The Role of Artificial Intelligence in Customer Satisfaction and Its Implementation Challenges in the Saudi Arabian Banking Sector

By

Dr. Abdulaziz Alotaibi

Business College, Marketing Department, Al-baha University, Saudi Arabia

akhalid@bu.edu.sa

Scientific Journal for Financial and Commercial Studies and Research (SJFCSR)

Faculty of Commerce – Damietta University

Vol.5, No.2, Part 1., July 2024

APA Citation:


Website: https://cfdj.journals.ekb.eg/
The Role of Artificial Intelligence in Customer Satisfaction and Its Implementation Challenges in the Saudi Arabian Banking Sector

Dr. Abdulaziz Alotaibi

Abstract

The study aimed to examine the impact of artificial intelligence on customer satisfaction and the challenges Saudi Arabian banks face in implementing this cross-cutting technology. The study used a survey design and collected responses from 100 participants, mainly bank customers and bank officials. The result revealed that artificial intelligence (AI) is positively and significantly correlated with customer satisfaction (CS). This suggests that customer satisfaction tends to rise in tandem with the application of AI in banking. The mediation analysis result showed that Ease of Use only mediates 9.82% of the relationship between AI and CS, and it is not statistically significant ($\beta=0.0607$ (95% CI: -.0246, .146), $z=1.39$, $p=0.163$). The study provides practical insights for Saudi Arabian banks, highlighting the need to enhance the adoption of AI to promote customer satisfaction. It also outlines frameworks for minimizing challenges and barriers against the implementation of AI, including the promotion of data security and customer privacy.

Keywords: The Banking Sector, Artificial Intelligence, Ease of Use, Saudi Arabia, and Customer Satisfaction.
1. Introduction

1.1. Introduction

The introduction section briefly summarizes the topic by analyzing what other studies have found. It helps show the research motivation and the study's rationale. Also, it focuses on the research questions and the significance of the study.

1.2. Background

Maintaining market share and improving performance metrics is a challenge for banks worldwide. The management must consider that digitalization has increased the inherent competition within the banking industry, which fintech companies and shadow banking institutions further intensify in most national markets (absent a few less developed economies, of course) to achieve this goal (Badea et al., 2021). Yet, consumers in most local markets have grown more discerning and demanding due to rising financial literacy, more accessible information access, and widespread Internet use, enabling customers to compare different banks' service offerings (Tiwari et al., 2021). As a counterpoint, banking does not permit substantial service offer differentiation, highlighting the significance of customer satisfaction determinants and the interest of bank management in identifying improvement directions to guarantee customer retention (El-Gohary et al., 2021).

This century has seen a rise in the use of artificial intelligence by banks to tailor their products to meet consumer needs. The capacity of a computer or a computer-controlled robot to carry out activities typically requiring human intellect and judgment is known as artificial intelligence (AI). This is an artificial intelligence system that mimics human cognition and behavior. For businesses, artificial intelligence (AI) is the future of problem-solving, automation, and customer service (Dantsoho et al., 2021). According to Badea et al. (2021), artificial intelligence can streamline data administration activities, enhance credit ratings, and detect possibly fraudulent transactions.

Artificial intelligence has made it possible to offer banking services even to the underserved population that was ignored by contemporary banks (Badea et al., 2021). Because of this, people no longer need to present themselves physically at the bank, which promises to enjoy banking services, but this can be done in the comfort of their homes. Additionally, service-
providing expectations shifted in the customer-bank relationship. Customers now want service bundles that address their financial service demands, unlike when this connection was often centered on only one service (Kochhar et al., 2019).

Saudi Arabia's banking sector has not been left behind, and it has used this technology to offer high-quality, adaptable delivery of financial services (Dantsoho et al., 2021). To enhance their online banking experience, a few top Saudi Arabian banks implemented an AI chatbot service solution—including lending, deposit-taking, investment banking, and asset management. Autonomous data management, which does not need human interaction, might significantly improve banks’ speed, accuracy, and efficiency (Ballestar et al., 2019). There are a lot of potential applications of AI in banking.

Research into AI applications in the banking industry is underway. With the expansion of online and mobile payment options, credit card fraud has exploded in popularity, making it a leading cybercrime threat (Hariguna & Ruangkanjanases, 2024). Businesses have started using AI algorithms to check the authenticity of clients' credit card transactions in real-time. These algorithms compare the amount and location of the transaction to prior ones (Hu & Krishen, 2019; Hughes et al., 2019).

