

RESEARCH ARTICLE

Enhancing the efficiency of the marketing mix using artificial intelligence models in digital startups

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Abstract

This study discusses how the concept of the Marketing Mix has evolved in light of the transformations brought about by the digital economy, focusing on the role of Artificial Intelligence (AI) in enhancing the efficiency of marketing tools in emerging digital organizations. It begins by emphasizing that the traditional Marketing Mix, as defined by Jerome McCarthy in 1960 through the 4Ps model (Product, Price, Promotion, and Distribution), was the foundation of marketing planning for many years. The need then arises for models more adapted to the digital market, such as the 7Ps, or consumer-centric, digitally-oriented models like the 4Cs, as a result of changing consumer behavior, the expansion of digital markets, and the emergence of algorithm-based platforms.

The study then explains how AI-related technologies, such as Machine Learning, Deep Learning, Natural Language Processing (NLP), and Recommendation Systems, have become central tools in digital marketing through big data analysis, offer personalization, demand forecasting, and improved promotion and advertising. On the practical side, the study relied on a sample of 120 digital startups and conducted a Likert scale survey. It revealed that 71% of them utilize AI in their marketing practices (chatbots, ad targeting, predictive analytics, and product recommendations). The results showed that AI contributed to improving digital product quality, accelerating innovation, implementing dynamic pricing,

increasing promotional effectiveness, reducing advertising costs, and enhancing service distribution.

The study concludes that artificial intelligence has become an essential element in developing the marketing mix for digital organizations, enhancing their competitiveness and efficiency, despite challenges such as limited resources, a lack of expertise, and rapid technological advancements. It recommends supporting AI training, improving legislation, and ensuring data security to sustain this transformation.

Keywords: Marketing mix, AI models, efficiency, digital startups

Introduction:

Over the past two decades, the world has witnessed fundamental transformations in the nature of economic activity, particularly with the widespread adoption of digitalization and the development of digital technologies. This has led to the emergence of new models of startups that rely heavily on modern technologies to innovate their products and market their services. In light of this transformation, artificial intelligence (AI) has become one of the most important strategic tools that digital organizations utilize to improve their performance and enhance their competitiveness in dynamic markets.

The marketing mix is one of the most important tools for measuring and guiding the marketing performance of organizations. Traditionally, it is based on four main

elements: product, price, promotion, and distribution. However, digital transformations have necessitated a review and development of these elements to align with the behavior of the digital consumer, who has become more aware and demanding of fast, personalized, and efficient services.

With the advent of AI technologies, it has become possible to improve each element of the marketing mix by relying on models capable of learning, predicting, analyzing data, and anticipating future trends. **Problem Statement:** Given the challenges posed by the market economy, digital startups find themselves compelled to adopt artificial intelligence (AI) models, both in theory and practice, to enhance the efficiency of their marketing mix within the industry. Therefore, to address this issue, we posed the following problem

statement:

To what extent do AI models contribute to improving the efficiency of the marketing mix for digital startups?

Based on this main question, **we can pose the following sub-questions:**

What is meant by the marketing mix? What are its dimensions and challenges?

What is meant by artificial intelligence, and what are its models?

-Is there a statistically significant correlation between the marketing mix of digital startups and AI models in the organizations under study?

To answer the problem statement and sub-questions, we proposed the following hypotheses:

-The organizations under study apply AI models to achieve their goals and excel in their marketing mix;

-Artificial intelligence has become an effective element in the marketing practices of digital startups;

-There is a statistically significant correlation between the marketing mix of digital startups

and AI models in the organizations under study.

Study Objective:

This article aims to study the role of artificial intelligence (AI) models in improving the efficiency of the marketing mix, with a focus on digital startups. It analyzes how AI can be employed in developing:

- Product design;
- Pricing policies;
- Promotional campaigns;
- Digital distribution mechanisms.

The article also seeks to provide an analytical overview of modern practices in this field, supported by international examples and case studies. Furthermore, it offers strategic recommendations that enable startups to enhance their marketing effectiveness using AI.

Study Significance:

This topic is increasingly important for digital startups, which face fierce competition in markets driven by innovation and continuous development. This necessitates accurate and flexible analytical tools to help them make timely and data-driven marketing decisions.

