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# The Impact of Artificial Intelligence Adoption on Marketing Agility and Competitiveness in Startups

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**ABSTRACT**

This study aims to investigate the impact of artificial intelligence (AI) adoption on marketing agility and competitiveness in startups operating in dynamic business environments. Employing a quantitative survey approach, data were collected from 300 startups active in information technology, e-commerce, and digital services in Iran. The data collection tool was a localized questionnaire measuring AI adoption (perceived usefulness, ease of use, and organizational infrastructure), marketing agility (responsiveness, flexibility, and speed), and competitiveness (competitive advantage and market performance). Data were analyzed using SmartPLS4 and structural equation modeling (SEM). Results indicate that AI adoption has a significant positive effect on marketing agility ($\beta=0.71$, $p<0.01$) and competitiveness ($\beta=0.58$, $p<0.01$). Additionally, marketing agility partially mediates the relationship between AI adoption and competitiveness ($\beta=0.35$, $p<0.05$). These findings suggest that startups effectively leveraging AI can enhance marketing agility, thereby achieving sustainable competitive advantages. It is recommended that startups invest in AI infrastructure and workforce training to maximize these benefits.

**KEYWORDS:** Artificial Intelligence, Marketing Agility, Competitiveness, Startups, Structural Equation Modeling



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## 1. Introduction

In the past decade, technological advancements, particularly in the field of artificial intelligence (AI), have profoundly transformed organizational operations. AI, as an innovative technology, enables the use of advanced algorithms, machine learning, and big data analytics. This technology has gained particular significance in dynamic and competitive environments such as startups. As engines of innovation in knowledge-based economies, startups require advanced technologies to achieve sustainable competitive advantages.

In the era of digital transformation, AI stands out as a key technology with the potential to reshape business structures. Startups, as innovative and dynamic entities, operate in competitive environments characterized by rapid market changes, necessitating marketing agility to meet customer needs and maintain competitive advantages (Kalaignanam et al., 2021). Marketing agility, encompassing rapid responsiveness to market changes, flexibility in strategies, and speed in decision execution, is recognized as a critical factor for startup success (Tabatabaei-Nasab & Mohammadian-Yazd, 2019). Conversely, competitiveness, measured through the creation of competitive advantages and improved market performance, is essential for startups' survival in dynamic environments (Desta & Amantie, 2024).

Despite AI's potential to enhance marketing processes through big data analytics, customer behavior prediction, and task automation, its adoption in Iranian startups faces challenges such as limited financial resources, infrastructural constraints, and organizational resistance (Safari & Ansari, 2022). The significance of this research is multifaceted. First, Iranian startups operate in an environment constrained by economic limitations and international sanctions, making the adoption of advanced technologies challenging. However, AI can enhance marketing process efficiency, enabling startups to stand out in competitive markets (Dwivedi et al., 2023a). Second, marketing agility, as a strategic capability, plays a pivotal role in responding to rapid market changes, which is critical for startups (Kalaignanam et al., 2021). Third, this study employs SmartPLS4 and structural equation modeling to provide a precise analysis of complex relationships between variables, contributing to the academic literature on marketing management. Moreover, despite the growing use of AI in organizations, limited research has directly examined its impact on marketing agility and competitiveness in startups. Marketing agility, defined as an organization's ability to respond swiftly and effectively to market changes, is a key factor in startup success. Similarly, competitiveness, as the capacity to achieve strategic advantages over competitors, is a primary goal for all organizations. Thus, the question arises: "Can AI adoption enhance marketing agility and competitiveness in startups?" Ultimately, the findings of this research can offer practical insights for startups and policymakers to improve technology adoption and enhance competitiveness.

This study aims to address the following research questions:

1. How does AI adoption impact marketing agility in startups?
2. How does AI adoption affect startup competitiveness?
3. Does marketing agility mediate the relationship between AI adoption and competitiveness?

## 2. Theoretical Framework and Literature Review

### Artificial Intelligence and Technology Adoption

Artificial Intelligence (AI) refers to a set of technologies capable of performing cognitive tasks such as learning, reasoning, and decision-making (Davenport et al., 2020). The Technology Acceptance Model (TAM) is a key framework for examining the adoption of new technologies, emphasizing two primary factors: Perceived Usefulness and Perceived Ease of Use (Davis, 1989). In startups, the adoption of AI is influenced by factors such as technological infrastructure, organizational culture, and financial resources (Kshetri et al., 2023). Recent studies indicate that AI can enhance marketing processes by providing advanced analytical tools and automation (Dwivedi et al., 2024).

### Marketing Agility

Marketing agility refers to an organization's ability to respond swiftly to market changes, exhibit flexibility in strategy formulation, and execute decisions rapidly (Kalaignanam et al., 2021). This concept encompasses three key dimensions:

1. **Responsiveness**: The ability to identify and react quickly to market changes.
2. **Flexibility**: The capacity to adjust marketing strategies based on evolving needs.
3. **Speed**: The ability to implement marketing decisions promptly. Research suggests that AI technologies, such as predictive analytics and chatbots, can enhance marketing agility (Manis & Madhavaram, 2023).

### Competitiveness

Competitiveness refers to an organization's ability to create sustainable competitive advantages and improve market performance (Porter, 1985). In startups, competitiveness is fostered through innovation, product differentiation, and responsiveness to customer needs (Desta & Amantie, 2024). AI can enhance competitiveness by offering tools for service personalization and pricing optimization (Chintalapati & Pandey, 2022).

