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Implications of Artificial Intelligence on Digital Marketing

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Abstract
This study aims to examine how artificial intelligence (AI) mechanisms are employed in digital marketing and to determine their impact on achieving competitive advantages, in addition to conducting a comprehensive analysis of these effects. It explores the reality of marketers' use of AI in this field, its working mechanisms, and various AI applications that contribute to the development of digital marketing. Furthermore, this study seeks to understand the role of orientations toward modern technologies as a mediator in enhancing the relationship between AI usage in digital marketing and achieving competitive advantage among Algerian companies. The study concludes that digital marketing serves as an innovative and technical approach to engaging in the electronic economy, which heavily relies on information and communication technology.

Keywords: Artificial Intelligence, Digital Marketing

JEL Classification: M390, M310.

1. Introduction:

Artificial intelligence (AI) is a branch of technology conceived and innovated by the human mind. It has become a tangible reality that has contributed to significant scientific and knowledge advancements. Once confined to research papers and laboratory discussions, AI has now become a fundamental pillar of human progress and development. Thanks to continuous scientific efforts, AI has evolved into its current form, casting its influence over various fields, particularly commercial transactions. The commercial and financial sectors have not remained isolated from this technological revolution, as AI has become indispensable, with undeniable value for businesses.

Given the rapid technological advancements, integrating AI into digital marketing has become an urgent necessity. AI provides speed and professionalism in operations, increases productivity, and offers various facilitative solutions for professionals in the field.

2. The Concept of Artificial Intelligence:

Artificial intelligence is considered one of the most significant outcomes of the Fourth Industrial Revolution due to its diverse applications across multiple fields (Al-Jabri, 2023, p. 681). Many scholars and specialized books have highlighted AI, presenting both imaginative and scientific ideas. AI remains an evolving field, expected to unlock limitless innovations and potentially lead to further industrial revolutions. These transformative changes will significantly impact human life, making AI a primary driver of future progress and prosperity.

2.1. Definition of Artificial Intelligence

A. Definitions by Foreign Researchers:

- **John McCarthy:** The American scientist John McCarthy, who coined the term "artificial intelligence" in 1956 at Dartmouth College, defined it as *"the science and engineering of making intelligent machines, particularly intelligent computer programs."* He described AI as a branch of computer science aimed at creating intelligent machines (NoorAbd, 2024).
- **Patterson Danw:** AI is *"a branch of computer science concerned with studying and developing computational systems capable of exhibiting some aspects of intelligence."* These systems can derive useful solutions to complex

problems, understand natural languages, and perform perceptual tasks that require intelligence when carried out by humans (Latif, 2017, p. 122).

- **Winston:** AI is *"the study of computing that enables perception, reasoning, and decision-making processes."* (Ph, 1992, p. 95).
- **Simon:** AI is *"a branch of computer science linked to disciplines such as psychology and knowledge sciences, aiming to develop computers capable of performing tasks with human-like efficiency, focusing on enabling intelligent reasoning."* (Harbert, 1995, p. 14).
- **Negnevitsky:** AI is *"the science that seeks to enable machines to act intelligently, similar to human intelligence."* (Michael, 2005, p. 18).

B. Definitions by Arab Researchers:

- **Al-Sharqawi:** AI is *"a branch of computer science that aims to design and develop software that mimics human intelligence, enabling computers to perform tasks that require thinking, understanding, hearing, speaking, and moving in a logical and organized manner, replacing human intervention."* (Mohammed, 2011, p. 23).
- **Al-Louzi:** AI is *"a scientific and technical field based on disciplines such as computer science, biology, psychology, linguistics, mathematics, and engineering. It aims to develop computers capable of thinking, perceiving, hearing, and moving."* (Mustafa, 2013, p. 20).
- **Anbar & Mohammed:** AI is *"a computer application that focuses on developing programs capable of analyzing and executing repetitive tasks typically performed by humans."* (Mohammed A., 2016, p. 44).

