Artificial Intelligence Techniques as a Strategic Lever for Marketing Innovation: A Case Study of the Algerian Transport Insurance Company (CAAT) in Mostaganem

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Abstract :

This study explores the impact of artificial intelligence (AI) on marketing innovation at CAAT Company. Using a case study and structured questionnaire, it finds that AI positively influences marketing innovation, with an overall impact of 80% and a strong correlation of 93%. Marketing innovation is affected at 59%, while deep learning has a lower impact of 27%. The study highlights the importance of applying lower-impact AI technologies and recommends integrating AI across all marketing processes, improving big data processing, meeting customer expectations, and developing strategies to enhance marketing innovation and competitiveness.

Mots clés:
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Résumé : Cette étude examine l'impact de l'intelligence artificielle (IA) sur l'innovation marketing au sein de l'entreprise CAAT. À travers une étude de cas et un questionnaire structuré, elle montre que l'IA influence positivement l'innovation marketing, avec un impact global de 80 % et une forte corrélation de 93 %. L'innovation marketing est affectée à 59 %, tandis que le deep learning a un impact plus faible de 27 %. L'étude souligne la nécessité d'appliquer les technologies d'IA à faible impact et recommande d'intégrer l'IA dans tous les processus marketing, d'améliorer l'analyse des données massives, de répondre aux attentes des clients et de développer des stratégies pour renforcer l'innovation marketing et la compétitivité.

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Introduction

The growing proliferation of artificial intelligence (AI) technologies has made them inseparable from our daily lives and has revolutionized various fields. They are utilized in education, industry, e-commerce, marketing, and the analysis of large datasets.

Studies confirm that artificial intelligence (AI) technologies provide a competitive advantage for many organizations, as they enable the simultaneous execution of multiple tasks and the creation of engaging, personalized experiences for customers. This, in turn, enhances customer loyalty and allows organizations to forecast business outcomes, ultimately increasing profitability.

Moreover, the current era is characterized by rapid change. It is therefore necessary to employ and innovate with modern methods to ensure survival and growth in a competitive environment among various organizations. This has led some companies to adopt strategies known as **marketing innovation**, enabling them to distinguish themselves from competitors through the use of innovative marketing methods based on artificial intelligence (AI) technologies. These strategies provide numerous benefits, allowing companies to identify target customers, understand their desires and needs, increase sales and profits, outperform competitors, and achieve customer satisfaction and loyalty.

This is a modern approach that has enabled companies to identify customers' needs and desires and to offer them the best products. Its importance has increased, and it is now used as a fundamental element, being considered one of the pillars on which organizations rely to cope with the constant and continuous changes in customer needs and desires. This necessitates innovation in products and services to ensure survival and sustainability in a highly competitive environment. Consequently, organizations strive to achieve a sustainable competitive advantage through innovation, which has a significant positive impact and whose importance is reflected in the introduction of all new developments.

The success of organizations is now closely linked to their ability to innovate by leveraging artificial intelligence (AI) technologies. Consequently, AI is considered essential for marketing innovation in services due to its ability to quickly respond to customers' tastes and preferences. Artificial intelligence is regarded as a critical component of innovation within the marketing mix in the communications sector, which is one of the most important industries. This observation led to the conception of the present study, which focuses on the importance of AI technologies in light of organizations' growing need to rely on AI as an indispensable tool for rapidly developing and innovating in marketing services. The goal is to

achieve a high level of marketing innovation to ensure organizational success and sustainability.

In the current progressively advanced and electronically networked age, the effectiveness of a firm's promotional activities is among the most vital elements to take into account. Promotion exerts a considerable impact on e-commerce buying choices since it covers a broad range. Efficient and creative marketing approaches are crucial for achieving success, and one method to attain this objective is via innovation in online marketing. Marketing entails conveying, developing, trading, and showcasing services that are advantageous to both clients and commercial associates. In today's increasingly technologically sophisticated and digitally connected era, the efficiency of a company's advertising efforts is one of the most critical factors to consider. Promotion has a significant influence on online purchasing decisions since it encompasses a wide spectrum. Effective and inventive marketing strategies are essential for attaining success, and one way to achieve this goal is through creativity in digital marketing.

Electronic marketing constitutes the procedure of advertising a business's goods or services via electronic technologies on the web, including smartphones, visual ads, and additional digital channels, encompassing platforms such as Google Ads, Facebook, Instagram, and internet marketplaces. Multiple approaches are applied in electronic marketing, including search engine optimization (SEO), search engine promotion (SEM), social network promotion (SNP), content promotion, email campaigns, online advertising, websites, affiliate programs, viral campaigns, and others (Taufik & Kurniawan, 2023).

Machine intelligence (AI) is a system that allows computers or devices to reason like humans and execute tasks analogous to those of the human mind. At present, AI systems are utilized in various areas of life, including online marketing, enabling companies to connect with customers more rapidly and effectively (Thilagavathy & Praveen Kumar, 2021).

