The Impact of Artificial Intelligence Acceptance on Customer Satisfaction in the Telecommunication Industry in Egypt

دراسة تأثير تقبل العملاء للخدمات الدعومة بالذكاء الاصطناعي علي مدي رضاء العملاء في مجال صناعة الاتصالات في مصر

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المستخلص:

تستكشف هذه الدراسة العلاقة بين قبول الذكاء الاصطناعي ورضا العملاء في قطاع الاتصالات في مصر، باستخدام نموذج قبول التكنولوجيا كإطار نظري. والغرض من ذلك هو التحقيق في كيفية تأثير الفائدة الملموسة وسهولة الاستخدام الملموسة على قبول الذكاء الاصطناعي وفهم الدور الوسيط للثقة في قبول العملاء للخدمات المدعومة بالذكاء الاصطناعي. بالإضافة إلى ذلك، يتم فحص العوامل الديموغرافية مثل العمر والدخل والتعليم كمُعدلات محتملة في هذه العلاقة.

تم استخدام منهجية بحث كمية، وجمع البيانات من ٤٤٢ عميلاً لخدمات الاتصالات في جميع أنحاء مصر من خلال استبيانات منظمة. ركزت هذه الاستبيانات على تصورات العملاء للخدمات التي تعمل بالذكاء الاصطناعي، بما في ذلك خدمت دعم العملاء الذي يعمل بالذكاء الاصطناعي، والخدمات التنبؤية المدعومة بالذكاء الاصطناعي، وإدارة الشبكة. تم تحليل البيانات باستخدام تحليل الانحدار المتعدد لتقييم تأثير الفائدة الملموسة وسهولة الاستخدام الملموسة، وتحليل الوساطة لاستكشاف دور الثقة، وتحليل الاعتدال لتقييم آثار العوامل الديموغرافية.

تكشف النتائج الرئيسية أن كل من الفائدة الملموسة وسهولة الاستخدام الملموسة من العوامل الهامة لقبول الذكاء الاصطناعي. من المرجح أن يتبنى العملاء تقنيات الذكاء الاصطناعي عندما يرون أنها تعزز تجربة الاتصالات الخاصة بهم من خلال خدمة عملاء أسرع وموثوقية أفضل للشبكة وعروض ترويجية مخصصة لهم. ظهرت الثقة في الذكاء الاصطناعي كعامل وسيط؛ حيث أجاب العملاء الذين يثقون في دقة وموثوقية وأمان أنظمة الذكاء الاصطناعي بمستويات رضا أعلى. كذلك يمكن أن يؤدي الافتقار إلى الثقة إلى عدول العملاء عن تبني تقنيات الذكاء الاصطناعي، مما يؤثر سلبًا على رضاهم العام. وجد أن العمر عامل معتدل مهم، حيث أظهر العملاء الأصغر سنًا (الذين تتراوح أعمارهم بين ١٨ و٣٥ عامًا) مستويات أعلى من قبول الذكاء الاصطناعي، بينما عبر العملاء الأكبر سنًا (الذين تتراوح أعمارهم بين ٥٠ عامًا وما فوق) عن المزيد من التحفظات. لم يؤثر مستوى الدخل بشكل كبير على قبول الذكاء الاصطناعي أو رضاه، وكان لمستوى التعليم تأثير طفيف. تشير الدراسة إلى أن مقدمي خدمات الاتصالات يجب أن يسلطوا الضوء على الفوائد الوظيفية لتقنيات الذكاء الاصطناعي والاستثمار في تطوير أنظمة الذكاء الاصطناعي سهلة الاستخدام لتعزيز تقبل العملاء لها. يعد بناء الثقة من خلال ممارسات التعامل مع شفافية البيانات وضمان أمان الخدمات التي تعتمد على الذكاء الاصطناعي أمرًا ضروريًا. إن تصميم استراتيجيات نشر الذكاء الاصطناعي لتلبية احتياجات مجموعات سكانية مختلفة – تقديم ميزات متقدمة للعملاء الأصغر سناً والمتمرسين في مجال التكنولوجيا وتقديم الدعم الشخصي للعملاء الأكبر سناً – يمكن أن يعزز رضا العملاء بشكل عام. يساهم هذا البحث في فهم قبول الذكاء الاصطناعي في الأسواق الناشئة ويؤكد على أهمية استراتيجيات الذكاء الاصطناعي التي تركز على العملاء والتي تلبي احتياجات مجموعات ديمغرافية متنوعة.

Abstract

This study explores the relationship between Artificial Intelligence (AI) acceptance and customer satisfaction in Egypt's telecommunications sector, utilizing the Technology Acceptance Model (TAM) as the theoretical framework. The purpose is to investigate how perceived usefulness (PU) and perceived ease of use (PEOU) influence AI acceptance and to understand the mediating role of trust in AI. Additionally, demographic factors such as age, income, and education are examined as potential moderators in this relationship.

A quantitative research methodology was employed, collecting data from 442 telecom service customers across Egypt through structured questionnaires. These questionnaires focused on customer perceptions of AI-powered services, including AI-driven customer support, predictive services, and network management. The data were analyzed using multiple regression analysis to assess the impact of PU and PEOU, mediation analysis to explore the role of trust, and moderation analysis to evaluate the effects of demographic factors.

The key findings reveal that both PU and PEOU are significant predictors of AI acceptance. Customers are more likely to adopt AI technologies when they perceive them as enhancing their telecom experience through faster customer service, better network reliability, and personalized offerings. Trust in AI emerged as a critical mediating factor; customers who trust the accuracy, reliability, and security of AI systems report higher

satisfaction levels. A lack of trust can deter customers from embracing AI technologies, negatively impacting their overall satisfaction. Age was found to be a significant moderating factor, with younger customers (aged 18-35) showing higher levels of AI acceptance, while older customers (aged 50 and above) expressed more reservations. Income level did not significantly influence AI acceptance or satisfaction, and education level had a minor effect. The study suggests that telecom service providers should highlight the functional benefits of AI technologies and invest in developing user-friendly AI systems to foster adoption. Building trust through transparent data handling practices and ensuring the security of AI-driven services is essential. Tailoring AI deployment strategies to cater to different demographic groups—offering advanced features to younger, tech-savvy customers and providing personalized support to older customers—can enhance overall customer satisfaction. This research contributes to the understanding of AI acceptance in emerging markets and underscores the importance of customer-centric AI strategies that cater to diverse demographic groups**.**

1. Introduction

Artificial Intelligence (AI) has significantly evolved in recent years, transitioning from basic machine learning algorithms to sophisticated deep learning and neural network technologies. This progression has allowed AI to efficiently process large datasets, recognize patterns, and make data-driven decisions, often surpassing human capabilities in specific tasks. AI has found its way into various industries, including healthcare, finance, and, notably, telecommunications. The latter sector has particularly benefited from AI, as it has enhanced operational

efficiency and customer service strategies. AI technologies like chatbots, predictive analytics, and automated customer support systems have transformed customer interactions, leading to improved satisfaction and service quality.

The Technology Acceptance Model (TAM), developed by Davis in 1989, serves as the foundational framework for understanding how users accept and engage with new technologies. TAM posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the primary factors influencing technology adoption. This model has been widely adapted to assess the acceptance of AI technologies, particularly in the telecommunications sector, where understanding these factors is crucial for improving customer experience.

This study explores the intersection of AI and customer satisfaction within Egypt's telecommunications industry, a sector experiencing rapid technological advancements. By integrating AI into customer service platforms, Egyptian telecom providers aim to enhance the overall customer experience, foster loyalty, and reduce churn rates. Given Egypt's growing digital infrastructure and the government's support for technological innovation, this study investigates how AI technologies are perceived by customers and their impact on satisfaction and service quality.