From the presented definitions, we can infer that despite the consensus that this field first emerged under the term *Artificial Intelligence* in the mid-1950s, there is still no unified definition. Each researcher defines AI based on their perspective, and this can be attributed to two main reasons:

First, the nature of artificial intelligence itself makes it difficult to establish a single, comprehensive definition that encompasses all its aspects. AI is not a static science; it constantly evolves and develops over time. The second reason is its widespread application across various fields, meaning that its definition in the medical sector differs from that in the commercial sector. Despite these definitional variations, researchers in the field agree that AI revolves around a single core concept: mimicking human intelligence.

2.2. Stages of AI Development

In the mid-20th century, a number of scientists began exploring a new approach to building intelligent machines, relying on recent discoveries in mathematical information theory and neuroscience, as well as insights into stability and control from cybernetics. The primary driving force behind this development was the invention of the electronic computer, which made it possible to create a machine capable of simulating human computational thought processes (Louis, 1987, p. 50).

Artificial intelligence first emerged in the 1950s, with the term being used for the first time at the *Dartmouth Summer School Conference* in the United States. This event, held in the summer of 1956, was led by John McCarthy (Eugene Charniak, 1985, pp. 6,7).

In 1965, Herbert Simon predicted that within twenty years, machines would be able to perform any task a human could do. Similarly, in 1967, Marvin Minsky stated that within a generation, the problem of AI development would be largely solved. However, by 1974, due to criticisms from Sir James Lighthill and ongoing pressure from Congress to fund more productive projects, the U.S. and British governments decided to halt funding for open-ended AI research. This led to the first major setback in AI development, adding further difficulties to the field (Al-Maghazi, 2003, p. 15).

In 1981, Japan launched the *Fifth Generation Computer Project*, taking the lead in providing financial support to develop machines capable of human-like conversation, language translation, and image interpretation. Soon after, the UK, the US, and other countries also began investing heavily in AI and information technology research.

During the 1990s and early 21st century, AI saw remarkable successes. Although many of these advancements remained behind the scenes, AI was increasingly applied in various fields, such as logistics, data mining, and medical diagnostics, as

well as several sectors within the tech industry. These achievements were driven by multiple factors, including the increasing power of computers, a greater focus on solving specific problems, and the establishment of stronger relationships between AI and other disciplines tackling similar challenges. Moreover, researchers began adhering to robust mathematical approaches and strict scientific standards (Salima, p. 10).

By 2019, the reliance on artificial intelligence and machine learning had surged, placing these technologies at the forefront of numerous industries. Companies increasingly leveraged AI in diverse ways, and many organizations sought to enhance user experiences by integrating AI into most of their solutions.

3. Characteristics and Evaluation of Artificial Intelligence

3.1. Characteristics of Artificial Intelligence

According to Abu Shamala (Suleiman, 2012), when designing and programming artificial intelligence, its characteristics must be considered to distinguish it from other programs and maximize its potential. The key characteristics of AI can be summarized as follows (Al-Najjar, 2010, pp. 169-170):

- Perception and reasoning
- Problem-solving using intelligence
- Learning and understanding from experience
- Acquiring knowledge and information and applying it effectively
- Demonstrating creativity and imagination
- Handling various situations and complex calculations
- Responding quickly and efficiently to new conditions
- Processing incomplete or ambiguous information accurately
- Supporting managerial decision-making
- Providing information to aid decision-making processes

3.2. Evaluation of Artificial Intelligence

Advantages of Artificial Intelligence

The advantages of AI include:

- Reducing human error
- Handling risks that could be dangerous for humans
- Operating continuously without the need for breaks
- Facilitating faster decision-making
- Efficiently storing and retrieving data with minimal effort
- Being unaffected by environmental conditions
- Performing routine tasks that burden humans and waste their time
- Analyzing problems logically without emotional influence

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Disadvantages of Artificial Intelligence

The disadvantages of AI include:

- Encouraging laziness among humans
- High production costs
- Increasing unemployment rates
- Lack of creative problem-solving and "out-of-the-box" thinking
- Potential for addiction and weakened human communication

4. Key Impacts of Using Artificial Intelligence in Digital Marketing

It is expected that AI-driven marketing will account for 45% of the global economy by 2030, achieving this through data-driven product enhancements, personalized services, and influencing consumer demand. But what are the key AI-powered technological applications used in marketing?

