in the field of AI-powered virtual agents, such as chatbots, research on what makes a virtual agent effective in interactions has been conducted (Lu, *et al*., 2022). It has been noted that the interaction between the customer and the virtual agent can be enhanced by giving the virtual agent more human-like capacities (Lee, Lee & Sah, 2020). On the other hand, according to Rapp, Curti and Boldi (2021), chatbots may not be able to satisfy customers in terms of human understanding, and they note that there is no comprehensive assessment of the human side of the human–virtual agent (VA) interaction.

Rapp *et al.* (2021) assessed several research papers on AI powered chatbots and noted a few commonly mentioned themes: (1) experiencing the chatbot using perception, satisfaction, and trust; (2) emotional experience and expression

of chatbots; and (3) the humanness of the chatbots. Another study indicated that VA's that exhibited human-like traits tended to be more enjoyable to interact with (Ghafurian, Budnarain & Hoey, 2019). It is also clear that the research surrounding virtual agents has mainly been conducted in the international context and relating to very narrow perspectives, such as in the tourism and hospitality sector or the human–computer interaction realm (Pillai & Sivathanu, 2020). Söderlund, Oikarinen and Tan (2022) also noted that more research is needed to identify behaviours of VAs that define the boundary between living humans and non-human entities that are human-like. Considering the above, more research is needed on customer satisfaction with regard to interactions with VAs, because the current digital age and recent Covid-19 pandemic have shifted the manner in which customers interact with businesses (Kuberkar & Singal, 2020). Thus, the object of this study is to determine the impact of perceived trust, emotionality, humanness, and the agency of virtual agents on customer's satisfaction.

The structure of this research paper is as follows:

Firstly, the current literature regarding salesforce automation, virtual agents, and the elements of human–computer interaction that contribute to the way people ascribe human qualities to non-human entities is discussed. The elements of human–computer interaction that is discussed include the role AI plays in creating human-like conversational agents and the concept of anthropomorphism, which considers the extent to which humans ascribe human qualities to non-human entities. Additionally, the theory of mind perception is discussed.

Secondly, a hypothesis formulation section is presented, which shows how the existing literature has been used to formulate the hypotheses tested in this study.

Thirdly, the methodology used in this study is discussed, including sampling and questionnaire design and data analysis.

Fourthly, the results, including descriptive statistics and statistical model outputs of the study are presented.

The final section includes the discussion and conclusion where the implications and contributions of the research are discussed, and where future research is proposed.

2. Literature Review

2.1 Virtual Agents

Increased access to web services has allowed more people to conduct their business online. Because of the Covid-19 pandemic, contactless methods of shopping have become more popular (Arora, Dahlstrom, Hazan, Khan & Khanna, 2020). This has driven the traditionally in-person customers to utilise online platforms (Sharma & Jhamb, 2020; Erjavec & Manfreda, 2022). Thus, it has become exceptionally important for companies to ensure that their infrastructure is up to date and includes higher functionality to cater for this increased traffic (Zoltners, Sinha, Sahay, Shastri & Lorimer, 2021). However, this increased functionality leads to increased complexity which may impact on the level of satisfaction customers can experience during their interactions (Kim, Mannino & Nieschwietz, 2009).

To counter the increased volume of users and complexity of use, companies utilise Sales Force Automation (SFA) to improve the customers' interactions (Jan & Abdullah, 2014).

One method used in SFA has been to incorporate service robots powered by AI (Pitardi, Wirtz, Paluch & Kunz, 2022). In the current literature many forms of automation have been outlined, including: chatbots, embodied robots, and synthetic agents (Söderlund, 2020; Illescas-Manzano, López, González & Rodríguez, 2021). These forms of automation all share certain characteristics: human-like behaviour (Söderlund, 2021); speech (Illescas-Manzano *et al.*, 2021); appearance (Söderlund & Oikarinen, 2021); and as a software that operates using AI (Pitardi *et al.*, 2022). According to Blut, Wang, Wünderlich and Brock (2021) service robots can be either virtual or have a physical body.

Artificial intelligence has been incorporated into tools such as chatbots, which are used to enhance the customers' experience across multiple platforms, and it has been used in many industries including e-commerce, retail, and finance (Singh *et al.,* 2019).

Thus, for the purpose of this research, the term virtual agents will encompass artificial intelligence powered software that exhibits human-like characteristics and exist virtually in the form of AI chatbots.

The next section looks at anthropomorphism.

2.2 Anthropomorphism

Anthropomorphism is the tendency of humans to attribute humanlike characteristics to non-human entities (Aggarwal & McGill, 2007; Złotowski, Strasser & Bartneck, 2014:66). It has been a long-standing practice to make artificial intelligences more human-like by giving them names or human forms, which have been shown to improve the trust customers have during the interaction (Hadi, 2019). However, there is still no consensus on whether anthropomorphism in virtual agents has a net positive effect on customer satisfaction, and further investigation is still required (Kuberkar & Singal, 2020).

Research on anthropomorphism has been linked to the study of artificial intelligence through the phenomenon known as the "ELIZA Effect". This phenomenon was named after an AI that appeared to be human and catered to the tendency of humans to attribute human characteristics to AI or virtual agents. (Kim, Schmidtt & Thalman, 2019).

According to the Greek philosopher Xenophanes, there are two ways in which things are anthropomorphised: (1) giving humanlike features, such as a face, to nonhumans and (2) attributing features of the human mind to non-humans, such as agency or emotion (Lesher, 1992). These points are expounded in modern research using the theory of mind perception (Gray, Gray & Wegner, 2007). An entity that is not human but has human physical features allows people to easily ascribe human qualities to it, such as ascribing schemas and behaviours that are typically used when interacting with other humans (Aggarwal & McGill, 2007).

2.3 Theory of Mind Perception

This section discusses the theory of mind perception which underpins the research in this study. Gray *et al.* (2007: 619) proposed the theory of mind perception that utilises a two-dimensional model based on agency and experience, where experience is the perceived capacity of the entity to accumulate subjective experiences and agency is where the entity is thought to have the ability to enact its own will (Thornton & Mitchell, 2018).

