

Measurement and Validation of Customer Perception towards AI – Driven Banking Services and Customer Satisfaction using CFA analysis

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Abstract

The banking industry is being transformed by the power of artificial intelligence (AI), which increases the efficiency of operations and the customer experience. The current study reviewed the perception of customers toward AI-based banking services in terms of Confirmatory Factor Analysis (CFA). The major objective of it was to establish the validity of constructs of customer perception and customer satisfaction. A structured questionnaire was used to collect data of 175 respondents. The first step was to have several items in various dimensions in a given instrument; after CFA, those items with low factor loading were dropped. The results indicate that the constructs have strong reliability and validity. Based on this, the study indicates that there is a positive rating of customer perceptions towards the AI-based banking services, and that the model that has been validated can be used in research activities in the future.

Keywords: *Artificial Intelligence, Customer Perception, Customer Satisfaction, Banking and Customer Experience*

Introduction

Artificial Intelligence (AI) has become an intrinsically disruptive technology in the banking industry, changing the nature of how financial services are provided. Modern

banking systems are increasingly relying on AI-powered solutions, such as chatbots, fraud detection algorithms, credit-scoring tools, and customized financial advice, to improve operational effectiveness, predictive accuracy and the customer experience and at the same time reduce expenses. The perception of customers is a critical driver in an effective adoption of AI technologies. Perception is explained as the mental process through which individuals interpret and process information that is obtained by the environment. In the banking environment, perception of AI determines the level of trust, acceptance, and general satisfaction of customers. As a result, the elucidation of these dynamics of perception is essential to every financial institution that seeks to adopt AI solutions successfully.

Review of Literature

Andreas Svoboda (2023) in his study “The Impact of Artificial Intelligence on the Banking Industry” examined that the paper highlights the rapid growth and transformative potential of artificial intelligence (AI) in various sectors, particularly in the financial industry. AI's ability to enhance institutional performance, make decisions, and reduce errors has led to widespread enthusiasm, especially in banking, where adoption is relatively high compared to other industries. The review defines AI, explores its current uses in banks, and examines its impact on performance, with a focus on the Indian banking sector. The study also discusses both the positive and negative effects of AI implementation, drawing from a range of publications, including journals, magazines, and online sources.

Batara Daniel Bagana and et al. (2021) “Artificial Intelligence As A Human Substitution? Customer's Perception of the Conversational User Interface in Banking Industry Based on Utaut Concept” revealed that the study examines customer perceptions of chatbots used by Bank Rakyat Indonesia, Bank Negara Indonesia, and Bank Mandiri. Based on responses from 58 participants and using the Kruskal-Wallis technique, the study found differences in how customers view the chatbots. While the chatbots are seen as easy to use, concerns about the chatbot's ability to provide accurate information, along with a lack of recommendations from family and friends, lead to customer reluctance in future use. This suggests that trust and credibility issues need to be addressed for better adoption of the technology.

Gayan Nayanajith (2020) in his research study titled “Customer’s Perceptions of E-security and Ease of Use on Artificial Intelligence enabled E-Banking Services” explored that the aim of the study is to identify the impact of e-security enabled e-banking adoption and to examine the perceived ease of use in adoption and finally identify difference in adoption between lower income customers and higher income customers. This study has to conducted for 305 respondents by using random sampling method. The result of the study the customers awareness on perceived ease of use and perceived security the acceptance of artificial intelligence enabled banking services.

Simone Castagno and Mohamed Khalifa (2020) in their research titled “Perception of Artificial Intelligence among Health Care Staff: A Qualitative Survey Study” discussed the medical community’s agreement that artificial intelligence will have a radical impact on patient care in the future. The purpose of the study is to assess the awareness of artificial intelligence in health care and to investigate the perception of AI in the medical sector. The researcher has to collect data through an online questionnaire only for staff working at the NHS Foundation Trust. The study outcome is to investigate the prior knowledge of health professionals on the subject of AI as well as their attitudes and worries about its current and future applications.

Statement of the Problem

Although the adoption of artificial intelligence in banking institutions has been increasing, the level of acceptance among customers is mixed. Whereas some customers appreciate the speed and efficiency of services that AI has provided, there is another group of customers who express their fears related to privacy, cyber security, and the loss of human interaction. This variety of perceptions creates problems to banks that want to realize pervasive adoption. Therefore, there is an urgent need to investigate the antecedents of customer perceptions of AI and evaluate their effects on customer satisfaction.

Objectives of the Study

The study has been conducted to achieve the following objectives.

- To evaluate the reliability of the constructs using Cronbach’s alpha and Composite Reliability.

- To assess the discriminant validity between constructs of customer perception and customer satisfaction.
- To analyze the relationship between perception variables and customer satisfaction.
- To provide valuable suggestions based on the findings of the Study.

