

AI-Driven Business Model Innovation in Fashion and Beauty E-Commerce: How Multi-agent Systems Reshape Intelligent Shopping Services

Zhaowanyun Yan

UNSW Business School, University of New South Wales, Sydney, Australia
z5595918@ad.unsw.edu.au

Abstract. Artificial intelligence is increasingly reshaping the business logic of internet platforms, driving a fundamental shift from software-based digital services toward more intelligent, outcome-oriented value delivery. This study investigates how AI, specifically multi-agent systems, enables business model innovation in the fashion and beauty e-commerce sector through the provision of intelligent shopping guidance services. Employing a comparative case study approach, the research examines two to three representative companies to analyze how AI influences key dimensions of business models, including value proposition, customer relationships, revenue streams, and key activities. Furthermore, it explores how AI reconfigures critical segments of the value chain, such as product discovery, content generation, personalized recommendation, virtual try-on, customer interaction, and service delivery. By situating the study within the context of fashion and beauty e-commerce, this research aims to elucidate how internet platforms transition beyond traditional digital service logic toward more intelligent, service-oriented, and results-driven commercial models. The findings are expected to contribute to academic discourse on AI-driven business model innovation and offer practical insights for industry practitioners and platform strategists.

Keywords: AI-driven business model, multi-agent systems, fashion and beauty e-commerce, Consumer Journey

1. Introduction

Artificial intelligence is changing the way Internet platforms create and deliver value. Early AI was mainly seen as a tool for automation, information processing, and efficiency improvement, but now it has gradually become an important force in promoting business model innovation. In the platform economy, AI not only improves operational efficiency, but also affects value creation, value delivery, and value capture. Platforms can form a positive cycle through data, models, and service experiences; that is, more data improves model capabilities, better services attract more users, and further generate data. In this context, fashion and beauty e-commerce is a representative Research scenario. The industry has high emotional participation, strong visual dependence, and personalized needs, and the traditional online model also has some problems, such as inconvenient fitting, limited

matching efficiency, and insufficient decision-making support. Therefore, it is of practical significance to study how AI changes the platform service logic of the industry.

Studies have shown that AI is pushing platforms from simply selling products to a more service-oriented and results-oriented value delivery model. In fashion and beauty e-commerce, relevant studies also pointed out that the industry is particularly suitable for AI applications, because consumer decision-making is highly dependent on visual experience, emotional interaction, and personalized support. At the same time, AI can improve the user experience through recommendation, content generation, virtual fitting, and interactive services. Further, multi-agent systems provide a new technical path for platform upgrading. Compared with a single AI system, multi-agent systems emphasize task division, role collaboration, and dynamic response, and can connect recommendation, content generation, user interaction, and feedback processing. Recent studies on multi-agent recommender systems have also shown that specialization and collaboration among different agents have higher value when shopping support becomes more complex and multistage.

However, most of the existing studies analyze fashion and beauty e-commerce from customer engagement, personality, or a single AI function, and there is still insufficient discussion on how multi-agent systems can promote platform business model innovation. This paper fills this gap and focuses on how multi-agent systems reshape the value proposition, customer relationships, key activities, and service delivery of the platform. Taking fashion and beauty e-commerce as the research scenario, this paper uses a case study method to explore the possibility of moving from traditional digital retail logic to more intelligent and results-oriented services by analyzing the AI applications of related platforms and brands. In theory, this paper introduces multi-agent systems into the discussion of AI-driven business model innovation to avoid treating AI as a single capability. In practice, this paper can provide a reference for enterprises to organize intelligent services such as recommendation, content generation, virtual fitting, and customer interaction.

