Artificial Intelligence in Financial Services: Customer Chatbot Advisor Adoption

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ABSTRACT: The growing sophistication technology has helped us exchange Information at our fingertips, eliminating the need for human support." A platform designed to understand, learn and converse like a human and answer ad-hoc queries in real time is commonly referred to as a Chabot". Chabot advisor is Artificial intelligence (AI) computer program that impersonates human communication in its natural format including text or spoken language using a technique such as NLP, image processing or video processing along with the end task completion as instructed by the user [1]. The purpose of the paper was to examine what are the drivers for Chabot advisor services adoption (CBA), focusing on financial services. This study presents the explanatory Chabot advisor services factors by extending the Technology Acceptance Model (TAM). The construct in the research are like perceived privacy, perceived security, enjoyment and social influence. This empirical study was conducted in Pune city in India by collecting primary data from 310 online financial services customers. Data collected was analyzed using structural equation modeling using PLS-SEM. The outcome of this study is vital to financial companies like banks, policymakers, technology services adoption literature and provide customer-centric financial services.

Keywords Chatbot advisors, Artificial Intelligence, Financial Services, Technology adoption, PLS SEM.

I. INTRODUCTION

In light of the recent trend towards enhancing customer service, all the customer-driven companies tend to improve step by step towards digitalisation and technological advancement. In the current era of digitally enabled bank chatbot is one of the services which enhance customer engagement [2]. A chatbot is a computer program that can converse with a human, derived from the word ROBOT which essentially means an automatic program which replaces human-being who can chat with the person in the front. A chatbot is Artificial intelligence computer program that impersonates human communication in its natural format including text or spoken language using a technique such as NLP, image processing or video processing along with the end task completion as instructed by the user. [1]. A chatbot is a new platform for the customer to form the intelligence way of the communicator [3]. Implementation of Chatbot have gained in popularity since the release of Alexa and Siri Chatbot has replaced to a greater extent the 24/7 call centre executives in the business operations [4]. However, all the request cannot be handled entirely by Chabot. However, it is exposed to web attacks and requires serious consideration in expansion of its safety and security systems [5].

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According to 2020 report given by Gartner, mentions that in banking, companies will rely upon almost 85% of their relationship Banking services without a human touch. Robotic automation is some of the priorities with the technology advancement in conversational AI in the financial sector. According to Digital Trends in Financial Services report which mentions that about 34% financial Service chatbots for used for product campaign also additional 37% of investment are expected out of them.

The presence of chatbots in financial services industries are referred from Gartner report, business today, indusnet, itnext, cognizant report. Kotak Mahindra Bank's Keya, Yes bank: Yes-bank ROBOT, SBI: SBI intelligence. Assistant. (SBI's SIA), HDFC Bank's Eva, ICICI bank: iPal, HSBC Bank's Olivia, and Standard Chartered Bank's KAI, Financial services like ICICI Prudential AMC has launched voice-enabled investors. SBI Mutual Fund Investment Queries Via YUVA, a chatbot for its investors. Even the insurance companies examples such as Edelweiss Tokio, a leading life insurance brand, Eazy Connect from TATA AIA, Alisha is Aviva India's AI-enabled chatbot, Bajaj Allianz General Insurance Co. Ltd, a private general insurance company (a joint venture between Allianz SE and Bajaj Finserv Limited) has rolled out a chatbot named "Boing.",Birla Sun Life Insurance (BSLI) is the first insurance company in India to launch a chatbot. The chatbot is known as Disha, HDFC Life's email bot, "SPOK".There are various organisations including Banks that use social media platform example like PNB MetLife launched their chatbot Dr Jeevan this year to help users know their health quotient and educate them about Cancer & Heart-related illnesses using interactive videos. It is available on FB Messenger.