4.1. Digital Marketing and AI-Based Applications

➤ Chatbots

Chatbots are computer programs designed to interact with customers online by answering inquiries, providing support, and assisting with purchases. These bots are integrated into social media pages and websites, enabling them to handle multiple customers simultaneously. Due to their low cost and high efficiency, many companies now rely on chatbots for customer support (Ma, 2021, pp. 111,128).

Additionally, AI-powered chatbots can now generate news articles with high professionalism, making them useful in content marketing. A significant portion of daily blog and news website content is written by AI tools. Leading news agencies like Associated Press and Reuters successfully use AI for automated news writing (Brosnan, 2012).

➤ Dynamic Pricing

Dynamic pricing, also known as personalized pricing, is a pricing strategy based on multiple factors, such as demand, product inventory, and customer profile. AI programs analyze user data, including cookies, browsing history, and search activity, to adjust product prices dynamically. A notable example is hotel booking websites, where room prices fluctuate based on occupancy rates, seasonality, previous bookings, and customer history.

➤ Personalized Promotions

AI enables targeted advertising by leveraging cookies and browsing history to tailor ads based on factors like age, location, and gender. This is evident in Google Ads and social media platforms like Facebook and YouTube.

Ismail (p. 1088) states that the relationship between AI and marketing innovation is influenced by the adoption of modern technologies. For instance, if a user searches for a product on Google and later visits YouTube, AI algorithms ensure that related ads appear, analyzing user activity and search history to deliver personalized promotions (Berger & Humphreys, 2019, pp. 1,25).

➤ Data Analysis

Data analysis is one of AI's most prominent applications in digital marketing, as marketing decisions are based on data-driven insights. AI tools can process vast amounts of customer data and generate valuable insights for crafting highly targeted marketing campaigns.

AI excels at fast and accurate data analysis, outperforming humans in detecting market fluctuations, predicting trends, and understanding consumer behavior. Businesses leveraging AI-powered data analysis can better understand their customers and design effective marketing strategies.

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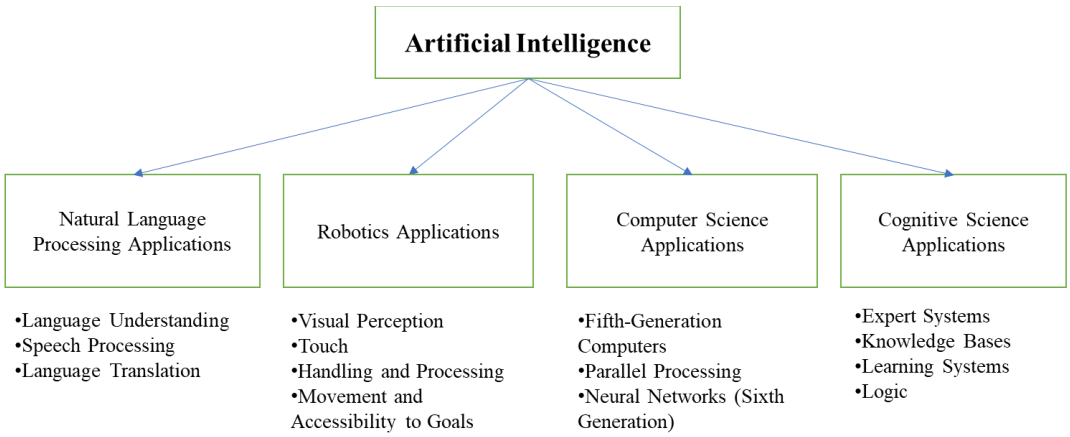
Figure 01: Main AI Applications in Marketing



Source: Mousa Al-Louzi, *Artificial Intelligence in Business*, International Conference on Business Intelligence and the Knowledge Economy, Al-Zaytoonah University of Jordan, April 23-24, 2012, Jordan, p. 23.

