

AI Chatbots and customer service: A comparative empirical study among users and non-users of m-chatbots in Greek mobile network operators

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Abstract

AI-powered chatbots help companies and marketing experts to serve customers in real time from anywhere and without human intervention. Nowadays chatbots are greatly utilized from numerous firms and organisations to help them in customer service and marketing activities. Therefore, the aim of this paper is to explore the differences between users and non-users of chatbots with respect to the factors influencing the intention to use and adopt them via smartphones. Based on the UTAUT 2 theory and variables of mobile phone service quality, a quantitative survey using a questionnaire was conducted among 411 university students in Greece. T-Test test for independent samples revealed statistically significant differences in a couple of the examined factors between the two investigated groups. The study expects to provide meaningful insights both to the academia and the industry concerning their marketing actions.

Keywords: chatbot adoption, AI, UTAUT 2, mobile service quality, customer service.

Introduction

The widespread use of the Internet has greatly affected the daily lives of individuals and the way they interact with firms and organisations. Nowadays, consumers are spending even and more time shopping, entertain themselves, listening to music, communicating, educate themselves or getting information online. As a result, firms are moving more and more to e-services taking advantage of the continuous advances in the Information and Communication Technologies (ICT). One of the alternative ways of interaction and communication in contemporary e-commerce is AI agents (chatbots).

Chatbots are being integrated into firms' marketing strategy as a highly effective tool for customer service, problem solution and 24/7 advice provision. They are also used to

answer customer questions and requests, as well as saving money, time, and human resources (Daugherty et al., 2019). Their goal is to satisfy customers and drive positive attitudes and loyalty (Holzwarth et al., 2006).

On the other hand, the intensive ownership and use of smartphones with their built-in capabilities offer advanced interaction especially to the new generation of consumers, pushing e-commerce businesses to increasingly adopt text or voice AI agents to respond to their customers' requests. Access to the Internet via mobile devices anytime and anywhere is highly significant for consumers (63%) (Ceci, 2023). Specifically, in 2022, Greeks spent an average of 2.56 hours per day in front of a smartphone screen (Statista, 2024).

Based on the aforementioned facts, the scope of this empirical paper is to investigate the similarities as well as the differences between users and nonusers' perceptions towards chatbots applied in mobile network operators in Greece. At this point it should be mentioned that this empirical study is a part of an ongoing research effort to systematically examine the topic. While the investigation of adoption and usage intention factors has been extensively investigated in the extant literature (e.g., Balakrishnan et al., 2022; Murtarelli et al., 2023; Roozen et al., 2022), and in the customer service literature as well (e.g., Kvale et al., 2021; Luo et al., 2019; Van den Broeck et al., 2019; Zarouali et al., 2018), the novelty of this paper is based on the investigation of mobile service quality factors via smartphones. Therefore, a number of analogous factors that are: information quality (IQ), privacy concerns (PC), interface (INTF), equipment (EQP), along with trust (TR) and mobility (MOB) variables and five factors from the widely applied UTAUT2 theory developed by Venkatesh et al. (2012) were investigated. In the rest of the paper the theoretical background, the research methodology and results, as well as the conclusions follow.

Theoretical Background

Text and text-to-speech AI agents are a direct solution to customer requests providing a competitive advantage and an additional channel of communication and interaction for businesses that incorporate them into their marketing practices (Kumar et al., 2019). AI applications are used by firms in sales (41%) and customer service (37%) in the context of e-commerce (Ashfaq et al., 2020).

Marketing is heavily influenced by the use of AI and chatbots as there is the ability to store customer preferences, personalize suggestions according to customers' previous purchases, explore and analyse their needs as well as engage them with the firm (Davenport et al., 2020). AI agents can also explore the history of customer preferences and generate more satisfactory responses that improve communication and the way they interact.

