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The Impact Of Artificial Intelligence Technologies On Improving Customer Perceived Value: An Applied Study On Telecom Egypt Customers In The Upper Egypt Sector

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Abstract

This study investigates the impact of artificial intelligence (AI) technologies on improving customer perceived value (CPV) in the telecommunications sector, with as a mediating variable. Focusing on Telecom Egypt customers in the Southern Upper Egypt sector (Aswan, Luxor, and Qena governorates), the research employs a descriptive-analytical approach with a stratified random sample of 384 customers. The study confirms direct positive effects of AI technologies—intelligent agents, visual aids, big data analytics, and artificial neural networks—on (CPV) dimensions (emotional, financial, social, and functional value). A structural model is proposed to elucidate these relationship, offering practical implications for enhancing competitive strategies in telecommunications. The study contributes to the literature by integrating AI, CPV, in a novel model within the Egyptian context, addressing a gap in academic research and providing actionable insights for Telecom Egypt.

Keywords: *Artificial Intelligence, Customer Perceived Value, Telecom Egypt, Southern Upper Egypt*

1. INTRODUCTION

The telecommunications sector serves as a critical driver of economic and social activities, facilitating advanced information solutions that enhance business efficiency and institutional performance (**Balducci & Marinova, 2018**). The Fourth Industrial Revolution has ushered in transformative technologies, including the Internet of Things (IoT), smart cities, and digitalization, all of which rely heavily on robust telecommunications infrastructure (**Kolodin et al., 2020**). Artificial intelligence (AI) technologies-such as intelligent agents, visual aids, big data analytics, and artificial neural networks—have become pivotal in enhancing service delivery, operational efficiency, and customer engagement in this sector (**Ibrahim, 2022**). These technologies leverage advanced computing, communications, and electronics infrastructure to develop software and systems that improve customer experiences and organizational outcomes.Sustainable competitive advantage (SCA) is essential for telecommunications companies to differentiate themselves in a highly competitive market (**Al-Tawil & Ismail, 2018**). SCA can be achieved through strategies that reduce costs, enhance quality, improve flexibility, or ensure timely delivery, often enabled by innovative technologies (**Fou et al., 2020**). Concurrently, customer perceived value (CPV) plays a central role in shaping consumer behavior and loyalty, reflecting the benefits customers expect from products or services relative to their costs (**Kaplan & Haenlein, 2019; Ahmed, 2021**). CPV encompasses emotional, financial, social, and functional dimensions, each contributing to customer satisfaction and retention.In the context of Telecom Egypt, a leading telecommunications provider in the Southern Upper Egypt sector (Aswan, Luxor, and Qena governorates), this study examines how AI technologies as an independent variable influence CPV acting as adependent variable. The research addresses a gap in the Egyptian academic literature by integrating AI, CPV, into a novel model, offering both theoretical and practical contributions. The study aims to provide actionable insights for Telecom Egypt to enhance its competitive strategies, leveraging AI to improve service quality and customer satisfaction while maintaining a sustainable market position.

The telecommunications sector in Egypt has witnessed significant growth, driven by digital transformation and increasing demand for advanced services. Telecom Egypt, as a major player, faces intense competition from both local and international providers, necessitating innovative approaches to maintain its market leadership. AI technologies offer opportunities to enhance operational efficiency, personalize customer experiences, and reduce costs, there by strengthening AI Technologies. However, the precise mechanisms through which AI influences CPV, remain underexplored in the Egyptian context, making this study timely and relevant.

2. Research Problem

The telecommunications industry is characterized by intense competition, driven by rapid technological advancements and evolving customer expectations (Shibly, 2022). AI technologies hold significant potential for improving operational efficiency, customer satisfaction, and competitive positioning, yet their specific impact on CPV in the Egyptian telecommunications sector is not well understood (**Uama & Pavelkova, 2021**). The study addresses the following research questions:

1. What is the direct impact of AI technologies (intelligent agents, visual aids, big data analytics, and artificial neural networks) on Customer perceived value from the perspective of Telecom Egypt customers in the Southern Upper Egypt sector?
2. How do AI technologies influence Customer perceived value, including its dimensions (emotional, financial, social, and functional value), from the perspective of Telecom Egypt customers?

These questions aim to clarify the relationship between AI technologies, and CPV, addressing a gap in understanding how these variables interact in a service-oriented, developing economy context like Egypt.

3. Research Objectives

The study pursues the following objectives:

1. To identify the direct impact of AI technologies (intelligent agents, visual aids, big data analytics, and artificial neural networks) on Customer perceived value.
2. To determine the direct impact of AI technologies on Customer perceived value, including its emotional, financial, social, and functional dimensions.
3. To develop a practical structural model illustrating these relationships, applicable to Telecom Egypt.
4. To provide recommendations for Telecom Egypt and stakeholders to enhance competitive strategies and customer satisfaction.