The Egyptian Telecommunication Industry has witnessed substantial growth, primarily driven by increasing digital acceptance and investments in infrastructure. With more customers relying on AI-driven solutions, such as chatbots and automated response systems, the study focuses on understanding how these technologies influence customer satisfaction. The Egyptian government and telecom companies have committed significant resources to digital transformation, fostering an environment conducive to AI deployment.

Despite these advancements, the acceptance of AI technologies varies among consumers. While AI offers enhanced efficiency and personalized services, the extent to which customers perceive

these benefits plays a crucial role in determining the success of AI initiatives.

Problem Statement

The problem this research addresses is the lack of empirical data regarding customer acceptance of AI technologies in Egypt's telecom sector. While AI implementation is increasing, there is limited understanding of how Egyptian customers perceive AI technologies and how these perceptions affect customer satisfaction. By applying the Technology Acceptance Model (TAM), this study aims to explore the key drivers behind AI acceptance and its impact on customer loyalty and satisfaction in the Egyptian telecommunications context.

Research Aim

This research aims to investigate the factors influencing AI acceptance among customers in Egypt's telecom industry. Specifically, it focuses on understanding the roles of perceived usefulness (PU), perceived ease of use (PEOU), and trust in the adoption of AI technologies. Additionally, it examines the impact of these factors on customer satisfaction, using the TAM framework to structure the analysis.

Research Objectives

The primary objectives of this research are:

1. To evaluate the role of perceived usefulness and ease of use in the adoption of AI technologies in Egypt's telecom sector.
2. To assess how trust influences AI acceptance and customer satisfaction.
3. To explore demographic variables such as age and education as potential moderators of AI acceptance.
4. To provide strategic recommendations for enhancing AI-driven customer experiences in Egypt's telecom industry.

Research Questions

The following research questions guide this study:

1. What is the relationship between AI acceptance and customer satisfaction in the Egyptian telecommunications industry?
2. How do perceived usefulness (PU) and perceived ease of use (PEOU) influence AI acceptance?

3. To what extent does trust mediate the relationship between AI acceptance and customer satisfaction?
4. How do demographic factors, such as age and education, moderate the acceptance of AI technologies?

Research Academic Importance

This study contributes to the growing body of knowledge on AI acceptance by offering insights specific to the Egyptian telecom industry. By applying the Technology Acceptance Model (TAM), it provides an understanding of the unique factors influencing AI acceptance in a rapidly evolving market.

Research Practical Importance

The research offers telecom companies actionable insights into customer behavior, enabling them to tailor AI strategies to meet customer expectations. By understanding the determinants of AI acceptance, companies can enhance customer satisfaction through better-designed AI services. This is particularly important in Egypt, where customer satisfaction directly influences retention and loyalty in a highly competitive market.

2. Literature Review

Artificial Intelligence (AI) has made remarkable advancements in recent years, moving from simple machine learning models to sophisticated deep learning systems and neural networks. This technological evolution has positioned AI as a key driver of innovation across many industries, including telecommunications, healthcare, finance, and retail. By enabling machines to process vast amounts of data, recognize complex patterns, and make informed decisions, AI often surpasses human capabilities in specific tasks. In telecommunications, the impact of AI is especially pronounced, as companies rely on it to enhance both operational efficiency and customer interaction strategies. AI technologies such as chatbots, predictive analytics, and automated customer support systems are increasingly being used to improve service delivery and customer satisfaction.

The journey of AI can be traced back to the mid-20th century, when the field first began developing algorithms for problem-solving, symbolic reasoning, and learning. Over the decades, AI

has grown from handling basic tasks, such as automating repetitive processes, to managing complex systems, such as network optimization and real-time customer service in telecommunications. Today, AI's ability to analyze large datasets and provide actionable insights makes it indispensable in the telecom industry, particularly in areas like predictive maintenance, network management, and customer service automation.

AI has become a central component of many industries. In healthcare, it is used for diagnostic systems, patient monitoring, and personalized medicine. In finance, AI-driven algorithms detect fraudulent activities, optimize trading strategies, and manage risk. In retail, AI enhances customer experiences through personalized product recommendations and inventory management systems. In telecommunications, AI applications include network traffic management, predictive analysis for customer behavior, and service automation, all of which help telecom companies reduce costs and improve customer satisfaction.

Despite its many advantages, the adoption of AI comes with a set of challenges, including ethical and practical concerns. Privacy is a significant issue, as AI systems often rely on personal data to provide accurate services. Bias within AI algorithms is another major concern, as these systems can inadvertently reinforce or amplify existing biases in the data used to train them. In telecommunications, where sensitive customer information is regularly handled, issues surrounding data security and bias are particularly critical. Moreover, there are growing concerns over the impact of AI on employment, as many fear that widespread AI adoption will lead to job displacement, especially in customer service roles traditionally filled by humans. Companies must also ensure transparency and accountability in AI systems, particularly when these technologies are used in customer-facing roles. Trust is a crucial factor for customers, and if AI systems are not perceived as reliable or fair, they may face resistance from both employees and consumers.

Looking forward, the role of AI in telecommunications is expected to expand even further. AI is poised to enable more efficient customer service operations by automating a wider range of tasks and improving the personalization of customer interactions. For instance, AI's ability to handle large datasets and complex queries in real-time makes it an ideal tool for managing telecom networks and anticipating customer needs. AI-powered systems can predict network outages, manage traffic surges, and offer more efficient bandwidth allocation, all of which improve service quality. Moreover, AI's potential to integrate with emerging technologies such as 5G, the Internet of Things (IoT), and blockchain opens new possibilities for innovation in the telecom industry.

The telecommunications market in Egypt has undergone significant transformation over the past two decades, driven by advancements in technology and increased consumer demand for digital services. Today, the Egyptian telecom sector is one of the most dynamic industries in the country, with several major players, including Vodafone, Orange, Telecom Egypt (WE), and Etisalat Misr. These companies compete fiercely to expand their market share by offering innovative services, many of which rely heavily on AI.

The Egyptian telecom market has seen considerable growth in both mobile and internet penetration. With a mobile penetration rate exceeding 100%, Egypt has one of the highest mobile adoption rates in the region. Internet penetration is also on the rise, driven by government initiatives to enhance the country's digital infrastructure and by increasing demand for broadband services. These factors make the Egyptian telecom industry a fertile ground for AI adoption, as telecom operators look for ways to meet the growing demand for more personalized, efficient, and reliable services.

Regulation in the Egyptian telecom market is overseen by the National Telecom Regulatory Authority (NTRA), which works to ensure fair competition, service quality, and consumer protection. The NTRA has been instrumental in facilitating the integration of

new technologies, including AI, into the telecom sector. Its initiatives have supported the rollout of AI-driven solutions by ensuring that telecom operators adhere to stringent standards regarding data privacy, service quality, and customer satisfaction. Despite the positive trajectory, the Egyptian telecom market faces several challenges that could affect the pace of AI adoption. Infrastructure remains a significant concern, particularly in rural areas where telecom services are often limited or unreliable. Digital literacy is another issue, as not all segments of the population are equally familiar with AI technologies or comfortable using them. However, these challenges also present opportunities for telecom companies to leverage AI as a tool for overcoming infrastructure limitations and improving customer engagement through more personalized and intuitive services.

One of the primary applications of AI in telecommunications is network management and optimization. Telecom networks generate vast amounts of data daily, much of which needs to be processed in real-time to ensure smooth operations. AI's ability to analyze this data quickly and accurately allows telecom operators to predict potential issues and address them before they affect service quality. For example, AI can monitor network traffic patterns, identify areas at risk of congestion, and automatically adjust bandwidth allocation to prevent service degradation. This proactive approach helps telecom companies reduce downtime and improve overall network performance, leading to higher customer satisfaction.