1.3. Problem Statement

Banks have been refining their customer service strategies for decades, and they have customized cutting-edge technology to suit the unique nature of their job. For instance, the first automated teller machines (ATMs) went live in the 1960s, and payment cards were available for use a decade later. Users became aware of 24/7 internet banking at the turn of the century and of mobile banking around 2010 (Khatoon et al., 2020). However, advancements in the financial system are far from over; new possibilities are emerging due to the digital era, such as the application of AI to banking and other financial organizations. Banks could save almost $447 billion in 2023 by developing and implementing AI technologies (Polireddi, 2024). Despite the comprehensive acknowledgment of the impact of AI in the banking sector, studies in this field are still scanty. Some studies have tried to look at the impact of AI in the banking sector but with a focus on other regions. So far, no study has been conducted on Saudi Arabian banks. For example, Al-Araj et al. (2022) looked at how AI could be used to improve service quality and customer satisfaction in Jordan, and Dantsoho et al. (2021) examined the relationship between artificial intelligence quality, customer preference, satisfaction, and continuous usage intention of e-banking services powered
by AI solution within the Nigeria banking sector. Additionally, Bhattacharya and Sinha (2022) examined how AI could be leveraged to improve consumer experience in the Indian banking sector. Therefore, the present study is set to fill this gap in the literature by looking at the relationship between AI usage in the banking sector and customer satisfaction.

1.4. Research Questions

i. What is the relationship between AI and customer satisfaction levels in Saudi Arabian banks?

ii. To what extent does perceived ease of use of AI technology mediate the relationship between AI usage and customer satisfaction levels in the Saudi Arabian banking sector?

iii. What challenges do Saudi Arabian banks face in implementing AI systems?

1.5. Research Objectives

i. To examine the relationship between AI and customer satisfaction levels in Saudi Arabian banks.

ii. To examine the extent to which perceived ease of use of AI technology mediates the relationship between AI usage and customer satisfaction levels in the Saudi Arabian banking sector.

iv. To examine challenges the Saudi Arabian banks face in implementing AI systems.

1.6. Significance of the Study

The impact of AI in banking and how AI is being used has been on the rise, especially in the post-COVID-19 era, which proved that adopting digital solutions can help navigate intricate events in the business environment. Most banks have implemented AI solutions to offer personalized services, enhance fraud detection, and streamline processes. Despite the widespread recognition of the importance of AI solutions in the banking sector, there is a shortage of studies examining Saudi Arabia’s context. Also, some banks have not adopted AI solutions because of the lack of awareness that comes with such solutions. Therefore, the study aims to improve understanding of how implementing AI solutions can help improve customer satisfaction.
2. Literature Review

2.1. Introduction

This section presents an analysis of the previous literature on the proliferation of AI in the banking sector.

2.2. The Scope of AI Applications in the Banking Sector

2.2.1. Credit Score

Before acquiring funds, banks must meticulously evaluate the creditworthiness of customers requesting loans. Banks leverage AI to credit score their clients and avoid unnecessary losses (Ghodselahi & Amirmadhi, 2011). Using this grading system, banks can tell which scores indicate a low probability of default and which ones indicate a high possibility of default. One artificial intelligence technique for scenario classification is the decision tree approach, which is used to build regression and classification tree models (Al-Araj et al., 2022). In terms of marketing and profit, this method outperforms other approaches to credit rating analysis, such as logistic regression and discriminant analysis. Also, getting a loan is very important.

2.2.2. Mobile Banking

Most customers and 65% of member organizations currently utilize mobile wallets (Manser Payne et al., 2021). Online payment services are well-received by customers since they improve banking services by increasing revenue production and reducing the use of traditional card transactions. It uses AI to glean insights from readily available unstructured data to understand client's needs and tailor their mobile banking products to meet these needs (Al-Araj et al., 2022).

2.2.3. Customer Loyalty

The bond between bankers and their clients must be strong to keep and attract new customers. The client relationship is critical if banks want to meet their customers' ever-changing demands and expectations. Attracting customers with competently priced, high-quality services may improve their loyalty. Using an artificial neural network trained for similar tasks in other industries, the banking industry might potentially forecast customer loyalty. Multiple regression should be used after data collection to identify the most critical aspects of the available variables and prepare the data for future modeling (Al-Araj et al., 2022). This prediction model uses an artificial neural network and a feedforward deep residual technique.
2.2.4. Tracing Scams and Frauds

New and improved ways of detecting fraud have emerged in this era of digital technology (16). Regulators require more complex fraud detection methods due to the abundance of data provided by electronic papers, contracts, emails, texts, and financial transactions (Hassan et al., 2023). With the abundance of digital data and the relative ease of evaluating language and data, artificial intelligence and machine learning are well-suited for fraud detection. Using AI in operational setups and strategic objectives might help administrators get more done in less time (Al-Araj et al., 2022). AI should not be seen as an independent technical toy but rather as an integral part of the organization's authority, as it affects their most essential tasks. Integrating it into the service's routine operations helps staff members grasp overarching concepts and choose how to apply them in their areas of expertise.