One of the most significant consequences of AI in online marketing is its capacity to anticipate customer behavior. By examining information from social networks, search engines, and other internet sources, AI can detect trends and generate predictions concerning consumers' forthcoming demands. This functionality enables business owners to focus on the preferences and needs of their particular market segments efficiently.

The rise of the evolutionary approach in economics has led to the emergence of new areas of research (DEKKICHE Mokhtar), among which is the concept of National Innovation Systems (NIS). This concept examines how technology, learning, and collaboration among various economic

actors—including firms, institutions, universities, and organizations—stimulate growth and innovation across different sectors, including marketing.

Problem Statement of the Study:

The review of previous studies reveals the existence of a scientific gap, reflected in the scarcity of research examining the interaction between marketing innovation and customer loyalty through the mediating role of artificial intelligence (AI) mechanisms. This highlights the necessity of conducting studies to understand the role that AI technologies play in marketing innovation, as they have a positive impact on understanding customer desires and introducing new and innovative offerings. Accordingly the research issue is expressed in the subsequent primary question:

To what degree does (AI) technologies affect marketing innovation?

Importance of the Study:

1. **Theoretical Significance:** The study derives its theoretical significance from addressing two important themes: artificial intelligence (AI) and marketing innovation. These themes provide valuable insights for researchers in the context of both fields, making this study a scientific reference.
2. **Scientific Significance:** The study's scientific significance lies in the novelty of the topic and the scarcity of scientific research that has established a link between the study's variables, namely artificial intelligence (AI) technologies and marketing innovation.
3. **Practical Significance:** The practical significance the purpose of the research is in identifying the impact of artificial intelligence (AI) technologies on marketing innovation at CAAT. The study aims to produce results that support insurance companies in developing their services and achieving their objectives, encourage the adoption of AI technologies by organizations in the field of marketing innovation, and propose a model for the adoption of AI technologies in marketing innovation at CAAT in Mostaganem

4. Goals of the Research:

The research seeks to accomplish the following goals:

1. To identify the actual use of artificial intelligence (AI) technologies within CAAT Insurance Company.
2. To examine the current state of marketing innovation at CAAT.
3. To determine the impact of AI technologies on marketing innovation at CAAT.

4. To develop a proposed model that helps clarify the importance of utilizing AI technologies in marketing innovation.

Research Queries:
The study seeks to answer the following questions:

1- What is the actual extent of the use of artificial intelligence (AI) technologies at CAAT?

2- To what extent is marketing innovation applied at CAAT?

3- What is the proposed model that helps clarify the importance of using artificial intelligence (AI) technologies in marketing innovation?

Research Hypotheses:

Primary Hypothesis 1: Artificial intelligence (AI) technologies have a statistically meaningful impact, at the 0.05 significance threshold, on marketing innovation at CAAT.

Primary Hypothesis 2: There exists a statistically significant relationship, at the 0.05 significance level, between artificial intelligence (AI) technologies and marketing innovation at CAAT Insurance Company.

Methodology and Study Population:

The study employed a **case** study methodology applied to CAAT Company in Mostaganem. Data were collected through a structured scientific questionnaire distributed to the study population, which consisted of 30 employees. All participants completed the questionnaire, and the validity of all 30 responses was confirmed for subsequent analysis. Additionally, a content analysis approach was utilized, aligned with the study's objectives, enabling a thorough examination of previous literature, relevant topics, and existing practices related to the research focus. Insights gained from this analysis contributed to the development of **a** proposed model for the utilization of artificial intelligence (AI) technologies in advancing marketing innovation.

Limitations of the Study :

❖ **Thematic Limitations:** This study was limited to examining the impact of artificial intelligence (AI) technologies on marketing innovation within CAAT Insurance Company.

❖ **Spatial Limitations:** The study was confined to the main agency in Mostaganem. The questionnaire was completed by 30 employees, all members of the study sample, and the validity of all questionnaires was confirmed for analysis.

❖ **Temporal Limitations:** The study was conducted at CAAT Company during the year 2026.

1. Literature Review

1.2 Artificial Intelligence:

The origins of artificial intelligence (AI) can be traced back to ancient times, when numerous philosophers envisioned the creation of mechanical beings—automata that could, in some way, emulate human functions. This idea gained increased attention during the 18th century and thereafter. Philosophers began exploring the potential of non-human intelligent machines to replicate or influence human thought, a line of inquiry that ultimately contributed to the development of the digital computer.Approximately a century later, several proposals emerged to evaluate machines' capacity to imitate human behaviors, culminating in the formal introduction of the term "Artificial Intelligence" in the 1950s. Since the mid-20th century, AI has experienced substantial advancements, which have significantly shaped public perceptions and understanding of the technology (DOUAH Aicha & BOUHRIZ DAIDJ, 2025).