These objectives guide the study in exploring the complex interplay between AI and CPV, offering a framework for both academic and practical advancements.

4. LITERATURE REVIEW

4.1 Artificial Intelligence in Telecommunications

AI technologies, including intelligent agents, visual aids, big data analytics, and artificial neural networks, have transformed the telecommunications sector by enabling data-driven decision-making, predictive analytics, and personalized customer experiences (**Marius et al., 2019**). Intelligent agents, such as chatbots, automate customer service interactions, reducing response times and improving efficiency. Visual aids, including augmented reality and image recognition, enhance user experiences by providing intuitive interfaces. Big data analytics processes vast datasets to uncover customer preferences and optimize operations, while artificial neural networks enable advanced pattern recognition and predictive modeling (**Duoala, 2020**). These technologies have shifted from requiring human input to leveraging machine learning for autonomous improvements, significantly enhancing service delivery (**Uama & Pavelkova, 2021**).

The adoption of AI in telecommunications is driven by the need to manage complex networks, improve service quality, and meet rising customer expectations. For instance, AI-driven analytics can predict network congestion, optimize resource allocation, and personalize marketing strategies, thereby enhancing customer satisfaction and operational efficiency (**Ibrahim, 2022**). In Egypt, Telecom Egypt has increasingly adopted AI to improve its service offerings, yet the specific impact of these technologies on CPA remains underexplored.

4.3 Customer Perceived Value

CPV is defined as the customer's evaluation of a product or service's benefits relative to its costs (**Upmannyu & Rajput, 2017**). It encompasses four dimensions: emotional value (feelings associated with the service), financial value (cost-benefit balance), social value (social status or recognition), and functional value (practical utility). CPV significantly influences customer satisfaction, loyalty, and purchase decisions (**Asgarpour et al., 2015**). In telecommunications, CPV is critical for retaining customers in a competitive market, as it reflects their perceived benefits from services like network reliability, customer support, and pricing.

AI enhances CPV by enabling personalized services, improving service quality, and reducing costs (**Hennrich et al. , 2024**). For instance, AI-driven chatbots provide instant support, enhancing functional value, while personalized offers based on data analytics increase emotional and financial value (**Kumar et al. , 2023**). In the Egyptian context, understanding CPV is essential for Telecom Egypt to tailor its services to diverse customer needs, particularly in the Southern Upper Egypt sector, where cultural and economic factors influence perceptions (**Kumar et al., 2022**).

4.4 Theoretical Framework

The study integrates AI technologies and CPV into a conceptual model, hypothesizing that AI directly enhances CPV, relationship. This framework is grounded in prior studies (**Balducci & Marinova, 2018; Kaplan & Haenlein, 2019 Fou et al., 2020 ; Thomas et al., 2023**). The model posits that AI technologies enhancing Customer perceived value by delivering personalized and cost-effective services. increasing customer satisfaction and loyalty, creating a direct effect. This framework is novel in the Egyptian context, as it combines these variables in a single model applied to a specific sector and region.

5. METHODOLOGY

5.1 Research Design

The study adopted a descriptive-analytical approach, combining qualitative insights from an exploratory study with quantitative analysis of survey data. The exploratory study involved personal interviews with 50 Telecom Egypt customers to identify key variables and phenomena, informing the design of the main study (**Megala, 2025**). The quantitative phase used a structured questionnaire to collect data from a larger sample, enabling statistical analysis of the relationship between AI technologies, and CPV.

5.2 Study Population and Sample

The study population consisted of Telecom Egypt customers in the Southern Upper Egypt sector (Aswan, Luxor, and Qena governorates) with higher education qualifications, ensuring a sample capable of understanding and evaluating AI-driven services. A stratified random sample of 384 customers was selected, proportionate to the population size of each governorate. This sample size was determined using standard statistical methods to ensure representativeness and reliability (Magla, 2025).

5.3 Data Collection

Data were collected using a structured questionnaire distributed to the sample. The questionnaire was developed based on the exploratory study and validated through pilot testing. It included sections on:

- **AI Technologies**: Intelligent agents, visual aids, big data analytics, and artificial neural networks.
- **CPV**: Emotional, financial, social, and functional value.

The exploratory study, conducted from November to December 2023, involved 50 customers and used a personal interview guide to identify key phenomena, such as the perceived importance of AI in enhancing CPV (**Megala, 2025**).

5.4 Measurement

The questionnaire used a five-point Likert scale to measure responses, ensuring consistency and ease of analysis. Reliability was assessed using Cronbach's Alpha, with coefficients indicating high internal consistency for all variables (**Meglaa, 2025**). Validity was confirmed through confirmatory factor analysis (CFA), ensuring convergent and discriminant validity and excluding insignificant items.

5.5 Data Analysis

The study employed the following statistical methods:

- **Descriptive Statistics**: Frequencies, percentages, means, and standard deviations to summarize data.
- **Correlation Analysis**: Simple correlation coefficients to test relationships between variables.
- **Regression Analysis**: Simple and multiple linear regression to assess direct effects.