When the theory of mind perception was first proposed, Gray *et al.* (2007:619) sought to answer the question of what kind of entities have minds, and this led to them researching the fields of social cognition and social psychology. They developed a study to assess mind perception of individuals by using a survey of pair-wise statements about the mental capacities of 13 characters (Figure 1). Their results led to the creation of a mind perception map (Figure 1) on which the varying degrees of perceived humanness are plotted.

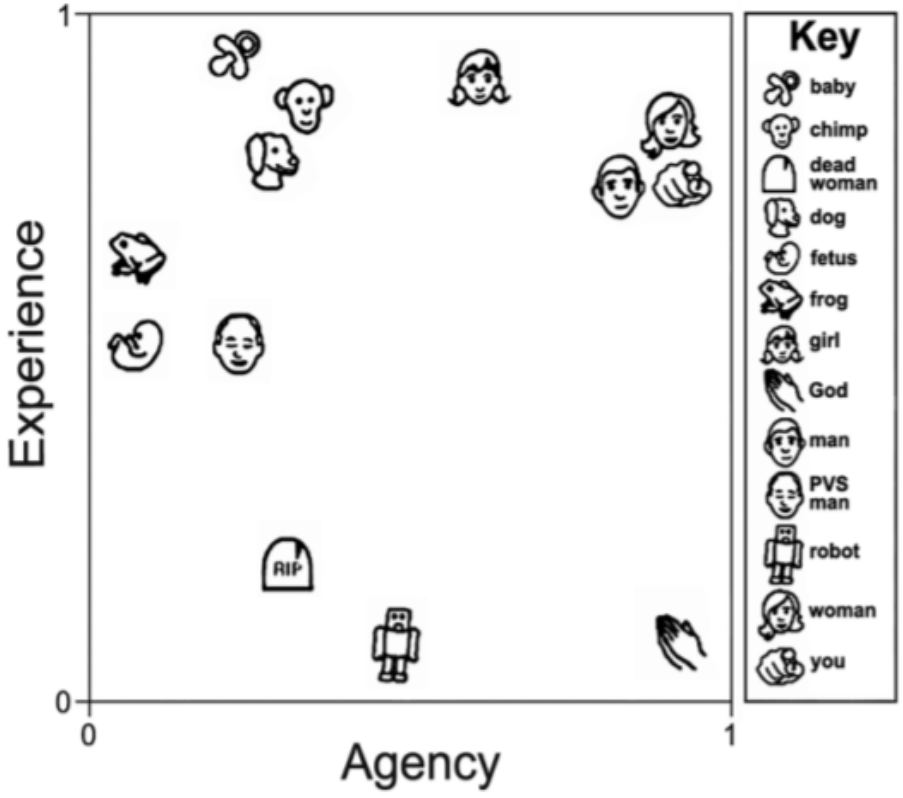

Figure 1. Mind perception map of Gray *et al.* (2007: 619)

Participants rated robots very low on the experience dimension of Figure 1 and about halfway on the agency scale. This indicates that people believe that robots, or similar entities, have the ability to make decisions and execute them to some extent, but that they also do not experience things as humans do.

The perception of the mind of robots, and recently in virtual agents, has been studied thoroughly in recent years. In a study by Gray, Knobe, Sheskin, Bloom and Barrett (2011), it was noted that the two proposed dimensions of mind perception (agency and experience) show promise in being used to explicate how humans perceive the mind in non-human entities.

Many factors contribute to the perception of the mind in non-human entities, namely, humanness (Haslam, Loughman, Kashima & Bain, 2008), emotionality (Bigman & Gray, 2018), agency (Gray *et al,* 2007: 619), and trust (Lee & See, 2004).

2.4 Humanness

Humanness has been researched thoroughly in the vein of dehumanisation research, and it has been understood that humanness entails features that form the core of what it means to be human and distinguishes us from animals and machines (Haslam *et al.,* 2008:57). Humanness can be separated into human uniqueness, which refers to rationality and morality, and human nature, which refers to warmth and emotionality (Vezzali et al., 2021). Thus, for the purposes of this research, humanness is defined as emotionality, morality, warmth, and rationality.

2.5 Emotionality

In the sphere of human-robot interaction, emotionality is the capacity of an entity to experience human emotions which can affect its decision making. This concept of emotionality has been linked to experience, which is the second dimension of the theory of mind perception framework and is the capacity of entities to experience authentic emotions (Bigman & Gray,2018). Thus, emotionality in this study is defined as the extent to which the virtual agent is viewed as being able to experience or understand human emotions.

2.6 Agency

Agency is presented as one of the two dimensions of the theory of mind perception framework (Gray *et al.* 2007:619). It is described as the necessary ability of an entity to make decisions, act upon them, and exert self-control (Gray *et al.*, 2011). Machines have also been said to possess a limited degree of agency as they can plan actions and execute them; however, they are often limited to one domain and are thus seen as having less agency than an adult human who can operate in multiple domains (Bigman & Gray, 2018). In the context of this study, agency is defined as the extent to which the virtual agent is seen as having the ability to plan and execute decisions with a modicum of self-control.

2.7 Trust

According to Rotter (1967), trust is the expectation that an individual has during an interaction that the word of another can be relied upon. The definition of trust was also discussed by Lee and See (2004) where they noted that trust is the belief that an agent will help another individual achieve their goals. Similarly, in the online context Corritore, Kracher, and Wiedendbeck (2003) noted that people tend to trust machines when the machines know more about a topic than they do and can execute it better than they can. In a more recent study, the trust individuals hold in a chatbot is determined by its ability and reliability to accomplish a task (Aoki, 2020). Hence, in the context of this research trust is defined as the extent to which the virtual agent is capable of reliably and accurately performing tasks at the customer's behest.

2.8 Customer Satisfaction

Customer satisfaction is a negative or positive feeling customers hold after they compare their expectations preceding an interaction with the actual interaction that occurred (Leninkumar, 2017; Sitorus & Yustisia, 2018). According to Eren (2020), customer satisfaction is significantly affected by the perceived performance of a VA, as well as its perceived usefulness. Furthermore, customer satisfaction is also impacted by the timely and accurate provision of information that the customer requested: this makes the VA competent and trustworthy in the customer's view (Chung, Ko, Joung & Kim, 2020).

