AI as an Autonomous Economic Agent Redefining E Commerce and E Service Ecosystems Beyond Human Centric Models

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ABSTRACT:

- Recent advances in artificial intelligence have significantly transformed electronic commerce and electronic service platforms, primarily by enhancing decision support, personalization, and automation for human users. However, existing systems remain fundamentally human centric, assuming humans as the sole economic decision makers. This paper challenges this assumption by conceptualizing artificial intelligence as an autonomous economic agent capable of acting as a direct customer within e commerce and e service ecosystems. The study introduces a novel conceptual framework that defines the characteristics, decision making autonomy, and interaction mechanisms of AI driven customers operating independently of continuous human supervision. A layered architecture is proposed to illustrate how autonomous AI agents interact with digital marketplaces, service providers, and other intelligent agents. The implications of this paradigm shift are analyzed from technical, service design, and market perspectives, highlighting its potential impact on pricing models, service personalization, loyalty mechanisms, and platform governance. In addition, ethical and strategic challenges arising from non-human consumption behaviors are discussed. By moving beyond human centric models, this research provides a forward looking foundation for the design of future e commerce and e service systems in which artificial intelligence participates as an active economic entity rather than a passive tool.

ARTICLE HISTORY

Received: 01/04/2026

Accepted: 01/08/2026

KEY WORDS:

Artificial intelligence, Autonomous agents, E commerce, E services, digital markets, Service design, Intelligent systems

I. Introduction

Electronic commerce and electronic service platforms increasingly rely on artificial intelligence to enhance efficiency, personalization, and automation. In most existing systems, AI functions as a supportive technology that assists human users in recommendation, decision making, and service delivery [1], [5]. *Consequently, current digital marketplaces remain fundamentally human centric, assuming humans as the sole economic actors.*

Recent advances in autonomous and agent based AI systems enable artificial intelligence to operate with higher levels of independence [3], [4]. *including goal driven behavior and adaptive decision making. These capabilities raise an important but underexplored question: how should e commerce and e service systems be designed when artificial intelligence itself acts as a customer rather than a supporting tool. Existing AI driven commerce solutions still depend on explicit human intent and supervision* [5] *and therefore cannot be considered autonomous economic participants.*

This paper addresses this gap by conceptualizing artificial intelligence as an autonomous economic agent within digital marketplaces and discussing its implications for future e commerce and e service ecosystems.

II. CONCEPTUALIZING AI AS AN ECONOMIC AGENT

In this study, artificial intelligence is conceptualized as an economic agent that can independently participate in e commerce and e service ecosystems [3], [4]. Unlike traditional AI applications that support or recommend actions to human users, an AI economic agent operates with a defined level of autonomy, enabling it to initiate service selection and purchasing decisions without continuous human intervention.

An AI economic agent is characterized by three core properties. First, autonomy allows the system to act based on predefined objectives and constraints. Second, goal orientation enables the agent to evaluate available services according to specific performance criteria [4], such as efficiency, cost, or sustainability. Third, adaptive learning allows the agent to refine its behavior over time based on past interactions and outcomes.

By treating artificial intelligence as an economic agent rather than a supportive tool, this conceptualization provides a foundation for analyzing non-human participation in future digital marketplaces.

III. PROPOSED ARCHITECTURE

To support artificial intelligence acting as an autonomous economic agent, a high level conceptual architecture is proposed [4] for e commerce and e service ecosystems. The architecture is designed to enable independent interaction between AI driven customers and digital platforms while maintaining compatibility with existing service infrastructures. The overall architecture of the proposed AI-based economic agent is illustrated in Fig. 1.

