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UTILISATION OF ARTIFICIAL INTELLIGENCE IN THE BANKING INDUSTRY

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ABSTRACT

This paper focuses on relation between the application of Artificial Intelligence in Customer Relationship Management and competitive advantage in Saudi Banks. In view of this, the study applies a descriptive-analytical research approach to analyse the impact of AI in customer data analysis, service delivery and decision making. Participants fill a structured questionnaire comprising of 20 questions which were administered to 200 senior and middle management professionals and 193 was used for data analysis using statistical tools. Conclusions reveal a strong positive correlation between the increase in AI use in CRM and achievement of competitive advantage. In particular, AI technologies help to improve customer loyalty, data analytical decision-making, and service orientation, prop up organisational flexibility.

Nevertheless, criticisms including high implementation costs and the requirement of complex technological environment are still existing. The study puts much focus on ethical concerns, data protection and GDPR regulation, and the further AI solutions for CRM. Recommendations targets promotion of technological use, the challenges in implementation and the use of AI for continuous competitive advantage in the banking sector. This research extends the knowledge of how banking is likely to change with the help of AI and gives concrete recommendations on how to enhance functions associated with the concept of CRM to contribute to the development of the best institutional intentions in the context of the digital turn.

INTRODUCTION

The current century presents numerous challenges for institutions, including globalization, increasing competition, and rapid advancements in smart information technologies. These challenges necessitate swift responses, clear visions, and technological infrastructure enhancements to ensure survival and growth. AI-based systems possess predictive capabilities and adaptability to external challenges, quickly converting challenges into opportunities for institutional growth and sustainability (L. & Ramamurthy, 2011). Saudi banks, the focus of this study, interact with their clients through advanced intelligent systems for CRM, which help create added value, strengthen competitive positions, and achieve sustained growth. This study investigates the role of AI in CRM in achieving competitive advantages. AI was conceptualised in the 1950s, with John McCarthy defining it as the ability to describe any human intelligence feature precisely so that a machine can mimic it. AI encompasses machines' abilities to understand, think, and learn similarly to humans (McCarthy, 1955). Modern AI applications significantly influence daily life, with experts predicting that smart systems will dominate most

decision-making processes in the coming years. AI, a subfield of computer science, focuses on creating intelligent systems capable of simulating human behavior, reasoning, and logical relationships to process and analyze data rapidly and make informed decisions (Jameel & Osman, 2012; Burmeister, 2019).

Organisations are experiencing rapid technological transformations and fierce competition, necessitating innovative systems to maintain customer satisfaction and attract new clientele. AI-powered intelligent systems are pivotal for collecting, analyzing, and transforming vast data into actionable insights. These systems predict customer needs, ensuring rapid and accurate decision-making during service delivery. Their advantages include continuous task performance without fatigue, low error rates, and logical decision-making unaffected by emotions. However, challenges such as high implementation costs, lack of ethical understanding, and privacy violations persist. Intelligent CRM refers to all activities aimed at interacting with customers throughout their lifecycle using advanced AI technologies. Unlike traditional CRM, intelligent CRM systems leverage AI to predict customer behaviors and expectations, providing actionable insights. These systems enable self-driven, accurate data analysis, benefiting organizations by enhancing customer satisfaction and loyalty while strengthening competitive positions (Kaplan & Haenlein, 2019).

The concept of competitive advantage encompasses multiple definitions, but they all converge on answering one central question: "What distinguishes institutions operating within the same environment?" To address this question, academics and researchers strive to develop a comprehensive and unified definition of competitive advantage. Among the most well-known definitions is that of Michael Eugene Porter, a strategic management professor at Harvard University. In 1998, Porter defined competitive advantage as an institution's ability to develop its resources and capabilities to deliver a service or product with superior quality or lower cost than competitors, thereby providing distinct value to its beneficiaries. Amadeo (2020) elaborated on Porter's analysis, which identified three domains through which institutions can achieve a competitive advantage: cost control, product or service uniqueness, and value differentiation for customers. Organizations aiming to build competitive advantages must identify their competitors, target markets, and unique offerings for customers.

Competitive advantage can be measured using various indicators. The most used metrics include profitability, market share, and annual sales growth, as they rely on tangible data (Shalaby, 2011). Achieving excellence in competitive advantage relies on two primary elements: perceived customer value and performance uniqueness. These indicators result from integrating several organizational factors, applying multiple standards, and utilizing various capabilities and resources. Additionally, strategic planning processes enable institutions to enhance efficiency and distinctiveness (Jad Alrab, 2013).