Hence, for the purposes of this research, customer satisfaction is defined as the extent to which the customer views their expectations of the interaction with the virtual agent as being congruent with the actual interaction.

The following section discusses the development of the hypothesis for this research, which can be seen in figure 2.

3. Hypotheses Development

3.1 Humanness

The humanness a VA exhibits can come from physical features such as body, name, shape, avatar (Söderlund & Oikarinen, 2021), speech (Illescas-Manzano *et al.*, 2021), or by the way the VA can understand the customer as a human being would (Hu *et al.*, 2021). Considering that humans are more likely to trust entities that are competent and predictable, this makes them more amenable to liking interactions with entities that are predictable in a human-like manner (Soderlund, 2020). Humans are also affected by a phenomenon called the "person-positivity bias" where entities that resemble humans in some way, like VAs, tend to have positively charged interactions (Oikarinen & Söderlund, 2022). These positively charged interactions were noted in the study by de Graaf, Allouch and van Dijk (2015) which showed that VAs that exhibited a human-like appearance will be received more positively by users. Soderlund, Oikaren and Tan (2020) also found that humanlike features of a VA have a positive influence on customer satisfaction. Thus, the following hypothesis is formulated:

H1: There is a positive relationship between VA perceived humanness and customer satisfaction.

3.2 Agency

Agency is the ability of an entity to make decisions, act upon them, and exert self-control (Gray *et al.*, 2011). It is one of the major dimensions of the theory of mind perception (Gray *et al.*, 2011). This theory identifies that people are more likely to perceive VAs that have high levels of agency, in a positive light and have empathy towards the VAs, as they would toward other humans. Additionally, when VAs are seen as more human, people feel more trust and joy during the interaction (van Pinxteren, Wetzels, Rüger, Pluymaekers & Wetzels, 2019). It has also been found that VAs which exhibited human-like cues of agency led to the customer having positive intentions to use them (Cheng & Jiang, 2020). As stated above, a customer will be satisfied with an interaction if they feel positive things about the interaction. Thus, the following hypothesis is formulated:

H2: There is a positive relationship between VA agency and customer satisfaction.

3.3 Emotionality

The theory of mind perception also proposes the capacity for an entity to experience emotions as one of its dimensions (Gray *et al.*, 2007:619). As such, it is an integral component of interactions between customers and virtual agents (Pitardi *et al.*, 2022:393). Leninkumar (2017:452) also noted that an emotional response to an interaction is a significant component of customer satisfaction. From this assertion, it can be inferred that the capacity of a virtual agent to experience and understand emotion has an impact on the customers' level of satisfaction. Additionally, it has been found that VAs that are capable of portraying meaningful emotion were viewed as much more human-like; this helped people who interacted with them to co-operate better and enjoy the interaction more (Ghafurian *et al*., 2019). Thus, the following hypothesis is developed:

H3: There is a positive relationship between VA emotionality and customer satisfaction.

3.4 Trust

The trust customers hold in VAs is related to how human-like it portrays itself as, and as such, people assess them using human-like traits of competence, integrity, and benevolence (Hu, Lu, & Gong, 2021). Trust has been identified as a key antecedent to the success of virtual agents (Lu *et al.*, 2022), and elements of trust, such as reliability and accuracy, are linked to customer satisfaction (Chung *et al.*, 2020). It has also been noted that customers who receive timely and accurate information are left with positive feelings about an interaction (Jiang, Rashid & Wang, 2019) which can lead to higher customer satisfaction when using the operational definition of customer satisfaction as above. Thus, the following hypothesis is proposed:

H4: There is a positive relationship between trust in the VA and customer satisfaction.

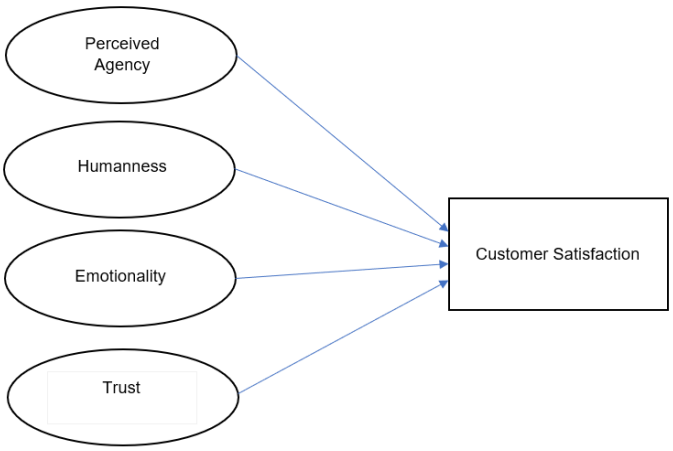

Figure 2. Conceptual framework

4. Methodology

This research followed a cross-sectional quantitative research design and non-probability convenience sampling was used. Convenience sampling is a type of non-probability sampling where all population members do not have an equal probability of being selected, usually due to ease of access or meeting the requirements of the study (Etikan, Musa & Alkassim, 2016).

The participants for this study included South Africans who are 18-years or older, and who have encountered virtual

agents, whether in physical form, such as a service robot, or in virtual form, such as a chatbot.

The data collection method used for this study was a self-administered questionnaire consisting of 5-point Likert scales with responses ranging from 1 = Strongly disagree to 5 = Strongly agree. The questionnaire was hosted on Qualtrics and distributed via online social platforms (email lists and LinkedIn, Facebook, and WhatsApp).

Trust in the virtual agent was measured using a 5-point Likert scale adapted from Cheng, Zhang, Cohen, and Mou (2022). Trust was measured using four items (α= 0.89). Humanness of the virtual agent was also measured using a 5-point Likert scale adapted from Lu *et al.* (2022). Humanness was measured using ten items ($\alpha = 0.94$).

The perceived agency of the virtual agent was measured using a 5-point Likert scale ranging from 1 = Strongly disagree to 5 = Strongly agree, adapted from Polito, Barnier and Woody's (2013) Sense of Agency Rating Scale (SOARS), in which they broke agency down into the two dimensions of involuntariness, and effortlessness. When Polito *et al.* (2013) retested the dimensions, involuntariness remained highly stable while effortlessness was only moderately stable. For the purpose of this research, the involuntariness dimension was adapted and consisted of four items.