2. Theoretical foundation and literature review

2.1. Agent AI for business model innovation

Agent AI refers to intelligent systems capable of autonomous perception, judgment, and action around specific goals. Unlike traditional AI that only executes single instructions or outputs single results, Agent AI emphasizes continuous decision-making, task execution, and situational response, thus boasting greater potential in efficiency improvement, cost reduction, and new value creation. Single-agent AI relies on a single model to complete perception, reasoning, and output, while multi-agent systems involve multiple intelligent entities with different roles and capabilities, finishing complex service processes through distributed decision-making, collaborative work, and dynamic interaction. This makes multi-agent systems an architecture more adaptable to complex platform service scenarios, especially those requiring multi-step collaboration, continuous feedback, and cross-link integration. In the fashion and beauty industry with high emotional engagement and prominent personalized demands, multi-agent architecture connects recommendation, content interpretation, and consumption guidance into continuous intelligent shopping guidance, driving the platform to shift from "providing information" to "assisting decision-making". Relevant research confirms that the integration of AI and recommendation systems can improve shopping prediction ability and optimize consumers' overall experience [1].

From the perspective of business model innovation, Agent AI carries more prominent strategic significance. Studies indicate that the core of AI-enabled business models lies not in single technical

tools, but in the combination of AI with business model logic, data network effects and platform ecosystems to create new competitive advantages [2]. Research on AI-driven platform innovation also shows that data, analytics, and AI services within platforms are not subsidiary tools, but play a more active and dynamic role in business model design and value creation [3]. At the micro level, multi-agent systems promote platform services to shift from passive response to proactive delivery through autonomous decision-making and systematic collaboration. At the macro level, they strengthen the organizational capacity of platforms as multilateral markets, enabling closer matching between supply-side participants and demand-side consumers. This architecture releases the big data flywheel effect to enhance platform stickiness, and lays a core foundation for platforms to transform into service-oriented and result-driven business models.

2.2. Agent AI for e-commerce in fashion and beauty

Fashion and beauty e-commerce have more complex decisions than other kinds of e-commerce. When buying clothes, cosmetics and skincare products, people consider how much they cost and what functions these products have. At the same time, they also think whether these products suit their own styles, skin conditions, bodies and self-concepts, so brand participation is closely linked to emotions and identity expression. Information overload for consumers of e-commerce platforms may lead to more impulse purchases and a high return rate. Therefore, Agent AI can address this problem by providing personalized decision-making support at all times in the customer journey and promoting voluntary purchases. Agent AI links the originally dispersed service links in a consumer journey. The user portfolio agent learns about a user through their browsing, purchase and feedback history to build an evolving profile of the user and tracks changes in preferences and the main reasons for making a purchase. Design products and content based on the needs of consumers to reduce choice fatigue and improve the customer experience [4]. Based on the above, the search optimization agent knows what the user wants and returns relevant recommendation results.

Fashion and beauty e-commerce also need to provide a good visual experience. Consumers wish to know how the products will actually affect them before buying, and the online environment cannot fully replace offline trials and make-up tests. The visual perception agent detects users' facial features, skin colour, body shape and product image information, and the simulation agent supports virtual try-on, fitting and makeup simulation. In conjunction with user profiles and conversational assistant agents, these visual functions can also be used to collect user preferences and enhance recommendation accuracy through interaction [5]. Agent AI continues to work after purchase: the issue classification agent identifies the type of problem, and the solution agent offers support, such as a refund or replacement, and usage advice [6]. Beauty products have a regular consumption cycle. Therefore, repurchase and loyalty agents will send targeted reminders at different times during the purchase cycle. By means of cross-journey cooperation, the platform will evolve into an intelligent decision-support system rather than a product information intermediary.

3. Methods

3.1. Research design

This study will use a qualitative research design and incorporate desk research and case studies. Research has explored the features of fashion and beauty e-commerce, the concept of agent AI, and applications of multi-agent systems in the consumer journey to provide the basis for this study in a literature review. Based on the above, this section will introduce the criteria for selecting cases, the

process of secondary data collection and methods of case analysis in line with the consumer-journey multi-agent framework. Given that this study focuses on AI applications in real business scenarios, a case study method will be used to explore complex issues in an actual environment through case studies. Therefore, this paper will use a multiple-case study method to explore the forms of AI applications in fashion and beauty e-commerce, the service functions they offer, and whether there is potential for cross-stage coordination of these services for consumers.