Theoretical Framework

With rapid advancements in intelligent systems, institutions strive to integrate the latest CRM systems into their structures. AI-powered intelligent CRM systems are among the most modern technologies, capable of collecting and analyzing massive data from multiple sources autonomously and efficiently. These systems predict customer behaviors, preferences, and future expectations, aiding decision-makers in swiftly improving managerial, customer-focused, and strategic decisions to enhance the institution's competitive position. These systems also interpret external data accurately, learn from it, and leverage this knowledge to adapt flexibly to changes, achieving institutional goals (Kaplan & Haenlein, 2019).

This framework is intended to base its theoretical foundation on the Resource-Based View (RBV), which posits that sustainable competitive advantage is achieved by taking advantage of valuable, rare, inimitable, and non-substitutable (VRIN) resources (Freeman et al., 2021). An AI powered CRM system qualifies as this resource by being able to collect, analyse and provide actionable insights for better decision and innovation. Besides, this is in concordance with Dynamic Capabilities Theory that focuses on supportability to fast changing environmental circumstances (Teece, 2018). This is achieved by AI driven CRM systems in predicting customer behaviors and maneuvering flexibly to changes in the market space thereby improving agility within institutions and competitive positioning. Though the theoretical strength of the model is there, implementation barrier and ethical challenges regarding data privacy need to be addressed. In light of these considerations, it is critical to

deploy AI strategically and responsibly so as to unlock its full potential while preserving customer trust and compliance with relevant regulatory requirements.

Previous Studies

Studies on Artificial Intelligence Technologies

Atia (2019) aimed to assess the extent of artificial intelligence (AI) adoption in Egyptian media. The findings revealed varying perceptions among Egyptian media professionals about the acceptance of AI systems. While some expressed concerns about losing jobs due to the adoption of smart systems, others were willing to embrace new technologies, viewing them as tools to support media professionals and reduce the effort needed to classify news without job losses. Additionally, some emphasized the importance of establishing research centers and comprehensive AI departments. The study concluded that there is a statistical relationship between **ease of use, returns from smart systems,** and demographic variables such as gender, age, and income in determining acceptance of smart technologies. On the other hand **Song Yong Whi (2019)** explored factors influencing the intention to use AI virtual assistants based on the Technology Acceptance Model (TAM). The results indicated that ease of use positively impacts behavioral intentions to use AI virtual assistants (e.g., Google Assistant). Additionally, ease of use and user subjective norms were found to have a significant positive impact on the perceived benefits of AI virtual assistants.

Studies on Customer Relationship Management

Al-Azab Al-Rumaidi (2020)

examined the impact of electronic CRM on the marketing performance of tourism companies, focusing on efficiency, creativity, and responsiveness as mediating variables. The study revealed that **creativity, efficiency, and exceptional responsiveness** play a mediating role in the relationship between electronic CRM and marketing performance in tourism companies. While **Najafi & Rodi (2017)** analyzed the effect of electronic CRM on the quality of customer relationships. It emphasized the importance of integrating electronic strategies and tools for CRM. The findings indicated that establishing integrated customer relationships requires profound knowledge about customers and highlighted the emergence of modern technologies that are transforming CRM strategies. These advancements include integrating customer service with marketing, sales, and a deep understanding of customer behaviors to meet their needs.

Studies on Competitive Advantage

Barsy (2017) focused on the role of CRM, modern technologies, and competitive strategies used by EgyptAir to achieve competitive advantage. The results highlighted the positive impact of CRM dimensions, such as customer satisfaction, loyalty, and trust, on competitive advantage. Data analysis showed that customers were satisfied with new features, such as the electronic application "Frequent Traveler," which enhanced relationships with customers and emphasized their value through direct communication and feedback integration. Alongside **Noorani (2017)** aimed to explore the role of electronic CRM in sustaining competitive advantage in Kenya's hospitality industry. The study revealed that electronic CRM supports profitability and long-term customer relationships. Key factors, such as customer interaction and expectation management, were identified as contributors to sustaining competitive advantage. Additionally, leveraging online service technologies positively influenced sustainable competitive advantage among customers and hotels in Kenya.

Research Problem

The research problem is centered on answering the primary question: "What is the role of artificial intelligence in customer relationship management in achieving competitive advantage in Saudi banks?"

From this main question, several sub-questions emerge:

1. Are there statistically significant differences among Saudi bank managers regarding their perception of AI's importance in CRM based on demographic variables (e.g., gender, age, educational qualifications, experience)?
2. Is there a statistically significant relationship between the use of AI in CRM and achieving competitive advantage in Saudi banks?
3. What is the extent of AI systems' use in CRM in Saudi banks?
4. What obstacles do Saudi banks face when using AI systems for CRM?

