Role of Chatbot in Customer Service: A Study from the Perspectives of the Banking Industry of Bangladesh

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The use of robots in live chats often known as chatbots is an emerging, smart and readily adoptable technology. It is also now a common customer service strategy as this is very much beneficial in rendering various customer services such as one-to-one conversations, customized offer, responsive customer service through 24/7/365 availability, etc. From this perspective the current study is an attempt to examine the role of chatbot in customer service of the banking industry of Bangladesh. The current study is the embodiment of both primary and secondary data collection and their analyses in which, the secondary data have been collected from the recent research findings and the primary data have been collected during the month of September 1, 2019 to November 30, 2019 from the sample size of 125 respondents including users and employees of digital banking service providers using judgment sampling method through a structured and self-administered questionnaire. The current study found the feasibility of using chatbots because of its varied forms of benefits in rendering customer service which include i) gathering feedback and suggestions from the customers via simple question-answer interaction so that the lead page of the website of the concerned organization can be improved, ii) assisting users in navigation on the site, to limit the amount of clicks and to shorten the time to reach the desired information or product so that social relationships and emotional bond with customers can be built by increasing their confidence in the company, iii) using Natural Language Processing (NLP) to give unique feel in human-like conversations and personalized response to its customers and many more. Thus, chatbots centric services can be considered to enable effective customer service and thus ensure business growth and development of the online banking in Bangladesh.

Field of Study: Banking, Customer Service

Keywords: Chatbot, Customer Service, Banking industry of Bangladesh

1. Introduction

The evolving benefits of automation are becoming an increasingly significant part of the banking industry of Bangladesh. It is because the advancement of technology enables a bank to penetrate market on larger, wider scale by further enhancing its presence and it is obligated to provide fast, secure and ubiquitous services (as in financial services) to customers, in order to create profit, with the implementation of various business objectives and strategies (Aithal, 2006). A recent innovation of such automated

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technology is chatbot or chatting robot which is a computer program that mimics human conversations in its natural format including text or spoken language using artificial intelligence techniques such as Natural Language Processing (NLP), image, audio and video processing with the end task completion as instructed by the user (Bala et al, 2017; Dale, 2016). The humanlike conversation of chatbots gives customers the opportunity to type questions and in return get meaningful answers to those questions in everyday language (Crutzen, Peters, Portugal, Fisser, & Grolleman, 2011).

Customer service is a domain where chatbots have achieved strong and growing interest (Accenture, 2016). Chatbots can thereby be used to deal with many of the routine queries that typically make up most service request (Accenture, 2016).Chatbot offers to connect customers with a human through telephone when it does not know the answer to a question (SEB, 2018). To offer human take over it repairs the conversation in case it breaks down (McTear et al, 2016).However, perceived risk in chatbot system adoption leads to uncertainty, discomfort, anxiety, psychological discomfort, cognitive dissonance and change of internet as an unsecured communication medium (Deloitte.Com). For example, issues pertaining to getting hacked, fooled, waste time, or getting an incorrect answer may be relevant because of undoubtedly higher risk when chatbots become more advanced and involve a higher engagement of the user (Nordheim, 2018). Personal privacy of customer is also a threat since exposed to several threats like internet privacy concern like spam privacy invasion, payment fraud or quality and service short comings (Shaikh et al, 2016).

Despite the some limitations of using chatbots in providing customer service in the banking context, the bank marketers adopt the same as chatbots help customers to do financial transactions with a bank (Richad et al, 2019). Recent practice and research show that consumers in the banking industry are keen to adopt the chatbots as a result of curiosity, convenience and technology advancement (Gupta and Sharma, 2019). There has been a substantial growth in the development of chatbots for customer service and marketing (Zumstein & Hundertmark, 2017). Servion (2017) has recently predicted 95% of all customer interactions to be handled by AI-applications within 2025, including live telephone and online conversations. In this regard, the number of internet users in Bangladesh till October 2019 is 99.569 million (BTRC, October 2019) is worthy to mention. This big group of internet users' represent large young population who are regular in online shopping and banking which bears immense potentials for Bangladesh.