Emotionality of the virtual agent was measured using a 5-point Likert scale adapted from Contini, Goddard, Grootswagers, Williams and Carlson (2020). The scale consisted of seven items and asked the participants to rate the extent they attribute various human emotions to the virtual agent ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Customer satisfaction was measured using a 5-point Likert scale adapted from, Tehseen, Itoo and Parrey (2019:207), with responses ranging from 1 = Strongly disagree to 5 = Strongly agree. The scale consisted of four items (=0.94).

Data analysis incorporating multiple linear regression was performed using the statistical software SPSS28 to test hypotheses H1-H4.

5. Results

5.1 Sample Profile

The sample population for this research consisted of 207 respondents: 62.3% women and 36.2% men (Table 1). A large proportion of the respondents have an education at the post-graduate level (38.2%) and fall between the ages of 18-30 years. The sample profile is broken down in Table 1 below.

Table 1. Sample profile breakdown

Item	Frequency	Percent %
Age		
18–30	132	63.8
31–40	32	15.5
41–50	15	7.3
≥ 51	28	13.5
Gender		
Female	129	62.3
Male	75	36.2
Prefer not to say	3	1.4
Education		
Matriculation certificate	45	21.7
Diploma	23	11.1
Undergraduate degree	60	29.0
Postgraduate degree	79	38.2

5.2 Factor Analysis

Exploratory Factor Analysis (EFA) was conducted using IBM SPSS Statistics version 28 on the 18 items utilised in the questionnaire to explore the relationships between the items and to test discriminant validity (Pallant, 2020:188).

Principal Axis Factor was used for extraction, and varimax rotation with Kaiser normalisation was set at 0.5 to obtain a cleaner rotated factor matrix (Hair, Black, Babin & Anderson, 2009).

Before running the EFA, the suitability of the data was first determined by assessing the Kaiser-Meyer-Olkin (KMO) value and the correlation matrix. The Kaiser-Meyer-Olkin (KMO) value for sampling adequacy was 0.905, which is greater than the recommended minimum of 0.6, and the X^2 of the Bartlett's test of sphericity was significant (Sig. = 0.000) yielding a value of 2116.898; these results indicate that the data was suitable for EFA (Pallant, 2020).

After the EFA was run, four factors were extracted with no cross-loadings. Additionally, the average variance extracted (AVE) and the composite reliability (CR) were looked at to further determine the discriminant and convergent validity of the data. The calculated CR for all the factors was above the minimum threshold of 0.7, as stipulated by Hair *et al.* (2009), with perceived agency yielding 0.752, trust 0.751, humanness 0.799, and emotionality 0.846.

Table 2. Individual factor loadings, reliability, and descriptive statistics

Humanness				**0.873**	**0.799**	
The virtual agent I interacted with used conversational style.	3.164	1.103	0.763			
The virtual agent I interacted with was open to dialogue.	2.865	1.191	0.690			
The virtual agent I interacted with was human-like.	2.710	1.112	0.609			
The virtual agent I interacted with was real.	2.700	1.109	0.605			
The virtual agent I interacted with was natural.	3.010	1.066	0.582			
The virtual agent I interacted with was sincere.	2.966	1.049	0.527			
Emotionality				**0.895**	**0.856**	**0.528**
The virtual agent is capable of experiencing physical or emotional pleasure	1.928	1.029	0.853			
The virtual agent is capable of longing or hoping for things	1.913	1.030	0.834			
The virtual agent can feel afraid or fearful.	1.865	0.930	0.656			
The virtual agent is capable of having experiences and being aware of things	2.241	1.199	0.631			
The virtual agent is capable of understanding how others are feeling	2.150	1.120	0.622			
Perceived agency				**0.817**	**0.752**	**0.433**
The virtual agent controlled its own actions.	2.681	1.164	0.740			
The virtual agents' responses were voluntary.	2.546	1.082	0.695			
The virtual agent chose how to respond to me.	2.947	1.171	0.598			
The virtual agent's actions were generated by itself.	2.729	1.172	0.589			
Trust				**0.843**	**0.751**	**0.505**
The virtual agent's behaviour and response can meet my expectations.	3.116	1.027	0.805			
The virtual agent is capable of addressing my issues.	3.048	0.999	0.703			
I trust the suggestions and decisions provided by a virtual agent.	3.208	0.990	0.611			
Customer satisfaction				**0.931**	**0.932**	**0.774**
I was pleased to do business with the virtual agent.	2.865	.976	0.914			
I really enjoyed my interaction with the virtual agent.	2.850	1.020	0.891			
Overall, I felt satisfied with the virtual agent.	2.720	1.038	0.866			
Overall feeling I got from the virtual agent put me in a good mood.	3.043	1.081	0.847			

5.3 Reliability and Validity

A reliability analysis was conducted to test reliability of the scale measures using Cronbach's α. According to Pallant (2020), a Cronbach $\alpha \geq 0.7$ is reliable. All the constructs had a Cronbach's $\alpha > 0.7$, indicating that the scales are all internally reliable. Humanness $\alpha = 0.873$, trust $\alpha = 0.843$, emotionality $\alpha = 0.895$, and perceived agency $\alpha = 0.817$.

5.4 Multiple Regression

Multiple linear regression was used for this study because it can analyse the effects that two or more independent variables have on the dependent variable simultaneously (Babin & Zikmund, 2018). However, several assumptions need to be met before multiple linear regression can be performed.

The first assumption of minimum sample size was tested using the formula N = 50+8m where N is the sample size and m is the number of independent variables (Tabachnick & Fidell, 2019). Using this formula yielded a minimum sample size of 88. The sample size in this research was 207.

A preliminary analysis was conducted to ensure that the assumptions of normality, linearity, multicollinearity, and homoscedacity were not violated. After the initial analysis, the Mahalanobis distance was assessed to determine if there were any outliers. The Mahalanobis distance was 17.135, which is smaller than the distance indicated by Tabachnick and Fidell (2019) for four independent variables (18.470) and indicates that there were no outliers. The Cook's distance was 0.187, which is smaller than one and indicates that no single case has a detrimental effect on the overall model (Pallant, 2020).