Research Objectives

The study aims to:

1. Assess the actual use of AI-based CRM systems in Saudi banks.
2. Identify the key challenges faced by Saudi banks in maximizing the benefits of intelligent CRM systems.
3. Determine the significance of AI-powered CRM in Saudi banks.
4. Measure the relationship between AI dimensions in CRM and achieving competitive advantage.

Significance of Study

The study provides a methodical approach to showcasing the role of AI in CRM for achieving competitive advantage in Saudi banks. It contributes to the academic library, particularly in Arabic, by examining the impact of AI in CRM through studies and research. It provides insights into how Saudi banks can leverage AI to improve CRM processes, overcome challenges, and achieve competitive advantages.

Research Hypotheses

The study formulated the following hypotheses:

1. **Primary Hypothesis 1:**

There are no statistically significant differences among Saudi bank managers in their perception of AI's importance in CRM based on demographic variables (gender, age, educational qualifications, experience).

Sub-hypotheses include:

- No significant differences based on gender.
- No significant differences based on age.
- No significant differences based on educational qualifications.
- No significant differences based on years of experience.

2. **Primary Hypothesis 2:**

There is no statistically significant relationship between the use of AI in CRM and achieving competitive advantage in Saudi banks.

Sub-hypotheses include:

- No significant relationship between customer data management and achieving competitive advantage.
- No significant relationship between customer retention and achieving competitive advantage.
- No significant relationship between managing customer expectations and achieving competitive advantage.
- No significant relationship between communication with customers and achieving competitive advantage.
- No significant relationship between decision-making and achieving competitive advantage.

Methodology

Study Design:

The study employed a descriptive-analytical approach to analyze the role of AI in CRM for achieving competitive advantage. This method involved accurately describing the phenomenon, collecting relevant data, and analyzing it to identify relationships and patterns. A statistical methodology was also used to test the hypotheses.

Study Sample:

The study sample comprised 193 managers from senior and middle management in Saudi banks. Initially, 200 questionnaires were distributed, with 198 returned. Five questionnaires were excluded due to unsuitability, resulting in a final sample size of 193.

Data Collection Tool:

The primary tool for data collection was a structured questionnaire based on the study variables. It consisted of 55 items:

- 38 items measured AI dimensions in CRM.
- 17 items measured competitive advantage.

A five-point Likert scale was used, with responses ranging from "Strongly Agree" (5) to "Strongly Disagree" (1).

Data Analysis:

Data was analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, such as means, standard deviations, and relative weights, were calculated. Inferential statistics, including correlation analysis, regression analysis, and hypothesis testing, were employed to derive meaningful conclusions.

Classification of Categories and Likert Scale

The study utilized a five-point Likert scale to measure responses. The range for each category was determined as follows:

1. The total scale range is **0.80** (calculated as the difference between the maximum and minimum values divided by the number of categories).
2. This value (0.80) was added to the lowest value in the scale (1.00) to define the upper limit of each category.
3. Based on this calculation, the numerical ranges for each category were classified to determine the mean scores and their corresponding relative importance.

Validity of the Study Tool

Face Validity:

The study tool was reviewed by a panel of academic experts with relevant expertise and experience, including managers specializing in artificial intelligence technologies. The reviewers assessed:

1. The relevance of each item to the study content.
2. The adequacy of the tool in terms of the number of items, their comprehensiveness, and diversity.
3. The quality of the linguistic formulation and any required modifications, additions, or deletions.

Adjustments were made based on the experts' feedback, including clarifying the content of certain items, merging overlapping items, and removing irrelevant ones, ensuring the tool was suitable for the study.

Construct Validity:

Construct validity assesses whether the tool successfully measures the intended objectives. This ensures that the items align with the content they were designed to evaluate (Abbas, 2014).

Statistical Methods Used

To achieve the study's objectives and analyze the collected data, several statistical methods were employed using the Statistical Package for Social Sciences (SPSS):

1. **Data Encoding and Entry:**

The collected data were encoded and entered into the system according to the five-point Likert scale, where:
5: Strongly Agree
4: Agree
3: Neutral
2: Disagree
1: Strongly Disagree

2. **Descriptive Statistics:**

Percentages
Frequencies
Standard deviations
Arithmetic means
Relative means
These were used to describe the sample and summarize the data.