The term **"artificial intelligence" (AI)** was coined by John McCarthy in 1956. It refers to the science of creating devices and computer programs capable of thinking in a manner similar to the human brain—that is, simulating human intelligence through complex computer systems. Modern artificial intelligence is a broad field that employs advanced technologies to extract insights and make predictions from massive amounts of data. Its fundamental principle is to train machines to learn and solve problems that we encounter in daily life. The emergence of machine learning in the early 20th century has accelerated the development of artificial intelligence

(Thilagavathy & Praveen Kumar, 2021). Artificial intelligence is the form of intelligence that machines implement within their work environment, interacting to perform their functions. It consists of advanced software structures and technological systems that enhance environmental simulation and work tools. AI aims to integrate intelligent decision-making processes and work schedules guided by the latest technologies and information systems (Mukhopadhyay, Singh, & Jain, 2024).

Artificial intelligence (AI) denotes the capability of machines to exhibit intelligence implement within their work environment, interacting to perform their functions. It consists of advanced software structures and technological systems that enhance environmental simulation and work tools. AI aims to integrate intelligent decision-making processes and work schedules guided by the latest technologies and information systems (Mukhopadhyay, Singh, & Jain, 2024). It contributes to minimizing recurring issues by increasing accuracy and legitimacy to the greatest extent possible. AI is poised to redefine the marketing function**.** Intelligent management of work processes**,** smart information management, technological and intelligent integration of systems, and intelligent human resource management, when used in conjunction with machines, enhance organizational goals and performance. They can facilitate the implementation of required operations and system automation while effectively managing technological disruptions (Van Esch & Stewart Balack, 2021).

1.2 Marketing Innovation

The theoretical foundations of the concept and strategies of marketing innovation have been extensively studied by numerous national and international scholars. Renowned marketing experts such as Philip Kotler, Kevin Keller, and Jean-Jacques Lambin have emphasized in their work the necessity of integrating innovations into the marketing process. In particular, F. Kotler's book *Marketing Management* highlights the role of a differentiated approach and innovative ideas in the successful market introduction of new and innovative products and services.

The concept of innovation in the business model proposed by A. Osterwalder and Y. Pigneur highlights the importance of creative and flexible approaches in developing marketing strategies. They emphasize the

need for companies to reconsider not only the product itself but also the entire marketing ecosystem based on an innovative idea.

The scholarly work of local researchers D. Tursunov and Sh. Murodov focuses on analyzing the characteristics of marketing innovation development in Uzbekistan and the factors contributing to increased competitiveness. Their research emphasizes improving business efficiency through digital marketing technologies, including **social media marketing, content marketing, and big data marketing**.

Furthermore, analytical reports published by consulting firms such as **McKinsey & Company** and **Boston Consulting Group (BCG)** provide valuable practical insights into modern trends in innovative marketing strategies, as well as the impact of artificial intelligence (AI) and automation technologies on marketing processes.

Overall, the literature review indicates that innovative marketing strategies are among the most important tools available to companies for creating and sustaining a long-term competitive advantage. Key factors include the digitalization of marketing activities**,** forecasting customer needs, and the development of a personalized approach**.**

1.3 The Contribution of AI Technologies to Marketing Innovation

According to Silalahi (2024), Artificial intelligence (AI) serves a pivotal role in driving marketing innovation by enabling companies to use technology effectively to enhance the customer experience. In today's marketing landscape, AI allows businesses to better identify and understand the needs and anticipated experiences of customers with respect to products and services.

By leveraging artificial intelligence (AI), marketers are able to analyze vast volumes of data in real time, enhancing the personalization of marketing efforts and enabling quicker and more precise responses to customer requirements. AI possesses the ability to execute cognitive functions traditionally linked to human intelligence, including problem-solving, learning, creative thinking, reasoning, comprehension, and environmental interaction.

The use of AI-enabled marketing tools has reduced the hands-on workload for marketers, boosting overall efficiency and helping organizations address customer needs more quickly (Silalahi, 2024).

- **Advantages of Using AI in Marketing**

Silalahi (2024) offers an in-depth examination of the application of artificial intelligence (AI) in marketing and the advantages it provides, emphasizing how AI is transforming the marketing landscape and effectively addressing customer requirements through real-world examples from diverse companies. By harnessing AI technology, numerous marketing processes can be automated to enhance efficiency, especially in digital marketing, which can rapidly analyze large datasets from multiple channels, including websites, social media platforms, and email communications. This allows businesses to gain richer insights into consumer behavior and preferences, ultimately improving overall marketing performance.