Another critical area where AI has made significant inroads is customer service. AI-powered customer service systems, such as chatbots and virtual assistants, have revolutionized how telecom companies interact with customers. These systems can handle a wide range of customer inquiries, from answering simple questions to resolving more complex issues, all without the need for human intervention. By automating routine tasks, AI allows human customer service agents to focus on more complicated cases, thereby improving the overall efficiency of the customer service department. Moreover, AI systems can provide 24/7

customer support, ensuring that customers can get help whenever they need it. This constant availability is a major factor in enhancing customer satisfaction, as customers no longer need to wait for business hours to resolve their issues.

The Technology Acceptance Model (TAM), developed by Fred Davis in 1989, provides a theoretical framework for understanding how users accept and use new technologies. According to TAM, two key factors influence the decision to adopt a new technology: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which users believe that a particular technology will enhance their performance, while perceived ease of use measures how effortless the technology is to use. TAM posits that if users perceive a technology as both useful and easy to use, they are more likely to adopt it.

TAM has been widely applied to study the adoption of various technologies, including AI. In the context of telecommunications, TAM helps explain why some customers readily accept AI-driven services while others are more resistant. For example, if customers believe that AI-powered customer service systems will resolve their issues more quickly and accurately than traditional methods, they are more likely to embrace the technology. However, if they find the AI systems difficult to use or confusing, they may resist adoption, regardless of the potential benefits.

In recent years, TAM has been adapted to include additional factors relevant to modern technologies like AI. For example, trust has emerged as a critical factor influencing AI adoption. In telecommunications, customers must trust that AI systems will handle their data securely and provide accurate, unbiased information. Without this trust, even the most advanced AI systems may face resistance from users.

Customer satisfaction is one of the most important metrics for evaluating the success of AI implementation in telecommunications. In an industry as competitive as telecommunications, maintaining high levels of customer satisfaction is essential for retaining customers and reducing

churn. Customer satisfaction in this context refers to the extent to which a customer's expectations are met or exceeded by a company's services. Several factors contribute to customer satisfaction in the telecom industry, including service quality, reliability, pricing, and the efficiency of customer service.

AI has the potential to significantly enhance customer satisfaction by improving these key areas. For example, AI systems can provide more reliable and faster customer service, which is a critical factor in customer satisfaction. By automating routine inquiries, AI systems can reduce the time it takes for customers to get answers to their questions. Additionally, AI systems can provide more personalized service by analyzing customer data and offering tailored recommendations or solutions. This level of personalization helps create a more positive customer experience, leading to higher satisfaction levels.

AI also plays a role in improving service quality and reliability in telecommunications. By using AI to predict and prevent network issues, telecom operators can reduce downtime and ensure that customers receive consistent, high-quality service. This proactive approach to network management not only enhances the customer experience but also helps build customer loyalty, as customers are more likely to stay with a telecom provider that delivers reliable service.

However, implementing AI in telecommunications is not without challenges. One of the biggest obstacles is customer trust. For AI to be successful, customers must trust that the systems will work correctly, protect their data, and provide unbiased, accurate information. Building this trust requires telecom companies to ensure transparency in how AI systems operate and to address any concerns customers may have about data privacy and security. Moreover, companies must ensure that AI systems are reliable and capable of handling customer inquiries in a way that meets or exceeds expectations. Failure to do so could result in decreased customer satisfaction and resistance to further AI adoption.
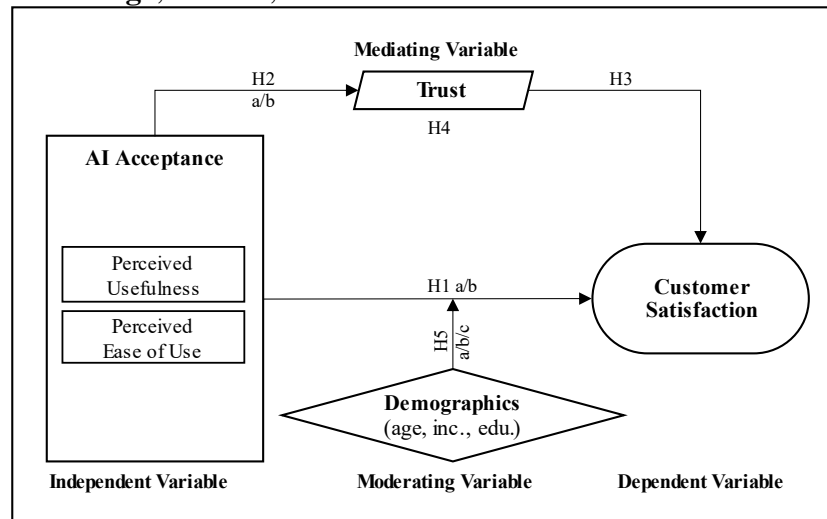
3. Research Methodology

This research employs a **quantitative approach** to investigate the acceptance of AI-powered services in the Egyptian telecommunication industry and its impact on customer satisfaction. A quantitative methodology is particularly suited to this study because it allows for the systematic collection and analysis of numerical data, enabling hypothesis testing and the discovery of statistical relationships between variables. Quantitative research is characterized by its objectivity and reliance on structured tools like surveys and questionnaires, making it appropriate for examining the relationships between key variables such as AI acceptance, customer trust, and satisfaction.

The research design includes the development and administration of a structured **questionnaire** to a sample of telecom service customers in Egypt. The questionnaire was selected as the primary data collection method due to its efficiency in reaching a large and geographically dispersed population. The survey questions were designed to capture respondents' perceptions of AI-powered telecom services, as well as their demographic characteristics. The data collected were then analyzed using various statistical techniques to explore the relationships between the variables of interest.

The population targeted by this study comprises **telecom service customers** across Egypt. According to the Ministry of Communications and Information Technology, the country has approximately 99 million telecom subscribers served by four main operators: Vodafone, Orange, Etisalat, and Telecom Egypt (WE). A **probability sampling** technique was employed to ensure that the sample is representative of the population. This method ensures that each telecom customer had an equal chance of being selected, minimizing sampling bias and enabling generalizability. A total of 461 responses were collected, of which 441 were deemed valid and relevant for analysis.

Conceptual Framework

The study's conceptual framework is based on the **Technology Acceptance Model (TAM)**, which posits that two critical factors—**Perceived Usefulness (PU)** and **Perceived Ease of Use (PEOU)**—influence users' acceptance of technology. The conceptual framework for this study expands on TAM by including **Trust** as a mediating variable between AI acceptance and customer satisfaction. Additionally, demographic factors such as **age**, **income**, and **education** are examined as moderators.

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The conceptual framework is visualized as follows:

1. **Independent Variables:**
   Perceived Usefulness (PU): The extent to which a customer believes that using AI-powered services will enhance their telecom experience.
   Perceived Ease of Use (PEOU): The extent to which a customer believes that using AI-powered services will be free from effort.

2. **Mediating Variable:**
Trust: The degree of confidence customers have in AI systems, particularly concerning their accuracy, reliability, and security.

3. **Dependent Variable:**
   Customer Satisfaction: The overall satisfaction level of telecom customers with AI-powered services.

4. **Moderating Variables:**
   Age: Younger vs. older customers.
   Income: High vs. low-income customers.
   Education: Highly educated vs. less educated customers.

Research Hypotheses

Based on the conceptual framework, the following hypotheses were formulated to guide the research:

1. **H1a**: Perceived Usefulness has a positive impact on customer satisfaction in the Egyptian telecommunication industry

2. **H1b**: Perceived Ease of Use has a positive impact on customer satisfaction in the Egyptian telecommunication industry

3. **H2**: AI technology acceptance has a positive impact on Trust in AI technology in the Egyptian telecommunication industry

4. **H3**: Trust in AI technology has a positive impact on customer satisfaction in the Egyptian telecommunication industry

5. **H4**: Trust mediates the relationship between AI acceptance and customer satisfaction.