2.2.5. Aggregating Cybersecurity

Data applications with capabilities such as Threat Match and Pattern Scout could assist financial institutions in improving network visibility and monitoring internal systems for network issues in real time (Al-Araj et al., 2022). Software solutions like this may help banks find cybersecurity flaws in their networks, which might lead to a decrease in long-term security spending and the prevention of data breaches. The platforms may use machine learning to identify patterns in companies and assist with enterprise-wide security and operational tasks. Human security officers sometimes spent fifteen to sixty minutes on a single event since the banks relied on outdated technology (Pakurár et al., 2019; Soni, 2019). With the integration of cybersecurity technology, individuals could quickly evaluate the extent of an event and decide if it required escalation within one to five minutes.

2.3. Customer Satisfaction

Consumer satisfaction with a business's goods, services, and abilities drives growth. It's crucial to client loyalty and future purchases. Thus, future growth and revenue are more straightforward to anticipate. Standardization in the banking business limits price competition. One bank may outperform another based on customer satisfaction (Al-Araj et al., 2022). Two ways banks please clients may set them apart. Bank-customer connections heavily influence customer satisfaction. Customers want banks that understand them as individuals rather than just selling products. Modern banking allows users to communicate with banks via phone, ATM, internet, and mobile banking
Customer experience consistency across channels is a crucial discovery. These factors are critical for speedy information transmission across channels or consistent deposit timings regardless of deposit mode (Tatikonda et al., 2022). Banks must meet client expectations across all channels to provide a great experience.

Consumer satisfaction indicates how successfully a company serves consumer demands (Al-Araj et al., 2022). Facilitating service quality evaluation is another component. Modern businesses that do not provide high-quality goods and services risk losing clients to competition. Customers may rate products and services by providing feedback. Due to increased quality expectations and more demanding customers, enterprises should prioritize client attention, value providing, relationship nurturing, and market innovation. Firms seldom track consumer expectations, satisfaction, or rival performance (Kishada et al., 2016). The authors say such clients demanded service improvements (Suhartanto et al., 2022). Businesses are using AI to meet customers' growing needs. The article discusses the banking industry's influence on national growth (Manser Payne et al., 2021). Bankers must interact with customers to retain and build loyalty. Banks must maintain client relationships to fulfill clients' evolving needs (Al-Araj et al., 2022). Providing affordable, high-quality services may also increase client loyalty.

Banking may use artificial neural networks to forecast customer loyalty like other industries. Studies suggest factor analysis to discover critical factors from all variables after data gathering to prepare data for modeling. This approach predicts using an artificial neural network and feedforward backpropagation. The training dataset's classification creates K subsets in K-fold cross-validation (Al-Araj et al., 2022). The efficiency coefficient and root-mean-squared error may evaluate the approach after dataset assessment. The artificial neural network predicts consumer loyalty with high accuracy.

2.4. Leveraging AI in Saudi Arabia's Banking Sector

Twelve banks are part of Saudi Arabia's banking system. Among the banks in the Kingdom, the National Commercial Bank (NCB) has the highest balance sheet, with assets exceeding SAR 466.3 billion. It accounts for 20.5% of the overall market. Al Rajhi Bank comes in second, with an asset base of SAR 363.3 billion and a 16.0% market share (Al-Baity, 2023). The fast use of AI and analytics drives a dramatic revolution in Saudi Arabia's financial
industry. According to Al-Baity (2023), these technologies are beyond mere accessories and are crucial in revolutionizing client experiences and improving operational efficiency. Personalized services, better fraud detection, and streamlined operations are just a few ways that banks and other financial institutions are using AI. The partnership between financial technology companies and banks is essential to this change. Innovative financial services and products are brought to market via the synergy of such collaborations (Badghish & Soomro, 2024). Al-Baity (2023) states that the Kingdom's dedication to creating a favorable climate for FinTech innovation is seen via the execution of programs like the Makken Program, established by SAMA, and the sandbox framework. These initiatives allow financial technology companies to safely test cutting-edge artificial intelligence and analytics tools on consumer data.

There is more than just customer service that AI may improve in the banking industry. Risk assessment, compliance, and the creation of new financial products all rely on it heavily. The need to incorporate new technology into existing banking processes is becoming more acknowledged by Saudi Arabian financial institutions (Al-Baity, 2023). They will be positioned as pioneers in the digital transformation path, and their service offerings will be enhanced. In 2024, digitization, regulatory improvements, and an injection of international capital will drive the sustained expansion of the Saudi Arabian banking sector. The industry is expected to be a vital driver of the nation's economic diversification and growth in 2023 as it adapts to suit the evolving demands of consumers and enterprises. To succeed in this changing financial environment, customers and banks alike must be aware of these trends and open to new ideas.