As a result, the banks should start testing and using chatbots as an important tool to interact with their clients (Gupta and Sharma, 2019). Some commercial banks in Bangladesh namely Eastern Bank, Mututal Trust Bank, etc., have already commenced chatbot based customer service. Therefore, adoption of chatbot can enhance the customer service in the banking industry of Bangladesh. Chatbot is such automation technology that can affect, or are affected by the customers while helping the latter with banking services like viewing bills, scheduling payments, paying bills, transferring money between accounts, locking and unlocking debit card, sending money, etc. (Bank of America, 2018). The analysis and implementation of the chatbot may be effective for the banks in gaining competitive advantages by coping with such trends. This research study seems to be fruitful to investigate and explore how and why chatbot is used in

customer service from the perspective of banking industry in Bangladesh. The present study, in this regard, is the result of motivation to identify the role of chatbot because of which banks may enjoy offering excellent customer service.

The earlier research studies exhibit that in the financial services, conversational chatbots are famous on social media and messaging applications in rapid customer engagement (Hsu and Lu, 2004). It has also been found that although there are obvious uses and benefits of chatbot in banking customer service, academic research indicates that chatbots are still facing issues regarding securities and trusts as this technology is still vulnerable to web attacks (Dole et al, 2015). However, the recent studies are different from the previous research works which highlight AI-powered chatbots as a powerful tool to provide fast and reliable information to bank consumers, improving their banking experience (Sridhar, 2017).Li and Yeh (2010) and Richad et al (2019) shed light on the ease of use feature of chatbots that has significant explanatory power in building trust for vendors and this also reasonably affects users' trust in chatbots for customer service.

While growing number of businesses are adopting chatbot to render excellent customer service, there seems to be little research on how and why they are used to add any value to the customers experience of their services. Furthermore, the bank marketers in Bangladesh are yet to be skilled in chatbot usage for customer service. There is also an overall lack of understanding of why and how banks should use chatbot in customer service context. Dole et al (2015) call for further research to focus on adoption of intelligent chatbot for Banking System. Gupta and Sharma (2019) also argue that there is a need to assess specific role of chatbot in customer service to help the banking industry solidify banks' chatbot usages and measure their effects on customers. So, it is clearly evident that there is a **research gap** due to limited number of studies investigating the adoption of chatbots in banking and to mitigate this gap a rigorous research is yet to be attempted. To fill up this knowledge gap left out by the previous researches, it is especially important to gain knowledge regarding the why and how of customer service rendered by the banks in Bangladesh using chatbots. With this end in view, the present study investigates the **research question**: "Is there any role of chatbot in customer service of the banking industry of Bangladesh?"This research question requires a thorough investigation with the help of an extensive literature review to investigate promising role of chatbot in customer service of the banking industry of Bangladesh. In case where the available literature does not explore answer to the formulated research question a primary survey is essential to check whether there are other roles or factors relevant for chatbot based customer service in the banking industry than those identified in the literature in the other industries.

Based on the literature survey based primary feasibility study, the following **hypothesis** is stated for the explanatory part: H: Role of chatbot in customer service of the banking industry of Bangladesh is hypothesized to be effective or positively affected by advisory services, ease of use and convenient service, cost effective and efficient service, customer-friendly service, customized service, relationship banking services, responsive service, trustworthy service, value based useful service and maintaining customers security and privacy. From the light of the above hypothesis, the principal **objective** of

this study is to examine whether there is any effective role of chatbot in customer service of the banking industry of Bangladesh or not. This study aims to highlight the influencing roles as factors or services which have positive impact on the customers so that the respective banks can enhance their service providing capacities and thus accelerate their business growth. In this regard, the present study is **significant** and deserves credit because this paper incorporates around 10 variables from multifarious studies which have direct influence on the effective role of chatbot in customer service of the banking industry of Bangladesh.

This paper is organized with the various sections. Section 1 deals with introduction, Section 2 focuses on the literature review, Section 3 depicts the conceptual model of the present study, Section 4 outlines the research methodology, Section 5 contains the analysis and findings and finally Section 6 draws a constructive conclusion with reply to the research question and unique contribution, and managerial implications and direction to future research.

2. Literature Review

Enjoyment of the chatbot advisory is the excitement of usage of the chatbot (Patil et al, 2019).Customers have fun while interacting with a chatbot advisor (Gupta, 2018; Haque, 2017). Chatbot advisory services are better than traditional human advisor services when compared for the factors like price and convenience, lower fees and 24/7 access (Patil et al, 2019).As chatbots help in upgrading consumers' knowledge and increasing communication, banks should be ready for the adoption of this advanced technology (Gupta & Sharma, 2019). However, chatbot advisors may not be effective for large portfolio management or complicated financial situation (Patil et al, 2019).

