

# Tripartite evolutionary game analysis of the adoption of AI delivery technology

Lin, S.Y.<sup>a</sup>, Zheng, M.Y.<sup>a</sup>, Chen, J.L.<sup>a,\*</sup>

<sup>a</sup>Logistics and E-commerce College, Zhejiang Wanli University, Ningbo, P.R. China

## ABSTRACT

The decision of logistics enterprises to adopt AI delivery technology is influenced by multiple stakeholders, a fact that is largely ignored in existing research. A tripartite evolutionary game model incorporating the government, logistics enterprises, and consumers was established in this study. It analyzed the strategies adopted by the three actors in promoting AI delivery technology and examined the factors influencing their choices. Furthermore, the evolutionary equilibrium and stability of these strategies were explored and verified through simulation analysis. Results reveal several key insights: (1) Technology promotion is a collaborative process driven by multiple stakeholders. Government subsidies, enterprise costs and benefits, and consumer utility are the crucial variables determining system stability. (2) Government incentives not only reduce enterprises' adoption costs but also increase consumer willingness to adopt through subsidies and publicity. These measures accelerate the system's evolution toward the ideal stable state of "introduction, incentive, AI delivery". (3) Enterprises' investment decisions are highly sensitive to input costs and economic benefits. The threshold for technology adoption decreases when significant economic benefits are present or costs decline. (4) Consumers' perceived utility and learning costs directly affect their usage intentions and subsequently influence the strategic choices of the government and enterprises through demand feedback. This study provides a novel perspective on the promotion of AI delivery and offers practical management insights for policy-making and user analysis in logistics enterprises.

## ARTICLE INFO

**Keywords:**  
Artificial intelligence;  
AI delivery;  
Logistics delivery services;  
Technology adoption;  
Tripartite evolutionary game model;  
Government incentives;  
Logistics enterprise decision-making;  
Consumer behaviour

**\*Corresponding author:**  
[chenjinlong@zww.edu.cn](mailto:chenjinlong@zww.edu.cn)  
(Chen, J.L.)

**Article history:**  
Received 10 September 2025  
Revised 6 December 2025  
Accepted 13 December 2025



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# Evolucijska igra za analizo odločanja treh deležnikov o uvedbi tehnologije dostave s podporo umetne inteligence

Lin, S.Y.<sup>a</sup>, Zheng, M.Y.<sup>a</sup>, Chen, J.L.<sup>a,\*</sup>

<sup>a</sup>Logistics and E-commerce College, Zhejiang Wanli University, Ningbo, P.R. China

## POVZETEK

Odločanje logističnih podjetij o uvedbi tehnologije dostave s podporo umetne inteligence je odvisno od vpliva več deležnikov, kar je v obstoječih raziskavah večinoma zanemarjeno. V tej študiji je vzpostavljen evolucijski model igre treh deležnikov, ki vključuje vlado, logistična podjetja in potrošnike. Analizirane so strategije, ki jih ti trije akterji sprejemajo pri spodbujanju tehnologije dostave s podporo umetne inteligence, ter dejavniki, ki vplivajo na njihove izbire. Poleg tega sta z uporabo simulacijske analize proučena evolucijsko ravnotežje in stabilnost teh strategij. Rezultati razkrivajo več ključnih ugotovitev: (1) Spodbujanje tehnologije je sodelovalen proces, ki ga poganjajo številni deležniki. Državne subvencije, stroški in koristi podjetij ter koristnost za potrošnike so ključne spremenljivke, ki določajo stabilnost sistema. (2) Državne subvencije ne le zmanjšujejo stroške uvedbe tehnologije za podjetja, temveč prek subvencij in ozaveščevalnih dejavnosti povečujejo tudi pripravljenost potrošnikov za uporabo tehnologije. Ti ukrepi pospešujejo razvoj sistema proti idealnemu stabilnemu stanju »uvedba – spodbude – dostava z umetno inteligenco«. (3) Naložbene odločitve podjetij so izrazito občutljive na vhodne stroške in ekonomske koristi. Prag za uvedbo tehnologije se znižuje ob znatnih ekonomskih koristih ali zmanjšanju stroškov. (4) Zaznana koristnost in učni stroški pri potrošnikih neposredno vplivajo na njihovo pripravljenost za uporabo ter posledično prek povratnih informacij o povpraševanju vplivajo na strateške odločitve vlade in podjetij. Študija ponuja nov pogled na spodbujanje dostave s podporo umetne inteligence ter zagotavlja uporabne usmeritve za oblikovanje politik in analizo uporabnikov v logističnih podjetjih.

## PODATKI O ČLANKU

### Ključne besede:

Umetna inteligenca;  
Dostava s podporo umetne inteligence;  
Logistične dostavne storitve;  
Uvajanje tehnologije;  
Evolucijski model igre treh deležnikov;  
Državne spodbude;  
Odločanje logističnih podjetij;  
Vedenje potrošnikov

### \*Kontaktna oseba:

chenjinlong@zww.edu.cn  
(Chen, J.L.)

### Zgodovina članka:

Prejet 10. septembra 2025  
Popravljen 6. decembra 2025  
Sprejet 13. decembra 2025



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