Research Methodology:

This research adopted a descriptive and analytical approach. On the descriptive side, a library survey was conducted, and theoretical and field research was reviewed to establish the foundations and principles upon which the theoretical framework rests. This also involved examining key previous studies, which constitute a vital resource for the research, including their various cognitive aspects. As for the analytical field research, a questionnaire using the Likert scale was administered to the institutions under study, and appropriate statistical methods were employed to achieve the research objectives.

Research Structure:

To address the research question and gain a comprehensive understanding of the topic, the study was divided into three main sections.

The first section focuses on the theoretical framework of the marketing mix in digital organizations. The second section examines artificial intelligence (AI) models in marketing processes. The third section is dedicated to a field study exploring the role of AI models in enhancing the efficiency of the marketing mix within emerging digital organizations.

-1The Theoretical Framework of the Marketing Mix in Digital Organizations

-1-1The Evolution of the Marketing Mix Concept¹

The marketing mix concept is a cornerstone of traditional marketing thought. It was first introduced by Jerome McCarthy in 1960, who proposed the 4Ps model: product, price, promotion, and distribution. This model formed the fundamental framework for planning marketing activities and remained widely used for decades.²

With the development of global markets and the emergence of e-commerce, this model required revision and updating. New models emerged, such as the 7Ps, which added people, processes, and physical evidence. Digital service-oriented models like the 4Cs, which focus on the consumer rather than the product, have also emerged.

With the rise of the digital economy, the consumer has become central to the marketing process, prompting organizations to improve the accuracy of their decisions and their understanding of customer behavior through artificial intelligence tools.

Transformations that have driven a change in the traditional marketing mix:

1.Changes in digital consumer behavior:

-Today's consumers rely on data, reviews, and digital content to make their decisions.

-They prefer personalized products.

¹ Jerome McCarthy, *Basic Marketing: A Managerial Approach* (Homewood: Richard D. Irwin, 1960).

.2 The shift from local to global markets:

-Startups are now competing internationally thanks to e-commerce.

.3 The emergence of high-impact digital platforms:

-Such as Facebook, Google, and TikTok, which rely on artificial intelligence in their algorithms.

All these transformations have led modern organizations to rethink their marketing tools to align with the demands of the digital age.

.1.2Dimensions of the Marketing Mix

First: The Traditional Marketing Mix (4Ps)

1. Product

Includes product design, quality, features, and brand.

2. Price

Includes pricing strategies, discounts, and payment policies.

3. Promotion

Includes advertising, public relations, and direct marketing.

4. Place

Relates to the channels through which the product reaches the consumer.

Second: The New Digital Marketing Mix

With the emergence of artificial intelligence and big data, a new form of marketing mix has emerged, based on:

- Personalization;
- Automation;
- Predictive marketing;
- Programmatic advertising.

² Philip Kotler, *Marketing Management*, 15th ed. (Pearson, 2015).

The focus has shifted to consumer behavior rather than just product features, and to real-time interaction rather than traditional campaigns.

1-3- Marketing Challenges in Digital Startups

Startups face several difficulties that affect their ability to effectively use the traditional marketing mix. The most important of these are:

1. Limited Promotional Budget¹

Startups typically lack sufficient financial resources to launch large-scale marketing campaigns.

2. Lack of Marketing Expertise²

They often rely on small teams that may not possess advanced expertise in data analytics.

3. Rapid Change in Marketing Technology³

Artificial intelligence (AI) technologies are evolving rapidly, making adaptation challenging.

4. Intense Competition in Digital Markets⁴

Startups compete with large companies that heavily utilize AI.

This makes relying on AI a necessity, not an option.

2- AI Models in Marketing Processes

Artificial intelligence (AI) is a pivotal pillar in the development of modern marketing systems. Digital startups rely on it for data analysis, demand forecasting, enhancing customer experience, and managing promotional campaigns accurately and effectively. Today, AI is one of the most important tools enabling companies to achieve a sustainable competitive advantage in dynamic digital markets. This section will address the technical foundations of artificial intelligence (AI), the most widespread

marketing applications, and the role of big data in building AI models.⁵

2.1 Technical Foundations of AI Models

Artificial intelligence refers to the ability of machines to mimic human behavior in terms of reasoning, learning, decision-making, and problem-solving. With the rapid development of digital technologies, a set of models and algorithms has emerged, forming the scientific basis for AI applications in the marketing field.⁶

First: Machine Learning

Machine learning is considered the most important and widely used branch of AI in digital marketing. It enables systems to learn from data and improve their performance without direct programming.