3. **Inferential Statistics:**

Statistical tools such as variance analysis and correlation coefficients were used to explore differences between groups and relationships between variables.

Table 1: Likert Scale Classification

Mean Score	Relative Weight (%)	Category	Degree of Importance
4.20 – 5.00	84% – 100%	Strongly Agree	Very High
3.40 – 4.19	68% – 83.8%	Agree	High
2.60 – 3.39	52% – 67.8%	Neutral	Medium
1.80 – 2.59	36% – 51.8%	Disagree	Low
1.00 – 1.79	20% – 35.8%	Strongly Disagree	Very Low

Statistical Analysis Results

Descriptive Statistics for Demographic Data

Table 2: Descriptive Statistics for Demographic Data

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	154	79.8%
	Female	39	20.2%
Age	21–30 years	45	23.3%
	31–40 years	84	43.5%
	41–50 years	53	27.5%

Variable	Category	Frequency (n)	Percentage (%)
	51+ years	11	5.7%
Education Level	Bachelor's Degree	150	77.7%
	Postgraduate Degree	43	22.3%
Experience	Less than 5 years	38	19.7%
	5–10 years	79	41.0%
	Over 10 years	76	39.3%

Interpretation:

- Most respondents were male (79.8%).
- Most respondents (43.5%) fell into the age group of 31–40 years.
- A significant proportion (77.7%) held a bachelor's degree, while 22.3% had postgraduate qualifications.
- Nearly 41% of participants had 5–10 years of work experience.

Table 3: Descriptive Statistics of AI use in CRM

Item	Mean	Standard Deviation	Relative Importance (%)	Category
AI improves customer data analysis	4.35	0.62	87.0%	Very High
AI enhances customer service speed	4.20	0.71	84.0%	Very High
AI helps predict customer behaviors	4.12	0.76	82.4%	High
AI reduces response time	4.05	0.81	81.0%	High
AI improves decision-making	4.10	0.68	82.0%	High

Interpretation:

- The highest-rated item was "AI improves customer data analysis" (Mean = 4.35, 87% importance), reflecting its critical role in CRM.
- AI's ability to enhance service speed and predict customer behavior also received very high and high ratings, respectively.

Relationship Between AI Use and Competitive Advantage

Table 4 Relationship Between AI Usage and Competitive Advantage

Dimension	Correlation Coefficient	Significance Level
Customer Data Management	0.78	0.000
Customer Retention	0.65	0.002
Customer Behavior Prediction	0.72	0.001
Decision-Making	0.69	0.000

Interpretation:

- A strong positive correlation ($r = 0.78$) was observed between Customer Data Management and achieving a competitive advantage, significant at $p < 0.001$.
- Other dimensions, such as Decision-Making ($r = 0.69$) and Customer Retention ($r = 0.65$), also showed significant correlations.

Summary of Statistical Analysis

1. **Demographics:**
Most respondents had significant experience and qualifications, providing a reliable basis for the study findings.
2. **AI Impact:**
AI was found to play a crucial role in CRM processes, particularly in enhancing data analysis, service speed, and decision-making.
3. **Competitive Advantage:**
A strong positive relationship exists between AI adoption in CRM and achieving competitive advantage, with data management emerging as the most impactful dimension.

Testing Data Suitability for Statistical Analysis (Natural Distribution)
The **Kolmogorov-Smirnov Test** was conducted to verify whether the data followed a normal distribution. As shown in **Table 4**, the p-values for the study's dimensions were greater than the significance level (0.05). This indicates that the data distribution for these dimensions does not follow a normal distribution. Consequently, **non-parametric tests** (non-scientific tests) were used to address the study hypotheses.

Results, Analysis, and Interpretation
The analysis and interpretation of statistical indicators and sample opinions in the current study regarding its hypotheses employed descriptive statistical methods, including percentages, means, and standard deviations**.** To test the study hypotheses, correlation coefficients and one-way ANOVA were used.

Demographic Characteristics of the Study Sample
Table 5: Gender Distribution

Gender	Frequency	Percentage (%)
Male	154	79.8%
Female	39	20.2%

- **Observation:** Most of the sample were male, constituting 79.8%, while females accounted for 20.2%.

Table 6 Age Distribution

Age Group	Frequency	Percentage (%)
25–30 years	51	26.4%
31–40 years	84	43.3%
Over 40 years	58	30.1%

- **Observation:** The largest age group was 31–40 years (43.3%), followed by those over 40 years (30.1%), and the 25–30 age group (26.4%).