Multicollinearity occurs when the independent variables are too highly correlated. In Table 3, it can be seen that the independent variables trust, emotionality, perceived agency, and humanness have a variance inflation factor (VIF) and tolerance that are below 10 and above 0.10, respectively, which indicates that there is no multicollinearity (Pallant, 2020).

Table 3. Collinearity statistics

IV	Tolerance	VIF
Trust	0.575	1.739
Humanness	0.463	2.160
Emotionality	0.566	1.768
Perceived agency	0.607	1.647

The normal probability plot displayed a relatively straight diagonal line from the origin to the top right of the graph, indicating no violations of normality. The scatterplot shows the data points spread evenly in a rectangle around the zero point which indicates no major violations of normality (Pallant, 2020; Tabachnick & Fidel, 2019).

The multiple linear regression model explained 66.7% of the variance in customer satisfaction ($p < 0.05$). The ANOVA results are given in Table 4.

Table 4. Multiple linear regression results (ANOVA Table)

Regression	120.639	4	30.160	101.177	<0.001
Residual	60.214	202	0.298		
Total	180.853	206			

5.5 Hypothesis Testing

According to the results of the multiple linear regression, two of the independent variables, namely, humanness and perceived agency, are significant predictors of the dependent variable, customer satisfaction. Humanness was statistically significant (p=0.001), with a beta value of 0.606, which indicates that it is the strongest predictor in the model. Perceived agency was also statistically significant (p=0.001), with a beta value of 0.222. Thus, hypotheses 1 and 2 were accepted. The relationship between emotionality and customer satisfaction (p=0.118) and between trust and customer satisfaction (p=0.541) were not statistically significant. Hence, hypotheses 3 and 4 were not supported.

The full results of the hypothesis testing can be seen in Figure 3 below:

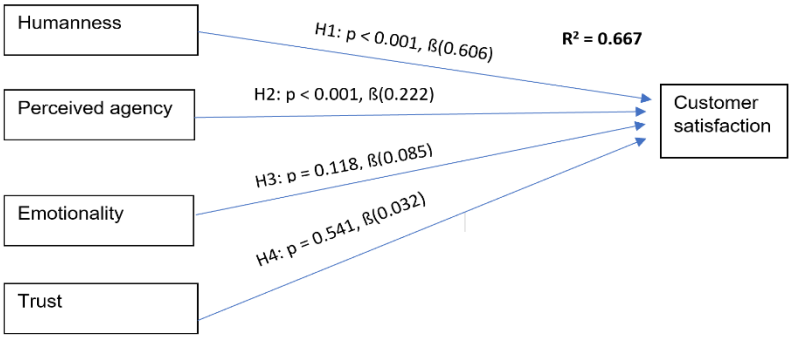

Figure 3. Hypothesis testing and theoretical model

6. Discussion

This research set out to examine what impact humanness, perceived agency, trust, and emotionality have on customer satisfaction in interactions with virtual agents, or more specifically, AI chatbots. This was done to address the contradictory results identified in the literature.

A study conducted by Lee *et al.* (2020) indicated that the interactions between virtual agents and customers could be enhanced by giving the virtual agent more human-like capacities. These findings were contradicted by findings in Rapp *et al.* (202) that virtual agents, like chatbots, may not satisfy customers in terms of humanness. Thus, the findings of this current research are more in line with the findings of Lee *et al.* (2020), Soderlund *et al.* (2020) and de Graaf and Allouch and van Dijk (2015) that show human-like capacities can indeed lead to more customer satisfaction in interactions with virtual agents.

Another finding of this research is that perceived agency, which entails the virtual agent being able to plan and execute actions with some level of self-control, was found to be a significant predictor of customer satisfaction. This finding is in line with the assertions by van Pinxteren *et al.* (2019) and Cheng and Jiang (2020) that when virtual agents are seen as having more human capabilities, users feel more pleasurable feelings, such as trust and joy, during the interaction.

In this research, it was found that emotionality did not significantly predict customer satisfaction. This finding contradicts Ghafurian *et al.* (2019:) who found that VAs that are capable of portraying meaningful emotion resulted in people enjoying interacting with them. On the other hand, the findings of this research are in line with Gray *et al.* (2007), who hypothesise that robots, and by extension virtual agents, are viewed as low on the experience measure.

This current research also found that trust did not predict customer satisfaction in interactions with VAs. This finding contradicts the findings of Chung *et al.* (2020), who found that the presence of elements of trust were linked with satisfaction.

Thus, the results from this current research provides new information that can help influence the design and implementation of AI chatbots to provide benefits for organisations, and as such, offers theoretical and managerial implications for researchers and managers.

7. Implications

7.1 Theoretical Implications

This research contributes to the academic literature by showing that humanness and perceived agency are predictors of customer satisfaction in virtual agents, specifically AI chatbots. On the other hand, it can be noted that emotionality and trust were not significant predictors of customer satisfaction in virtual agents, specifically AI chatbots.

Agency, as one of the dimensions of the Theory of Mind Perception, has been shown in this research to explain how humans perceive non-human entities, such as AI chatbots, and that higher levels of perceived agency can predict customer satisfaction. Thus, the results from this research lends support and further strengthens the agency dimension of the Theory of Mind Perception.

7.2 Managerial Implications

The result of this current research provides many practical implications for managers to consider when designing or deploying an AI chatbot.

Humanness and perceived agency were significant predictors of customer satisfaction in using virtual agents, specifically chatbots, and as such, managers should focus on maximising these features.

Perceived agency can be enhanced by ensuring that when chatbots are being created, more attention is paid to their ability to undertake useful actions independently. By using natural language processing (NLP), the chatbot should be trained to respond in a timeous manner to the customer and ensure that the customer does not have to deliver more explicit instructions to the chatbot than is necessary. This will improve the perception that the chatbot can produce its own actions.

Humanness can be harnessed by managers to improve customer satisfaction by designing the chatbot to possess as many human-like traits as possible whilst avoiding the "uncanny valley". This can be accomplished by designing the chatbot to have a human name, and a human-like avatar. Another practical design concept that should be considered is that of giving the chatbot a human sounding voice or tone in text. This can be done by training the chatbot using natural-sounding conversations native to the context in which the chatbot will be deployed so that it can communicate in a similar manner.