2.5. Theoretical Framework and Hypotheses Development

Understanding the paradigm shifts associated with the constant evolution of technology and the adoption of AI in the banking industry provides evidence of the need for the research framework to facilitate the exploration of specific associations between AI adoption and customer satisfaction. Contextualizing the implementation of AI technologies to enhance customer satisfaction in the Saudi Arabian banking sector, the theoretical framework recognizes the need to incorporate the analysis of the diverse range of factors, including how AI applications, data privacy practices, and integration of AI designs impact customers. A key point of
consideration entails the need to understand that the varied range of factors within the scope of implementing AI for customer satisfaction moderate outcomes, and that includes how AI applications such as fraud detection and personalization of recommendations influence the perception of customers in the industry. Fundamentally, the theoretical framework looks into perspectives of AI implementation relative to the achievement of enhanced customer satisfaction with a view that there exist other moderating factors that influence outcomes either in a positive or negative direction (Rafique et al., 2020). It is an argument that is widely researched in current technological evolution associated with increased adoption of innovative strategies in the banking sector, with findings revealing how customer factors such as cultural attitudes towards AI and level of technology knowledge contribute to enhanced leverage on AI (Ibrahim et al., 2017). In cases where customer attitudes toward AI implementation reflect positive behavior and their general demographic characteristics linked to embracing new technologies, the implementation of AI can significantly contribute to enhanced customer satisfaction (Davis, 1989). With this understanding, the theoretical framework advances ideas around customer perception constructions in the implementation of the research, and that entails the analysis of the perceived usefulness of AI, each of its uses, and its impact on customers. Through the lens of a unified theory of acceptance and use of technology, the research receives capabilities for understanding how AI adoption influences customer satisfaction in the Saudi Arabian banking industry.
Based on the theoretical significance of the study, the following hypotheses were formulated:

**H1:** The use of AI in Saudi Arabian banks is directly related to customer satisfaction levels.

**H2:** Perceived ease of use of AI technology mediates the relationship between AI usage in Saudi Arabian banks and customer satisfaction levels.

### 3. Methodology

#### 3.1. Research Design

This investigation will use a quantitative research approach. Quantitative researchers gather numerical data and analyze it mathematically to find patterns, forecast outcomes, test ideas, and perform experiments (Sileyew, 2019). The quantitative method is efficient where data from several research participants is needed.
3.2. Research Strategy

Research goals, questions, and methods for data collection may all be better understood with a well-thought-out research plan (Oliva, 2019). This study used a survey as its research approach. The survey strategy was selected because it effectively collects data from a broad population sample. Time restrictions also allowed for rapid data collecting without going overboard on expenses. The survey is not exhaustive. A significant flaw is that respondents are never impartial while answering questions.

3.3. Data Collection Method

Addressing research questions comprehensively calls for efficient data collection. To come up with reliable research questions, the study began by looking through various academic databases, such as PubsOnLine, Google Scholar, ISI Web of Knowledge/ISI Web of Science, and subject-specific databases, such as ACM Digital Library.

3.3.1 Data Collection Instrument: Survey

Examining the correlation between AI implementation in Saudi Arabian banks and happy customers is the primary goal of the research. The data collection equipment used in this study was a survey (Stockemer et al., 2019). Prior studies on the subject were considered during the creation of the survey. The first of the three parts that made up the questionnaire was a cover letter explaining the research goals. The purpose of the cover letter was to explain the purpose of the study and assure them that their response would be treated with utmost confidentiality. The second part included quantitative questions, and that part questions the independent and dependent variables. The variables were assigned on a five-point scale: strongly agree=5, agree=4, neutral=3, disagree=2 and severely disagree=1. Using Likert questions, research participants may easily express their opinions on specific topics by giving yes or no responses (Bell et al., 2022). The "Neutral" option allowed participants to answer questions they were unsure about.

Google Forms was used to gather data for the research due to its user-friendliness. The researcher had to do pilot testing before distributing the survey and beginning data gathering. Bell et al. (2022) agree that pilot testing is an excellent way to validate the idea and quantification of the questions. Before data collection, pilot testing is necessary for survey mistake correction (Bell et al., 2022). Due to time constraints, I asked friends, family, and
classmates to complete the survey and let me know whether they grasped the key points (Bell et al., 2022). The expert's recommendation on the improvements that needed to be made immediately was included in the research. The research relies on social media sites to communicate the poll to a large audience because of their vast use. Social media sites, including X, formally Twitter, Instagram, WhatsApp, LinkedIn, and Snapchat, were among the many that were used. A personalized letter was sent to every respondent outlining the study's objectives and what they may anticipate from the survey. The survey was prepared in Arabic and English language.

3.3.2. Sampling

The present study was interested in getting insights from bank employees, especially financial managers, and clients in Saudi Arabia, making purposive sampling the suitable method. Purposive sampling was chosen because it ensured that participants had a more profound knowledge of how AI can affect customer satisfaction in the banking sector. The survey was distributed to 140 people, and 100 responded, representing a 71.43% response rate.