II. RESEARCH GAP

The Chatbot advisor services industry is in a nascent stage, in developing economies like India. AI is the next-generation digital disruption and organisations have pulled their socks up for adopting the same. Considering the increase in digitization and upcoming technologies like Artificial Intelligence (AI) has impacted on all businesses. Financial institution and Banks usually accept and adopt changes in new technology at very early stages. They are also among the leading in the usage of AI technology and achieved commercial success. According to Mckinsey report, 2019 AI adopting an organisation that combines strong digital capability with proactive strategies have higher profit margins and expect the performance gap. This research focuses on the research framework to better understand how Chatbot advisor adoption by a wide range of potential customers in the financial services industry.

This research is among the initial to address Banks and other organizations in the financial services should design Chatbot advisor to be widely used by consumers. This research identifies the key drivers of Chatbot advisor adoption. It contributes to understanding consumers' perceptions.

The chart above clearly mentions that financial services are leading in respect of the use of AI technology usage. A chatbot can thus give a prompt response to the queries of the potential customer and provides customer engagement and experience. Therefore, the purpose of the study is to explore the factors of acceptance in the financial sector in India. [6], [7]. Hence (TAM) technology acceptance model is the appropriate model that identifies the key drivers of Chatbot advisor adoption.

RQ: What are the factors that determine the adoption of Artificial intelligent Chatbot advisor for financial services?

III. LITERATURE REVIEW

The TAM model which was proposed by Davis in 1989 is model to explain how human behaviour can adopt technology accepted and readiness to use the technology [8], [9], [1]. TAM explained acceptance and usages of technology-enabled innovations ([10], [11], and [12]). TAM was extended and modified for different technology-related adoptions as the choice to utilize a technology depended on the functionality of technology and the characteristics of the user interface [13]. Research mentions that there is a relationship between the risk factor and technology usage. Also personal privacy is also a threat since exposed to several threats like internet privacy concern like spam privacy invasion, payment fraud or quality and service shortcomings. Thus there for the usage of chatbot there will always be a war between convince and security among customer [14]. Customer engagement or customer satisfaction includes all the behaviour, emotions and that occurs before and after usage [15].

Research Objectives

1. To validate TAM factors relationships for chatbot advisor adoption intentions in financial services of consumers.
2. To study how perceived risk, perceived privacy, enjoyment, social influence and perceived strength of control contribute towards chatbot advisor adoption intentions.

IV. THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

TAM model construct of perceived Usefulness and Perceived ease of use is user's attitude and user's behaviour intend. Perceived ease of use was the extent to which an individual considered that using chatbot advisor system would be without physical and mental efforts and perceived usefulness of chatbot advisor services was the extent to which an individual supposed that using chatbot advisor services would improve their performance [16]. The relationship among PEOU, PU and their influence on behaviour intention towards the adoption of new technology was evident ([17] [18] [19]). Ease of use was the personalization of information as per individual customers' preferences. Usefulness was the ability of customization-so that the system recognized the user and displayed links that the user frequently used. Hence hypotheses stated below are:

H1: Perceived Ease of Use for chatbot advisor adoption affects Perceived Usefulness for financial services.
H2: Perceived Ease of Use for chatbot advisor favourably affects the adoption intentions of chatbot advisor services.
H3: Perceived Usefulness for chatbot advisor favourably affects the adoption intentions of chatbot advisor services.

As explained by [20], perceived risk was the extent of customers' perception of uncertainty in transactions due to uncontrollable and unknown situations in the virtual environment related to the chatbot advisor. The exchanges with a chatbot advisor were virtual; no physical transfer of correspondence by the citizens was there. Hence the hazards were pivotal in the virtual climate of chatbot advisor services. Trust for the chatbot advisor was essential for customer dealing with the innovation [21]. During transactions with a chatbot advisor, customers were often asked to provide information when they interacted or transacted. Therefore customers of chatbot advisor required confidentiality. Perceived Risk in information system adoption led to uncertainty, discomfort, anxiety, psychological discomfort, cognitive dissonance and change of internet as an unsecured communication medium ([22]. As per the above discussion, hypotheses stated below are:

H4: Perceived risk of chatbot advisor adversely affects the adoption intentions of chatbot advisor services.
H5: Perceived privacy of chatbot advisor favourably affects the adoption intentions of chatbot advisor services.