It has been found to have a positive relationship with consumers' trust in interactive chatbots as they help in ease of use service and thus potentially affecting trust in chatbots (Corritore et al, 2003; Gefen et al, 2003). Customers perceive chatbots are faster and more convenient than calling (Deshpande et al, 2017; Gefen et al, 2003; Okuda and Shoda, 2018). Patil et al (2019) found chat-bots are advantageous for businesses because of time saving factor and convenience. According to Richad et al (2019), with the chatbot, banks can provide customer services for 24 hours a day which, can be accessed from anywhere. With the chatbot, customers can conveniently find out various kinds of banking products and services quickly, such as promotion information, exchange rates, the nearest ATM location, and can also register for credit cards and mortgages, check balances, check accounts, credit card information, and other administrative services (Richad et al, 2019).

Chatbot advisors have been designed to cater large number of investors in a cost-effective manner and so they have low operational expenditure and can handle more number of accounts than traditional financial advisor can do in the same amount of time and hence, this is best alternative for low budget customers as they cannot hire a financial advisor due to the cost (Patil et al, 2019). Chatbots bring efficiency in customer service by rendering quick service complete understanding and improved productivity (Deshpande et al, 2017; Gefen et al, 2003; Okuda and Shoda, 2018). The main reason

to use chatbots in customer service is productivity, meaning quicker answer with less cost and effort (Brandtzaeg & Følstad, 2017).

Chatbots enable customer services more user-friendly by facilitating easy navigation and completing transactions (Deshpande et al, 2017; Gefen et al, 2003; Okuda and Shoda, 2018). Capability of providing information as per customers' preferences has made customers chat-bots user-friendly (Patil et al, 2019). In the current era of digitally enabled bank chatbot is one of the services which enhance customer engagement (Belanche et al, 2019). For example, consumers prefer to view, search, contact and make queries to know the details of the financial products before buying through Chatbot services (Sahu and Gupta, 2004; Shih and Hung-Pin, 2004).

Chatbots seem to be easier to use than traditional banking as customized services can be provided through the same. For example, large number of customer-centric queries like credit card payment, balance inquiries, account summaries, loans, and investments can be handled by chatbots simultaneously (Patil et al, 2019).

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 (STAMFORD, 2017). Chatbot contributes to understanding consumers' perceptions and also helps to manage and give suggestions on investment and saving habits (Patil et al, 2019). Through relationship banking service chatbot can surely add to the customer experience from customer engagement to retention leading to customer loyalty (Zafiropoulos et al, 2014). Customers experience excitement, enjoyment, interesting and also feel free to chat with the chatbot which can surely add to the customer experience from customer engagement to retention leading to customer loyalty (Hair et al, 2016; Zafiropoulos, et al, 2014). According to Ringle et al (2012), feelings of joy and pleasure have a significant impact on customer's behaviour intensions. Dreyer (2016) stated that consumers felt good about the company offering chatbots if they had a good experience using the new technology.

Chatbot can provide a quick response to questions from customers, to provide a good customer experience (Richad et al, 2019). In most cases in bank customers get prompt services 24X7 through chatbots rather than waiting longer for response through email communication or human advisor(Deloitte.Com). According to Thong et al (2006), chatbots are tone-trained to give appropriate response as per the customers and are found more considerate and empathetic than human.

The humanlike qualities of chatbots, such as their natural language interaction, may make trust particularly important (Holtgraves et al, 2007). As basis for a framework of trust in customer service chatbots, a relevant related model on trust in websites was presented by Corritore et al. (2003). In their model, drawing upon the preceding trust literature, ease of use, risk, and four credibility factors (honesty, expertise, reputation, predictability) were argued as the main factors affecting users' trust in websites. However, Murgia et al. (2016) studied the human-chatbot interaction in the context of a question-answer website. In their experiment, the preliminary results indicated that humans either don't fully trust suggestions given by a chatbot, or they expected

chatbots to provide better answers than humans. If the user perceives the chatbots as predictable, this may lead to a feeling of trust in the chatbot (Corritore et al, 2003; Fogg et al, 2001; Vries and Midden, 2008; Nordheim, 2018).