The investigation of factors influencing the adoption of AI agents has been widely investigated by authors in the literature. Thus, previous researchers have identified the factors that influence both users and non-users to adopt this technology or intend to do so in the future. UTAUT and UTAUT 2 theory were widely used to highlight the influential factors (e.g., Kuberkar & Singhal, 2020; Melián-González et al., 2021; Mogaji et al., 2021; Sitthipon et al., 2022). Effort expectancy, performance expectancy, social influence, habit, facilitators and fun motivation were found to influence the intention to use and adopt chatbots in many studies (Kuberkar & Singhal, 2020; Melián-González et al., 2021; Sitthipon et al., 2022). For example, Balakrishnan et al. (2022) examined the continued intention to use chatbots from individuals who have already tried them; and proved that certain factors were confirmed.

In addition to the aforementioned factors of the UTAUT and the UTAUT 2 theory, trust

has been addressed to both users and non-users (e.g., Murtarelli et al., 2023; Rodríguez Cardona et al., 2021; Bharathi et al. 2022; Trapero et al., 2020) as well as privacy issues (e.g., Rodríguez Cardona et al., 2021; Roozen et al., 2022).

Hence, the aforementioned factors were captured as influentials towards the intention to adopt and use of chatbots since the digital environment contains a high degree of uncertainty and disclosure of personal information (Riedl et al., 2011).

To the best of our knowledge, however, there is no study that has investigated the comparison of the factors affecting users and non-users of AI agents in telecommunication companies in Greece that applied the UTAUT 2 model and mobile phone service quality variables and additional variables, such as trust and mobility.

Based on the extant literature, the variables that affect the intention to use and adopt chatbots were clarified. In specific, the independent variables were selected without including the dependent variable -intention to adopt/use- in order to investigate whether these variables have statistically significant differences in their effect on users and non-users of chatbots in Greek telecommunication companies.

Methodology

A convenience sampling survey was conducted in three Greek public universities via an online questionnaire. This data collection method was selected as it was considered as the most preferred method for the study. Thus, this measurement instrument was developed using a five-point Likert scale based on existing empirical studies (e.g., Dixit et al., 2023; Kante et al., 2019; Gatzidoufa et al., 2023; Venkatesh et al., 2012) to avoid validity and reliability issues. The total sample consists of 411 students who responded to it from in a two-month period (September-October 2023).

Initially, the sample was categorized into Users and Non-Users. The former category included individuals who had a previous chatbots' use experience, while the latter category students with no previous chatbots' experience. Afterwards, Factor Analysis was performed to extract the factors from the set of items, through Principal Components Analysis (PCA), by applying the Varimax rotation solution. Latent variables were created for each factor under consideration and then were tested for coefficient loadings, composite reliability (CR) and average extracted variance (AVE). The reliability of the latent variables was assessed using Cronbach's alpha coefficient. Finally, an independent sample T-test was then performed to find statistically significant differences in group means and to calculate their effect sizes. At this point it should be stressed out that all data analyses were performed via the statistical package of SPSS IBM Version 29.

Results

Based on respondents' feedback, 272 students were classified as non-users of chatbots, while 139 students had a previous chatbot experience via their mobile network operator. A further analysis of the descriptive characteristics is presented in Table 1. Women outnumber men in terms of usage rates, with a 61.9% among users and a 54.8% among non-users. The predominance age group category is the 18-21 years old - 51.1% for users and 41.9% for non-users -, which explains the increased proportion of people in their first year of study - 46% for users and 42.3% for non-users -. Mobile device screens size observed in both categories, where screens larger than 5.4 inches were observed among respondents. In terms of the education level, the percentages are similar to both examined groups.

[Table 1 here]

Factor Analysis was performed to extract the factors from the set of items, through PCA, by applying the Varimax rotation solution. The factors that included 3 items were PE, EE, SI, FC, IQ, PC, TR, MOB and INTF, whereas 2 items were included in EQP and HM.