Perceived enjoyment is a hedonic factor that impacts chatbot advisor usage and its performance. Customers have fun while interacting with a chatbot advisor [23], [24]. Therefore, the financial institution should give importance to this hedonic factor while designing Chatbot advisors. According to [25], feelings of joy and pleasure have a significant impact on customer's behaviour intensions. As per the above discussion,

H6: Enjoyment with chatbot advisor favourably affects the adoption intentions of chatbot advisor services.

Perceived Strength of Control (PSC) was the users' approach towards the strength offered by the chatbot advisor services. The extent of trust the users had while doing online transactions using the chatbot advisor services played a crucial role in the adoption of the chatbot advisor services. Since the citizens might face when they

provided access to their sensitive information the chatbot advisor services system had to be secured from all the risks. The security control mechanism for chatbot advisor services, ensuring authentication, confidentiality, privacy, data reliability and message transmission guarantee was essential for Perceived Strength of Control. As per the above discussion,

H7: Perceived strength of control affect the adoption intentions of chatbot advisor services.

Social influence also defined as an image [26] consisted of the approval and use of an innovation. Perceived image related to customers' assumption that utilizing chatbot advisor services would make them better than others in society. Interacting with chatbot advisor services, instead of the long-established traditional human advisor offers these customers a position of superiority.

Since the adoption of chatbot advisor services showcased the adopters' awareness of current technology, higher education, proficiency in the usage of computers and the internet and insights of modernization, these phenomena reflected the aspects of social values and status to adopters [20] [27]

H8: Social influence affects the adoption intentions of chatbot advisor services.

V. RESEARCH METHOD

Extending the technology acceptance model (TAM), the researcher proposed chatbot advisor services adoption model that consisted of technology factors (perceived usefulness and perceived ease of use, perceived risk, perceived privacy); a social context factor (social influence); and individual user characteristics (perceived behavioral control, enjoyment, chatbot advisor services adoption). Survey methodology was adopted to gather primary data for the empirical analysis. The study focused on the adoption of chatbot advisor services by the citizens of Pune and Pimpri-Chinchwad cities. Researcher synthesized findings from existing research on chatbot advisor adoption and artificial intelligence usage for financial services. Purposive non-probabilistic sampling method was used to select the respondents according to the objectives of this study. Previous research had indicated that consumers in the age group of 18-35 years are active internet users. The population of the study comprises of citizens, of age 18 years or older who were Internet users.

A. Measures

The questionnaire was prepared through an extensive review of the literature regarding the TAM, extended TAM models to study the concept of chatbot advisor financial services adoption by citizens of the city to develop the survey instrument. Development of scale is taken from previous literatures of Technology Adoption Model (TAM) and extended TAM [8], [27], [28], [29], [30], and [31]).

B. Research instrument design

The Scale was adapted by adding or deleting items according to their appropriateness for the context of chatbot advisor financial services adoption Scale to measure 8 constructs through 36 variables to measure perceived ease of use, perceived usefulness, perceived risk, perceived privacy, enjoyment, social influence and perceived behaviour control

and Chatbot services adoption was developed. To measure the operational constructs, a 5-point Likert scale was used. The effects of the scale items were compared by maximizing Cronbach's alpha for each dimension. It was essential to establish construct validity and scale reliability [32].To establish face validity, suggestions and feedback from six subject matter experts like bank officials, financial advisors and academicians for all constructs were taken.