Brandtzaeg and Følstad (2017) conclude that if the main reason for engaging with chatbots is productivity, the concept of usefulness is an important factor when designing a successful chatbot based customer service. Chatbot improves customer service performance (Porto, 2017). Patil et al (2019) and Richad et al (2019) found chatbot as useful in regards to the speed and accuracy as it can provide answers to customers' common questions. The use of chatbot is a great effort to engage and serve customers directly online through the medium like mobiles, computer/laptop. Through interaction with the chatbots customers get instant information about transfers, deposits account balance, upcoming payments and credit card history, payment date, credit limits as an instant message and can pay bills instantly (Patil et al, 2019; Richad et al, 2019). Numerous commercial banks have chatbots available on platforms such as mobile applications and websites as well as social media platforms such as Facebook Messenger, Telegram, WhatsApp and Twitter (Baruah, 2018; Baxi, 2017).
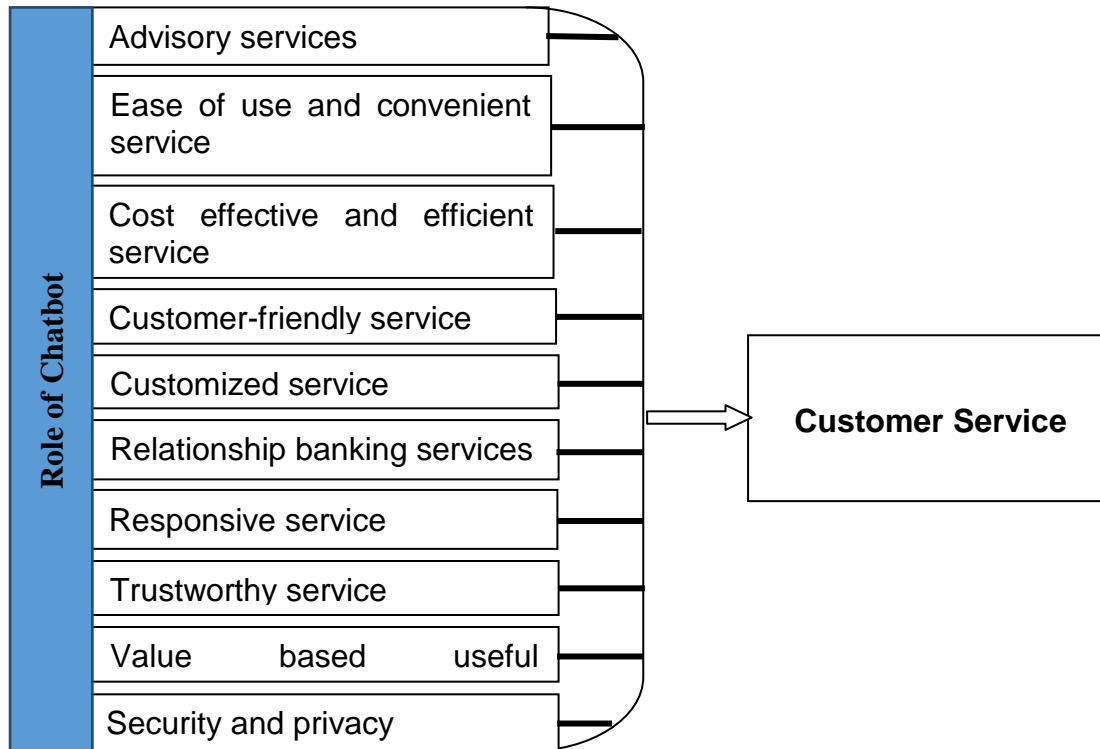
Perceived security is important as financial services as chatbots keep track of the credit card usage, spending and investment habits which are very confidential information (Patil et al, 2019).The financial institutions like banks take responsibility for all insecurities during the online transaction through the chatbot based more trustworthy, safe and secure customer services. While rendering services chatbot protects customers' personal information and do not share with other sites (Aboelmaged and Gebba, 2013; Deloitte.Com; Gefen et al, 2003; Gupta et al, 2016).Nordheim (2018) found that perceived risk is arguably low in the context of customer service chatbots. To minimize such risk further, Patil et al (2019) advocated security control mechanism for chatbot advisor services, ensuring authentication, confidentiality, privacy, data reliability and message transmission guarantee.

However, the **limitations or problems of past studies** found in the literature review of the current paper exhibit that very few previous papers focused on both qualitative and quantitative aspects of the subject matter of this very research. Again some of those papers which were cited in the study either focused on one or few of the individual variables as factors of integrated marketing.

3. Conceptual Model of the Present Study

From the light of the extensive literature review the following **Figure 1** has been developed forthe present study to exhibit the analytical (i.e., graphical) model of the role of chatbot in customer service of the banking industry of Bangladesh.