Latent variables were created using the average value of the questions that formed each factor. The analysis confirmed that the factor loading values exceeded 0.5, the composite reliability (CR) exceeded 0.6 and the average of the extracted variance (AVE), except for HM and TR, exceeded 0.5 as suggested by Fornell and Larcker (1981). The reliability of the factors was also assessed with Cronbach's Alpha coefficient. More specifically, for each factor considered, the results are as follows: PE=0.871, EE=0.946, SI=0.954, FC=0.902, HM=0.731, IQ=0.804, PC=0.896, INTF=0.779, EQP=0.786, TR=0.812 and MOB=0.821 (Table 2).

[Table 2 here]

From the Independent Samples Test (Appendix A) it is concluded that the condition of Homoscedasticity (equality of variances) does not apply to variables EE, SI, FC and INTF. Statistically significant differences were found for the factors EE, SI, FC and EQP. The mean values for these variables are presented in Table 3.

In order to identify the differences in performance exhibited by Users and Nonusers, their Effect Size (Cohen, 1988, 1992) was calculated according to the following formula:

$$d = (M_{User} - M_{Nonuser})/\sigma$$

where

$$\sigma = \sqrt{\left(\frac{SD_{User}^2 + SD_{Nonuser}^2}{2} \right)}$$

According to Cohen (1988), values such as 0.2 indicate little difference between the tested groups, values at 0.5 indicate a moderate effect and values of 0.8 indicate a large effect. This means that if the difference between two groups is less than or equal to 0.2 standard deviations, the difference is negligible even if it is statistically significant.

[Table 3 here]

The factors of adoption and use of chatbots by students were examined based on the UTAUT model, their perceptions of the quality of the information provided, their privacy concerns, interface, and equipment environment. Trust and mobility factors were also evaluated. In general, the average scores of those who adopt to be served via chatbot and those who prefer the traditional human representative route do not show significant differences, demonstrating the important place of human communication in solving problematic situations. Regarding the Effort Expectancy, users scored 0.42 standard deviations higher than non-users, proving the ease of using chatbots. Their personal experience and ease of use is reflected in the fact that the users are not influenced by negative comments or adverse third-party reviews, as reflected by the 0.36 lower effect of the Social Influence factor than the non-users. Our survey also tested perceptions about the ability of the respondent's device to support the application and the belief that the network provides sufficient support for this technology.

In general, users perceive better that their modern devices can be used for effective communication with chatbots, showing a performance 0.34 standard deviations higher on the Facilitating Conditions than non-users. Complementing the previous finding, non-users consider not only that they need higher technology on their devices than what

is currently available, but a better and more efficient internet connection, which is reflected in the higher average score observed among users for this factor. Specifically, users scored 0.21 standard deviations lower on equipment than non-users, indicating a negligible difference between the equipment used by the 2 groups.

Conclusions

This empirical paper compares perceptions of chatbots' users and non-users towards their adoption and use, focusing on university students that use a smartphone and a mobile network operator in Greece. The results shows that statistically significant differences were found in effort expectancy, social influence, facilitating factors and equipment examined factors. Specifically, chatbot users expressed that they are not influenced by others and neither do they exert much effort to utilize chatbots compared to non-users. Having already interacted with AI agents, they have cultivated appropriate skills and techniques unlike non-users, while in terms of the equipment needed on their smartphone, they expect better network stability and adequate equipment from mobile network operators.

The research combines the examination of chatbots usage and adoption intention factors along with mobile phone quality variables. More specifically, it investigates the differences between users and non-users for selected factors identified from the exploration of the relevant literature. This study is in line with contemporary research regarding relational marketing and the strategies that are developed and implemented in this direction by exploring the potential role of chatbots. Thus, its results expect to offer valuable insights for further research in the field as well as implementation potentials in other key areas of digital environments such as e-, m-commerce and conversational-commerce.

AI agents are a valuable tool for businesses and organizations in the context of customer service. Online users, especially the younger generation, navigate through the Internet many hours daily. Therefore, websites and mobile apps' integration with chatbots is considered nowadays as an effective tool of firms' marketing strategies, as well as an alternative and very effective solution to answer any query. Mobile access involves dimensions that must be considered in order to lead to satisfaction and enhancement of the corporate image. Young people do not face difficulties to use chatbots in their daily life with their smartphones. In addition, mobile network operators should also take into account their services for better, easier and broader access. Gathering and storing customers' information through their use enable the implementation of personalized marketing actions that can focus on customer specific needs and preferences.