Pilot study was conducted and reliability and validity was performed on the pilot study with test sample of 150.This was done using PLS -SEM 2.0.Cronbach's alpha was calculated which was 0.93

C. Sampling and data collection

The required sample size, ten times the number of items of the most significant construct chatbot advisor adoption was used [33]. Hence, the required sample size was 310 respondents. The sampling frame was internet users in Pune and Pimpri-Chinchwad city. The respondents were allowed to make informed decisions to participate in research voluntarily, only if they have information on the possible risks and benefits of the chatbot advisor services. The respondents were informed that their anonymity and confidentiality would be protected as their identity would not be linked with their personal responses. Six hundred questionnaires were distributed, but only 407 citizens responded. Three hundred ten responses were fit for the analysis with the response rate of 51.66 %.To address non-response bias, the researchers divided the data collected into early respondents and late respondents by doing the wave analysis. The researcher conducted a single factor Harman test [35] to test common method bias which indicated that 24.64 per cent of the variance was represented by one factor indicating no standard method bias.

VI. DATA ANALYSIS

Variance-based Partial least square (PLS) was used for structural equation modeling (SEM). The objective of this research was to extend the existing TAM theory; hence, PLS-SEM was preferred [36]. PLS-SEM was used to model the research constructs [37].Smart PLS 2.0 software. Was used for data analysis. The inner and outer model was specified; data collected and analyzed and evaluated the results.

VII. RESULTS

Table I -The demographic profile of the respondents' (N=310)

Demographics	Characteristics	Frequency	%
Gender	Male	167	54
	Female	143	46
Age	18-30	117	37.8
	30-45	101	32.7
	45-60	78	25
	Above 60	14	4.5
Education	Diploma	83	26.8
	Undergraduate	121	38.9
	Postgraduate	106	34.3

Occupation	Student	111	35.7	
	Employed	132	42.6	
	Un-Employed	55	17.6	
	Retired	13	4.1	
Chat board Used	EVA	97	31.3	
	Boing	13	4.1	
	SIA	56	18.1	
	YUVA	38	12.3	
	iPal	88	28.3	
	SPOK	7	2.3	
	Disha	11	3.6	

A. Measurement model

The reflective constructs in the conceptual model, according to Table II, were analyzed. Factor loadings [38]) and Cronbach's alpha of indicators were more significant than 0.7 for all the constructs indicating the reliability of measures. All the research constructs showed high levels of internal consistency/reliability as the composite reliability values displayed in Table II. The convergent validity for all the constructs is confirmed as the AVE values are more than 0.5.

Table II -Main Constructs and Construct Validity

Main Construct	Type	Measure	References
Perceived Usefulness AVE-.681 CR-.91 α .72	Reflective	a.Chatbot advisor (CBA) services are of use to me. b. CBA services facilitate me to accomplish my tasks quickly. c.Transactions through CBA services improve my efficiency and my performance. d. CBA services allow complete understanding and improve my productivity. e CBA services make tasks more manageable.	[8] [27], [12]
Perceived ease of Use AVE-.651 CR-.941 α .747	Reflective	a.Operations with the CBA services would be easy for me. b. CBA services facilitate customers. c. Acquiring skills to use CBA services is easy. d. CBA services are user-friendly. e. CBA services facilitate easy navigation and completing tasks.	[8] [27] [12]
Perceived Risk AVE-.558 CR-.931 α .835	Reflective	a.Interaction with the CBA service is difficult as direct personnel are absent. b.Communication in the online environment is risky. c.Interaction outcome is uncertain due to the absence of direct staff.	[20]
Perceived Privacy AVE-.655 CR-.923 α .726	Reflective	a.The CBA services protect my personal information and do not share with other sites. b.The CBA service is, overall, safe and secure. c. CBA services are more trustworthy than personnel. d. The financial institutions take responsibility for all insecurities during the online transaction through the CBA services. e.Legal and technological policies of the financial services are formulated.	[20] [8] [39] [29], [30]
Enjoyment AVE-.753 CR-..824 α .726	Reflective	a.I shall have fun when using CBA services. b.Using CBA services would provide me with enjoyment. c I think using CBA services shall be interesting. d.Using CBA services would offer me with excitement.	[40]
Perceived Strength of Control AVE-.765 CR-.904 α .732	Reflective	a. CBA services website, is safe for financial transactions. b. The CBA services are secure. c. CBA services maintain privacy about my financial information. d. Security policy is clearly stated for the CBA services.	[20]