Hypothesis of the Study

Ho: There is no significant relationship between customer perception and customer satisfaction.

Methodology

The present study utilizes the simple random sampling design, which will give a sample population of 175 respondents. The analysis included both primary and secondary data sources. The primary data were collected using a strictly designed questionnaire, and secondary data were collected using scholarly journals, periodicals, newspapers, and online archives. The study used to the analytical processes such as reliability analysis, validity test, and computations of model-fit indices to test the measurement model using first-order Confirmatory Factor Analysis (CFA).

Results and Discussion

Ho: There is no significant relationship between customer perception and customer satisfaction.

Measurement Model

The construct reliability and validity of the Customer Perception and Customer Satisfaction constructs were assessed through Confirmatory Factor Analysis (CFA). The analysis was performed using AMOS based on the collected data.

Table 1: Assessment of Reliability, Convergent Validity and Discriminant Validity of the Measurement Model

S. No	Measurement	Obtained Value		Recomm ended Value	Result
		Customer Perception (CP)	Customer Satisfaction (CS)		
1.	Reliability	0.872	0.901	> 0.70	Accepted

2.	Composite Reliability	0.889	0.914	> 0.70	Accepted
3.	Convergent Validity (AVE)	0.573	0.601	>0.50	Accepted
4.	Discriminant Validity \sqrt{AVE}	0.757	0.775	>0.642	Accepted

Source: Computed Data

Table 1 shows that the measurement model meets the necessary requirements of reliability and validity. The alpha coefficients of the Customer Perception (0.872) and Customer Satisfaction (0.901) constructs exceed the generally recognized threshold of 0.70, thus giving an indication of high internal consistency. Similarly, the composite indices of reliability are above 0.70, which verifies the reliability of the constructs. The mean values of the average variance extracted (AVE) of the two constructs exceed 0.50, which confirms convergent validity. Moreover, discriminant validity is determined, because the square roots of the AVE of each construct are larger than the correlations among construct products (0.642). As a result, the results show that the measurement model is reliable and valid, which means that it can be used in further analyses.

Confirmatory Factor Analysis

The First-order Confirmatory Factor Analysis (CFA) is used to explore the relationships between the measured variables and their related latent constructs. In this methodological approach, each indicator is unambiguously linked to one construct, which allows the researcher to confirm the measurement model per the theoretical assumptions. This analytic methodology is used to analyze factor loadings, reliability and construct validity. A good model fit refers to the fact that the hypothesized structure agrees with the empirical data; hence, it confirms that the measurement model is adequate to proceed with the analyses.

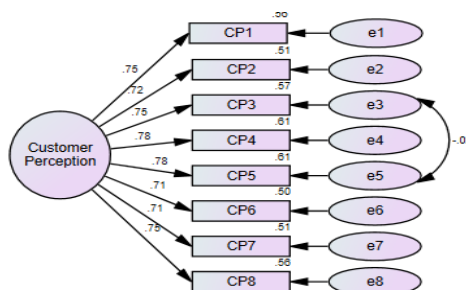


Figure1: First Order CFA for Customer Perception

Table 2: Model Fit Summary for CFA: Customer Perception

Dimension	Fit Indices		Actual Values	Suggested Values for Good Fit	Result
Customer Perception	Absolute Fit	P- Value	0.235	P-value > 0.05	Reached
		Root Mean Square Error Approximation Index (RMSEA)	0.045	< 0.08 (Hair et al. 2006)	Reached
		Goodness of Fit Index (CFI)	0.985	>0.90 (Hair et al. 2006)	Reached
	Incremental Fit	Adjusted Goodness of Fit (AGFI)	0.972	>0.80 (Hair et al. 2006)	Reached
		Comparative Fit Index (CFI)	0.997	>0.90 (Hu and Bentler, 1999)	Reached
		Tucker Lewis Index (TLI)	0.996	>0.90 (Hair et al. 1998)	Reached
		Normated Fit Index (NFI)	0.985	>0.90 (Hu and Bentler, 1999)	Reached
	Parsimony Fit	CMIN/df	1.214	< 5(Hair et al. 1998)	Reached

Source: AMOS Output

Table 2 shows that the model fit indices indicate that the Customer Perception model has a good fit. The p-value is greater than 0.05 and RMSEA is below 0.08, confirming acceptable fit. All other indices (GFI, AGFI, CFI, TLI, and NFI) exceed the recommended values, and CMIN/df is within the acceptable range. Hence, the model is well-fitted and suitable for further analysis