Chatbot designers, particularly in the context of B2C customer service that take into account the features that customers value highly, are oriented towards redefining their functions and capabilities in the mobile phone environment, while telecommunication operators are making efforts to provide better service by integrating modern solutions such as chatbots.

With AI advertising spending set to reach 370 billion US dollars in 2022 (Dencheva, 2024), global trends to automate interactions with customers through chatbots makes this communication channel very attractive for marketers. Thus, marketers can target users and non-users differently with the aim to improve their experience and, therefore, offer an improved and much better customer journey via smartphones.

Improving customer experience through ease of use, targeted advertising campaigns and personalized recommendations created autonomously from AI chatbots, is a vital issue for contemporary mobile marketing. Therefore, marketers can take advantage of the

different approach they should follow between chatbots' users and non-users with the aim to build stronger brand engagement and, thereby, enhancing customer satisfaction and loyalty.

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Table 1 Descriptive Statistic

		Users			Non_users		
		Frequency	Valid Percent	Cumulative Percent	Frequency	Valid Percent	Cumulative Percent
Gender	Man	53	38.1	38.1	123	45.2	45.2
	Woman	86	61.9	100.0	149	54.8	100.0
	Total	139	100.0		272	100.0	
Age	18-21	71	51.1	51.1	114	41.9	41.9
	22-25	13	9.4	60.4	40	14.7	56.6
	26-29	1	.7	61.2	19	7.0	63.6
	>30	54	38.8	100.0	99	36.4	100.0
	Total	139	100.0		272	100.0	
Mobile phone screen size	Up to 5.4''	16	11.5	11.5	35	12.9	12.9
	5.5''-5.9''	55	39.6	51.1	101	37.1	50.0
	6''-6.4''	52	37.4	88.5	92	33.8	83.8
	>6.4''	16	11.5	100.0	44	16.2	100.0
	Total	139	100.0		272	100.0	
Year of studies	1st	64	46.0	46.0	115	42.3	42.3
	2nd	13	9.4	55.4	20	7.4	49.6
	3rd	23	16.5	71.9	53	19.5	69.1
	4th	15	10.8	82.7	47	17.3	86.4
	>4	24	17.3	100.0	37	13.6	100.0
	Total	139	100.0		272	100.0	
Level of education	Under-graduate	90	64.7	64.7	166	61.0	61.0
	Post-graduate	42	30.2	95.0	84	30.9	91.9
	Ph.D	7	5.0	100.0	22	8.1	100.0
	Total	139	100.0		272	100.0	

Table 2 Factor loadings, convergent validity, average extracted variance and reliability.

Research variables	Items	Loadings	Mean	SD	CR	AVE	Cronbach's α
Performance Expectancy (PE) (Venkatesh et al., 2012)	PE1 I believe that using chatbots on my smartphone will help/ helps me complete my tasks more quickly.	.776	3.22	9.48	.788	.554	.871
	PE2 By using chatbots on my smartphone, I (will) have greater chances of finding solutions to issues that are important to me.	.770	3.19	1.009			
	PE3 Using chatbots on my smartphone will make/ makes me more efficient.	.683	2.99	.973			
Effort Expectancy (EE) (Venkatesh et al., 2012)	EE1 I believe that using chatbots is simple and comprehensible.	.890	3.88	1.082	.914	.779	.946
	EE2 I believe that the skills required for using chatbots are easily acquired.	.868	3.91	1.009			
	EE3 I generally believe that using chatbots is easy.	.890	3.22	1.069			
Social Influence (SI) (Venkatesh et al., 2012)	SI1 The people who influence my behavior believe that I should use chatbots.	.916	2.75	1.157	.931	.817	.954
	SI2 The people who are important to me believe that I should use chatbots.	.903	2.68	1.195			