Alibaba Tmall, L'Oréal and Gucci were selected as the three case studies in this paper to cover different positions in the market and business models of the fashion and beauty e-commerce industry. Alibaba Tmall serves as the platform-level case. As a large-scale retail ecosystem, it has many kinds of fashion and beauty products, including affordable goods and official brand flagship stores. L'Oréal is selected as the mid-to-high-end beauty case, and the application of AI can be explored in terms of skincare advice, product evaluation, and personalized beauty decisions. Gucci offers a luxury fashion case for digital experience that integrates product perception, brand interaction and identity-based consumption. Therefore, this selection of cases can help us examine AI applications in platform retail, beauty technology and luxury fashion without assessing the operational performance of the enterprises.

3.2. Data collection

Secondary data are to be collected in this study. Data will be obtained from the company's website and product pages, press releases, public news reports, industry analysis materials, relevant academic resources, etc. Based on a specific case and the consumer journey framework, it will collect data to explore which companies use AI, how it is connected to all stages of the consumer journey, and what effect this has had on overall service transformation. As all the data are from public sources, this study does not aim to reconstruct each company's internal AI architecture or analyze internal algorithms, user data and system deployment details.

A Framework is Used to Analyze the Collected Data. The consumer-journey-based multi-agent framework proposed in the literature review for AI applications in fashion and beauty e-commerce considers them as parts of a cooperative service process. Based on the above system, the three cases of Alibaba Tmall, L'Oréal and Gucci will be analyzed for journey coverage, service coordination and possible deficiencies. The question is whether the AI applications of these companies are merely tools or exhibit features of multi-agent coordination, rather than ranking them by company performance.

4. Case analysis

4.1. Individual case analysis

Alibaba Tmall demonstrates how AI is embedded in retail infrastructure. As a platform case, Tmall connects links including search, recommendation, purchase, logistics tracking, and after-sales services. Relevant industry information shows that Alibaba is integrating Qwen AI with Taobao, shifting shopping patterns from keyword-based search to AI-driven shopping conversations, and supporting functions such as browsing, comparison, purchase, virtual try-ons, price tracking, and post-purchase support. This indicates that AI can support a more coherent e-commerce transaction process. Its potential business value lies in using behavioral and transaction data to identify target consumers, match products, support smart pricing, generate marketing content, distribute traffic, and assist service operations [7].

L'Oréal illustrates how AI supports product evaluation and personalized advice in the beauty sector. Its Skin Genius tool uses artificial intelligence to analyze users' skin conditions and provides personalized skincare routines. ModiFace supports virtual makeup try-on through augmented reality technology. Different from Tmall's behavior-focused data application, L'Oréal's AI applications are more oriented to beauty information related to skin, hair, and health conditions. These applications may support consumer insight mining and potential product development, but this study cannot confirm that such outcomes have been fully achieved.

Gucci embodies the application of AI in luxury experience enhancement. Gucci Beauty provides virtual try-on functions to support online beauty interaction scenarios. For luxury fashion brands, the value of AI lies not only in improving transaction efficiency, but also in enriching product perception, brand interaction, and identity-based consumption experiences. AI-enabled tools can support personalized recommendations, styling assistance, and trend-related engagement [8]. However, in the absence of internal enterprise data, judgments on trend prediction effects or actual business impacts can only be regarded as potential implications.

4.2. Cross-case comparison

Across these three cases, they illustrate different AI transformation logics. Alibaba Tmall is closer to retail infrastructure because the platform requires connectivity, search, recommendation, pricing, traffic distribution, purchase, logistics, and after-sales services. L'Oréal has a different path, mainly through AI to support beauty assessment and personalized advice, and may be further connected to product insight and value chain development. Gucci emphasizes luxury experience enhancement, enhancing the brand experience through virtual interaction, recommendation engines, styling support, and trend-related engagement.