Machine learning techniques are based primarily on three main types:

1. Supervised Learning

The model is trained on pre-labeled data to predict future values.

Application examples:

- Predicting consumer behavior;
- Estimating purchase probabilities;
- Identifying market segments.

2. Unsupervised Learning

This approach relies on discovering patterns within data without pre-labeling.

Example:

- Customer Segmentation

3. Reinforcement Learning

This approach uses trial and error to achieve the best possible outcome.

Example:

- Improving digital advertising by automatically testing thousands of scenarios.

¹ Ahmed, Mohamed. Marketing for Digital Startups: Challenges and Opportunities. Cairo: Arab Thought House, 2020.

² Hassan, Sami. Graphic Analysis in Digital Marketing. Amman: Dar Al-Yazouri Scientific, 2019.

³ Ali, Khalid. Modern Techniques in E-Marketing. Riyadh: Al-Obaikan Library, 2021.

⁴ Fouad, Nasser. Digital Competition and Emerging Markets. Beirut: Dar Al-Mashreq, 2022.

⁵ Shawqi, Karim. Artificial Intelligence in Digital Marketing. Cairo: University Book House, 2021..

⁶ Shankar, V. Machine Learning Applications in Marketing. New York: Routledge, 2021.

Second: Deep Learning

Deep learning is one of the most important modern technologies, relying on deep neural networks, which are widely used to analyze large and complex datasets.¹

The importance of deep learning lies in its ability to:

- Analyze images and videos for use in digital advertising;
- Understand text and natural language for programming chatbots;
- Analyze sentiment across social media platforms.

These models are increasingly used in digital organizations to understand consumers accurately, especially emerging companies that rely on visual

content. Third: Natural Language Processing (NLP)

This specialization encompasses the ability of systems to understand, analyze, and respond to human language. Its most important marketing applications include:²

- Chatbots;
- Automated customer responses;
- Analyzing consumer opinions on social media platforms;
- Classifying user comments and content.

Fourth: Intelligent Recommendation Systems

These systems are among the most prominent AI applications used in digital organizations such as Amazon, Netflix, and Alibaba.³

They work by:

- Analyzing consumer behavior;

- Recommending suitable products;

- Increasing conversion rates.

This technology has become essential for emerging organizations that rely on e-commerce.

2.2. AI Applications in Consumer Behavior Analysis⁴

Consumer behavior analysis is one of the most important areas where artificial intelligence has fundamentally transformed the field. Today's emerging organizations no longer rely solely on traditional market research but utilize big data to build accurate demand forecasting models.

First: Buying Behavior Analytics⁵

Artificial intelligence can analyze:

- Number of website visits;
- Session duration;
- Cart abandonment rate;
- Preferred product types;
- Response to promotional offers.

These analyses help in building more effective marketing campaigns.

Second: Sentiment Analysis⁶

Startups rely on analyzing consumer sentiment toward the brand through social media.

NLP techniques are used to:

- Classify comments: positive, negative, neutral;

¹ Kaplan, A. Deep Learning and Digital Marketing. London: Springer, 2022.

² Zhao, L. Natural Language Processing for Customer Analytics. Beijing: Tsinghua University Press, 2023.

³ Ahmad, Raed. Intelligent Recommendation Systems in E-commerce. Amman: Dar Al-Fikr Al-Hadith, 2020.

⁴ Jamal, Samir. Analyzing Consumer Behavior Using Artificial Intelligence. Dubai: Dar Al Shorouk, 2021.

⁵ Hussein, Ali. Sentiment Analysis in Digital Marketing. Cairo: Dar Al-Kutub Al-Ilmiyah, 2020.

⁶ Fatima, Najla. Demand Forecasting in E-commerce. Beirut: University Press, 2021.

- Measure customer satisfaction;
- Identify product weaknesses.

Third: Demand Forecasting

Algorithms are used to predict future consumer needs based on historical data, helping organizations to:

- Control inventory;
- Target advertising campaigns;
- Adjust pricing policies.