- **Benefits of Implementing AI in Marketing**

According to Silalahi (2024), artificial intelligence (AI) plays a transformative role in marketing by improving efficiency and better addressing customer needs. AI enables the automation of various marketing processes, especially in digital marketing, allowing companies to quickly analyze large volumes of data from websites, social media, emails, and other platforms. This capability helps businesses gain deeper insights into consumer behavior and preferences, ultimately enhancing marketing effectiveness and performance, as demonstrated through practical examples from multiple companies:

a. Image recognition technology enables companies to analyze images and videos on social media, monitor consumer behavior, and automatically identify brands or products.

b. Customer sentiment analysis, leveraging deep learning on product reviews and social media comments, allows companies to respond more confidently and promptly to consumer feedback.

c. Recommendation systems powered by deep learning foster trust by delivering personalized product suggestions based on customer behavior and preferences, thereby enhancing engagement and increasing conversion rates.

d. Visual search engines allow users to discover products through visual content, improving the user experience and facilitating product exploration.

e. The combination of big data analytics and deep learning provides deeper insights into consumer behavior, enabling companies to identify market trends and forecast product demand.

f. Voice recognition technology converts spoken language into text and is widely utilized in voice-based marketing applications, including voice search and virtual assistants.

g. The optimization of digital advertising is strengthened through deep learning, which examines user behavior and interactions with advertisements to improve targeting and ad placement (Silalahi, 2024).

Overall, Silalahi et al. (2024) demonstrate that AI and deep learning are powerful tools for driving marketing innovation, enabling businesses to better understand and serve their customers, optimize marketing operations, and gain a sustainable competitive advantage.

The Potential of Generative AI for Marketing and Innovation

By examining the training methodologies of generative AI models and their content creation mechanisms, we can gain a clearer understanding of the current capabilities and limitations of these technologies (Huang & Rust, *The Caring Machine: Feeling AI for Customer Care*, 2023). Generative AI (GenAI) is conceptualized as affective AI, a form of artificial intelligence capable of interacting and communicating with humans by interpreting emotional data to understand human feelings. Huang and Rust (2021) note that these models differ from earlier AI systems, which were largely designed for mechanical AI—performing repetitive tasks—or cognitive AI—supporting analytical decision-making.

We concur with their perspective that GenAI represents a fundamentally novel type of AI, particularly highlighting its ability to generate original content. Given our focus on how businesses can leverage GenAI in innovation and marketing processes, we explore whether GenAI outputs can simultaneously be innovative and appropriate, as both attributes are essential in shaping consumer evaluations of new products, marketing campaigns, and advertisements (Rubera, Ordanini, & Mazursky, 2010).

The Associative Theory of Creativity and Large Language Models

The associative theory of creativity suggests that novelty arises from the ability to link loosely related concepts to generate innovative ideas (Dahl &

Moreau, 2002; Toubia & Netza, 2017). Since large language models (LLMs) are trained on extensive datasets, they can extract concepts from a wide range of domains. Researchers have begun exploring how LLMs can leverage this capability to generate new hypotheses and insights (Hutson, 2023).

The inherent randomness in how these models generate content is a key factor in producing innovative outputs. Historically, major innovations often emerged serendipitously, from medical discoveries (Meyers, 2007) to consumer products like Post-it notes or unbreakable glass. However, simply combining concepts from different domains is not enough; the content must also be appropriate and valuable to consumers (Rubera, Ordanini, & Mazursky, 2010). Because base models are trained on massive datasets, they are likely to have internalized what humans generally consider appropriate (Gorotra, Terwiesch, & Ulrich, 2023).

A comparative study assessed ideas generated by MBA students against those produced by ChatGPT-4 under two conditions. In the baseline condition, ChatGPT-4 received the same prompt as the students (generate ten ideas targeting U.S. university students). In the "prompt with good examples" condition, additional high-quality ideas were included in the prompt. The study found that ChatGPT-4 consistently produced ideas with higher average purchase intention scores than those from MBA students. Notably, there was no significant difference between the two GPT conditions, likely because the model had already seen similar high-quality ideas during training, rendering extra examples redundant.

In summary, the stochastic nature of base models allows for the generation of novel content, while their extensive training data ensures this content is also appropriate. OpenAI recognized that ChatGPT could produce errors, and early generative AI systems such as Bard and Galactica highlighted these limitations. Generative AI excels when tasked with creating content where there are no strictly right or wrong answers, such as artistic works or innovative product concepts (Cill & Rubera, 2024).

To guide marketers in leveraging generative AI effectively, Table 1 summarizes studies on emerging GenAI capabilities most relevant to innovation. These include idea generation, divergent thinking, analogical reasoning, and inductive reasoning—skills traditionally linked to creativity (Dahl & Moreau, 2002; Vartanian & Kwiatkowski, 2003). Interviews also

indicate that a growing number of executives rely on—or wish to rely on—GenAI for decision-making. Consequently, reasoning skills such as causal inference, logical reasoning with novel cases, and the formulation of causal explanations are also critical areas of focus.