6. **H5a**: Age moderates the relationship between AI acceptance and customer satisfaction, with younger customers being more likely to accept AI technologies.

7. **H5b**: Income moderates the relationship between AI acceptance and customer satisfaction, with higher-income customers more likely to accept AI technologies.

8. **H5c**: Education moderates the relationship between AI acceptance and customer satisfaction, with more educated customers more likely to accept AI technologies.

Research Variables

The research includes the following variables:

1. **Perceived Usefulness (PU)**: This variable measures how useful customers perceive AI-powered services to be in enhancing their telecom experience. It is expected that higher PU leads to greater AI acceptance.

2. **Perceived Ease of Use (PEOU)**: This variable assesses how easy customers perceive AI services to be. According to TAM, the easier a technology is to use, the more likely customers are to adopt it.

3. **Trust**: As a mediating variable, trust measures the level of confidence customers have in AI-powered systems. Trust encompasses perceptions of reliability, data security, and system accuracy.

4. **Customer Satisfaction**: The dependent variable of the study, customer satisfaction, refers to the degree to which AI-powered services meet or exceed customer expectations in terms of service quality, efficiency, and overall experience.

5. **Demographic Variables** (Moderators): Age, income, and education level are analyzed as moderators to determine whether these factors influence the strength of the relationship between AI acceptance and customer satisfaction.

Data Collection and Sample

Data were collected through an online survey distributed to telecom customers across Egypt. The survey was divided into sections covering demographic information, AI acceptance, perceived usefulness, perceived ease of use, trust, and customer satisfaction. Respondents were asked to rate their agreement with various statements using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The final dataset consisted of 442 valid responses, which were subjected to thorough data cleaning and checking processes. Incomplete or inconsistent responses were excluded to ensure the accuracy of the analysis. The cleaned data were then entered into **SPSS** (Statistical Package for the Social Sciences) for statistical analysis.

Data Processing and Analysis

The data analysis began with **descriptive statistics** to summarize the demographic characteristics of the respondents. Variables such as age, income, education, and telecom provider were analyzed to provide an overview of the sample. These descriptive statistics also helped ensure that the sample was representative of the broader population of telecom customers in Egypt.

Reliability and **validity** tests were then conducted to ensure that the measurement instruments were consistent and accurate. Cronbach's alpha was used to assess the internal consistency of the scales used in the survey, with values above 0.7 indicating acceptable reliability. The validity of the scales was established through both face validity (expert judgment) and construct validity (correlation analysis).

To test the study's hypotheses, **inferential statistics** were used. **Multiple regression analysis** was employed to assess the relationship between the independent variables (PU, PEOU), the mediating variable (trust), and the dependent variable (customer satisfaction). The results indicated that both perceived usefulness and perceived ease of use were significant predictors of AI acceptance, confirming H1a and H1b.

A **mediation analysis** was conducted to test H4, which hypothesized that trust mediates the relationship between AI acceptance and customer satisfaction. The analysis confirmed that trust plays a significant mediating role, meaning that customers who trust AI-powered services are more likely to adopt them and report higher satisfaction levels.

In addition, a **moderation analysis** was conducted to test the impact of age, income, and education on the relationship between AI acceptance and customer satisfaction. The analysis revealed

that **age** was a significant moderator, supporting H5a. Younger customers (aged 18-35) demonstrated higher levels of AI acceptance and reported greater satisfaction with AI services compared to older customers (aged 50 and above). However, income and education were not found to moderate the relationship significantly; thus, H5b and H5c were not supported by the data.

4. Findings and Data Analysis

The survey collected responses from a total of 442 valid participants, drawn from telecom service customers across Egypt. The analysis of the demographic data shows that respondents were diverse in terms of age, gender, education, and income levels. A significant proportion of respondents (about 60%) were in the age group of 18-35, reflecting a younger demographic profile that is typically more comfortable with technological advancements like AI. In terms of education, more than 50% of the respondents held university degrees or higher, suggesting a relatively educated sample base. Income levels were distributed across various brackets, though a notable portion of respondents earned between 10,000 to 20,000 EGP per month.

In addition to demographic data, the study examined the distribution of respondents among Egypt's main telecom operators. Approximately 40% of respondents used Vodafone, 35% used Orange, and 25% were subscribed to Telecom Egypt (WE), indicating the dominance of these major providers in the market. This distribution is essential for understanding how the acceptance of AI services may vary across different telecom operators, which can influence customer satisfaction in unique ways.

Descriptive Statistics of Research Variables

The analysis of the research variables showed that perceived usefulness (PU) and perceived ease of use (PEOU) of AI-powered services had generally high mean scores, indicating a positive perception of these services. Respondents agreed that AI services, such as chatbots and automated customer support, helped save time, provided accurate information, and made interactions with their telecom provider more efficient. These findings suggest that

customers perceive AI as a valuable tool for managing telecom services, which aligns with the theoretical predictions of the Technology Acceptance Model (TAM).

	Perceived Usefulness (USEF)	Perceived Ease of Use (ESOU)	AI Technology Acceptance (ACPT)	Customer Satisfaction (SATS)	Trust (TRST)
Mean	3.3820	3.3171	3.3496	3.2815	3.3148
Median	3.5714	3.5000	3.4464	3.4286	3.3571
Mode	4.00	4.00	3.00	4.00	3.00
Std. Dev.	.89871	.80878	.80905	.89586	.84703
Minimum	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00

Trust, as a variable, had mixed responses, reflecting some concerns among customers regarding the security and reliability of AI technologies. While many respondents acknowledged the convenience AI brings, a subset expressed reservations about data privacy and the accuracy of AI systems in solving complex problems.

Normality and Reliability Tests

A normality test was conducted to determine if the data distribution met the assumptions required for parametric statistical analysis. Both informal (e.g., histogram observation) and formal tests (e.g., Kolmogorov-Smirnov) were applied. The data for key variables, such as perceived usefulness, ease of use, and trust, were found to be approximately normally distributed, allowing for the use of regression analysis.

Reliability analysis using Cronbach's alpha was performed to assess the internal consistency of the research scales.

All scales used in the study (PU, PEOU, trust, and customer satisfaction) achieved acceptable reliability levels, with Cronbach's alpha values exceeding 0.7, which indicates good reliability for the questionnaire items.

Research Variable	Cronbach's Alpha	N
Perceived Usefulness (USEF)	.931	7
Perceived Ease of Use (ESOU)	.885	6
Customer Satisfaction (SATS)	.944	7
Trust (TRST)	.923	7

This validation step confirms that the measurement tools employed in the survey were reliable and accurately captured the respondents' perceptions.

Inferential Statistics: Correlation and Regression Analysis

To test the hypotheses, Pearson's correlation was first employed to examine the relationships between the independent variables (PU, PEOU), the mediating variable (trust), and the dependent variable (customer satisfaction).

	Perceived Usefulness (USEF)	Perceived Ease of Use (ESOU)	AI technology Acceptance (ACPT)	Customer Satisfaction (SATS)	Trust (TRST)
SATS	.835**	.833**	.880**	1	
TRST	.800**	.818**	.853**	.864**	1

The correlation analysis showed that both perceived usefulness (r = 0.835, p < 0.05) and perceived ease of use (r = 0.833, p < 0.05) were positively and significantly correlated with customer satisfaction. These strong positive correlations indicate that customers who find AI services useful and easy to use are more likely to report higher satisfaction levels with their telecom provider.