Emotionality and trust were found not to be significant in model results. This finding can benefit the chatbot design phase. In this phase, designers should limit the time for the chatbot to understand and produce emotional responses, as this would limit the available resources that could be used in the other features, and it can possibly lower costs.

Large technology companies, such as Google, Samsung, and Apple have taken advantage of the benefits provided by virtual agents like 'Google Assistant', 'Sam', and 'Siri'. The case of Samsung is notable because they have promoted their virtual agent, Sam, by giving it a name and human visage to provide a more human-like experience.

Thus, the results of this research could be considered because the predictors of customer satisfaction that were identified could benefit practitioners.

8. Limitations

Measures that were used were adapted from scales developed and used in international contexts (Pillai & Sivathanu, 2020) and may therefore not truly represent the South African context.

Another possible limitation is that measures were adapted and used in a marketing context, even though they originated in divorced fields, such as human-computer interaction (Cheng *et al.*, 2022; Lu *et al.*, 2022), neuroscience (Contini *et al.*, 2020), and psychology (Polito *et al.*, 2013).

In terms of data collection, using a non-probability sampling method brings with it concerns over representativeness because it is uncertain what the true population or sample distribution is (Explorable, 2009).

The cross-sectional design of the study presents a possible limitation as it did not assess respondent's answers over a long period of time, and this does not account for the multitude of factors that could affect responses at a particular time (Wang & Cheng, 2020).

9. Directions for Further Research

Since the scales adapted for use in this research came from contexts outside of South Africa and originated in literature that was outside of the field of human-computer interaction (Pillai & Sivanthu, 2020; Lin, Shao, Wang *et al.*, 2022:46), it would be beneficial for future research to be conducted using new measurement scales that are developed within the South African context and with specific aims to be used in the marketing field.

Future research can be in the form of a longitudinal study as it will allow for repeated testing of the sample population over time which can eliminate the effects of unwanted external influences (Caruana, Roman, Hernández-Sánchez & Solli, 2015). A qualitative research design can be employed in future research in which data can be collected through in-depth interviews or focus group discussions.

Future research could also be extended to assess the moderating effects of emotionality and trust on customer satisfaction as this research found that they are not significant predictors themselves.

Acknowledgments

Not applicable.

Authors contributions

All authors contributed equally to the study.

Funding

Not applicable.

Competing interests

Not applicable.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

References

Aggarwal, P., & McGill, A. L. (2007). Is that car smiling at me? Schema congruity as a basis for evaluating anthropomorphized products. *Journal of Consumer Research*, *34*(4), 468-479. https://doi.org/10.1086/518544

Aoki, N. (2020). An experimental study of public trust in AI chatbots in the public sector. *Government Information Quarterly, 37*(1), 1-10. https://doi.org/10.1016/j.giq.2020.101490

Arora, A., Dahlström, P., Hazan, E., Khan, H., & Khanna, R. (2020). *Reimagining marketing in the next normal*. New York City: McKinsey & Company.

Babin., B. J., & Zikmund., W. G. (2018). *Essentials of marketing research*.6th ed. Boston, USA: Cengage Learning.

Bigman, Y. E., & Gray, K. (2018). People are averse to machines making moral decisions. *Cognition*, *181*(1), 21-34. https://doi.org/10.1016/j.cognition.2018.08.003

Blut, M., Wang, C., Wünderlich, N. V., & Brock, C. (2021). Understanding anthropomorphism in service provision: A meta-analysis of physical robots, chatbots, and other AI. *Journal of the Academy of Marketing Science*, *49*(1), 632-658. https://doi.org/10.1007/s11747-020-00762-y

Buttle, F. A., & Maklan, S. (2015). *Customer relationship management: concepts and technologies*. 4th ed. London: Routledge. https://doi.org/10.4324/9781315764597

Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. *Journal of Thoracic Disease, 7*(11), 537-540.

Cheng, X., Zhang, X., Cohen, J., & Mou, J. (2022). Human vs. AI: Understanding the impact of anthropomorphism on consumer response to chatbots from the perspective of trust and relationship norms. *Information Processing and Management, 59*(1), 1-16. https://doi.org/10.1016/j.ipm.2022.102940

Cheng, Y., & Jiang, H. (2020). How do AI-driven chatbots impact user experience? Examining gratifications, perceived privacy risk, satisfaction, loyalty, and continued use. *Journal of Broadcasting & Electronic Media*, *64*(4), 1-23. https://doi.org/10.1080/08838151.2020.1834296

Chung, M., Ko, E., Joung, H., & Kim, S. J. (2020). Chatbot e-service and customer satisfaction regarding luxury brands. *Journal of Business Research*, *117*(1), 587-595. https://doi.org/10.1016/j.jbusres.2018.10.004

Contini, E. W., Goddard, E., Grootswagers, T., Williams, M., & Carlson, T. A. (2020). A humanness dimension to visual object coding in the brain. *NeuroImage*, *221*(1), 1-11. https://doi.org/10.1016/j.neuroimage.2020.117139

Corritore, C. L., Kracher, B., & Wiedenbeck, S. (2003). On-line trust: concepts, evolving themes, a model. *International Journal of Human-Computer Studies*, *58*(1), 737-758. https://doi.org/10.1016/S1071-5819(03)00041-7

de Graaf, M. M. A., Allouch, S. B., & van Dijk, J. A. G. M. (2015). *What makes robots social?: A user's perspective on characteristics for social human-robot interaction.* Paper presented at International conference on Social Robotics, Paris, 27 October 2015: 1-10. [Online] Available from: [Accessed: 2022-07-28].

Eren, B. A. (2020). Determinants of customer satisfaction in chatbot use: evidence from a banking application in Turkey. *International Journal of Bank Marketing*, 39(2), 294-311. https://doi.org/10.1108/IJBM-02-2020-0056

Erjavec, J., & Manfreda, A. (2022). Online shopping adoption during COVID-19 and social isolation: extending the UTAUT model with herd behaviour. *Journal of Retailing and Consumer Services*, *65*(1), 1-12. https://doi.org/10.1016/j.jretconser.2021.102867

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1-4. https://doi.org/10.11648/j.ajtas.20160501.11

Explorable. (2009). *Snowball sampling*. [Online] Available from: https://explorable.com/snowball-sampling [Accessed: 2022-09-10].