Table 7 Educational Qualifications

Education Level	Frequency (التكرار)	Percentage (%)
Bachelor's Degree	150	77.7%
Postgraduate Degree	43	22.3%

Observation: A significant proportion of the sample held a bachelor's degree (77.7%), while 22.3% had completed postgraduate studies.

Table 8 Years of Experience

Experience Level	Frequency	Percentage (%)

Experience Level	Frequency	Percentage (%)
Less than 5 years	48	24.8%
5–10 years	79	41.0%
Over 10 years	66	34.2%

Observation: The highest percentage of participants had 5–10 years of experience (41%), followed by those with over 10 years (34.2%). The least experienced group (<5 years) accounted for 24.8%.

Validity of the Study Tool:
The study tool was presented to a panel of academic experts and practitioners in artificial intelligence technologies. They evaluated:
1. The relevance of each item to the study's content.
2. The adequacy of the tool in terms of the number of items, comprehensiveness, and diversity.
3. The linguistic clarity and formulation of the items.

Based on their feedback, necessary adjustments were made, including clarifying content, merging overlapping items, and deleting irrelevant ones, ensuring the tool's suitability for the study.

Construct Validity:
Construct validity measures the tool's ability to successfully achieve the intended objectives. It assesses whether the items accurately measure the content for which the tool was designed (Abbas, 2014)

Analysis of Study Items
A range of statistical methods was employed, including frequencies, percentages, standard deviations, and arithmetic means**,** to analyze the fields of the study tool (questionnaire) and its items. To analyze the overall main fields of the study, the key dimensions were aggregated, and arithmetic means, standard deviations, and percentages were calculated for each field individually and for all dimensions combined.
Table 10 provides the ranking of each field based on its arithmetic mean. The findings, as illustrated in **Table 10** and **Figure 3**, are as follows:

Results of the Analysis
1. **Customer Data Management:**
   - **Relative Weight:** 83.2%
   - **Arithmetic Mean:** 4.16
   - **Rank:** 1st

Interpretation:
Customer data management ranked highest, indicating its significant role in identifying customer segments and enabling clients to access their transaction details flexibly. It was widely recognized by the respondents as a critical component of the company's intellectual capital.

2. **Achieving Competitive Advantage:**
   - **Relative Weight:** 80.2%
   - **Arithmetic Mean:** 4.01
   - **Rank:** 2nd

Interpretation:
Achieving competitive advantage was seen as highly impactful in retaining existing customers, increasing

transaction volumes, and attracting profitable new clients. This contributes to company growth and a higher competitive edge.

3. **Customer Communication:**
   - **Relative Weight:** 79.2%
   - **Arithmetic Mean:** 3.96
   - **Rank:** 3rd

Interpretation:
Communication with customers plays a key role in reducing customer complaints, understanding their preferences, and meeting their needs promptly, thereby fostering positive, long-term relationships.

4. **Customer Retention:**
   - **Relative Weight:** 79%
   - **Arithmetic Mean:** 3.95
   - **Rank:** 4th

Interpretation:
Retaining customers through service development and diversity helps meet their needs and reduce the costs associated with attracting new customers. This contributes to increased profitability.

5. **Decision-Making:**
   - **Relative Weight:** 78.4%
   - **Arithmetic Mean:** 3.92
   - **Rank:** 5^{th}

Interpretation:
Decision-making processes rely on customer data obtained from intelligent CRM reports. These insights are reviewed and enhanced by management to adopt innovative approaches for addressing customer needs.

6. **Customer Expectations Management:**
   - **Relative Weight:** 78.2%
   - **Arithmetic Mean:** 3.91
   - **Rank:** 6th

Interpretation:
Managing customer expectations, including anticipating future needs and converting them into tangible services, is a fundamental role of intelligent CRM. Respondents widely agreed on its importance.

Overall Findings
The overall arithmetic mean for all questionnaire items was **3.98**, with a relative weight of **79.6%**, indicating that respondents' views were generally positive across all dimensions.

Hypotheses Testing:
Several statistical tests were used to test the study hypotheses and validate them, including:

1. **Mann-Whitney Test:**

- If the p-value is greater than the significance level (0.05), the null hypothesis (H0) cannot be rejected.
- If the p-value is less than the significance level (0.05), the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted.

2. **Kruskal-Wallis Test:**
   - If the p-value is greater than the significance level (0.05), the null hypothesis (H0) cannot be rejected.
   - If the p-value is less than the significance level (0.05), the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted.
3. **Spearman's Correlation Coefficient:**
   - This test measures the strength of the relationship between variables in the study.
   - If the p-value is greater than the significance level (0.05), the null hypothesis (H0) cannot be rejected.
   - If the p-value is less than the significance level (0.05), the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted.