Next, multiple regression analysis was applied to model the impact of PU and PEOU on customer satisfaction. The results revealed that both variables were significant predictors of satisfaction, with perceived usefulness having a slightly stronger effect ($\beta = 0.5808$) than perceived ease of use ($\beta = 0.4409$). This supports the first two hypotheses of the study, indicating that AI

technologies that are perceived as both useful and easy to use significantly enhance customer satisfaction. T-Test analysis of Satisfaction (dependent variable) and Acceptance (independent variable) concluded that AI acceptance is significant ($\beta = 0.975$), while the constant was insignificant. That resulted in a regression model of **Satisfaction = 0.975 Acceptance.**

The adjusted R-squared value from the regression analysis was 0.774, meaning that about 77.4% of the variance in customer satisfaction could be explained by the independent variables included in the model (PU and PEOU). The remaining 22.6% of the variance is attributable to other factors not included in the study.

Mediation Analysis: Role of Trust

To test the third hypothesis regarding the mediating role of trust in the relationship between AI acceptance and customer satisfaction, a mediation analysis was conducted using the SPSS Process macro (Hayes 2022). The results confirmed that trust significantly mediated the relationship between AI acceptance and customer satisfaction. Specifically, the indirect effect of AI acceptance on customer satisfaction through trust was 0.3938, with a 95% confidence interval that did not include zero, indicating that the mediation was statistically significant.

This finding suggests that while AI acceptance directly influences customer satisfaction, trust enhances this relationship. Customers who trust AI technologies are not only more likely to accept them but also report higher satisfaction levels with their overall telecom experience. Thus, building customer trust in AI systems, particularly in terms of security and reliability, is essential for maximizing the benefits of AI adoption.

Moderation Analysis: Age, Income, and Education

The study also explored the moderating effects of demographic variables—age, income, and education level—on the relationship between AI acceptance and customer satisfaction. Moderation analysis was conducted using SPSS to test whether these variables influenced the strength of the relationship between the independent and dependent variables.

	β	t	p	95% CI	
				LL	UL
ACPT * AGE	0.0699	2.1883	**0.0292**	0.0071	0.1326
ACPT * INC	-0.0076	-0.469	**0.6393**	-0.0396	0.0244
ACPT * EDU	0.057	1.3005	**0.1941**	-0.0291	0.1432

The results revealed that age significantly moderated the relationship between AI acceptance and customer satisfaction (p = 0.029 < 0.05). Specifically, the interaction effect showed that the positive relationship between AI acceptance and satisfaction was stronger for older customers (aged 50 and above) compared to younger customers (aged 18-35). This finding supports the hypothesis that age plays a significant role in shaping customers' perceptions of AI technologies. Older customers, who may initially be more skeptical of AI, report higher satisfaction once they accept and trust the technology.

However, income and education level were not found to have significant moderating effects on the relationship between AI acceptance and customer satisfaction (p < 0.05). These results suggest that, in the Egyptian telecom market, income and education do not substantially influence how customers perceive and adopt AI technologies. This finding was somewhat unexpected, as previous research often suggests that higher income and education levels are associated with greater technology adoption. These results indicate that other factors, such as cultural attitudes or regional market characteristics, may play a more significant role in influencing AI acceptance.

Implications of the Findings

The findings from this study have important implications for telecom providers in Egypt. First, the strong influence of perceived usefulness and ease of use on customer satisfaction highlights the need for telecom companies to focus on enhancing the functionality and user-friendliness of their AI services. Ensuring that AI-powered customer support tools and automated systems are intuitive and effective will likely lead to higher adoption rates and improved customer satisfaction.

Second, the mediating role of trust underscores the importance of building and maintaining trust in AI systems. Telecom providers should prioritize transparent communication about how AI systems operate, especially concerning data privacy and security. By addressing customers' concerns about these issues, companies can foster greater trust in their AI offerings and, consequently, improve customer satisfaction.

Lastly, the finding that age moderates the relationship between AI acceptance and satisfaction suggests that telecom providers should tailor their AI services to different age groups. Older customers may require more guidance and reassurance when interacting with AI systems, while younger customers, who are generally more tech-savvy, may be more open to adopting new technologies without hesitation.

5. Discussion and Recommendation

The findings underscore the importance of perceived usefulness and perceived ease of use in determining the acceptance of AI-powered services by customers in the telecommunications sector. These two variables, derived from the **Technology Acceptance Model (TAM)**, were significant predictors of customer satisfaction. The research shows that customers who believe that AI services make their interactions more efficient and convenient are more likely to report higher levels of satisfaction. This suggests that improving the functionality and accessibility of AI tools, such as chatbots and automated service agents, can substantially increase customer satisfaction.

A key mediator identified in this study is **trust**. Trust plays a pivotal role in enhancing the relationship between AI acceptance and customer satisfaction. While AI systems can provide substantial benefits, such as improved service speed and accuracy, the lack of trust in these systems—due to concerns about data privacy and reliability—can undermine customer satisfaction. Therefore, telecom providers must focus on building and maintaining trust by ensuring transparency in how AI systems work, particularly concerning data security. For example, providing clear information about how customer data is handled

and the safeguards in place to protect it can help alleviate privacy concerns.

The moderating role of **demographic factors**, such as **age**, was also explored in this study. The findings indicate that older customers tend to exhibit a stronger relationship between AI acceptance and satisfaction than younger customers. This suggests that older individuals, while potentially more skeptical of new technologies initially, are likely to appreciate and value AI services more once they adopt them. This finding calls for telecom providers to tailor their AI-powered services to meet the needs of different age groups. While younger customers might be more inclined to explore and accept AI technologies quickly, older customers might require more straightforward interfaces, better guidance, and additional support to feel comfortable using these services.

Conversely, the study did not find significant moderation effects from other demographic variables such as **income** and **education level**. While this was somewhat unexpected, it suggests that the acceptance of AI-powered services and their impact on satisfaction may be more influenced by the perceived functionality of the services than by socioeconomic factors. This finding is important for telecom providers as it indicates that AI-powered services can appeal to a broad audience if they are designed to be user-friendly and offer tangible benefits.

From a theoretical perspective, this research contributes to the broader understanding of AI acceptance in the telecommunications industry by applying and extending the **TAM** framework. The inclusion of **trust** as a mediating variable and the exploration of **demographic moderators** adds depth to the model, highlighting how contextual factors, such as trust and customer demographics, can influence the acceptance of AI technologies. This study provides empirical support for the importance of trust in the adoption of AI and aligns with previous research suggesting that customers are more likely to embrace AI when they feel confident in its reliability and security.

Practical Implications and Recommendations

The findings offer valuable practical implications for **telecom providers** in Egypt and beyond. Based on the results, several key recommendations are suggested:

1. **Enhance the Perceived Usefulness of AI Services**: Telecom providers should focus on increasing the practical value of AI-powered services. Enhancing features that directly address common customer needs, such as faster problem resolution, more accurate service recommendations, and proactive network management, can increase the perceived usefulness of these services. By improving the functionality of AI tools, providers can drive higher acceptance and satisfaction levels.

2. **Improve the Usability of AI Services**: **Perceived ease of use** is another crucial factor influencing customer satisfaction. Telecom providers should ensure that their AI systems, such as chatbots and automated service portals, are designed to be intuitive and easy to navigate. Simplified interfaces, clear instructions, and effective support systems are likely to improve the customer experience, particularly for older or less tech-savvy customers.

3. **Build and Maintain Trust**: Trust is a critical factor mediating the relationship between AI acceptance and satisfaction. Telecom providers must prioritize transparency and data security to build and maintain customer trust. Providing clear communication about how AI systems function and how customer data is used and protected can help reduce privacy concerns and increase trust in these systems. Regular updates and improvements to ensure the reliability and accuracy of AI services will also help reinforce customer confidence.

4. **Tailor AI Services for Different Demographic Groups**: While the study found no significant moderation effects from income and education, it did reveal a stronger relationship between AI acceptance and satisfaction among older customers. Therefore, providers should consider tailoring their AI services to meet the needs of different demographic segments. For older customers, offering simpler, more user-

friendly AI solutions, along with additional guidance and support, could enhance their experience and satisfaction.