➤ Understanding Customers

AI technology helps marketers gain real-time insights into consumer opinions about their brand. AI-powered social media monitoring tools analyze public sentiment towards a brand, determining whether mentions are positive, negative, or neutral. Based on these insights, marketers can refine their messaging for optimal results.

One key AI application in digital marketing is content recommendation, where e-commerce sites, blogs, and social networks analyze visitor behavior to offer personalized content. "Social Mention" is an AI tool that scans multiple social media platforms for mentions of a brand name, providing reports on mention frequency and sentiment (positive, negative, or neutral).

4.2. AI Technologies and Their Role in Marketing

Achieving a competitive advantage is not just about understanding customer needs and preferences but also about delivering personalized offers that enhance customer satisfaction and loyalty. So, how does AI impact the marketing mix elements?

➤ AI's Role in Product Management

AI-driven market analysis significantly aids in identifying the right product to meet customer needs, as well as designing it to suit their preferences. AI tracks customer searches and preferences, enabling companies to develop products that better align with consumer desires.

According to Dzyabura (2019, pp. 417,441), AI empowers companies to customize products based on consumer demand, ensuring higher satisfaction levels.

➤ AI's Role in Pricing Management

Pricing is one of the most dynamic and sensitive aspects of marketing. AI enables companies to adjust prices flexibly by tracking market variables and responding instantly to changes in demand.

AI-powered Bayesian inference techniques allow businesses to monitor competitor pricing in real time and adjust their own pricing strategies accordingly (Misra, 2019, p. 226).

➤ AI's Role in Distribution Management

Product availability and ease of access are key concerns for consumers. Distribution relies on supply chain activities, which are often repetitive. AI plays a crucial role in optimizing distribution through various technologies, such as:

- Robots for packaging optimization
- Drones for product delivery
- AI-controlled machines providing direct consumer services, such as self-service kiosks

By integrating AI and machine learning, companies can enhance customer satisfaction through more efficient supply chain management (Huang, 2020, p. 13).

➤ AI's Role in Promotional Management

Successful promotion strategies require content planning, campaign scheduling, and management. With digital marketing and social media campaigns, traditional advertising has shifted towards data-driven strategies, where consumers have greater control over what, when, and where they engage with promotional content (Verma, 2017, p. 9).

➤ AI's Role in Operations Management

AI-powered data analysis is fundamental to digital marketing, as marketing decisions rely on data-driven insights. AI tools can process vast customer datasets to generate highly targeted and effective marketing campaigns.

AI's predictive analytics capabilities help businesses:

- Analyze market trends
- Forecast customer behavior
- Optimize marketing strategies

➤ AI's Role in Customer Engagement

A study by Huang & Rust examined the integration of human intelligence and AI in customer tracking and behavioral analysis. Findings suggest that AI-driven businesses gain a competitive edge by responding more efficiently to customer needs, anticipating preferences, and offering innovative products and services.

Additionally, AI enhances customer relationship management (CRM) and after-sales services, ensuring long-term consumer engagement (Ismail, p. 1094).

5. The Benefits of AI in Marketing Decision-Making

Artificial Intelligence (AI) serves as the computational equivalent of human intelligence, using algorithms to collect, analyze, and learn from data to make better decisions. Companies that integrate machine learning and cognitive computing into their traditional operations can significantly improve productivity and customer experience.