Ghafurian, M., Budnarain, N., &and Hoey, J. (2019). *Role of emotions in perception of humanness of virtual agents*. Paper presented at AAMAS '19: International Conference on Autonomous Agents and Multiagent Systems, Montreal, 13-17 May 2019:1979-1981. [Online] Available from

https://dl.acm.org/doi/pdf/10.5555/3306127.3331983[Accessed: 2022-07-17].

Gray, H. M., Gray, K., & Wegner, D. M. (2007). Dimensions of mind perception. *Science*, *315*(5812), 619-620. https://doi.org/10.1126/science.1134475

Gray, K., & Wegner, D. M. (2012). Feeling robots and human zombies: mind perception and the uncanny valley. *Cognition, 125*(1), 125-130. https://doi.org/10.1016/j.cognition.2012.06.007

Gray, K., Knobe, J., Sheskin, M., Bloom, P., & Barrett, L. F. (2011). More than a body: mind perception and the nature of objectification. *Journal of Personality and Social Psychology*, *101*(6), 1207-1220. https://doi.org/10.1037/a0025883

Hadi, R. (2019). When humanizing customer service chatbots might backfire. *NIM Marketing Intelligence Review*, *11*(2), 31-35. https://doi.org/10.2478/nimmir-2019-0013

Hair, J. F., Black, J. C., Babin. B. J., & Anderson, R. E. (2009). *Multivariate data analysis*. 7th ed. Upper Saddle River, New Jersey: Pearson.

Haslam, N., Kashima, Y., Loughnan, S., Shi, J., & Suitner, C. (2008). Subhuman, inhuman, and superhuman: contrasting humans with nonhumans in three cultures. *Social Cognition*, *26*(2), 248-258. https://doi.org/10.1521/soco.2008.26.2.248

Hu, P., Lu, Y., & Gong, Y. Y. (2021). Dual humanness and trust in conversational AI: A person-centered approach. *Computers in Human Behavior*, *119*(1), 1-18. https://doi.org/10.1016/j.chb.2021.106727

Illescas-Manzano, M. D., López, N. V., González, N. A., & Rodríguez, C. C. (2021). Implementation of chatbot in online commerce, and open innovation. *Journal of Open Innovation*, *7*(125), 1-20. https://doi.org/10.3390/joitmc7020125

Jan, M. T., & Abdullah, K. (2014). The impact of technology CSFs on customer satisfaction and the role of trust. *International Journal of Bank Marketing*, *32*(5), 429-447. https://doi.org/10.1108/IJBM-11-2013-0139

Jang, M., Jung, Y., & Kim, S. (2021). Investigating managers' understanding of chatbots in the Korean financial industry. *Computers in Human Behavior*, *120*(1), 1-11. https://doi.org/10.1016/j.chb.2021.106747

Jiang, C., Rashid, R. M., & Wang, J. (2019). Investigating the role of social presence dimensions and information support on consumers' trust and shopping intentions. *Journal of Retailing and Consumer Services*, *51*(1), 263-270. https://doi.org/10.1016/j.jretconser.2019.06.007

Kim, H. J., Mannino, M., & Nieschwietz, R. J. (2009). Information technology acceptance in the internal audit profession: Impact of technology features and complexity. *International Journal of Accounting Information Systems*, 10(1), 214-228. https://doi.org/10.1016/j.accinf.2009.09.001

Kim, S. Y., Schmidtt, B. H., & Thalmann, N. M. (2019). Eliza in the uncanny valley: anthropomorphizing consumer robots increases their perceived warmth but decreases liking. *Marketing Letters*, *30*(1), 1-12. https://doi.org/10.1007/s11002-019-09485-9

Kuberkar, S., & Singhal, T. K. (2020). Factors influencing adoption intention of AI powered chatbot for public transport services within a smart city. *International Journal on Emerging Technologies*, *11*(3), 948-958.

Lee, J. D., & See, K. A. (2004). Trust in automation: designing for appropriate reliance. *Human Factors*, *46*(1), 50-80. https://doi.org/10.1518/hfes.46.1.50.30392

Lee, S., Lee, N., & Sah, Y. J. (2020). Perceiving a mind in a chatbot: effect of mind perception and social cues on co-presence, closeness, and intention to use. *International Journal of Human-Computer Interaction*, *36*(10), 930-940. https://doi.org/10.1080/10447318.2019.1699748

Leninkumar, V. (2017). The relationship between customer satisfaction and customer trust on customer loyalty. *International Journal of Academic Research in Business and Social Sciences*, *7*(4), 450-465. https://doi.org/10.6007/IJARBSS/v7-i4/2821

Lesher, J. H. (1992). *Xenophanes of Colophon: Fragments: a text and translation with a commentary*. Toronto, Canada: University of Toronto Press Incorporated. https://doi.org/10.3138/9781442627826

Lin, X., Shao, B., & Wang, X. (2022). Employees' perceptions of chatbots in B2B marketing: affordances vs. disaffordances. *Industrial Marketing Management*, *101*(1), 45-56. https://doi.org/10.1016/j.indmarman.2021.11.016

Lu, L., McDonald, C., Kelleher, T., Lee, S., Chung, Y. J., Mueller, S., Vielledent, M., & Yue, C. A. (2022). Measuring consumer-perceived humanness of online organizational agents. *Computers in Human Behavior*, *128*(1), 1-10.

https://doi.org/10.1016/j.chb.2021.107092

Mahlamäki, T., Storbacka, K., Pylkkönen, S., & Ojala, M. (2020). Adoption of digital sales force automation tools in supply chain: Customers' acceptance of sales configurators. *Industrial Marketing Management*, *91*(1), 162-173. https://doi.org/10.1016/j.indmarman.2020.08.024

Morgan., A. J., & Inks, S. A. (2001). Technology and the sales force: Increasing acceptance of sales force automation. *Industrial Marketing Management*, *30*(5), 463-472. https://doi.org/10.1016/S0019-8501(99)00115-7