5. **Customer Education and Engagement**: Many customers may still be unaware of the full range of benefits that AI-powered services can offer. Telecom providers should invest in educational campaigns to inform customers about how to use these services effectively. Offering tutorials, FAQs, and support resources can empower customers to make the most of AI tools, leading to higher satisfaction and increased adoption. Additionally, engaging customers in feedback processes to gather their opinions and experiences with AI services can help providers identify areas for improvement and foster a sense of involvement and trust.

6. **Recommendations for Policymakers**: **Regulatory bodies** play a crucial role in ensuring the responsible deployment of AI technologies. Policymakers should establish clear guidelines and standards for AI use in telecommunications, addressing key concerns such as data privacy, security, and transparency. Certification programs for AI systems that meet specific standards for security and reliability could help build customer trust and encourage widespread adoption.

Limitations and Future Research

While this study provides valuable insights, there are several limitations that should be addressed in future research. First, the **cross-sectional nature** of the study means that it captures customer attitudes and satisfaction at a single point in time. Future studies could employ **longitudinal designs** to examine how customer acceptance and satisfaction evolve as they gain more experience with AI technologies. Additionally, the study relied on **self-reported data**, which is subject to biases such as social desirability. Incorporating **objective measures** of AI service performance and customer behavior would provide a more comprehensive understanding of the factors driving satisfaction. Moreover, this study focused on the Egyptian telecommunications market, which may limit the **generalizability** of the findings to other regions or industries.

Future research could explore how the acceptance of AI-powered services varies across different cultural and economic contexts, providing a more global perspective on the factors influencing AI adoption and satisfaction.

Conclusion

This study has provided valuable insights into the acceptance of AI-powered services in the Egyptian telecommunications industry, highlighting the importance of perceived usefulness, ease of use, and trust in driving customer satisfaction. The findings underscore the need for telecom providers to focus on enhancing the functionality, usability, and transparency of AI services to build trust and improve customer experiences. With the right strategies in place, AI technologies have the potential to significantly transform the customer service landscape, leading to higher satisfaction and loyalty among telecom customers.

References

[1]   Abomhara, M., & Køien, G. M. (2015). Cyber security and the internet of things: Vulnerabilities, threats, intruders and attacks. *J. Cyber Secur. Mobil., 4*(1), 65-88.

[2]   Abu Afifa, A., & Abu-Assab, S. (2023). *Big Data in the Telecommunication Sector in Palestine: Challenges and Opportunities* (Vol. 488). Springer. https://doi.org/10.1007/978-3-031-39158-3_87

[3]   Abu Afifa, A., & Abu-Assab, S. (2023). Big Data in the Telecommunication Sector in Palestine: Challenges and Opportunities. In *Artificial Intelligence (AI) and Finance* (pp. 934-944).

[4]   Adam, M., Wessel, M., & Benlian, A. (2021). AI-based chatbots in customer service and their effects on user compliance. *Electronic Markets, 31*(2), 427-445.

[5]   Ahmad, T., Zhang, D., Huang, C., & Zhang, H. (2021). Artificial Intelligence in Sustainable Energy Industry: Status Quo, Challenges and Opportunities. *Journal of Cleaner Production*, 125834. https://doi.org/10.1016/j.jclepro.2021.125834

[6]   Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Prentice-Hall.

[7]   ALi, M. (2020). Artificial intelligence in telecommunications: Enhancing customer experience and operational efficiency. *Telecom Review, 15*(3), 45-56.

[8]   Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of enterprise information management, 26*(3), 250-275.

[9]   Anderson, R. E., & Srinivasan, S. S. (2003). E-satisfaction and e-loyalty: A contingency framework. *Psychology & marketing, 20*(2), 123-138.

[10] Badran, O., & AL-Haddad, S. (2018). The impact of software user experience on customer satisfaction. *Journal of Management Information and Decision Science, 21*(1), 1-20.

[11] Balmer, R. E., Levin, S. L., & Schmidt, S. (2020). Artificial Intelligence Applications in Telecommunications and other network industries. *Telecommunications Policy, 44*(6), 101977.

[12] Baquero, A. (2022). Net Promoter Score (NPS) and Customer Satisfaction: Relationship and Efficient Management. *Sustainability, 14*(4), 2011.

[13] Bélanger, F., & Carter, L. (2008). Trust and risk in e-government adoption. *The journal of strategic information systems, 17*(2), 65-176.

[14] Belda, B., Cubela, S., Gaffey, B., González, S., & Lajous, T. (2024). With advances in AI, telecom operators can better understand individual customers' network experience, enabling ROI-maximizing capital allocation, higher reliability, and better commercial outcomes. *McKinsey & Company*.

[15] Benbasat, I., & Wang, W. (2005). Trust in and adoption of online recommendation agents. *Journal of the association for information systems, 6*(3), 4.

[16]   Bessen, J. E. (2018). AI and Jobs: The Role of Demand. In I. National Bureau of Economic Research, *The Economics of Artificial Intelligence* (pp. 291-307). Bureau.

[17]   Bollen, K. A. (1989). *Structural Equations with Latent Variables.* John Wiley and Sons, Inc., New York. https://doi.org/10.1002/9781118619179

[18]   Bougie, R., & Sekaran, U. (2019). *Research methods for business: A skill building approach.* John Wiley & Sons.

[19]   Bougie, R., & Sekaran, U. (2019). *Research methods for business: A skill building approach.* John Wiley & Sons.

[20]   Brannen, J. (2017). Combining qualitative and quantitative approaches: an overview. In *Mixing methods: Qualitative and quantitative research* (pp. 3-37).

[21]   CAPMAS. (2023). Egypt Demographic and Health Survey. Retrieved from https://www.capmas.gov.eg/

[22]   Chatfield, C. (1995). *Problem solving: a statistician's guide.* CRC Press.

[23]   Chong, A. Y., Chan, F. T., & Ooi, K. B. (2012). Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia. *Decision support systems, 53*(1), 34-43.

[24]   Creswell, J. W., & Creswell, J. d. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. *Sage publications*.

[25]   Daqar, M. A., & Smoudy, A. (2019). The Role of Artificial Intelligence on Enhancing Customer Experience. *International Review of Management and Marketing, 9*(4), 22-31. https://doi.org/10.32479/irmm.8166

[26]   Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review, 96*(1), 108-116.

[27]   Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science, 48*, 24-42. https://doi.org/10.1007/s11747-019-00696-0

[28] Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340.

[29] Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research.* Thousand Oaks, CA: SAGE.

[30] Dhruv, G., Roggeveen, A. L., & Nordfält, J. (2017). The future of retailing. *Journal of Retailing, 93*(1), 1-6.

[31] Dixon, M., Freeman, K., & Toman, N. (2010). Stop trying to delight your customers. *Harvard business review, 88*(7/8), 116-122.

[32] Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and perspectives, 38*(1), 105-123.

[33] Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data–evolution, challenges and research agenda. *International Journal of Information Management,, 48*, 63-71.

[34] Dutta, S., & Lanvin, B. (2020). The network readiness index 2020: Accelerating digital transformation in a post-COVID global economy. *Portulans Institute, WITSA: Washington, DC, USA*.

[35] Dutta, S., Geiger, T., & Lanvin, B. (2015). The networked readiness index 2015: taking the pulse of the ICT revolution. *The global information technology report, 3*.

[36] Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2021). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers, 23*(4), 987-1005. https://doi.org/10.1007/s10796-019-09972-0

[37] ENISA. (2020). Guidelines for securing the Internet of Things. *European Union Agency for Cybersecurity*. Retrieved from https://www.enisa.europa.eu/publications/guidelines-for-securing-the-internet-of-things

[38]   Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., . . . Dean, J. (2019). A guide to deep learning in healthcare. *Nature medicine, 25*(1), 24-29.