5.1. AI Benefits in the Market

AI brings several advantages, including:

- **Faster Decision-Making**:
  The pace of business has accelerated significantly, and decision speed is more critical than ever. For instance, oil companies adjust gas prices dynamically based on demand with AI-driven pricing, potentially increasing their profit margins by up to 5%. Similarly, travel websites, retailers, and service providers leverage dynamic pricing to optimize revenue (AI Functions, 2020).
- **Handling Multiple Inputs Efficiently**:
  AI outperforms humans when processing data from multiple sources simultaneously. Machines can analyze vast datasets in real-time, allowing them to make complex decisions and offer accurate predictions or optimal suggestions.
- **Reduced Fatigue in Decision-Making**:
  Psychological studies show that decision fatigue leads to poorer choices when people are forced to make multiple

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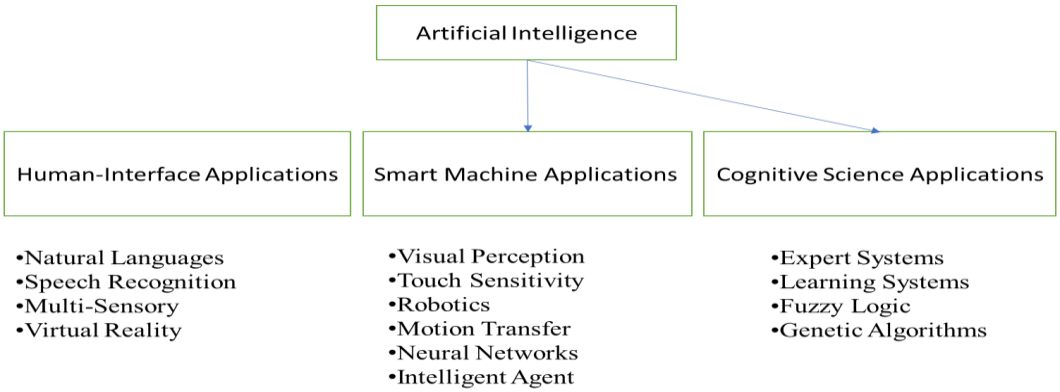
decisions in a short time. AI, on the other hand, does not suffer from fatigue—it consistently makes high-quality decisions at all times, helping executives avoid suboptimal choices due to exhaustion.

- **Non-Intuitive Predictions**: AI enables original thinking by identifying patterns that may not be obvious to human analysts. These unique insights, when incorporated into decision-making, can have an immediate and significant impact on business success (Dekimpe, 2020, pp. 3,14).

Figure 02: AI Applications



(Source: O'Brien James, "Management Information Systems", USA, McGraw, 2011, p. 422.)

5.2. AI as a Strategic and Competitive Necessity

AI technology has become a strategic necessity that enhances efficiency, creates new revenue opportunities, and improves customer loyalty. As AI continues to shape competitive advantages, it enables companies to:

- Complete more tasks in less time
- Offer personalized and engaging customer experiences
- Predict business outcomes, leading to higher profitability (Manasria, 2003, p. 68).

Although AI is a new and complex technology, maximizing its benefits requires expertise in developing and managing intelligent solutions on a large scale. An AI project demands more than just hiring a data scientist; companies must also implement the right tools, processes, and management strategies to ensure the successful deployment of this technology.

According to a recent survey conducted by Weber, consumers worldwide have a positive perception of AI's impact on society. The findings revealed that about 55% of organizations expect AI to have a stronger impact on marketing and communications compared to social media. The company also conducted an online survey with 2,100 participants from the UK, US, Brazil, China, and Canada, showing that 78% of brands believe they will be able to provide better customer experiences between 2019 and 2023 thanks to virtual reality. Additionally, around 80% of companies expect customers to interact with AI-powered chatbots by 2020 (Rao, 2020).

6. Conclusion

Through our study of AI and its impact on digital marketing, we have explored the nature of both concepts, their interrelationship, and their mutual influence. Based on our findings, we can conclude that digital marketing serves as an innovative and artistic gateway into the world of the digital economy, which is driven by information and communication technologies.

Therefore, modern businesses must embrace AI and adopt this groundbreaking innovation. However, doing so requires a strong infrastructure to support the creation of various e-commerce platforms as an initial step, followed by the implementation and use of electronic payment systems, which serve as the foundation for successful online marketing transactions.

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