Figure 1: Research Model for Role of Chatbot in Customer Service

Role of Chatbot	
Advisory services	
Ease of use and convenient service	
Cost effective and efficient service	
Customer-friendly service	
Customized service	→ **Customer Service**
Relationship banking services	
Responsive service	
Trustworthy service	
Value based useful	
Security and privacy	

4. Methodology of the Study

The current study is the combination of both primary and secondary data collection and their analyses in which, the secondary data have been collected from the updated research papers and articles published in the referred journals relevant to the subject matter of the study. While the primary data have been collected during the month of September 1, 2019 to November 30, 2019 from the sample size of 125 respondents including users and employees of digital banking service providers using judgment sampling method through a structured and self-administered questionnaire based extensive survey comprising of open-ended and non-forced, balanced and odd numbered non-comparative itemized questions using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Inferential statistical tools have been used for the analysis of the collected primary data. From the literature review 10 factors of chatbot based customer service have been identified as variables which are exhibited in the **Table 1** from v1 to v10.

Table 1: Identification of Variables

Code	Items	Sources
v1	Advisory services	Gupta & Sharma, 2019; Gupta, 2018; Haque, 2017; Patil et al, 2019; Sridhar 2017
v2	Ease of use and convenient service	Corritore et al, 2003; Deshpande et al, 2017; Gefen et al, 2003; Li and Yeh, 2010; Okuda and Shoda, 2018; Patil et al, 2019; Richad et al, 2019
v3	Cost effective and efficient service	Brandtzaeg&Følstad, 2017; Deshpande et al, 2017; Gefen et al, 2003; Okuda and Shoda, 2018; Patil et al, 2019
v4	Customer-friendly service	Belanche et al, 2019; Deshpande et al, 2017; Gefen et al, 2003; Hsu and Lu, 2004; Okuda and Shoda, 2018; Patil et al, 2019; Sahu and Gupta, 2004; Shih and Hung-Pin, 2004
v5	Customized service	Patil et al, 2019
v6	Relationship banking services	Dreyer, 2016; Hair et al, 2016; STAMFORD, 2017; Patil et al, 2019; Ringle et al, 2012; Zafiropoulos et al, 2014
v7	Responsive service	Deloitte.Com, Richad et al, 2019; Thong et al, 2006
v8	Trustworthy service	Corritore et al, 2003; Fogg et al, 2001; Holtgraves et al, 2007; Murgia et al, 2016; Nordheim, 2018; Vries and Midden, 2008
v9	Value based useful service	Baruah, 2018; Baxi, 2017; Brandtzaeg and Følstad, 2017; Patil et al, 2019; Porto, 2017; Richad et al, 2019
v10	Security and privacy	Aboelmaged and Gebba, 2013; Deloitte.Com; Dole et al, 2015; Gefen et al, 2003; Gupta et al, 2016; Kaushik et. al, 2015; Nordheim, 2018; Park & Kim, 2014; Patil et al, 2019; Shaikh et al, 2016

Source: Literature Review

Sample size:

The number of valid samples for this set of variables is 125. With 125 samples and 10 variables, the ratio of cases to variables is 12.5 to 1, which exceeds the requirement of 4:1 (Malhotra and Dhas, 2011) for the ratio of cases to variables.

Sampling Adequacy:

Kaiser (1974) recommends accepting values greater than 0.5 as acceptable as proof of sampling adequacy. Kaiser provided a range in which values less than 0.50 are considered as "probably won't be very useful", values between 0.5 and 0.7 are "mediocre", values between 0.7 and 0.8 are "good", values between 0.8 and 0.9 are "great" and values above 0.9 are "superb. Table 2 exhibits that the value of Kaiser-Meyer-Olkin (KMO) Measureis .712 which is 'good' suggesting the adequacy of the sample size for the factor analysis. From the results of the Bartlett's Test of Sphericity it is seen that the approximate chi-square statistics is 396.862 with 45 degrees of freedom, which is greater than the table value. This means that the null hypothesis that the population correlation matrix is an identity matrix is rejected by Bartlett's test of sphericity. So, the result of Bartlett's test of sphericity is significant suggesting that the population was not an identity matrix. Therefore, the Bartlett's Test of Sphericity is significant.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.712
	Approx. Chi-Square	396.862
Bartlett's Test of Sphericity	Df	45
	Sig.	.000

So, by incorporating unique variables from the respective studies the current paper has gained a unique proposition which justifies the credibility of the proposed model.

4. Analysis and Findings

4.1 Reliability Analysis:

In **Table 3**, all the variables (10 independent variables and 1 dependent variable) studied in the current paper altogether exhibit alpha value of .798 which is greater than 0.6, a value between 6.0 to 7.0 recommended as acceptable (Cooper and Schindler, 2006; Malhotra and Birks, 2007). This justifies the reliability of the study.