[39]   Etisalat Group. (2023). Etisalat Egypt. Retrieved from https://www.etisalat.eg

[40]   Etisalat Misr. (2021). Annual Report 2021. Retrieved from https://eand.com/en/system/com/assets/docs/annual-report/2021/integrated-report-2021-en.pdf

[41]   Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., . . . Schafer, B. (2018). AI4People—an ethical framework for a good AI society: opportunities, risks, principles, and recommendations. *Minds and machines, 28*, 689-707.

[42]   Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996). The American customer satisfaction index: nature, purpose, and findings. *Journal of marketing, 60*(4), 7-18.

[43]   Frontiers. (2023). Exploring gender biases in ML and AI academic research through systematic literature review. Retrieved from https://frontiersin.org/articles/10.3389/frai.2022.976838/full

[44]   Fuller, M. A., Serva, M. A., & Baroudi, J. (2009). Clarifying the integration of trust and TAM in e-commerce environments: implications for systems design and management. *IEEE Transactions on Engineering Management, 57*(3), 380-393.

[45]   Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS quarterly*, 51-90.

[46]   Gliem, J. A., & Gliem, R. R. (2003, October). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. *In Midwest research-to-practice conference in adult, continuing, and community education, 1*, pp. 82-87.

[47]   Glikson, E., & Woolley, A. W. (2020). Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals, 14*(2), 627-660. https://doi.org/10.5465/annals.2018.0057

[48]   Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press.

[49]   Goodwin, G. (2024, 03 21). *How Telecommunications Operators Are Using AI to Boost Customer Experience*. Retrieved from Software Mind: https://softwaremind.com/blog/how-telecommunications-operators-are-using-ai-to-boost-customer-experience/

[50]   Goyal, K., & Kar, K. A. (2019). Determinants of Customer Satisfaction in Telecommunication. *Proceedings of ICETIT 2019 - Emerging Trends in Information Technology. 605*, pp. 754-761. India: Springer.

[51]   Griffith, J. D., & Stockton, J. R. (2016). Factors Affecting Consumer Perception of AI. In *Reliability and Statistics in Transportation and Communication* (p. 58).

[52]   Grover, P., Kar, A. K., & Dwivedi, Y. K. (2022). Understanding artificial intelligence adoption in operations management: insights from the review of academic literature and social media discussions. *Annals of Operations Research, 308*(1-2), 177-213.

[53]   GSMA. (2020). The Mobile Economy Middle East and North Africa 2020. Retrieved from https://www.gsma.com/mobileeconomy/mena/

[54]   Gunning, D. (2017). Explainable Artificial Intelligence (XAI): Program Update. DARPA/I2O. Retrieved from https://nsarchive.gwu.edu/document/18382-national-security-archive-david-gunning-darpa

[55]   Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management, 49*, 157-169.

[56] Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process andlysis: A regression-based approach.* New York: The Guildford Press.

[57] Hill, N., Roche, G., & Allen, R. (2020). Customer satisfaction: The customer experience through the customer's eyes. *Springer*.

[58] Hlatshwayo, M. A. (2023). The Integration of Artificial Intelligence (AI) Into Business Processes. https://doi.org/10.5281/zenodo.10893971

[59] Holden, R. J., & Karsh, B. T. (2010). The technology acceptance model: its past and its future in health care. *Journal of biomedical informatics, 43*(1), 159-172.

[60] Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education. Promise and Implications for Teaching and Learning. *Center for Curriculum Redesign*.

[61] Hsu, C. L., & Lin, J. C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. *Information & management, 45*(1), 65-74.

[62] Huang, M. H., & Rust, R. T. (2018). Artificial Intelligence in Service. *Journal of Service Research, 21*(2), 155-172.

[63] Huang, M. H., & Rust, R. T. (2020). Engaged to a robot? The role of AI in service. *Journal of Service Research, 24*(1), 30-41. https://doi.org/10.1177/1094670520902266

[64] Huang, M. H., & Rust, R. T. (2021). Engaging with Artificial Intelligence in Service. *Journal of Service Research, 24*(1), 1-14.

[65] IMF. (2023). Egypt: Country Report. Retrieved from https://www.imf.org/en/Countries/EGY

[66] International Journal of Educational Technology in Higher Education. (2023). Acceptance of artificial intelligence among pre-service teachers: a multigroup analysis. Retrieved from https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00420-7

[67] Kamilaris, A., & Prenafeta-Boldú, F. X. (2018). Deep learning in agriculture: A survey. *Computers and Electronics in Agriculture, 147*, 70-90.

[68] Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2020). Advances in Social Media Research: Past, Present and Future. *Information Systems Frontiers, 22*(2), 269-285.

[69] Kelly, S., Kaye, S. A., & Oviedo-Trespalacios, O. (2023). What factors contribute to the acceptance of artificial intelligence? A systematic review. *Telematics and Informatics, 77*, 101925.

[70] Klaus, P., & Maklan, S. (2012). EXQ: A multiple-item scale for assessing service experience. *Journal of Service Management, 23*(1), 5-33.

[71] Krejcie, R. V., & Morgan, D. W. (1970). Sample size determination table. *Educational and psychological Measurement, 30*, 607-610.

[72] Kshetri, N. (2017). Can blockchain strengthen the internet of things? *IT professional, 19*(4), 68-72.

[73] Kumar, A., Sharma, R., & Agarwal, A. (2022). AI-driven customer experience and service innovation in telecommunications. *Journal of Service Research, 25*(2), 145-162.

[74] Kumar, V., & Reinartz, W. (2018). *Customer Relationship Management: Concept, Strategy, and Tools.* Springer.

[75] Kumar, V., Rajan, B., Gupta, S., & Pozza, I. D. (2019). Customer engagement in service. *Journal of the Academy of Marketing Science, 47*, 138-160.

[76] LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *nature, 521*(7553), 436-444.

[77] Lee, J., Bagheri, B., & Jin, C. (2020). Introduction to cyber manufacturing. *Manufacturing Letters, 8*, 11-15.

[78] Lighthill, J. (1973). Artificial Intelligence: a paper symposium. *Science Research Council, 25*, 1-16.

[79] Lin, T. T., Yeh, Y. Q., & Hsu, S. Y. (2022). Analysis of the Effects of Perceived Value, Price Sensitivity, Word-of-Mouth, and Customer Satisfaction on Repurchase Intentions of Safety Shoes under the Consideration of Sustainability. *Sustainability, 14*(24), 16546. https://doi.org/10.3390/su142416546

[80] Litjens, G., Kooi, T., Bejnordi, B. E., Setio, A. A., Ciompi, F., Ghafoorian, M., . . . Sánchez, C. I. (2017). A survey on deep learning in medical image analysis. *Medical image analysis, 42*, 60-88.

[81] Litman, T. (2020). Autonomous vehicle implementation predictions. *Implications for transport planning*.

[82] Matellio Inc. (2023). *Predictive analytics in telecom: Enhancing network performance and customer satisfaction*. Retrieved from https://www.matellio.com/

[83] McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (2006). A proposal for the Dartmouth summer research project on artificial intelligence, August 31, 1955. *AI Magazine, 27*(4), 12-14.

[84] MCIT. (2020). Digital Egypt Strategy. *Ministry of Communications and Information Technology*. Retrieved from https://mcit.gov.eg/

[85] MCIT. (2022, December). *ICT Indicators Bulletin*(Quarterly Issue).

[86] MDPI. (2023). Perceptions and Acceptance of Artificial Intelligence: A Multi-Dimensional Study. Retrieved from https://www.mdpi.com/2076-0760/12/9/502

[87] Meske, C., & Bunde, E. (2023). Design principles for user interfaces in AI-Based decision support systems: The case of explainable hate speech detection. *Information Systems Frontiers, 25*(2), 743-773.