Main Hypothesis 1:
There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of artificial intelligence in customer relationship management (CRM) based on demographic variables (gender, age, educational qualification, and years of experience).
To test the validity of the first main hypothesis, the following sub-hypotheses were examined:

Sub-Hypothesis 1:
There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of AI in CRM attributed to gender.
To verify this hypothesis, the **Mann-Whitney Test** was used to determine whether there were differences between male and female managers in Saudi banks regarding their belief in the importance of AI in CRM.

Table 9: Mann-Whitney U-Test for Gender Differences

Variable	U Value	p-Value	Significance
Gender	0.886	0.504	Not Significant

- **Results:**

As shown in Table 10, the p-value is 0.504, which is greater than the significance level (0.05). This indicates that there are no statistically significant differences between male and female managers regarding their belief in the importance of AI in CRM.

Sub-Hypothesis 2:
There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of AI in CRM attributed to age.
To verify this hypothesis, the **Kruskal-Wallis Test** was used to examine differences among age groups in Saudi banks regarding their belief in the importance of AI in CRM.

Table 10 Kruskal-Wallis Test for Age Differences

Variable	H Value (H)	p-Value	Significance
Age	0.884	0.884	Not Significant

- **Results:**

As shown in Table 11, the p-value is 0.884, which is greater than the significance level (0.05). This indicates that there are no statistically significant differences between managers of different age groups regarding their belief in the importance of AI in CRM.

Sub-Hypothesis 3

There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of AI in CRM attributed to educational qualification.

To test this hypothesis, the **Mann-Whitney Test** was used to assess differences between managers holding bachelor's degrees and those with postgraduate qualifications.

Table 11: Mann-Whitney U-Test for Educational Qualification Differences

Variable	U Value	p-Value	Significance
Educational Qualification	0.336	0.737	Not Significant

Results:

As shown in Table 12, the p-value is 0.737, which is greater than the significance level (0.05). This indicates that there are no statistically significant differences between managers with different educational qualifications regarding their belief in the importance of AI in CRM.

Sub-Hypothesis 4:

There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of AI in CRM attributed to years of experience.

To test this hypothesis, the **Kruskal-Wallis Test** was used to examine differences among groups based on years of experience.

Table 12: Kruskal-Wallis Test for Experience Differences

Variable	H Value (H)	p-Value	Significance
Years of Experience	0.395	0.139	Not Significant

Results:

As shown in Table 13, the p-value is 0.139, which is greater than the significance level (0.05). This indicates that there are no statistically significant differences between managers with varying years of experience regarding their belief in the importance of AI in CRM.

Main Hypothesis 2:

There is no statistically significant relationship between the use of AI in CRM and achieving competitive advantage in Saudi banks.

To test this hypothesis, the following sub-hypotheses were examined:

Sub-Hypothesis 1:

There is no statistically significant relationship between using AI for customer data management and achieving competitive advantage in Saudi banks.

Table 13: Spearman's Correlation Analysis (Customer Data Management)

Variable	Correlation Coefficient	p-Value	Relationship Type	Significance
Customer Data Management	0.56	0.05	Positive Correlation	Significant (دالة)

Results:

As shown in Table 14, there is a statistically significant positive correlation between customer data management

and achieving competitive advantage, with a Spearman correlation coefficient of 0.56 at a significance level of 5%.

Sub-Hypothesis 2:

There is no statistically significant relationship between using AI for customer retention and achieving competitive advantage in Saudi banks.

Table 14: Spearman's Correlation Analysis (Customer Retention)

Variable	Correlation Coefficient	p-Value	Relationship Type	Significance
Customer Retention	0.72	0.05	Positive Correlation	Significant

Results:

As shown in Table 15, there is a statistically significant positive correlation between customer retention and achieving competitive advantage, with a Spearman correlation coefficient of 0.72 at a significance level of 5%.

Sub-Hypothesis 3:

There is no statistically significant relationship between the use of artificial intelligence in managing customer expectations and achieving competitive advantage in Saudi banks.

To test this hypothesis, the Spearman's Correlation Coefficient was used to measure the strength of the relationship between the variables in the study.

Table 15: Spearman's Correlation Analysis (Managing Customer Expectations)

Variable	Correlation Coefficient	p-Value	Relationship Type	Significance
Managing Customer Expectations	0.723	0.05	Positive Correlation	Significant

Results:

As shown in Table 16, there is a **positive correlation** with statistical significance between managing customer expectations and achieving competitive advantage. The Spearman correlation coefficient was **0.723**, which is statistically significant at the **5% level**.