Oikarinen, E., & Söderlund, M. (2022). Responsible service employee behaviour and its impact on customer satisfaction during the coronavirus crisis. *The International Review of Retail, Distribution and Consumer Research, 32*(2), 184-200. https://doi.org/10.1080/09593969.2022.2047757

Pallant, J. (2020). *SPSS survival manual : a step by step guide to data analysis using IBM SPSS*. 7th ed. Crows Nest, NSW: Allen & Unwin. https://doi.org/10.4324/9781003117407

Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management, 32*(10), 3199-3226. https://doi.org/10.1108/IJCHM-04-2020-0259

Pitardi, V., Wirtz, J., Paluch, S., & Kunz, W. H. (2022). Service robots, agency and embarrassing service encounters. *Journal of Service Management*, *33*(2), 389-414. https://doi.org/10.1108/JOSM-12-2020-0435

Polito, V., Barnier, A. J., & Woody, E. Z. (2013). Developing the Sense of Agency Rating Scale (SOARS): an empirical measure of agency disruption in hypnosis. *Consciousness and Cognition*, *22*(1), 684-696. https://doi.org/10.1016/j.concog.2013.04.003

Rapp, A., Curti, L., & Boldi, A. (2021). The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots. *International Journal of Human - Computer Studies*, *151*(1), 1-24. https://doi.org/10.1016/j.ijhcs.2021.102630

Rodríguez, R., Svensson, G., & Mehl, E. J. (2020). Digitalization process of complex B2B sales processes - Enablers and obstacles. *Technology in Society*, *62*(1), 1-12. https://doi.org/10.1016/j.techsoc.2020.101324

Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality*, *35*(4), 651-665. https://doi.org/10.1111/j.1467-6494.1967.tb01454.x

Sharma, A., & Jhamb, D. (2020). Changing consumer behaviours towards online shopping - An Impact of Covid 19. *Academy of Marketing Studies Journal*, *24*(3), 1-11.

Singh, J., Flaherty, K., Sohi, R. S., Deeter-Schmelz, D., Habel, J., Le Meunier-FitzHugh, K., ... & Onyemah, V. (2019). Sales profession and professionals in the age of digitization and artificial intelligence technologies: concepts, priorities, and questions. *Journal of Personal Selling & Sales Management*, *39*(1), 1-22. https://doi.org/10.1080/08853134.2018.1557525

Sitorus, T., & Yustisia, M. (2018). The influence of service quality and customer trust toward customer loyalty: the role of customer satisfaction. *International Journal for Quality Research*, *12*(3), 639-654.

Söderlund, M. & Oikarinen, E. L. (2021). Service encounters with virtual agents: an examination of perceived humanness as a source of customer satisfaction. *European Journal of Marketing*, *55*(13), 94-121. https://doi.org/10.1108/EJM-09-2019-0748

Soderlund, M. ()2020. Employee encouragement of self-disclosure in the service encounter and its impact on customer satisfaction. *Journal of Retailing and Consumer Services*, *53*(1), 1-9. https://doi.org/10.1016/j.jretconser.2019.102001

Soderlund, M., Oikaren, E. L., & Tan, T. M. (2020). *The service robots have already arrived: Virtual agent features and behaviors that boost customer satisfaction in the service encounter*. Paper presented at EMAC ’20 - the 49th Annual European Marketing Academy Conference, Budapest, 26-29 May 2020:1-10. [Online] Available from: http://proceedings.emac-online.org/pdfs/A2020-61832.pdf [Accessed: 2022-10-27].

Soderlund, M., Oikaren, E. L., & Tan, T. M. (2022). The hard-working virtual agent in the service encounter boosts customer satisfaction. *The International Review of Retail, Distribution and Consumer Research*, *30*(2), 1-18. https://doi.org/10.1080/09593969.2022.2042715

Söderlund, M., & Oikarinen, E. L. (2021). Service encounters with virtual agents: an examination of perceived humanness as a source of customer satisfaction. *European Journal of Marketing*, *55*(13), 94-121. https://doi.org/10.1108/EJM-09-2019-0748

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics*. 7th ed. New York, New York: Pearson.

Tehseen, S., Itoo, M. H., & Hussain, S. (2019). Customer brand identification, affective commitment, customer satisfaction, and brand trust as antecedents of customer behavioral intention of loyalty: An empirical study in the hospitality sector. *Journal of Global Scholars of Marketing Science*, *29*(2), 196-217. https://doi.org/10.1080/21639159.2019.1577694

Thornton, M. A., & Mitchell, J. P. (2018). Theories of person perception predict of neural activity during mentalizing. *Cerebral Cortex*, *28*(10), 3505-3520. https://doi.org/10.1093/cercor/bhx216

van Pinxteren, M. M., Wetzels, R.W., Rüger, J., Pluymaekers, M., & Wetzels, M. (2019). Trust in humanoid robots: implications for services marketing. *Journal of Services Marketing*, *33*(4), 507-518. https://doi.org/10.1108/JSM-01-2018-0045

Vezzali, L., Capozza, D., Di Bernardo, G.A., Falvo, R., Stathi, S., & Hodson, G. (2021). Strategies for the promotion of humanity attribution to outgroups. *European Review of Social Psychology*, *32*(1), 1-40.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *An Overview of Study Design and Statistical Considerations, 158*(1), 65-71. https://doi.org/10.1016/j.chest.2020.03.012

Złotowski, J., Strasser, E., & Bartneck, C. (2014). March. *Dimensions of anthropomorphism: from humanness to humanlikeness*. Paper presented at Proceedings of the 2014 ACM/IEEE international conference on Human-robot interaction, Bielefeld, March 2014: 66-73. [Online] Available from: https://ir.canterbury.ac.nz/server/api/core/bitstreams/2f1c09e0-370d-4239-8a49-b86583b50682/content [Accessed: 2022-07-15].

Zoltners, A. A., Sinha, P., Sahay, D. Shastri, A., & Lorimer, S. E. (2021). Practical insights for sales force digitalization success. *Journal of Personal Selling & Sales Management*, *41*(2), 87-102. https://doi.org/10.1080/08853134.2021.1908144