[88] Middleton, H., Grimes, L., Willis, S. C., Steinke, D., & Shaw, M. (2023). Reliability and validity testing of the medicines related-consultation assessment tool for assessing pharmacists' consultations. *International journal of clinical pharmacy, 45*(1), 201-209.

[89] Morris, M. G., & Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force. *Personnel psychology, 53*(2), 375-403.

[90] Newell, A., & Simon, H. A. (1972). *Human problem solving (Vol. 104, No. 9) Englewood Cliffs.* NJ: Prentice-hall.

[91] Nguyen, N., Leclerc, A., & LeBlanc, G. (2013). The mediating role of customer trust on customer loyalty.

[92] Nicolescu, L., & Tudorache, M. T. (2022). Human-Computer Interaction in Customer Service: The Experience with AI Chatbots—A Systematic Literature Review. *Electronics, 11*(10), 1579.

[93] NTRA. (2021). Annual Report 2021. *National Telecom Regulatory Authority*. Retrieved from https://www.tra.gov.eg/

[94] Nunnally, J. C. (1978). *Psychometric Theory (2nd ed.).* New York: McGraw-Hill.

[95] Oliver, R. L. (1999). Whence consumer loyalty? *Journal of Marketing*, 63, 33-44.

[96] Oliver, R. L. (2010). Satisfaction: A behavioral perspective on the consume. *M.E. Sharpe*.

[97] Orange Egypt. (2023). Company Overview. Retrieved from https://www.orange.eg/

[98] Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1), 12-40.

[99] Park, S. Y. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. *Journal of Educational Technology & Society, 12*(3), 150-162.

[100] PgCert, A. R. (2024, April 8). Leveraging AI in Telecommunications: Revolutionizing Connectivity, Efficiency, and Customer Experience. *LinkedIn*. Retrieved from https://www.linkedin.com/pulse/leveraging-ai-telecommunications-revolutionizing-andre-ripla-pgcert-qmiqe/

[101] Rai, A. (2020). Explainable AI: From black box to glass box. *Journal of the Academy of Marketing Science, 48*, 137-141.

[102] Ren, W., Tong, X., Du, J., & Wang, N. (2021). Privacy-preserving using homomorphic encryption in Mobile IoT systems. *Computer Communications, 165*, 105-111. https://doi.org/10.1016/j.comcom.2020.10.022

[103] Ritika, H. J., & Mohana. (2022). Fraud Detection and Management for Telecommunication Systems using Artificial Intelligence (AI). *2022 3rd International Conference on Smart Electronics and Communication (ICOSEC)*, (pp. 1016-1022). Trichy, India. https://doi.org/10.1109/ICOSEC54921.2022.9951889

[104] Roy, S. K., Balaji, M. S., Sadeque, S., Nguyen, B., & Melewar, T. C. (2020). Constituents and consequences of smart customer experience in retailing. *Technological Forecasting and Social Change, 151*, 119791.

[105] Rumelhart, D. E., Hinton, G. E., & Williams, R. J. (1986). Learning representations by back-propagating errors. *Nature, 323*(6088), 533-536.

[106] Russell, S., & Norvig, P. (2021). *Artificial Intelligence: A Modern Approach (4th ed.).* Pearson.

[107] Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach.* john wiley & sons.

[108] Shin, D. H. (2020). User acceptance of AI in customer service: Examining the roles of perceived ease of use, perceived usefulness, and trust. *Journal of Telecommunications and the Digital Economy, 8*(1), 45-56.

[109] Siciliano, B., & Khatib, Q. (2016). *Springer Handbook of Robotics (2nd ed.).* Springer.

[110] Smith, B., & Linden, G. (2017). Two decades of recommender systems at Amazon. com. *Ieee internet computing, 21*(3), 12-18.

[111] Surden, H. (2019). . (2019). Artificial intelligence and law: An overview. *Georgia State University Law Review, 35*(4), 19-22.

[112] Szeliski, R. (2022). *Computer Vision: Algorithms and Applications.* Springer Nature.

[113] Tarhini, A., Hone, K., & Liu, X. (2013). User acceptance towards web-based learning systems: Investigating the role of social, organizational and individual factors in European higher education. *Procedia Computer Science, 141*, 159-163.

[114] Telecom Egypt. (2023). About WE. Retrieved from https://www.te.eg

[115] Trajtenberg, M. (2018). AI as the new general-purpose technology: Potential impacts on economic growth. *National Bureau of Economic Research.*

[116] Umoga, U. J., Sodiya, E. O., Ugwuanyi, E. D., & Jacks, B. S. (2024). Exploring the potential of AI-driven optimization in enhancing network performance and efficiency. *Magna Scientia Advanced Research and Reviews, 10*(1), 368-378. https://doi.org/10.30574/msarr.2024.10.1.0028

[117] UNESCO Institute for Statistics. (2023). Education Statistics. Retrieved from https://uis.unesco.org/

[118] Van den Berg, M., & Kuiper, O. (2020). Xai in the financial sector. A conceptual framework for explainable AI (XAI). *Hogeschool Utrecht, Lectoraat Artificial Intelligence, Version, 1*, 3-24.

[119] Vemuri, N., Thaneeru, N., & Tatikonda, V. M. (2022). AI-Driven Predictive Maintenance in the Telecommunications Industry. *Journal of Science & Technology, 3*(2), 21-45.

[120] Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences, 39*(2), 273-315.

[121] Venkatesh, V., & Bala, H. (2020). Adaptation and extension of the Technology Acceptance Model in the context of AI technologies. *Journal of the Association for Information Science and Technology, 71*(4), 470-487.

[122] Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

[123] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

[124] Venkatesh, V., Thong, J. Y., & Xu, X. (2020). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly, 44*(1), 85-102.

[125] Vodafone Egypt. (2021). *Annual Report 2021.* Retrieved from https://investors.vodafone.com/sites/vodafone-ir/files/2021-05/vodafone-annual-report-2021.pdf

[126] Vodafone Group Plc. (2023). Vodafone Egypt. Retrieved from https://www.vodafone.com.eg

[127] Wirtz, J., & Zeithaml, V. A. (2020). Cost-effective service excellence. *Journal of the Academy of Marketing Science, 48*(1), 59-80.

[128] World Bank. (2023). Gender Data Portal. Retrieved from https://databank.worldbank.org/source/gender-statistics

[129] Xu, Y., Shieh, C. H., van Esch, P., & Ling, I. L. (2020). AI customer service: Task complexity, problem-solving ability, and usage intention. *Australasian marketing journal, 28*(4), 189-199.

[130] Yang, H., Lee, H., & Zo, H. (2017). User acceptance of smart home services: an extension of the theory of planned behavior. *Industrial Management & Data Systems, 117*(1), 68-89.

[131] Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing, 60*(2), 31-46.

[132] Zeithaml, V. A., Bitner, M. J., & Gremler, D. D. (2018). *Services Marketing: Integrating Customer Focus Across the Firm (7th ed.).* McGraw-Hill Education.

[133] Zhang, B., Yang, Q., & Appelbaum, D. (2020). Towards an Ethical and Trustworthy Artificial Intelligence Era. *Journal of Business Ethics, 163*(4), 675-685.

[134] Zhang, Q., Yang, L. T., Chen, Z., & Li, P. (2018). A survey on deep learning for big data. *Information Fusion, 42*, 146-157.

[135] Zheng, Y., Peng, J., Zhang, Z., & Liu, Y. (2020). Smart telecommunications: Big data based network optimization and decision making. *IEEE Transactions on Network and Service Management, 17*(1), 87-100.

[136] Zhong, R. Y., Xu, Y., Klotz, E., & Newman, S. T. (2017). Intelligent manufacturing in the context of industry 4.0: A review. *Engineering, 3*(5), 616-630.

[137] Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in human behavior, 26*(4), 760-767.