Because different base models are trained on diverse datasets and architectures, and because models can be updated over time, the specific model used and testing time are indicated. Table 1 shows that current models have limited capabilities for causal reasoning. Computer scientists attribute such limitations and hallucinations to the lack of physical data in most GenAI models, which constrains their real-world understanding (Webb, Holyoak, & Lu, 2023; Zecevié, Willlia, Dhani, & Kersting, 2023).

Most prior studies have focused on text-only LLMs, which lack embodiment, sensory input, or concrete experiences—factors essential for human decision-making (McClelland, Schutze, Hell, & Rudolph, 2020). However, the advent of **multimodal models** like GPT-4 (Vision), capable of processing text, images, audio, and other sensory inputs, promises a more integrated understanding of the world (McClelland et al., 2020; Webb et al., 2023). Generative AI is evolving rapidly, and these current limitations may be overcome in the near future (Cill & Rubera, 2024).

3-Empirical Study and Its Procedures

Reliability and Validity of the Study Instrument

The study questionnaire was reviewed by a panel of experts and academic judges. **Cronbach's alpha** was used to assess the internal consistency of the study components, with values ranging from 0.491 to 0.943. The overall reliability of the study dimensions reached 0.966, indicating that the instrument was stable and suitable for statistical analysis. Additionally, the **Pearson correlation coefficient** was applied to evaluate the internal validity of questionnaire responses and the conceptual validity of the study's axes and dimensions.

Statistical Tools Used in the Study:

- The Cronbach's alpha test was used to determine the stability of the study components.
- The Pearson correlation coefficient test was employed to assess the internal validity of the questionnaire items and the conceptual validity of the study's dimensions and axes.

- Certain measures of central tendency and dispersion were used to define the axes of the descriptive study.
- A simple linear regression test was applied to identify the impact of using artificial intelligence technologies on marketing innovation and its dimensions within CAAT Company.

- **Responses to the Study Questions:**

Response to the First Question: What is the actual extent of the use of artificial intelligence technologies in marketing innovation at CAAT?

Table (1): Descriptive Analysis of the First Axis: Use of Artificial Intelligence Technologies at CAAT Company

Level of response	Percentage	Arithmetic mean	Standard deviation	Variation	First Axis: Use of Artificial Intelligence Technologies at CAAT	N=°
very high	%93	4.65	.486	.237	The agency uses automated chatbots to respond to inquiries and provide customer support (virtual assistant service).	1
very high	%92,2	4.61	.495	.245	L'agence utilise la technologie d'apprentissage automatique pour analyser les informations sur les clients et rechercher des clients potentiels	2
very high	%93	4.65	.486	.237	The agency uses social network analytics technology to understand customer behavior and measure brand awareness.	3
very high	%88,4	4.42	.672	.452	The agency relies on intelligent feedback systems technology to collect and manage customer comments and requests regarding the quality of products and services provided.	4
very high	%91	4.55	.506	.256	The agency will utilize big data analytics technology to enhance the customer experience and identify their needs.	5
very high	%93	4.65	.486	.237	The agency uses recommendation and content personalization technology to provide product and service suggestions tailored to customers' needs.	6
very high	%89	4.45	.624	.389	The agency uses recommendation and content personalization technology to provide product and service suggestions tailored to customers' needs.	7
very high	%87,8	4.39	.715	.512	The company's genetic algorithm technology enables the identification of the best solutions and alternatives among those available in service design.	8
very high	%89	4.45	.675	.456	The agency relies on expert system technology to generate creative ideas and practical solutions to complex problems in order to enhance decision-making.	9

very high	%87	4.35	.798	.637	The agency uses artificial neural network technology to forecast changes and make future-oriented decisions.	10
high	%83,2	4.16	.779	.606	Fuzzy logic system technology contributes to making sound business decisions for the company.	11
very high	%91	4.55	.568	.323	The agency uses augmented reality technology to allow customers to view the product before purchase, providing greater opportunities to market its products and services..	12
very high	%85,8	4.29	.643	.413	The agency applies dynamic product pricing techniques based on supply and demand.	13
very high	%87,8	4.39	.803	.645	The agency implements deep learning technology in the automated marketing of advertisements.	14
very high	%87	4.35	.661	.437	The agency uses 3D printing technology to create innovative advertisements for its products and services.	15
	%89,2	4.46	.446	.199	Overall mean of the axis	

The arithmetic mean of the researchers' responses on the first axis was 4.46, with a standard deviation of 0.446 and a variance of 0.199. This reflects the participants' responses, where the results of the factorial analysis of the first axis statements ranged from the first statement to a very high level of agreement. The first statement indicated that *"the company uses automated chatbots to respond to inquiries and provide customer support (helpdesk service),"* while the third statement indicated that *"the company uses social network analytics technology to monitor customer behavior and measure brand awareness,"* and the sixth statement, which stated that *"the company uses targeted offer technology by analyzing customer activity and presenting ads related to their interests,"* ranked first with an arithmetic mean of 4.65, a standard deviation of 0.486, and a variance of 0.237. This indicates a very high level of agreement.