Table 3: Reliability Analysis

Number of variables	Cronbach's Alpha
11	.798

4.2 Multiple Regression Analysis

Multiple regression analysis has been used to examine whether there is any positive role of chatbot in customer service of the banking industry of Bangladesh or not.

The dependent variable (impact of challenges on the online management of the banking services in Bangladesh in Bangladesh) has been regressed against each of the 10 identified independent variables in Table 1.

The following **Table 4** exhibits the results of the regression analysis. To predict the goodness-of-fit of the regression model, the Multiple Correlation Coefficient (R), Coefficient of Determination or, Square Multiple Correlation Coefficients (R^2), Adjusted R^2, F ratio and t-values with significance have been examined.

In the **Table4a**: **Firstly**, the multiple correlation coefficients (R) of 10 independent variables (v1to v10) on the dependent variable (Y_{DV}) is 0.755, which showed that the impact of challenges on the online management of the banking services in Bangladesh in Bangladesh has input from the 10 independent variables or factors. In other words, the R value 0.755 shows 75.5% multiple correlation coefficients which means that there is 75.5% correlation between the predictors or 10 independent variables and the

dependent variable (DV). **Secondly**, the Square multiple correlation coefficients (R^2) is 0.570, suggesting that more than 57.0% of the variation or variance in the dependent variable (DV) has been explained by the 10 predictors or independent variables. **Thirdly**, the adjusted R^2 value 0.532 is ideal to generalize the model well because this value is close to R^2 value with a small difference of 0.038 (0.570 – 0.532). This means that if the model were applied to the population, it would account for 3.8% less variance in outcome.

Table 4a: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.755[a]	.570	.532	.62132

a. Predictors: (Constant), v10, v5, v2, v6, v4, v7, v3, v1, v9, v8

In Table 4b: ANOVA[a]

The F ratio is 15.093, which is highly significant (p<0.001) and this means that the model significantly improves the ability to predict the outcome variable. In this table, the p value is shown as 0.000 which is less than 0.05 indicating the model has a significant fit to the overall data. This means that there is positive role of chatbot in customer service of the banking industry of Bangladesh.

Table 4b: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.264	10	5.826	15.093	.000[b]
	Residual	44.008	114	.386		
	Total	102.272	124			

a. Dependent Variable: DV
b. Predictors: (Constant), v10, v5, v2, v6, v4, v7, v3, v1, v9, v8

In **Table 4c:**

Since the beta values are the standardized versions of the b-values and are directly comparable, these values may be used to infer regarding the relative importance of each predictor or independent variables to the model. In other words, the beta coefficients could be used to explain the relative importance of the 10dimensions or factors (v1 to v10 i.e., independent variables) in contributing to the variance in the positive role of chatbot in customer service of the banking industry of Bangladesh(DV i.e., dependent variable).

The application of the beta-values in the multiple regression model equation ($Y_{DV} = \beta_0 +$ β1v1+ β2v2 + β3v3+ β4v4+ β4v5 + β4v6 + β4v7 + β4v8 + β4v9 + β4v10 Or, = .088 + .097 + .041 + .008 + .167 + .090 + .026) + .069 + .317 + .245 + .078) interprets this model to mean that for every increase of one unit in v1, assuming the effects of v2 to v11 be held constant, positive role of chatbot in customer service of the banking industry of Bangladesh would increase by 0.097. Likewise, should the effects of other components be held constant, a single unit increase in v2 would result in a 0.041 increase in positive role of chatbot in customer service of the banking industry of Bangladesh. Similarly, being other components held constant a single unit increase in v3 to v10 would lead to a 0.008, 0.167, 0.090,0.026, 0.069, 0.317, 0.245 and 0.078 increase respectively in positive role of chatbot in customer service of the banking industry of Bangladesh.

As far as the relative importance of the 10 dimensions is concerned, v8: (Beta=0.317) followed by v9: (Beta=0.245), v4: (Beta=0.167), v1: (Beta=0.097), v5: (Beta=0.090), v10: (Beta=0.078), v7: (Beta=0.069), v2: (Beta=0.041), v6: (Beta=0.026) and v3: (Beta=0.008) are all significant in the positive role of chatbot in customer service of the banking industry of Bangladesh.