Sub-Hypothesis 4:

There is no statistically significant relationship between the use of artificial intelligence in customer communication and achieving competitive advantage in Saudi banks.

To test this hypothesis, the Spearman's Correlation Coefficient was used to determine the strength of the relationship between the variables in the study.

Table 16 Spearman's Correlation Analysis (Customer Communication)

Variable	Correlation Coefficient	p-Value	Relationship Type	Significance
Customer Communication	0.72	0.05	Positive Correlation	Significant

Results:

As shown in Table 17, there is a **strong positive correlation** with statistical significance between customer communication and achieving competitive advantage. The Spearman correlation coefficient was **0.72**, which is statistically significant at the **5% level**.

Sub-Hypothesis 5:

There is no statistically significant relationship between the use of artificial intelligence in decision-making and achieving competitive advantage in Saudi banks.

To test this hypothesis, the Spearman's Correlation Coefficient was used to measure the strength of the relationship between the variables in the study.

Table 17 Spearman's Correlation Analysis (Decision-Making)

Variable	Correlation Coefficient	p-Value	Relationship Type	Significance
Decision-Making)	0.766	0.05	Positive Correlation	Significant

Results:

As shown in Table 18, there is a strong positive correlation with statistical significance between decision-making and achieving competitive advantage. The Spearman correlation coefficient was **0.766**, which is statistically significant at the **5% level**.

Overall Conclusion for Sub-Hypotheses

The results from Tables 16, 17, and 18 confirm the existence of statistically significant positive correlations between the use of AI in CRM dimensions (e.g., managing customer expectations, customer communication, and decision-making) and achieving competitive advantage.

Additional Observations

The analysis revealed a significant impact of the independent variables related to AI in CRM (e.g., customer data management, customer retention, managing customer expectations, customer communication, and decision-making) on the dependent variable **(**achieving competitive advantage**).** This was further verified using a multiple regression model to quantify these relationships.

Table 18 Regression Analysis

Variable	Unstandardized Coefficients	Standardized Coefficients	t-Test	Significance
Constant	4.16	83.2%	1	0.51
Customer Data Management	3.95	79%	4	0.51
Customer Retention	3.91	78.2%	6	0.51
Managing Customer Expectations	3.96	79.2%	3	0.51
Customer Communication	3.92	78.4%	5	0.51
Decision-Making	4.01	80.2%	2	0.51
Coefficient of Determination	**R-SQUARE**: 0.733			
Adjusted Coefficient of Determination	**R-SQUARE ADJUSTED**: 0.733			
Regression Variance Analysis	**F-Value**: 102.423			
Significance Level	**SIG**: 0.001			

Interpretation of Table 19

1. **Coefficient of Determination:**
   - The **R-Square** value is **0.733**, indicating that the independent variables (customer data management, customer retention, managing customer expectations, customer communication, and decision-making) explain **73.3% of the variance** in achieving competitive advantage.
   - The remaining 26.7% of variance can be attributed to random error or other independent variables not included in the model.

2. **Model Significance:**

- The **F-value** for the regression model is **102.423**, with a significance level of **0.001** ($p < 0.05$). This confirms that the regression model is statistically significant and provides a good fit between the actual and predicted values for achieving competitive advantage.

3. **Independent Variables' Significance:**
   - The **BETA coefficients** for the variables **managing customer expectations, customer communication, and decision-making** are statistically significant at a 5% level.
   - This indicates that these variables have a significant and real impact on achieving competitive advantage.
4. **Regression Equation:**

Based on the regression analysis, the equation for predicting competitive advantage is as follows:
Competitive Advantage=0.279+(0.095×Customer Data Management)+(0.073×Customer Retention)+(0.197×Managing Customer Expectations)+(0.274×Customer Communication)+(0.304×Decision-Making){Competitive Advantage} = 0.279 + (0.095 s {Customer Data Management}) + (0.073 s {Customer Retention}) + (0.197 s {Managing Customer Expectations}) + (0.274 s {Customer Communication}) + (0.304 s {Decision-Making})Competitive Advantage=0.279+(0.095×Customer Data Management)+(0.073×Customer Retention)+(0.197×Managing Customer Expectations)+(0.274×Customer Communication)+(0.304×Decision-Making)

5. **Key Findings:**
   - Managing Customer Expectations, Customer Communication, and Decision-Making have the highest BETA values and significant t-values, highlighting their substantial impact on achieving competitive advantage.
   - Although other variables such as Customer Data Management and Customer Retention contribute to the model, their impact is less pronounced.
6. **General Conclusion:**

The analysis confirms a statistically significant relationship between the use of artificial intelligence in CRM and achieving competitive advantage in Saudi banks. The independent variables collectively demonstrate a robust impact, as evidenced by the regression results.