Social Influence AVE-.726 CR-.904 α .817	Reflective	a. I use the CBA services as my friends and relatives use it.	[41]
		b. CBA services increases my status in society.	
		c. people encourage using this CBA services.	
		d.I have pride in using CBA services.	
		e. I recommend others to use CBA services.	
Chatbot advisor services adoption AVE-.731 CR-.916 α .842	Reflective	a.I have the intention to use CBA services continually.	[31]
		b.in present to view/search information, I use CBA services.	
		c.To view/search information, I shall use CBA services in future.	
		d. To contact/make queries/email I am using CBA services at present.	
		e.To contact/make queries/email I shall use CBA services in future.	

The off-diagonal values verify the discriminant validity of the constructs in Table III, showing the correlation between the latent constructs [32]. Discriminant validity is calculated as the shared variance values were less than the corresponding AVE.

Table III -Discriminant Validity

Constructs	PU	PEOU	PR	PS	E	PSC	SI	CBA
PU	.83							
PEOU	.32	.87						
PR	.38	.47	.85					
PS	.34	.39	.53	.75				
E	.28	.33	.36	.38	.83			
PSC	.57	.54	.52	.56	.51	.88		
SI	.26	.24	.22	.26	.21	.28	.83	
CBA	.22	.21	.27	.23	.25	.28	.42	.81

B. Structural model

The path analysis was done to assess the structural model relationships among the constructs by calculating the path coefficients and its significance. Assessment of predictive accuracy R^2 values [37]and predictive relevance Q^2 [36] was analyzed. The R^2 values and the Q^2 of the endogenous latent construct Perceived Usefulness and Chatbot advisor adoption(CBA) are as shown in Table IV.

Table IV. Results of R2 and predictive relevance Q2

Endogenous constructs	R^2	Q^2
PU	.63	.28
CBA	.69	.26

VIII.   PATH COEFFICIENTS

Path coefficients corresponded to the hypothesized relationships between the constructs linked to each other. Whether the relationships between constructs related were significant were verified in the study.

Results of hypothesis testing:

Hypothesis	Path	Path coefficient	Standard error	T statistics	Decision
H1	PEOU PU	0.613	0.078	7.228***	supported
H2	PEOU CBA	0.483	0.029	2.680***	supported
H3	PU CBA	0.499	0.061	2.171**	supported
H4	PR CBA	-0.224	0.042	2.297**	supported
H5	PP CBA	0.284	0.072	2.694***	supported
H6	E CBA	0.327	0.063	2.059**	supported
H7	PSC CBA	0.562	0.077	6.639***	supported
H8	SI CBA	0.32	0.081	3.378***	supported

IX.   FINDINGS AND DISCUSSIONS

Data from a primary survey of 310 Pune city users and potential users of Chatbot advisor services validates the measurement scales and provides the input for empirical analysis. Hypotheses involving relationship among all variables of extended TAM, perceived risk, perceived privacy, enjoyment, social influence and perceived behaviour control contribution towards chatbot advisor adoption intentions were analysed using an advanced statistical technique, structural equation modeling.

The results show that the score of R Square in Table IV shows the influence of exogenous latent variables on endogenous latent variables for the research, which are 0.630 for perceived usefulness (PU) to Chatbot advisor adoption is 0.694. we can also see the score of the predictive relevance score (Q2) > 0 which is interpreted as endogenous variables meet the standards.

It is found that the relationship between PEOU and PU is significant. The is due to the advantage that businesses have because of time saving factor and convenience. Since in most cases in bank or insurance or other financial domain customers get prompt services 24X7 through Chatbots rather than waiting longer for response through email communication or human advisor([20]. Customers perceive chatbots are faster and more convenient than calling [15].Thus chatbot do provide ease of use and usefulness in regards to the speed and accuracy in which they can obtain answers to common questions. Ease of use is the customised and personalised information as per individual customers' preferences and customers are finding chat-bots user-friendly.