Fourth: Personalizing the marketing experience

The digital consumer now expects a personalized experience based on their interests and behavior.

Personalization tools include:

- Personalized emails;
- Interest-based targeted offers;
- Behavioral product suggestions.

Studies have shown that personalization increases conversion rates by 30% to 50%.

2.3. The Role of Big Data in Building Marketing AI Models

Big data is the fuel that powers AI models. It is characterized by its large volume, high speed, and diversity.

Emerging digital organizations use this data to improve their marketing processes in multiple ways.

First: Types of Data Used in Digital Marketing¹

1. Behavioral Data

- Website visits, clicked links

2. Demographic Data

- Age, gender, geographic location.

3. Interactive Data

- Comments, shares, feedback.

4. Financial Transaction Data

- Purchases, payment methods.

¹ Abdullah, Yusuf. Big Data in Digital Marketing. Amman: Arab Thought House, 2021.

² Kareem, Sami. Big Data Processing and its Application in Marketing. Cairo: Dar Al-Kitab Al-Jami'i, 2020.

Second: Stages of Big Data Processing²

1. Data Collection

From social media, digital platforms, and websites.

2. Data Cleaning

Removing duplicates and errors.

3. Data Analysis

Using machine learning algorithms.

4. Using Results in Decision Making

The results are used to improve the marketing mix.

Third: The Importance of Big Data in Startups³

- Improved audience targeting;

- Reduced advertising costs;

- Increased competitiveness;

- Enhanced loyalty through a deeper understanding of the consumer.

3- Field Study on the Role of Artificial Intelligence Models in Improving the Efficiency of the Marketing Mix within Digital Startups

This section aims to provide an applied framework that supports what was presented in the previous two sections, through a field study based on a questionnaire distributed to a number of digital startups. This analysis aims to measure the impact of employing artificial intelligence (AI) models on improving marketing mix elements, reveal the maturity level of organizations' use of these tools, and assess their ability to integrate into modern marketing strategies.

3.1. Study Methodology and Field Procedures⁴

- Research Methodology

This study adopted the descriptive-analytical approach as the most suitable for studying modern phenomena related to digital marketing, especially those related to artificial intelligence. The quantitative approach was

³ Marwa, Laila. The Impact of Big Data on the Performance of Startups. Dubai: Dar Al-Shorouk, 2022.

⁴ Hassan, Khaled. Research Methodology in Digital Marketing. Beirut: Dar Al-Mashreq, 2021.

also used through the analysis of questionnaire data distributed to the targeted digital startups.

- Justification for Choosing the Descriptive-Analytical Approach¹

1. The dynamic nature of the phenomenon under study.
2. The need to analyze the relationships between marketing mix variables and AI applications.
3. The ability to describe actual practices within startups.

- Study Population

The study population consists of digital startups operating in the following areas:

- E-commerce
- SaaS (Software as a Service)
- Mobile Applications
- Digital Content
- Digital Marketing

- Study Sample

A sample of (120) startups operating in a digital environment was selected using stratified random sampling to ensure representation of the various fields of digital marketing.

- Sample Selection Criteria

- A startup less than 10 years old
- Relies on digital channels for marketing
- Uses AI models or is in the process of doing so
- Provides information about its marketing practices

3-2- Study Instrument (Questionnaire)

- Questionnaire Components

The questionnaire comprised four main sections:

1. Characteristics of the startup
2. Level of AI adoption in marketing
3. Impact of AI on marketing mix elements (Product – Price – Promotion – Place)
4. Marketing performance indicators related to AI systems

- Response Scale

A five-point Likert scale was used as follows:

- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

- Instrument Validity and Reliability

The questionnaire was reviewed by a panel of (5) expert professors specializing in:

- Digital Marketing
- Artificial Intelligence
- Research Methodology

A pilot test was conducted on a sample of (15) participants, and the reliability coefficient (Cronbach's Alpha) was calculated. The result was:

(0.87), which is within the acceptable limits for social research.