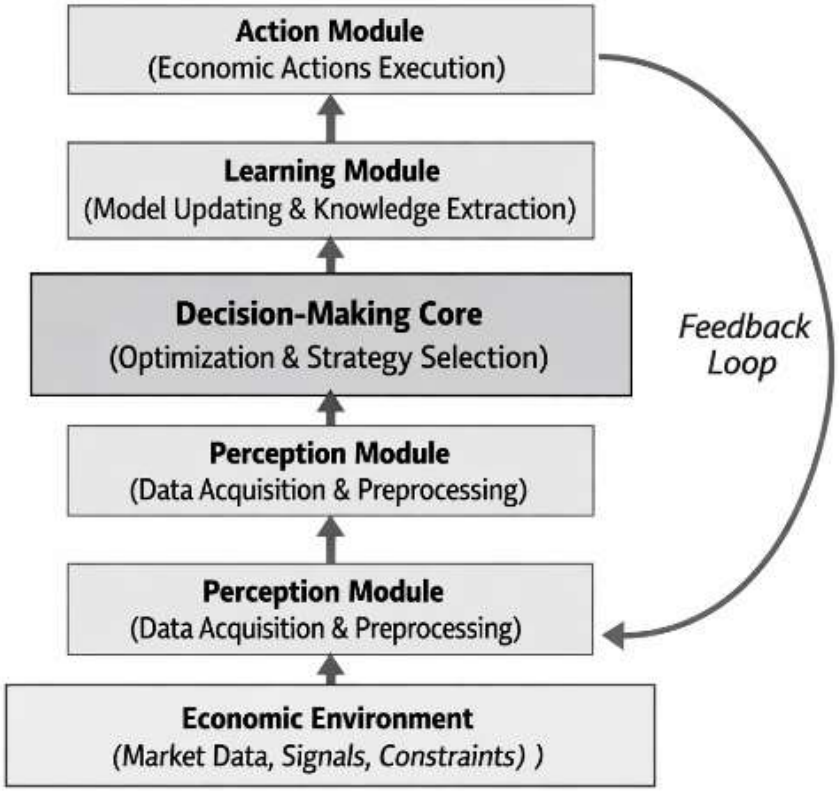

Fig. 1. Proposed architecture of an AI-based economic agent illustrating perception, learning, decision-making, and action components within a dynamic economic environment.

The proposed architecture enables continuous interaction between the AI agent and the economic environment through a feedback loop, allowing adaptive decision-making under dynamic market conditions.The proposed model consists of three main components. The first component is the AI economic agent, which is responsible for goal definition, service evaluation, and decision making based on predefined objectives and learned preferences. The second component is the digital marketplace layer, which provides access to products, services, pricing mechanisms, and

transaction interfaces. The third component is the service and governance layer, which manages policies, constraints, and system level rules [6] to ensure reliable and compliant interactions.

This architecture provides a flexible foundation for integrating non-human customers into future digital commerce environments. The proposed architecture can be extended to support simulation based evaluation in future work.

IV. IMPLICATIONS AND CHALLENGES

The emergence of artificial intelligence as an autonomous economic agent introduces important implications for e commerce and e service ecosystems [6], [7]. Service design models may require adaptation, as platforms must accommodate non-human customers that evaluate offerings based on predefined objectives rather than human preferences. Pricing mechanisms and personalization strategies may also change when transactions are driven by algorithmic decision making instead of emotional or behavioral factors.

Despite these opportunities, several challenges must be considered, particularly regarding alignment between human objectives and autonomous system behavior [1], [7]. Technical issues include ensuring transparency, reliability, and interoperability between AI agents and digital platforms [1], [7]. From an ethical and strategic perspective, questions arise regarding accountability, alignment between human and machine objectives, and the potential impact of AI driven consumption on market dynamics. Addressing these challenges is essential for the sustainable integration of non-human economic agents into future digital marketplaces.

V. CONCLUSION

This paper explored a shift from human centric to non-human centric models in e commerce and e service ecosystems by conceptualizing artificial intelligence as an autonomous economic agent. Unlike traditional AI applications that function as supportive tools, the proposed perspective positions artificial intelligence as an active participant capable of independent decision making and service consumption.

A conceptual framework and high level architecture were presented to illustrate how AI driven customers can interact with digital marketplaces and service platforms. The implications and challenges associated with this paradigm shift were briefly discussed, highlighting the need for adapted service design and governance models. Future studies may validate the proposed model through agent based simulations and real world case studies. Future research may focus on empirical validation, regulatory considerations, and the long term impact of non-human economic participation on digital markets [6], [7].

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