Response to the Second Question: To what extent is marketing innovation applied at CAAT Company?

Table (2): Descriptive Analysis Results of Marketing Innovation Dimensions at CAAT

Level of response	Percentage	Standard deviation	Arithmetic mean	Variation	Second axis	
very high	%92	4.60	.379	.144	Product Marketing Innovation	1
very high	%89	4.45	.418	.174	Pricing Marketing Innovation	2
very high	%88,6	4.43	.546	.298	Distribution Marketing Innovation	3

very high	%89	4.45	.443	.197	Promotion Marketing Innovation	4
very high	%87,8	4.39	.464	.216	Human Resources Marketing Innovation	5
very high	%92,2	4.61	.456	.208	Physical Support Marketing Innovation	6
very high	%88,2	4.41	.410	.168	Service Delivery Marketing Innovation	7
very high	%89,6	4.48	.388	.150	Overall mean of the axis	

The results presented in the table indicate that the means of the marketing innovation dimensions ranged from 4.39 to 4.61, with the sixth dimension (marketing innovation in the physical environment) ranking first, having a mean of 4.61, a standard deviation of 0.456, a response coefficient of [missing value], a response percentage of 92.2%, and a high level of agreement. In contrast, the fifth dimension (marketing innovation in human resources) ranked last, with a mean of 4.39, a standard deviation of 0.464, and a response percentage of 87.7%.

The table also shows that the arithmetic mean for the second axis reached 4.48, indicating a very high level of response, with a standard deviation of 0.388. The variance reached 0.150, corresponding to an agreement percentage of 89.6%, which reflects a very high level.

Hypothesis Testing of the Study:

Response to the First Main Hypothesis: There is a statistically significant effect, at the 0.05 significance level, of artificial intelligence technologies on marketing innovation at CAAT Company.

Table (3): Simple Linear Regression Test between Artificial Intelligence Techniques, Marketing Innovation, and Their Dimensions

interpretation of the results	F-value and model quality level	coefficient of determination	significance level	value of the impact	The impact
There is a significant effect.	187.342 (.000)	.866	(.000)	.808	Technologies d'intelligence artificielle → Innovation marketing
There is a significant effect.	57.673 (.000)	.665	(.000)	.693	Technologies d'intelligence artificielle → Innovation marketing de produit
There is a significant effect.	36.680 (.000)	.558	(.000)	.699	Technologies d'intelligence artificielle → Innovation marketing de prix

There is a significant effect.	78.325 (.000)	.730	(.000)	1.044	Technologies d'intelligence artificielle → Innovation marketing de distribution
There is a significant effect.	153.542 (.000)	.841	(.000)	.911	Technologies d'intelligence artificielle → Innovation marketing de promotion
There is a significant effect.	117.303 (.000)	.802	(.000)	.931	Technologies d'intelligence artificielle → Innovation marketing des ressources humaines
There is a significant effect.	35.178 (.000)	.548	(.000)	.757	Technologies d'intelligence artificielle → Innovation marketing du support physique
There is a significant effect.	24.198 (.000)	.455	(.000)	.620	Technologies d'intelligence artificielle → Innovation marketing de la prestation de service

The results presented in the table indicate a positive impact of using artificial intelligence technologies on marketing innovation at CAAT Company, with a slope coefficient of 0.808 and a significance level of 0.000. This suggests that increased use of artificial intelligence technologies leads to a corresponding increase in marketing innovation at the company by 0.808.

Table: (4) Simple Linear Regression Analysis of the Relationship between Types of Artificial Intelligence Techniques and Marketing Innovation.

Interpretation or Result	F-value / Model Quality Level	coefficient of determination	significance level	impact value	Paragraphs on Artificial Intelligence Techniques
"There is a significant effect."	20.442 (.000)	.413	.000	.512	**The company leverages automated chatbots to handle customer inquiries and offer support through a virtual assistant service.**
"There is a significant effect."	31.740 (.000)	.523	.000	.566	The company leverages machine learning technology to analyze customer data and discover potential clients.
"There is a significant effect."	22.363 (.000)	.435	.000	.526	"The company leverages social network analysis technology to gain insights into customer behavior and .assess brand awareness."
"There is a significant effect."	14.432 (.001)	.332	.001	.332	The company leverages intelligent systems technology to collect customer feedback and inquiries about the quality .of its products and services."