Table 4c: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.088	.359		.244	.807
	v1	.100	.086	.097	1.173	.243
	v2	.043	.090	.041	.483	.630
	v3	.010	.096	.008	.102	.919
	v4	.141	.061	.167	2.320	.022
	v5	.069	.056	.090	1.236	.219
	v6	.024	.066	.026	.361	.719
	v7	.071	.084	.069	.842	.402
	v8	.289	.089	.317	3.267	.001
	v9	.245	.090	.245	2.706	.008
	v10	.080	.086	.078	.929	.355

a. Dependent Variable: DV

Again, since there are more than one predictors (independent variables), the magnitude of the t-value in conjunction with the significance has been considered to assess the overall contribution to the model. Based on the decision rule "the greater the t-value, the greater the contribution of the predictor", it is seen that v8: (t=3.267) followed by v9: (t=2.706), v4: (t=2.320), v5: (t=1.236), v1: (t=1.173), v10: (t=0.929), v7: (t=0.842), v2: (t=0.483), v6: (t=.361)   and v3: (t=0.102) are all significant predictors or independent variables of the positive role of chatbot in customer service of the banking industry of Bangladesh. In this regard, from the t-values it can be also concluded that v8 has a greater impact on the outcome (i.e. DV) than v2 to v10.

In summary, it can be stated that all underlying dimensions are positive and therefore are significant. Thus, the result of multiple regression analysis accepts the hypothesis (H) and proves that there is positive role of chatbot in customer service of the banking industry of Bangladesh. So, there is a relationship as expected.

So, the regression model achieved a satisfactory level of goodness-of-fit in predicting the variance of DV in relation to the 10 predictors or independent variables, as measured by the above mentioned R, R^2, Adjusted R^2, F ratio, beta and t values. In other words, at least one of the 10 predictors or independent variables of the DV is important in contributing to the positive role of chatbot in customer service of the banking industry of Bangladesh.

4.3 Factor Analysis

The objective of the factors analysis in this study is to determine whether "there is any effective role of chatbot in customer service of the banking industry of Bangladesh or not".

The **Table 5** exhibits three components for chatbot based customer service of the banking industry of Bangladesh with eigen values greater than 1.0 using the factor loading of 0.50 as the cut-off point and cumulative proportion of **63.313**% variance.

From the findings of this study through **Table 5**, it is evident that the identified three components have positive role of chatbot in customer service of the banking industry of Bangladesh:

Table 5: Component Loadings

Name of Components	Code	Variables	Component Loading*	Eigen value **	Component Interpretation (% of Variance Explained)**
1: Fast, Trust, Valued and Secured Service	v7	Responsive service	.652	2.554	25.536
	v8	Trustworthy service	.797		
	v9	Value based useful service	.826		
	v10	Security and privacy	.815		
2: Efficient and convenient advisory services	v1	Advisory services	.818	2.130	21.303
	v2	Ease of use and convenient service	.840		
	v3	Cost effective and efficient service	.775		
3: Customer-oriented service	v4	Customer-friendly service	.570	1.647	16.473
	v5	Customized service	.850		
	v6	Relationship banking services	.641		
			Total Variance		**63.313**
Extraction Method: Principal Component Analysis **Rotation Method:** Varimax with Kaiser Normalization **a. Rotation converged in 5 iterations.**					

Each of the THREE components identified through PCA exhibits the significant role of chatbot in customer service of the banking industry of Bangladesh. Among them:

The Component 1 contains 4 (four) variables from v7 to v10. Since these variables include responsive service, trustworthy service, value based useful service and security and privacy aspects for the customers, the component can be labeled as 'Fast, Trust, Valued and Secured Service'.

The Component 2 contains 3 (three) variables from v1 to v3. Since these variables are devoted to advisory services, ease of use and convenient service and cost effective and efficient service, the component can be labeled as 'Efficient and convenient advisory services'.

The Component 3 contains 3 (three) variables from v4 to v6. Since these variables are devoted to customer-friendly service, customized service, relationship banking services, the component can be labeled as 'Customer-oriented service'.

In summary, it can be stated that all underlying dimensions are positive with more than .5 eigen value and therefore are significant. Thus, the result of factor analysis accepts the hypothesis (H): Role of chatbot in customer service of the banking industry of Bangladesh is hypothesized to be effective or positively affected by advisory services, ease of use and convenient service, cost effective and efficient service, customer-friendly service, customized service, relationship banking services, responsive service, trustworthy service, value based useful service and maintaining customers security and

privacy and proves that there is positive role of chatbot in customer service of the banking industry of Bangladesh. So, there is a relationship as expected.