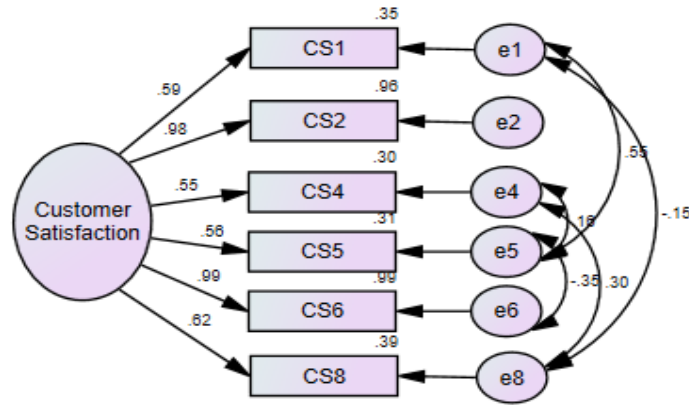


Figure2: First Order CFA for Customer Satisfaction

Table 3: Model Fit Summary for CFA: Customer Satisfaction

Dimension	Fit Indices		Actual Values	Suggested Values for Good Fit	Result
Customer Satisfaction	Absolute Fit	P- Value	0.033	P-value > 0.05	Not Reached
		Root Mean Square Error Approximation Index (RMSEA)	0.065	< 0.08 (Hair et al. 2006)	Reached
		Goodness of Fit Index (CFI)	0.991	>0.90 (Hair et al. 2006)	Reached
	Incremental Fit	Adjusted Goodness of Fit (AGFI)	0.954	>0.80 (Hair et al. 2006)	Reached
		Comparative Fit Index (CFI)	0.997	>0.90 (Hu and Bentler, 1999)	Reached
		Tucker Lewis Index (TLI)	0.988	>0.90 (Hair et al. 1998)	Reached
		Normated Fit Index (NFI)	0.995	>0.90 (Hu and Bentler, 1999)	Reached
	Parsimony Fit	CMIN/df	2.630	< 5(Hair et al. 1998)	Reached

Source: AMOS Output

Table 3 model fit indices that the customer satisfaction model has a good fit. Although the p-value of the p-value of 0.033 is less than the traditional significance level of 0.05, other fit measurements such as RMSEA, GFI/CFI, AGFI, TLI, and NFI meet the recommended cutoffs sufficiently well. Besides, value of the CMIN/df is within the acceptable range. As a result, despite the insignificant p-, the overall model fit is considered to be satisfactory and ready to be further analyzed.

Hypothesis Testing

The results indicated that the constructs demonstrated strong reliability, with Cronbach's Alpha and Composite Reliability values exceeding the recommended threshold. Convergent validity was established as the Average Variance Extracted (AVE) values were above 0.50, and discriminant validity was confirmed using the Fornell–Larcker criterion. Additionally, the model fit indices showed that the measurement model adequately fits the data. Further, hypothesis testing revealed that Customer Perception has a significant positive influence on Customer Satisfaction ($\beta = 0.642$, $p < 0.001$). Therefore, the null hypothesis is rejected, indicating that customer perception towards AI-driven banking services significantly enhances customer satisfaction.

Findings and Discussion

- The study results show that customer perception of AI-based banking services is a key determinant of customer satisfaction. The reliability and validity of the constructs are quite high and this validates that the measurement model is strong.
- The hypothesis testing revealed that Customer Perception has a significant positive influence on Customer Satisfaction ($\beta = 0.642$, $p < 0.001$). Therefore, the null hypothesis is rejected, indicating that customer perception towards AI-driven banking services significantly enhances customer satisfaction.
- The strong positive correlation between Customer Perception and Customer Satisfaction indicates that more satisfied customers are more likely to be perceived as using AI services as useful, secure, and efficient. This finding is consistent with the previous study that highlights the significance of trust, usability and technology acceptance in AI of banking.

Suggestion of the Study

Based on the findings of the study, the following suggestions can be made:

- Strengthening Customer Awareness -Financial institutions are prompted to proactively create awareness regarding AI-based services, thus enhancing customers to understand and adopt AI-based innovations.
- Building Security and Trust - The privacy of data and the visibility of AI activity are the necessary steps to develop customer confidence and a positive attitude towards AI operations.
- Enhancing User-Friendly Technology - Banking services provided through AI should be made easy, simple, and accessible to help streamline the entire customer experience.
- Maintaining Human Support and AI- Organizations must keep offering human service along with AI services to respond to complicated queries and build customer trust.

Conclusion

The study concludes that AI-based banking services have a strong positive effect on customer satisfaction, which is mediated mainly by customer perception. The findings of the Confirmatory Factor Analysis (CFA) show that the constructs are highly reliable and valid, thus supporting the strength of the measurement model. Furthermore, the adequate model fit also supports the applicability of the suggested framework. As a result, the present study provides empirical findings that customer perception is a critical factor in boosting the level of satisfaction, which makes the model relevant in future research initiatives and practical applications in relation to the adoption of AI in the banking industry.

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