Consumers prefer to know the details of the financial products before buying through Chatbot services [42].

Chat-bots facilitate conversational marketing to connect one to one with the potential users. Large number of queries like credit card payment, balance inquiries, account summaries, loans, and investments can be handled by chatbots simultaneously. Chatbots seems to be easier to use than traditional banking as customised services can be provided.

Perceived Privacy has impact on Chatbot adoption as interaction can be exposed to web attacks and requires serious consideration of safety and security systems. Risk appetite readiness or risk-taking the capacity of the customers concerning AI chatbots find some risk associated with it, especially in the case of financial services. There is a risk of breach of information concerning data protection or risk arising due to the lack of AI savvy resources [5]. Chatbot also help to manage and give suggestions on investment and saving habits.

Hence according to the statistics shown Perceived Risk has a negative association with the chatbot advisory. Perceived security is important as financial services chatbots keep track of the credit card usage, spending and investment habits which are very confidential information.

Enjoyment of the chatbot advisory is the excitement of usage of the chatbot. Consumer feels free to chat with the chatbot..This can surely add to the customer experience from customer engagement to retention leading to customer loyalty .Enjoyment is thus important part of emotional element in the experience. [43].

Perceived strength of control is the behavioural intention to use the innovative technology. Sometimes customers experience threat for the technology innovation leading to reluctance to use chatbot [44],[45].Therefore chatbots are tone-trained to give appropriate response as per the customers and are found more considerate and empathetic than human .Hence perceived strength of control influence chatbot advisory adoption [46].Chatbot has become a significantly important in rapid customer engagement. Conversational humans in the form of chatbots are becoming famous rapidly on social media and messaging applications especially with the financial services [47]. This is a great effort to engage and serve customers directly online through the medium like mobiles, computer/laptop. Customers gets instant information about transfers, deposits account balance, upcoming payment s and credit card history, payment date, credit limits as an instant message and can pay bills instantly.

X. IMPLICATIONS

AI implementation in form of Chatbots for financial services is important for financial companies, financial customer at the front end and also to the technology companies at the back end. The technology-enabled human conversation in financial services will improve the customer interface with financial services. Thus Chatbot advisors for financial services are significant mainly because of usefulness, ease of use, social media influence, efficient and cost-effective solution. Though the human touch is a missing factor still chatbot advisors will play a key role in customer engagement. Chatbot advisors offer 24/7 customer service, handling passwords or pin resets, wrong debit/credit numbers and other technical support.

XI. CONCLUSION

Chatbot advisors are technological developments of AI to advise the customers about different investment options. Chatbot advisors services are better than traditional human advisor services when compared for the factors like price and convenience, lower fees and 24/7 access. Human advisor services are preferred with regards to accountability and effectiveness. Chatbot advisors takes decisions based on the information given by the customer/investor; and cannot motivate the customer to focus on their financial goals. Chatbot advisors may not be effective for large portfolio management or complicated financial situation. Chatbot advisors have been designed to cater large number of investors, in a cost-effective manner and overcome the irrationalities and erroneous decisions caused by human behaviour. Chatbot advisors have low operational expenditure and can handle more number of accounts than traditional financial advisor can do in the same amount of time. This is best alternative for low budget customers as they cannot hire a financial advisor due to the cost. Chatbot advisors should be designed in a manner which is easy to understand and adopt.

XII. LIMITATIONS AND FUTURE SCOPE

The study is limited to the chatbots in the financial services sector in Pune and Pimpri Chinchwad area. Hence conclusion might not be generalized to a larger sample.

The study can be extended to the Millennial or Demographics variables. Moderating variables like the financial experience or Prior knowledge and High involvement services can be considered in the study for chatbot advisory adoption.

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