"There is a significant effect."	**45.328 (.000)**	**.610**	**.000**	**.598**	The company leverages big data analytics to improve the customer experience and better understand their needs."
"There is a significant effect."	**17.895 (.000)**	**.382**	**.000**	**.492**	The company leverages targeted offer technology to analyze customer activity and deliver advertisements aligned with their interests."
"There is a significant effect."	**44.547 (.000)**	**.606**	**.000**	**.483**	"The company leverages recommendation and personalization technology to offer products and services that are specifically tailored to customers' needs."
"There is a significant effect."	**13.978 (.001)**	**.325**	**.001**	**.309**	The company uses genetic algorithm technology to identify the optimal solutions and alternatives from those available in service design.
"There is a significant effect."	**12.931 (.001)**	**.308**	**.001**	**.319**	The company leverages expert system technology to develop creative ideas and practical solutions for complex problems, enhancing its decision-making process."
"There is a significant effect."	**27.300 (.000)**	**.485**	**.000**	**.338**	The company leverages artificial neural networks to predict changes and guide future decision-making."
"There is a significant effect."	**22.606 (.000)**	**.438**	**.000**	**.329**	Fuzzy systems technology helps the company make informed and effective decisions." .
"There is a significant effect."	**22.322 (.000)**	**.435**	**.000**	**.450**	The company leverages augmented reality technology to let customers view products before buying, creating better opportunities to promote its products and services."
"There is a significant effect."	**34.593 (.000)**	**.544**	**.000**	**.445**	The company uses dynamic pricing technology to adjust its services according to supply and demand."
"There is a significant effect."	**14.268 (.001)**	**.330**	**.001**	**.277**	The company uses deep learning technology to automate its marketing and advertising processes."
"There is a significant effect."	**41.301 (.000)**	**.587**	**.000**	**.450**	The company uses 3D printing technology to create innovative advertisements for its products and services."

It appears from the marketing innovation analysis that the most effective artificial intelligence technologies are those that use big data analytics to improve the customer experience and identify customer needs, with a correlation of 0.598 (59%). In contrast, the least effective AI technology is deep learning, applied in automated advertising marketing, with a correlation of 0.277 (27%).

Several secondary hypotheses stem from this main hypothesis, namely:

1. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in services at CAAT Company. The analysis results indicate that the AI technology with the greatest impact on product marketing innovation is machine learning, used by the Company to analyze customer information and identify potential clients, with a correlation of 0.575 (57%). In contrast, the least influential AI technology in service marketing innovation is deep learning, applied to automate advertising, with a correlation of 0.229 (22%).

2. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in pricing at CAAT Company. The analysis results indicate that the most effective AI technology is big data analytics, used to enhance the customer experience and identify their needs, with a correlation of 0.563 (56%). In contrast, the least influential AI technology is deep learning, applied to automate advertising, with a correlation of 0.185 (18%).
3. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in distribution at CAAT Company. The analysis results indicate that the most influential AI technology in distribution marketing innovation is big data analytics, used by the Company to enhance the customer experience and identify their needs, with a correlation of 0.828 (82%). In contrast, expert systems, which help generate ideas and provide solutions to complex problems to improve decision-making, are the least influential, with a correlation of 0.340 (34%).
4. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in promotion at CAAT Company. The analysis results indicate that the AI technology with the greatest impact on promotional marketing innovation is big data analytics, used by the Company to enhance the customer experience and identify their needs, with a correlation of 0.693 (69%). In contrast, the least influential AI technology is genetic algorithms, which help the Company identify the best

solutions and alternatives in service design, with a correlation of 0.320 (32%).

5. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in human resources at CAAT Company. The analysis results indicate that the AI technology with the greatest impact on HR marketing innovation is social network analysis, used by the Company to observe customer behavior and measure brand awareness, with a correlation of 0.600 (60%). In contrast, genetic algorithms, which help the Company identify the best solutions and alternatives in service design, have a correlation of 0.305 (30%) and the least impact.
6. There is a statistically significant effect ($p < 0.05$) of artificial intelligence techniques on marketing innovation in the physical environment at CAAT Company. The analysis results indicate that the most effective AI technology applied by the company—machine learning used to analyze customer information and identify potential clients—has a correlation of 0.728, representing 72%. In contrast, the AI technology with the least impact on marketing innovation in this domain is deep learning applied to automate advertising, with a correlation of 0.223, representing 22%.
7. There is a statistically significant effect at the 0.05 significance level of artificial intelligence techniques on marketing innovation in the service delivery process at CAAT Company. The analysis results indicate that the most influential AI technologies are those used by the Company to analyze customer information and identify potential customers, with a correlation of 0.531, representing 53%. In contrast, AI techniques applied to marketing innovation in the service delivery process, such as fuzzy logic systems, contribute mainly to making better decisions for the Company, with a correlation of 0.217, representing 21%.

Second main hypothesis: There is a statistically significant correlation at the 0.05 significance level between artificial intelligence techniques and marketing innovation at CAAT Company.