Research variables	Items	Loadings	Mean	SD	CR	AVE	Cronbach's α
	SI3 The people whose opinion I value believe that I should use chatbots.	.893	2.74	1.189			
Facilitating Conditions (FC) (Venkatesh et al. 2012)	FC1I believe that my smartphone is suitable for interaction with chatbots	.887	3.73	1.109	.890	.731	.902
	FC2 I believe I know how to interact with chatbots.	.863	3.60	1.212			
	FC3 I believe I can interact with chatbots on my smartphone.	.813	3.79	1.167			
Hedonic Motivation (HM) (Venkatesh et al. 2012; Li and Mao, 2015)	HM1 I think using chatbots is fun.	.778	3.15	.939	.678	.343	.731
	HM2 I think using chatbots is enjoyable.	.652	3.07	.980			
Information Quality (IQ) (Chae, 2002; Su Diep Ngoc et al., 2022; Cheng et al., 2021; Lu et al., 2009; Stiakakis et al., 2013)	IQ1 I believe that the information provided by chatbots is understandable.	.778	3.61	.881	.782	.546	
	IQ2 I believe that the information provided by chatbots is sufficient.	.722	3.29	.953			
	IQ3 I believe that chatbots offer information that helps me in decision-making.	.714	3.20	.989			
Privacy Concerns (PC)	PC1 I am worried that the information I (will) provide to chatbots might be used for a different purpose (abuse).	.903	3.37	1.172	.927	.809	.896

Research variables	Items	Loadings	Mean	SD	CR	AVE	Cronbach's α
(Shaw et al., 2022 ; De Cosmo et al., 2021 ; Xu et al., 2008)	PC2 I am worried that providers (company) will use the information I (will) provide to chatbots improperly.	.900	3.25	1.143			
	PC3 I am worried that the information I (will) provide to chatbots might be used maliciously.	.895	3.14	1.186			
Interface (INTF) (Lu et al., 2009; Chae et al., 2002)	INTF1 I believe that chatbot interface will serve/ serves its purpose.	.817	3.49	.909	.774	.535	.795
	INTF2 I believe that chatbot interface will be/ is aesthetically satisfactory.	.724	3.52	.903			
	INTF3 I believe that the icons-objects in chatbot interface (will) have a uniform display layout.	.644	3.53	.867			
Equipment (EQP) (Lu et al., 2009; Chae et al., 2002)	EQP1 I believe that mobile network provider offers a stable connectivity.	.902	3.66	1.070	.862	.505	.786
	EQP2 I believe that my smartphone network is stable.	.837	3.55	.990			
Trust (TR) (Ashforth, 2001; Shaw, 2014; Coopamootoo, 2020)	TR1 I believe that chatbots are reliable.	.762	3.08	1.014	.736	.487	.812
	TR2 I believe that I trust using chatbots.	.759	3.35	.984			
	TR3 I generally trust chatbots.	.548	3.23	1.041			
Mobility (MOB)	MOB1 I believe I could/ can interact with chatbots from anywhere.	.840	3.85	1.077	.862	.676	.821

Research variables	Items	Loadings	Mean	SD	CR	AVE	Cronbach's α
(Schierz et al., 2010; Leong et al., 2021; Ali et al., 2016)	MOB2 I believe I could/ can interact with chatbots any time.	.824	3.87	1.073			
	MOB3 I believe I could/ can interact with chatbots in any place.	.803	3.81	1.080			
Total variance explained = 82.199							

Table 1 Group Statistics

Group Statistics						
		N	Mean	Std. Deviation	Std. Error Mean	Effect Size
Effort Expectancy	Users	139	4.16	.786	.067	0.42
	Non-users	272	3.76	1.073	.065	
Social Influence	Users	139	2.47	.955	.081	-0.36
	Non-users	272	2.86	1.188	.072	
Facilitating Conditions	Users	139	3.94	.977	.083	0.34
	Non-users	272	3.59	1.088	.066	
Equipment	Users	139	3.47	.937	.079	-0.21
	Non-users	272	3.67	.929	.056	