5. Conclusion

The purpose of this study was to explore how banks use chatbot in rendering customer service. To identify different chatbot based services that a bank can provide to its customers the initial step is to listen and understand the process of automating customer service through chatbot which stresses the importance of managing this technology in banking (Brynjolfsson and McAfee, 2017). It could be concluded that the studied banks not only use chatbot in providing various services to the customers, but also ease the banking process for the employees. The study found that in response to customers' queries the sample banks use chatbot to provide advice, information regarding their various services and charges in the most cost-effective, efficient, convenient, customized, responsive, trustworthy, friendly and secured manner so that customers feel valued and thus relationship with them is strengthened leading to loyalty. This finding confirms extant literature showing that chatbot provides multifarious services for the bank customers (Baruah, 2018; Brandtzaeg & Følstad, 2017; Deshpande et al, 2017; Nordheim, 2018; Okuda and Shoda, 2018; Patil et al, 2019; Richad et al, 2019). However, sometimes customers experience threat for the technology innovation leading to reluctance to use chatbot (Kaushik et al, 2015; Park & Kim, 2014). Therefore, banks using chatbot need to realize that customers can be influenced by a broad range of threats including security and privacy issues, which all cannot be controlled (Nordheim, 2018; Shaikh et al, 2016). The findings also support previous findings that show that chatbot is useful for enhancing engagement and thereby establishing strong bond and relationships with different customers (Hair et al, 2016; Zafiropoulos, et al, 2014). However, the concerned policy makers need time to learn and understand how chatbot can render various services for customers and enhance banking performance and hence pay serious attention and consideration in the development of its safety and security systems(Patil et al, 2019). The banks learn to balance the adoption of chatbot in rendering service to customers in one hand and enjoy cost-effectiveness, efficiency and productivity in their operations with trustworthy image on the other hand (Baruah, 2018; Dole et al, 2015; Patil et al, 2019).

Managerial implications

The present paper is found very significant and unique for its compliance with the reliability test criterion. The results of this study indicate a lot of facilitating aspects which exhibit significant role of chatbot in customer service in the banking industry of Bangladesh. This study sheds light on how banks use chatbot in customer service. The findings provide implications to other banks and service as well as product based companies. For example, chatbot could be used for advisory services. This study shows how banks can use chatbot as a financial advisor to customers regarding various schemes, interest rate, charges, etc. Chat-bots can be advantageous for banks because of ease of use, time saving and convenience factors to illustrate how customers can enjoy banking services from anywhere at any time. Chatbot is also a useful tool and the best alternative to the low budget customers for quicker answer with

less cost and effort. Chatbots can be used to provide user-friendly service so that customers can easily contact and make queries to know the details of the banking products before making their transactions. Chatbots seem to be easier to provide customized services. Through relationship banking service chatbot enables customers to feel free to chat and can surely help to manage and give suggestions on investment and saving habits. From chatbot customers can enjoy 24 hours of responsive and prompt services than email communication or human advisor. By strictly maintaining four credibility factors (honesty, expertise, reputation, predictability) banks can make chatbot trustworthy in their customer services. Through interactive chatting customers can get valued information about transfers, deposits account balance, upcoming payments and credit card history, payment date, credit limits as an instant message from the chatbot and can pay bills instantly. With regard to security and privacy, it has been found that chatbot protects customers' personal information and do not share with other sites. However, being vulnerable to various threats banks have to ensure security control mechanism by ensuring authentication, confidentiality, privacy, data reliability and message transmission guarantee. So, the present study revealed that there is necessity to pay much attention on the improvement of customer service using chatbot, so that business success of the banks can be ensured. Therefore, banks are recommended to undertake feasibility study through technical and customer survey and thereby with all preparation start rendering chatbot based customer service for their banking excellence.

Future research

Additional studies of successful chatbot utilization in banks in different countries are required. Another useful topic would be to investigate banks that do not use chatbot in their customer service and determine why this is the case. A comparison of employees and customers perspectives on chatbot usage in customer service is another worthwhile topic. Here the customer service perspective can be useful, identifying the banks' customer, their behavior on chatbot based service and the underlying reason for the behavior, etc., can help banks in their chatbot based customer service strategies. Not all banks use chatbot, and the way they do can be quite different. It would therefore be beneficial to conduct a broad quantitative study to investigate chatbot usage in banks in different contexts, such as experience of chatbot usage in various services, industries and countries.

It is also expected that the current paper may contribute in the research and academic development of business success of the banks of Bangladesh through a systematic process of extensive literature review followed by the primary survey findings and analysis together with managerial implications. Thus, the paper will enable the banking industry in Bangladesh with necessary course of actions and new business models which will enable the academia in developing its theory based on proven practice.

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