3.3.3. Operationalization and Measuring of Variables

Andrade (2021) states that operationalization turns abstract concepts into measurable observations. Operationalization makes it easy to collect data on these concepts. The study's independent variable is Artificial Intelligence (AI), and the dependent variable is customer satisfaction (CS). The mediating variable in the study is perceived Ease of Use (EOU). The independent variable artificial intelligence explains the adoption of technologies such as machine learning in the banking sectors with crucial indicators, including investment in AI, AI-enabled services, and system quality. The measurements for AI as an independent variable in the study will focus on financial reports and data logs revealing trends in usage and surveys that seek to establish customer perception of AI implementation in the banking sector. The dependent variable, customer satisfaction, focuses on the level of attitudes, experiences, and contentment in using AI-enabled services in the banking sector, with key indicators ranging from loyalty, satisfaction, and positive perception. Primary sources of measurement include customer surveys and analysis of feedback from reviews and comments.
3.4. Quality Criteria

3.4.1. Validity

For a study to be considered valid, the research strategy and methods must be robust and widely recognized worldwide. A study's validity depends on how well-organized and error-free its data and results are and how reliable the instruments employed to gather them are (Chander, 2018). When the validity is kept within reasonable bounds, it promotes broader acceptability and results in advancements in research.

3.4.2. Reliability

To assess the reliability of a research, Sürüşü and Maslakçi (2020) state that one must consider the ideas' consistency and the study's repeatability. There are two types of reliability: internal reliability and external reliability. In the context of a survey, for example, internal reliability refers to the degree to which the several questions (or "items") assess the same concept. External reliability refers to how well a metric is used in different contexts (Chander, 2018).

3.4.2.1 Reliability Testing

Below is the Cronbach's Alpha measure for each variable.

Table 1

<table>
<thead>
<tr>
<th>Computed variables</th>
<th>Cronbach's Alpha</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial Intelligence (AI)</td>
<td>0.857</td>
<td>5</td>
</tr>
<tr>
<td>Customer Satisfaction (CS)</td>
<td>0.787</td>
<td>5</td>
</tr>
<tr>
<td>Ease of Use (EOU)</td>
<td>0.748</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Authors' analysis, 2024

3.5. Data Analysis

For the data to be correctly evaluated and understood and conclusions drawn, systematic data analysis must be used (Sileyew, 2019). Coding the raw materials was the first step in integrating the collected data into the SPSS statistical tool (Malhotra, 2010). Based on the survey questions, which included options like strongly disagree, disagree, neutral, agree, and strongly agree, the data had to be coded into numerical values before analysis could be performed (Sileyew, 2019). Data was coded and cleaned on an Excel database. However, all analyses were done using the SPSS program.
Descriptive statistics were run to find out how representative they were. This helped reveal data representation regarding gender, age, occupation, and educational level, among other things. The researchers used correlation analysis to determine the association between the two variables (Kim, 2019). A reasonably strong link is indicated by a correlation coefficient between 0.2 and 0.9, according to Shrestha (2020). Associations with values over 0.9 are considered vital, and those below 0.2 are considered weak. Since precise measurements are less prone to random mistakes and unexpected volatility, we tested the idea through reliability to ensure it was trustworthy. There was an administration of Cronbach's alpha, a reliability test. The regression equation and coefficient of multiple determination were generated using multiple regression analysis, which uses two or more independent variables (Klein, 2024). A linear connection exists when the changes in both variables are proportional (Klein, 2024). A linear regression study demonstrates the consistency between two variables when one variable is changed.

4. Finding

4.1. Descriptive Statistics

The survey was collected from 100 participants; 54% were females, and the remaining were males (Table 2). Table 2 shows that most of the study participants were aged between 26 and 35, at 34%, followed by those aged between 18 and 25, at 20%, and then those aged between 36 and 45, at 17%. Those aged 46 to 55 came third, at 16%, and those aged over 55% came last, at 13%.