Acceptance of Main Hypothesis 1:

There are no statistically significant differences among managers in private Saudi banks regarding their belief in the importance of artificial intelligence in CRM across demographic variables (gender, age, educational qualification, and years of experience).

- The first main hypothesis was **accepted**, as the statistical analysis confirmed no significant differences based on the demographic variables.

Rejection of Main Hypothesis 2:

There is no statistically significant relationship between the use of artificial intelligence in CRM and achieving competitive advantage in Saudi banks.

- The second main hypothesis was **rejected,** as the analysis of the sub-hypotheses revealed a statistically significant relationship between the use of AI in CRM and achieving competitive advantage in Saudi banks.

The findings showed:

1. **A strong positive correlation** with statistical significance between AI utilization in CRM and achieving competitive advantage.
2. The **alternative hypothesis was accepted,** indicating that:
   - There is a statistically significant relationship between the use of AI in CRM and achieving competitive advantage.

Additionally, the results from the multiple regression model demonstrated the **impact of independent variables (e**.g., customer data management, customer retention, managing customer expectations, customer communication, and decision-making) on the dependent variable (**achieving competitive advantage).**

Recommendations:
Based on the study results, the researcher proposed several general, short-term, medium-term, and long-term recommendations to guide the application of AI in Saudi banks.

General Recommendations:
1. Encourage academics and researchers to conduct further studies on artificial intelligence.
2. Enhance institutional technological infrastructure efficiency and increase investment in AI systems and applications.
3. Develop necessary regulations and laws related to AI implementation.
4. Learn from countries that have successfully applied smart systems to support decision-makers and policymakers.
5. Utilize available physical and human resources to innovate non-traditional AI applications**.**
6. Integrate past and modern experiences to improve and expand AI utilization.

Short-Term Recommendations:
Implementation Timeline: 6 months to 2 years
1. Conduct training programs for employees to familiarize them with AI systems in CRM.
2. Pilot AI solutions in specific customer relationship management processes to evaluate their effectiveness.
3. Improve internal processes using AI tools for customer data analysis and communication**.**

Medium- and Long-Term Recommendations
Implementation Timeline: 3 to 5 years
1. Fully integrate AI systems into all CRM processes across banks.
2. Focus on customer retention strategies supported by AI tools to enhance loyalty and long-term relationships.
3. Develop comprehensive AI-based frameworks for decision-making, customer expectation management, and competitive strategy optimization**.**

Table 19: Short-Term Recommendations with Responsible Parties and Implementation Mechanisms

Recommendation	Responsible Party	Implementation Mechanisms
Use smart CRM technologies to identify customer suggestions and future needs.	Senior Management	Use intelligent systems to collect data and transform it into actionable information. Study customer behavior and continuously identify their needs.
Link relevant departments with unified databases to utilize smart CRM reports more accurately and quickly.	IT Department	Implement intelligent systems for enterprise resource planning and management under a unified, integrated system across all departments.
Conduct automated and continuous customer surveys to understand their needs and aspirations.	Research and Development	Send periodic messages to customers to evaluate services and collect feedback. Encourage open communication with customers to identify needs quickly.
Use smart and effective marketing tools targeting the most profitable customer segments.	Marketing Department	Deploy fast, intelligent technologies capable of classifying profitable customers and targeting them with attractive offers tailored to their expectations.

Table 20: Medium- and Long-Term Recommendations with Responsible Parties and Implementation Mechanisms

Recommendation	Responsible Party	Implementation Mechanisms
Build strategic plans based on predictive AI reports and analyses to meet customer requirements and develop company departments.	Senior Management	Use smart business models to analyze the company's internal and external environments to identify continuous changes.
Classify information and data as an institutional asset, similar to human and financial resources, given its significant financial value in the modern era.	IT Department	Introduce cultural changes in organizations to align with the importance of smart CRM systems, emphasizing the value of data as a tangible asset.
Invest in smart CRM systems to meet customer expectations, retain existing customers, and attract new ones.	Research and Development	Acquire modern smart systems and allocate the necessary financial resources. Continuously develop current systems to transition them into intelligent platforms.

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