Appendix

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Performance Expectancy	Equal variances assumed	.908	.341	-.138	409	.890	-.013	.091	-.191	.166
Performance Expectancy	Equal variances not assumed			-.141	294.423	.888	-.013	.089	-.188	.163
Effort Expectancy	Equal variances assumed	10.096	.002	3.808	409	.000	.391	.103	.189	.593
	Equal variances not assumed			4.201	359.867	.000	.391	.093	.208	.574
Social Influence	Equal variances assumed	4.801	.029	-3.356	409	.001	-.390	.116	-.619	-.162
	Equal variances not assumed			-3.598	335.709	.000	-.390	.108	-.603	-.177
Facilitating Conditions	Equal variances assumed	3.643	.057	3.242	409	.001	.355	.110	.140	.571
	Equal variances not assumed			3.356	305.682	.001	.355	.106	.147	.564

Hedonic Motivation	Equal variances assumed	.624	.430	.400	409	.689	.036	.089	-.139	.210
	Equal variances not assumed			.406	289.477	.685	.036	.088	-.137	.208
Information Quality	Equal variances assumed	1.099	.295	-.109	409	.913	-.009	.083	-.173	.155
	Equal variances not assumed			-.112	295.948	.911	-.009	.081	-.169	.151
Privacy Concerns	Equal variances assumed	1.439	.231	.103	409	.918	.011	.111	-.207	.229
	Equal variances not assumed			.101	263.215	.920	.011	.113	-.211	.234
Interface	Equal variances assumed	4.411	.036	1.045	409	.297	.075	.072	-.066	.217
	Equal variances not assumed			1.111	328.081	.268	.075	.068	-.058	.209
Equipment	Equal variances assumed	.004	.952	-	409	.040	-.200	.097	-.391	-.009
	Equal variances not assumed			-	276.038	.041	-.200	.097	-.392	-.008
Trust	Equal variances assumed	.132	.716	-.992	409	.322	-.089	.090	-.266	.088
	Equal variances not assumed			-.970	261.834	.333	-.089	.092	-.271	.092
Mobility	Equal variances assumed	1.825	.177	1.008	409	.314	.097	.096	-.092	.286
	Equal variances not assumed			1.035	298.983	.301	.097	.094	-.088	.282

Continuous Behavioral Intention	Equal variances assumed	.478	.490	-1.325	409	.186	-.125	.095	-.311	.061
	Equal variances not assumed			-1.345	289.574	.180	-.125	.093	-.309	.058

Group Statistics

NonAdopt_Adopt		N	Mean	Std. Deviation	Std. Error Mean
Performance Expectancy	Users	139	3.12	.835	.071
	Non-users	272	3.14	.891	.054
Effort Expectancy	Users	139	4.16	.786	.067
	Non-users	272	3.76	1.073	.065
Social Influence	Users	139	2.47	.955	.081
	Non-users	272	2.86	1.188	.072
Facilitating Conditions	Users	139	3.94	.977	.083
	Non-users	272	3.59	1.088	.066
Hedonic Motivation	Users	139	3.14	.827	.070
	Non-users	272	3.10	.865	.052
Information Quality	Users	139	3.36	.762	.065
	Non-users	272	3.37	.818	.050

Privacy Concerns	Users	139	3.26	1.108	.094
	Non-users	272	3.25	1.040	.063
Interface	Users	139	3.59	.605	.051
	Non-users	272	3.51	.731	.044
Equipment	Users	139	3.47	.937	.079
	Non-users	272	3.67	.929	.056
Trust	Users	139	3.16	.903	.077
	Non-users	272	3.25	.843	.051
Mobility	Users	139	3.82	.874	.074
	Non-users	272	3.72	.948	.058
Continuous Behavioral Intention	Users	139	3.40	.879	.075
	Non-users	272	3.53	.920	.056