Table 2 shows the distribution of the study population in terms of their level of education. It is evident that most of the study participants had bachelor's degrees at 37%, followed by those with master's degrees at 35%, and those with a doctorate came third at 17%, with only 9% indicating that they only attained high school level of education. Table 2 proceeds to demonstrate the distribution in terms of income category. Most study participants (34%) earned between SAR 100,001 - SAR 150,000, followed by those earning between SAR 150,001 - SAR 200,000 at 27%, and those earning between SAR 50,000 - SAR 100,000. Only 9% of the study participants had an income of over SAR 200,000, and 8% indicated their income was less than. SAR 50,000. Because the survey was conducted among bank and customer officials, Table 2 shows that 60% of the research participants were bank customers, and the remaining were bank officials.
The demographic above clearly shows that the research participants were representative enough, and this comes with several advantages. Research results are more likely to indicate the target population's traits, habits, and attitudes when they are based on a statistically valid sample. The findings cannot be applied to the whole population under consideration if the sample is biased or skewed in any way. Secondly, a representative sample improves validity and reliability. A well-representative sample minimizes biases and is more likely to be consistent. Additionally, if the sample is representative, we may say that the study's results apply to the population as a whole. This is of utmost importance when concluding, formulating policies, or implementing plans that impact many persons or organizations.
Table 2. Descriptive statistics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25 Years Old</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>26-35 Years Old</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>54</td>
</tr>
<tr>
<td>36-45 Years Old</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>71</td>
</tr>
<tr>
<td>46-55 Years Old</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>87</td>
</tr>
<tr>
<td>Over 55 Years Old</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>100</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Doctorate</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>56</td>
</tr>
<tr>
<td>High School</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>65</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>100</td>
</tr>
<tr>
<td>Level of Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than SAR 50,000</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>SAR 50,000 - SAR 100,000</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>SAR 100,001 - SAR 150,000</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>64</td>
</tr>
<tr>
<td>SAR 150,001 - SAR 200,000</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>91</td>
</tr>
<tr>
<td>Over SAR 200,000</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank Official</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Customer</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

4.2. Regression Analysis

4.3.1. Multiple Regression

The study conducted multiple regression to provide deeper insights into the relationships between the study variables: Artificial Intelligence, Ease of Use, and Customer Satisfaction. Multiple regression helps determine how each aspect affects customer satisfaction and their importance. Multiple regression is also helpful in determining how well the model fits the data and how much of the variation in customer satisfaction is explained by the independent variables when taken as a whole. The regression result shows that Artificial Intelligence and Ease of Use control 63.9% variation in the dependent variable (customer satisfaction). The model p-value is 0.00, showing that the relationship.
The result revealed that artificial intelligence (AI) is positively and significantly correlated with customer satisfaction (CS), Pearson's r=0.799, p≤0.001. A very favorable association between AI and CS is shown by the positive correlation value of 0.799. This suggests that customer happiness tends to rise in tandem with the application of AI in banking. The mediation analysis result showed that Ease of Use only mediates 9.82% of the relationship between AI and CS, and it is not statistically significant (β=0.0607 (95% CI: -.0246, .146), z=1.39, p=0.163, which is greater than the significance level of 0.001. Therefore, ensuring that AI solutions are implemented in banking products is essential for banks to realize high customer satisfaction. However, it does not mediate the relationship between the use of artificial intelligence and customer satisfaction. Some of the challenges that Saudi Arabian banks face include regulatory hurdles, high cost of implementation, and challenges of ensuring unethical use of AI systems.

5. Discussion

The study findings provide evidence of the positive impact of AI on customer satisfaction, including the fact that the implementation of AI systems contributes to the personalization of services and efficiency. It demonstrates how technological paradigm shifts continue to revolutionize Saudi's banking sector, an aspect supported by El-Gohary et al. (2021) findings indicating faster response times due to AI improving customer levels. Fundamentally, the assessment of this study's findings supports Dantsoho et al.'s (2021) analysis of the perceived roles of AI implementation in process efficiency and increasing impact on customer satisfaction in the banking sector. In essence, it reveals the imperatives of sustaining frameworks for improved implementation of AI in service delivery. Similar to findings from Tiwari et al. (2021), the study underscores the fact that AI technologies contribute to improved ease of use from the perspective of user-friendly AI interfaces. Further analysis of the findings points to the fact that perceived ease of use builds a positive customer satisfaction index, an observation supported by Dantsoho et al. (2021) indicating how ease of use provides an important moderating factor in achieving a higher customer satisfaction rate.
Even though the current research receives significant support from previous studies' findings indicating the positive impact of AI implementation on customer satisfaction in the banking sector, there are several counterarguments advanced, including Ballestar et al. (2019) assertions of how different levels of technology knowledge among customer demographics impact negative changes. Low levels of technology knowledge among target customer demographics undermine the contribution of AI implementation toward achieving satisfaction. Hariguna and Ruangkanjanases (2024) further provide disagreeing arguments around AI and perceived ease of use, indicating how complexities associated with technologies can present challenges to how customers access banking services. In essence, a comparative analysis of findings in the current study underscores that aspects such as culture and religion, context, and technological maturity can undermine how AI implementation impacts customer satisfaction.