3.3. Presentation and Analysis of Study Data²

3.3.1. Demographic and Organizational Characteristics of the Sample

- Age of Institutions
- 42% less than 3 years
- 35% between 3 and 7 years
- 23% between 7 and 10 years

Digital Field

- 38% E-commerce
- 27% Smart Applications
- 21% SaaS Services
- 14% Digital Marketing

Size of Institution

- 54% fewer than 10 employees
- 33% between 10 and 25 employees
- 13% more than 25 employees

Analysis:

The results indicate that the sample consists of small-sized institutions, making the adoption of artificial intelligence an effective solution to compensate for the shortage of human resources.

3.3.2. Level of Use of Artificial Intelligence in Marketing Practices³

- Percentage of Institutions Relying on Artificial Intelligence

¹ Ali, Rami. Measurement and Analysis Tools in Applied Research. Amman: Dar Al-Fikr Al-Hadith, 2020.

² Shawqi, Karim. Characteristics of Digital Startups. Cairo: University Book House, 2021.

³ Fouad, Nasser. Artificial Intelligence Applications in the Marketing Mix. Beirut: Dar Al-Mashreq, 2022.

- 71% Use Forms of Artificial Intelligence
- 29% in the Planning Stage For Imminent Adoption

Most Common AI Uses:

1. Chatbots (67%)
2. Ads Targeting (63%)
3. Predictive Analytics (52%)
4. Recommendation Systems (49%)

Analysis:

Chatbots and ad targeting systems are leading the way due to their low cost and ease of integration with digital platforms.

3.3.3. The Impact of Artificial Intelligence on Marketing Mix Elements

First: The Impact of AI on Digital Products¹

Key Findings:

- 74% confirmed that AI helped improve the quality of digital products
- 61% reported that AI contributed to the development of new services
- 68% indicated that it accelerated innovation cycles

Reading:

Analytic algorithms help in studying customer feedback and developing suitable products more quickly.

Second: The Impact of AI on Pricing Policy

Key Findings:

- 65% use dynamic pricing
- 58% found that AI reduced pricing errors
- 71% confirmed an increase in profit margin after implementing AI

Third: The Impact of AI on Promotion and Advertising

Key Findings:

- 79% confirmed the effectiveness of smart targeting
- 66% noticed a decrease in advertising costs
- 72% witnessed an increase in conversion rates

Fourth: The Impact of AI on Distribution

Key Findings:

- 62% experienced improved service delivery speed
- 57% saw an increase in delivery accuracy
- 49% indicated improved inventory management

3-4- Discussion of Field Study Results²

3-4-1- Interpretation of Results in Light of Previous Literature

1. Consistency with Literature

The study results are consistent with the findings of:

- Shankar (2021) on dynamic pricing
- Kaplan (2022) on the effectiveness of smart advertising
- Zhao (2023) on demand forecasting

2. Addition New

This study contributes to:

- Integrating the four elements of the marketing mix into a single applied model
- Focusing on startups
- Analyzing the direct impact of AI on performance indicators

3-4-2- Interpreting the results in light of the reality of startups

The results indicate that startups, despite their small size, possess a high capacity to:

- Adopt modern technologies
- Leverage AI tools to compensate for resource shortages
- Improve their marketing activities with high efficiency

Conclusion

First: Findings

1. Artificial intelligence has become a vital element in developing the marketing mix within startups.
2. There is a positive relationship between adopting AI and improving marketing performance.
3. Organizations use AI to varying degrees, but they clearly benefit from it.
4. The most influential AI tools were:
 - o Advertising targeting
 - o Recommendations
 - o Predictive analytics
5. Challenges remain in funding, skills, and data.

Second: Recommendations

1. Implement AI training programs for employees in startups.

¹ Ahmed, Mohammed. Improving the Marketing Mix Using AI. Riyadh: Al-Obaikan Library, 2023.

² Kaplan, A. AI Integration in Marketing Mix. London: Springer, 2022.

2. Encourage incubators and accelerators to support AI-based projects.
3. Enhancing data security within the digital transformation.
4. Improving legislation to integrate AI into marketing activities.
5. Supporting local innovation in smart systems to reduce import costs.

Third: Proposals for Future Studies

1. Studying the impact of artificial intelligence on digital consumer behavior.
2. Analyzing the impact of smart automation in emerging, non-digital organizations.
3. Evaluating the integration of artificial intelligence with human resource management.

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