• **Structural Equation Modeling (SEM)**: To examine direct relationship between Artificial Intelligence Technologies and Customers perceived value, including (Emotional, financial, social, and functional value).
• **Confirmatory Factor Analysis (CFA)**: To validate the measurement model and ensure data suitability for SEM.
These methods provided a robust framework for testing the study's hypotheses and developing the proposed model.

6. Findings

6.1 Direct Impact of AI Technologies on CPV

AI technologies significantly influenced CPV ($p < 0.05$):
• **Intelligent Agents**: Regression path parameter = 0.253, explaining 25% of the variance. Intelligent Agents enhance customer perceived value through instant support.
• **Visual Aids**: Regression path parameter = 0.268, explaining 27% of the variance. Visual aids improve customer perceived value by providing engaging interfaces.
• **Big Data Analytics**: Regression path parameter = 0.261, explaining 26% of the variance. Analytics enhance financial value through personalized offers.
• **Artificial Neural Networks**: Regression path parameter = 0.244, explaining 24% of the variance. Artificial Neural networks improve customer perceived value through accurate predictions.
Visual aids had the strongest impact, likely due to their direct influence on user experience **(Megala, 2025)**.

6.2 Proposed Model

The study developed a structural model illustrating the direct effects of AI technologies on CPV. The model integrates the four AI technologies as independent variables, CPV as a dependent variable with four dimensions, The model is practical for application in telecommunications, providing a clear framework for leveraging AI to enhance customer perceptions.

7. Discussion

The findings align with prior studies, confirming that AI technologies enhance CPV by improving service quality, reducing costs, and increasing operational efficiency **(Balducci & Marinova, 2018 ; Fou et al., 2020)**. The significant role of AI as adependent variable underscores its importance in translating technological advancements into customer satisfaction and loyalty **(Kaplan & Haenlein, 2019 ; Demirag , 2020 ; Duellman & Holam, 2023)**. The dominance of artificial neural networks in direct effect on CPV highlights their advanced capabilities in processing complex data and predicting customer behavior, making them a critical tool for telecommunications companies **(Marius et al., 2019)**.Financial value emerged as the most influential CPV dimension, reflecting the cost-sensitive nature of customers in the Southern Upper Egypt sector. This aligns with **(Ahmed, 2021)** who emphasized the importance of cost-effectiveness in developing markets. Visual aids had the strongest impact on CPV, likely due to their ability to create engaging and intuitive customer experiences, supporting **(Wirth, 2018)**. The study's novel contribution lies in its integration of AI and CPV, in a single model, applied to a specific regional and sectoral context, addressing a gap in the Egyptian literature.The findings also highlight challenges, such as the need for customer awareness of AI technologies and their benefits. The exploratory study revealed that 48% of customers lacked clarity on CPV's role in the AI-SCA relationship, suggesting a need for educational initiatives **(Megala, 2025)**. Additionally, the varying impact of AI technologies suggests that Telecom Egypt should prioritize investments in neural networks and big data analytics to maximize Customer perceived value.

8. CONCLUSION AND RECOMMENDATIONS

This study demonstrates that AI technologies significantly enhance CPV in Telecom Egypt, directly. The proposed structural model offers a practical framework for telecommunications companies to leverage AI for Customer perceived value,. The findings highlight the importance of artificial neural networks and financial value, suggesting targeted investments in these areas.
Based on the findings, the following recommendations are proposed:

1. **Increase Customer Awareness**: Telecom Egypt should educate customers about AI technologies and their benefits to enhance CPV. Awareness campaigns can highlight how AI improves service quality and cost-effectiveness.
2. **Invest in Advanced AI Technologies**: Prioritize investments in artificial neural networks and big data analytics, given their significant impact on CPV.
3. **Integrate AI with Human Expertise**: Combine AI technologies with human knowledge to ensure balanced decision-making, addressing both efficiency and customer sensitivity.
4. **Enhance CPV**: Focus on improving financial and functional value through cost-effective and reliable services, tailored to customer needs in Southern Upper Egypt.
5. **Develop AI Capabilities**: Equip AI systems with capabilities to address psychological, social, and ethical dimensions, enhancing CPV across all dimensions.
6. **Continuous Innovation**: Encourage ongoing research and development to sustain CPA, adapting AI applications to evolving market and customer needs.

9. Limitations and Future Research

The study is limited to Telecom Egypt customers in the Southern Upper Egypt sector, potentially limiting generalizability to other regions or sectors. The focus on higher-educated customers may also exclude perspectives from less-educated segments. Future research could:

- Explore other telecommunications companies or regions in Egypt.
- Include additional AI technologies, such as natural language processing or IoT integration.
- Examine other CPV dimensions, such as experiential or cultural value.
- Investigate the long-term impact of AI adoption on CPA using longitudinal studies.

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