5.1. Customer Satisfaction

A company's success relies on consumer happiness with its products, services, and staff. It strongly predicts customer loyalty and repeat purchases. Thus, revenue and growth forecasting is easier. Banking is highly standardized, limiting pricing competition. However, consumer happiness determines which bank thrives while another fails (Al-Araj et al., 2022). To satisfy their customers' banks, banks must ensure they offer reliable services. Modern bank customers may engage with their banks online via a mobile banking app, ATM, or phone. Consistency across channels is a significant finding for customers. Both consistent deposit timings, irrespective of deposit mode, and quick information transmission across channels must be carefully examined (Tatikonda et al., 2022). Banks must satisfy customers across all channels to provide a great experience.

Al-Araj et al. (2022) also define customer satisfaction as a company's capacity to meet consumer needs. Additionally, it aids service quality assessment. Today's businesses risk losing customers to competitors offering superior products and services. Customers may evaluate items and services by rating quality. Due to increasingly demanding consumers and more significant quality requirements, companies should focus on customer service, value generation, connection building, and market innovation. Companies seldom track competitor performance, consumer satisfaction, and expectations (Kishada et al., 2016). The writers answered these customers' requests for enhanced service (Suhartanto et al., 2022). To satisfy client
expectations, several organizations are utilizing AI. According to the paper (Manser Payne et al., 2021), the banking sector drives national development. The quality of banker-customer interactions determines client retention and acquisition. Client-bank relationships are essential for banks to meet customers' changing demands and expectations (Al-Araj et al., 2022). Customer loyalty may be enhanced by offering affordable, high-quality services. Banks may use artificial neural networks to predict consumer loyalty like other sectors. Factor analysis should be used to extract critical variables from all data. This will boost data modeling readiness. This prediction method uses feedforward backpropagation and artificial neural networks. K-fold cross-validation builds K classification subgroups from the training dataset, per Al-Araj et al. (2022). The efficiency coefficient and root-mean-squared error show how effectively the strategy performed on the dataset. Client loyalty may be accurately predicted using an artificial neural network.

5.2. Benefits and Limitations

Artificial intelligence might transform banking by simplifying procedures, saving costs, and enhancing customer experience. However, additional dangers and downsides must be weighed. Artificial intelligence's capacity to analyze vast volumes of data and find insights people miss helps the banking business greatly. Use this data to train ML systems to forecast. AI also excels at repetitive work automation (Ramamurty et al., 2021). Chatbots and robo-advisors can handle customer service questions while humans focus on higher-order activities. Artificial intelligence can quickly evaluate enormous volumes of data, which may help risk management and fraud detection. After discovering detrimental behaviors, financial organizations are less likely to lose money or reputation. Ghandour (2021) also suggests that AI may enhance user experience. Personalization of chatbot and virtual assistant suggestions may boost client happiness and loyalty. Remember these considerations before using AI on your financial institution's data. The first happens when algorithms are trained to draw biased conclusions from incomplete or incorrect data. Fortunately, data collecting may help funding organizations prevent this. Data storage must be protected from cyberattacks to avoid data breaches and protect user privacy (Sharma, 2023). However, AI research demonstrates that it can tackle issues in previously unthinkable ways.
5.3. Challenges

The KSA banking industry is making AI progress, but several obstacles remain. Saudi banks and other financial institutions struggle to find AI experts. Ghandour (2021) claims that a lack of AI professionals in KSA's banking industry hinders AI development and implementation. AI experts are in high demand in healthcare and energy, worsening this shortage. Hasan et al. (2020) discussed how big data analytics may avoid public finance fraud, manage resources, reduce risks, and increase efficiency and effectiveness. According to their results, supporting this technology may help authorities. They found specific barriers, such as limited resources and expertise, that prevent large public finance data initiatives from succeeding. Additionally, Saudi financial institutions struggle with the high cost of AI. Few firms, particularly those with lower budgets, can afford AI software, hardware, and infrastructure (Subudhi, 2019). Updating and maintaining AI systems may be costly. AI technology in financial institutions causes data availability and quality issues. Financial firms struggle to get high-quality data due to data fragmentation, silos, and lack of standards (Subudhi, 2019). Algorithm training and development need high-quality data. These organizations may also require regulations to ensure ethical AI usage in banking. Confusion about standards and rules hinders acceptance and implementation (Subudhi, 2019).

5.4. Ethical and Regulatory Considerations

AI might change Saudi banking by improving efficiency and customer service. AI raises ethical and legal problems about privacy, security, prejudice, and responsibility. Consider numerous ethical challenges relating to AI's financial uses. Ahmadi (2024) states that an AI system's accuracy relies on the neutrality of its training data; biased data will skew the algorithm's outputs. Financial activities like loans or investments might cause discrimination. AI's impact on employment is another ethical issue. Humans replacing machines in customer service and data analysis has worried IT professionals (Krijger, 2023). Businesses should examine ways to offset these changes' economic impacts, especially for impacted workers, according to Abakare and Jeko (2024). Customers' data must also be protected. AI models must safely store vast volumes of sensitive financial data by data privacy laws to perform correctly. Hacking an AI model might lead to financial fraud. Thus, financial organizations should consider AI ethics before utilizing it.
Organizations may use AI to benefit everyone by eliminating prejudice, recognizing employee interests, and respecting data protection laws. Financial organizations should also incorporate all consumer groups in their data to avoid biased algorithmic decision-making (Abakare & Jeko, 2024). Finally, companies must safeguard client data (Ahmadi, 2024).