Table (5): Pearson Correlation Between Artificial Intelligence Techniques, Marketing Innovation, and Its Dimensions

Independent variable: Use of artificial intelligence technologies			Study axes	
Number of observations	Significance level	Pearson correlation coefficient		Dependent variables
	.000	.931**	Marketing	

			innovation	
30	.000	.816**	Product marketing innovation	
	.000	.747**	Price marketing innovation	
	.000	.854**	Price marketing innovation	
	.000	.917**	Promotion marketing innovation	
	.000	.895**	Human resources marketing innovation	
	.000	.740**	Physical environment marketing innovation	
	.000	.674**	Service delivery process marketing innovation	

The table reveals a strong 93% correlation between AI technology use and marketing innovation at CAAT Company ($p < 0.05$). Increased adoption of AI is linked to enhanced innovation across all dimensions, including service, pricing, distribution, promotion, human resources, physical environment, and service delivery processes.

Proposed Model:

Based on the study findings and content analysis, a model is proposed for applying artificial intelligence technologies in marketing innovation at CAAT Company. AI is gaining increasing attention due to rapid technological changes and the evolving expectations of customers regarding products and services. Its benefits include driving sales, boosting revenue, and enhancing profitability through personalization. Furthermore, integrating AI enables businesses to anticipate customer behavior and predict emerging trends.

Table (6): AI Techniques and Their Role in Marketing Innovation across Different Dimensions

Appropriate Artificial Intelligence Techniques	Operating Mechanism	Dimensions of Marketing Innovation
Artificial Neural Network Technology, Big Data Analysis Technology, Genetic Algorithms Technology	Artificial intelligence technologies play a key role in identifying products that best meet customer needs. They can track the items a customer is searching for and allow the company to tailor its offerings to match those specific requirements. Machine learning has the greatest impact on product marketing innovation, thanks to its ability to analyze customer data and generate a diverse range of products. In comparison, deep learning appears to have a smaller effect on product search and recommendation. Therefore, companies should place greater emphasis on leveraging deep learning technology to enhance product marketing innovation.	AI Technique Used in the Product

Intelligent Agent System Technology, Social Network Analysis Technology, Chatbots, and Deep Learning	Artificial intelligence plays a key role in managing distribution. Big data analytics has proven most effective in driving innovation, enabling companies to offer a diverse range of services and improve the customer experience. Product availability and accessibility remain top priorities for customers. In contrast, expert systems have the least impact on distribution innovation, making it crucial for companies to focus on them for predicting sales volumes and related metrics.	AI Techniques for Supply Chain and Distribution
3D Printing Technology, Content Recommendation and Personalization Technology,A ugmented Reality Technology, Chatbots, and Deep Learning..	Promotion serves as a key communication channel between a company and its customers. Big data analytics is the most impactful technology for marketing innovation in promotion, helping shape strategies and gauge brand acceptance. While genetic algorithms have minimal impact, companies should focus on designing new products, maintaining quality, and leveraging social network analysis to promote offerings. Targeted promotional campaigns that deliver personalized content aligned with customer interests can significantly boost sales.	AI Techniques for Marketing and Promotion
Fuzzy Logic System Technology, Artificial Neural Networks Technology, Expert System. Technology, and Intelligent Agent System Technology	Human resources are a key driver of a company's competitive advantage. Social network analysis has the greatest impact, enabling companies to track brand reach and gain precise insights into customer trends. Genetic algorithms have the least influence on HR-related marketing innovation, making it essential for companies to leverage advanced technologies to identify the best solutions and alternatives in a constantly changing environment.	AI Techniques for HR
Expert System Technology, Artificial Neural Networks Technology, and Genetic. Algorithms Technology	Artificial intelligence significantly enhances the speed and quality of service delivery. Machine learning has the greatest impact, enabling companies to predict customers' future value. While deep learning has a smaller effect on marketing innovation in the physical environment, companies should still focus on it to automate advertising and accurately forecast sales and demand.	AI Techniques for the Physical Environment
Chatbots, Intelligent Agent Systems Technology, Artificial Neural Networks Technology,. and Big Data Analytics Technology	Service delivery is a key driver of customer retention. Artificial intelligence plays an important role in predicting product supply and demand, helping companies outperform competitors in satisfying customer needs. Machine learning has the greatest impact on marketing innovation in service delivery, while fuzzy logic, though less influential, can enhance product design and provide new service levels to meet both current and future customer expectations.	AI Techniques for Service Provision

Study Results:

1- AI technologies are being used in marketing innovation at CAAT Company, with a utilization rate of 2.89%.
2- Their use has a significant positive impact on marketing innovation, reaching 80%.
3- There is a strong positive correlation (93%) between AI technologies and marketing innovation.
4- Big data analytics is identified as the most impactful AI technology for driving marketing innovation.

Study Recommendations:

1- Promote the adoption of AI technologies across all aspects of marketing innovation to improve big data processing and deliver customer-focused services.
2- Implement training programs on AI applications in marketing innovation.
3- Ensure all conditions are met for effective AI deployment in marketing innovation.
4- Develop a plan for leveraging big data analytics to enhance marketing innovation.

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