Recent studies have focused on the impact of AI on marketing and organizational performance. For instance, Dwivedi et al. (2023a) demonstrated that Generative AI (GAI) can improve customer experiences through personalized content creation. Manis and Madhavaram (2023) highlighted the role of AI in enhancing marketing agility, showing that AI tools can reduce market response times. Similarly, Mariani and Dwivedi (2024) explored the impact of AI on competitive advantage, finding that effective AI utilization can enhance market performance. However, few studies have investigated the mediating role of marketing agility in the relationship between AI adoption and competitiveness, a gap this research seeks to address.

## 3. Methodology

This study is applied and descriptive-survey in nature. The statistical population consisted of startups operating in the fields of information technology, e-commerce, and digital services in Iran. Sampling was conducted using a simple random sampling method, with 300 startups surveyed through a questionnaire. The sample size was determined using Cochran's formula with a 95% confidence level.

The primary data collection tool was a localized questionnaire comprising three main sections:

1. **AI Adoption (10 items)**: Based on the Technology Acceptance Model (TAM) focusing on Perceived Usefulness and Perceived Ease of Use, as well as organizational variables such as technological infrastructure (Kshetri et al., 2023).
2. **Marketing Agility (12 items)**: Measuring responsiveness, flexibility, and speed, adapted from Kalaignanam et al. (2021).
3. **Competitiveness (8 items)**: Assessing competitive advantage and market performance, adapted from Desta and Amantie (2024).

The questionnaire's reliability was confirmed with a Cronbach's alpha coefficient of 0.92. Its validity was verified through Confirmatory Factor Analysis (CFA) with fit indices (GFI = 0.94, CFI = 0.96, RMSEA = 0.05). Data were analyzed using SmartPLS4 software and the Structural Equation Modeling (SEM) method, which was suitable due to its ability to analyze complex and mediating relationships. The model's fit indices (GFI = 0.93, CFI = 0.95, RMSEA = 0.06) indicated a good model fit.

## 4. Findings

Data were analyzed using SmartPLS4. First, the constructs' validity and reliability were tested. Then, the structural model was analyzed using the PLS-SEM method. The results of the data analysis are presented in the tables below:

**Table 1: Model Fit Index**

| Index | Coefficients |
|---|---|
| GOF | 0.68 |
| $R^2$ | 0.59 (Marketing Agility), 0.48 (Competitiveness) |
| $Q^2$ | 0.51 |

**Table 2: Path Coefficients**

| Variables | Path Coefficient (β) | t-value | p-value | Result |
|---|---|---|---|---|
| AI Adoption → Marketing Agility Penalized | 0.71 | 9.12 | <0.01 | Supported |
| AI Adoption → Competitiveness | 0.58 | 7.45 | <0.01 | Supported |
| Marketing Agility → Competitiveness | 0.52 | 6.78 | <0.01 | Supported |
| AI Adoption → Marketing Agility → Competitiveness | 0.35 | 3.89 | <0.05 | Partial Mediation |

The results indicate that AI adoption has a significant positive effect on both marketing agility and competitiveness. Additionally, marketing agility plays a partial mediating role in the relationship between AI adoption and competitiveness. Further analyses revealed that technological infrastructure and perceived usefulness are the most significant factors influencing AI adoption.

## 5. Discussion and Conclusion

This study demonstrates that artificial intelligence (AI) can significantly enhance startups' marketing agility, thereby improving their competitive advantage in the market. Startup managers should develop strategic plans to adopt AI and leverage this technology to enhance marketing efficiency and competitiveness. The findings indicate that AI adoption has a significant impact on marketing agility, aligning with prior studies such as Wang and Wang (2021) and Sharma et al. (2023). Additionally, a positive relationship between AI adoption and competitiveness was confirmed, consistent with the results of Zhang et al. (2022) and Kumar and Singh (2024). Most notably, the mediating role of marketing agility highlights that this variable serves as a primary pathway for transmitting the effects of AI adoption to competitiveness.

The study's findings are consistent with recent research. For instance, Manis and Madhavaram (2023) demonstrated that AI enhances marketing agility by improving data analytics and process automation, enabling startups to respond more rapidly to market changes and adopt more flexible strategies. The direct impact of AI on competitiveness aligns with Mariani and Dwivedi (2024), who showed that AI can improve market performance through service personalization and pricing optimization. The mediating role of marketing agility underscores its importance in channeling AI's effects toward competitiveness. Startups utilizing AI tools such as chatbots and predictive analytics can reduce market response times and enhance customer experiences (Dwivedi et al., 2023b). However, limitations such as high implementation costs and a shortage of skilled personnel may hinder the full realization of this potential (Kshetri et al., 2023).

The study's limitations include the sampling being restricted to Iranian startups, which may limit the generalizability of the results; the lack of access to real-world data on the extent of AI implementation in startups; and the focus on specific variables (AI adoption, marketing agility, and competitiveness) without considering contextual factors such as organizational size. Overall, this research confirms that AI adoption has a significant positive effect on startups' marketing agility and competitiveness, with marketing agility partially mediating this relationship. Startups that effectively utilize AI can achieve sustainable competitive advantages by enhancing marketing agility. These findings emphasize the importance of investing in technological infrastructure and workforce training.

It is recommended that startups prioritize the development of technological infrastructure and human resource training to leverage AI effectively. Policymakers should facilitate AI adoption in startups by providing financial incentives and training programs. Future research could explore the impact of contextual factors such as organizational size, industry type, and organizational

culture. Additionally, investigating the effects of specific AI types, such as generative AI, on marketing agility and competitiveness is recommended.

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**ETHICAL CONSIDERATION**

Authenticity of the texts, honesty and fidelity has been observed.

**CONFLICT OF INTEREST**

Author/s confirmed no conflict of interest.