5.5. Regulatory Considerations

According to Al-Baity (2023), financial organizations using AI technology must comply with data protection laws, including the GDPR and the Saudi Arabian Data Protection Law. Consumer consent is required before utilizing personal data for AI. Accountability is essential. Al-Baity (2023) believes financial institutions should be responsible for AI system judgments. They should help injured customers get compensation. Mishra and Sant (2021) explain why financial investment services employ AI. Banks must handle customer data carefully and follow local and international data protection rules (Mishra & Sant, 2021). They may harness artificial intelligence's disruptive potential in banking while safeguarding client data and following ethical standards.

5.6. Ease of Use

While ensuring everything is easy to use is crucial, the findings show that banks should utilize AI for more than just making things more straightforward; they should use AI to boost customer satisfaction directly. To further understand the connection between AI and banking customers' happiness, future studies may look at other possible moderators or mediators (Alqasa (2023). Furthermore, qualitative research has the potential to reveal how consumers see and anticipate AI-powered financial services, which might aid in determining what factors, outside usability, are most important in determining customer happiness.
Conclusion

To meet and exceed client expectations and ensure their pleasure, disruptive technology such as artificial intelligence is becoming more critical in the banking business. A wide range of applications for artificial intelligence (AI) in the digital banking sector, including conversational bots, voice recognition, face recognition, biometric authentication, cyber security detection, and machine learning for fraud detection. Digital banking enabled by artificial intelligence is still in its early phases of acceptability, despite its efficiency in data interpretation and the capacity to address complicated issues and consumer concerns. Therefore, the current study looks at the impact of artificial intelligence on customer satisfaction in the banking sector, focusing on Saudi Arabian banks. Customer happiness tends to rise in tandem with the application of AI in banking. Some of the challenges that Saudi Arabian banks face include regulatory hurdles, high cost of implementation, and challenges of ensuring unethical use of AI systems.

The paradigm shifts in modern industry practice underscore the importance of leveraging technology to achieve sustainability and ensure process seamlessness. Fundamentally, understanding the changes associated with the increased integration of AI in the banking sector reveals several benefits supported by these research findings, including enhanced customer satisfaction through efficiency and personalization of service and product experiences. For instance, the analysis of findings underlines the fact that the implementation of AI systems for facial recognition contributes to how authentication approaches provide safeguards against security breaches, as well as the fact that banking personalization through machine learning builds a positive customer experience. In essence, the fundamentalism of sustained customer satisfaction based on findings in this study lies in the fact that AI implementation fosters frameworks implicit in recognizing unique customer needs. Improved efficiency, for instance, due to the implementation of AI, reduces wait time and allows continuous improvement in processes, which is critical in sustaining positive customer satisfaction. However, it is also essential to understand that implementing AI systems presents significant cost implications that can be transferred to banking consumers, reducing satisfaction overall. Implementing AI systems for banking in the Saudi Arabian banking sector presents a revolutionary strategy for enhanced customer satisfaction.
Recommendations

Saudi Arabian banks must address these challenges to fully benefit from implementing AI. They must ensure they safeguard the privacy of customers' data because AI has led to a surge in cyber risks. They should also ensure they comply with regulations and guarantee transparency and trustworthiness. Implementing effective AI systems in the banking sector in general can present significant cost and security implications, which can increase customer satisfaction. Understanding the changes in the implementation of AI recognizes the intrinsic value of customer trust through strategies for safeguarding data. It, therefore, implies that achieving solid customer satisfaction through the implementation of AI in the Saudi Arabian banking sector is a multifaceted aspect that requires the incorporation of frameworks for increased privacy and security. Therefore, enhanced customer satisfaction in the sector relies on recommendations emphasizing data privacy and security through advanced encryption, security audits, and staff training. Further, the sector needs to foster compliance with regulation, transparency, and prioritization of accountability.
References

Abakare, C., & Jeko, V. O. (2024). The ethics of artificial intelligence as the epistemology of information-based technology is examined in light of the banking industry. IGWEBUIKE: African Journal of Arts and Humanities, 10(1).

Ahmadi, S. (2024). A comprehensive study on the integration of big data and AI in the financial industry and its effect on present and future opportunities. International Journal of Current Science Research and Review, 7(01), 66-74. https://hal.science/hal-04456267


Manser Payne, E. H., Peltier, J., & Barger, V. A. (2021). Enhancing the value co-creation process: artificial intelligence and mobile banking service