These differences also reflect different business scopes. Tmall covers the more complete consumer shopping journey. L'Oréal's AI extends from consumer evaluation to potential research, operation, and organizational value creation. Gucci strengthens product perception, consumer participation, and identity-based consumption around the brand value chain. Therefore, the three cases can be summarized as three possible AI transformation paths: platform infrastructure, beauty value reconstruction, and luxury experience reshaping.

4.3. Summary of findings

The case findings show that AI in fashion and beauty e-commerce is moving from isolated tools toward a connected service system. Although Tmall, L'Oréal, and Gucci differ in market position, they share common AI functions, including prediction, pricing support, product matching, personalized recommendation, and customer engagement. Figure 1 summarizes these findings as a consumer-journey-based multi-Agent framework. It includes four layers: discovery and recommendation, experience enhancement, purchase and retention, and marketing. The first layer links user profiling, search optimization, and recommendation. The second layer supports virtual try-on, skin analysis, and conversational assistance. The third layer extends AI to customer support, repurchase reminders, and loyalty management. The final layer supports AI-generated content, campaign personalization, and virtual influencer simulation.

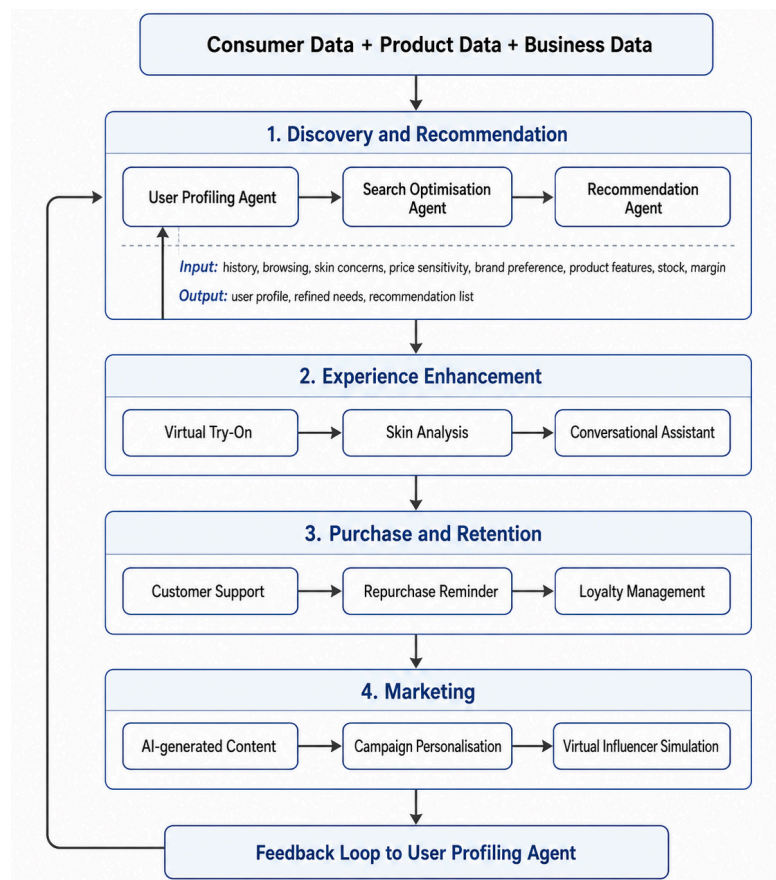


Figure 1. Customer-journey-based multi-agent framework (picture credit: original)

The cases also show how this framework can appear in different forms. Tmall illustrates full-journey platform support, L'Oréal provides the example of skin-related analysis and personalised beauty advice, and Gucci reflects luxury-oriented experience and styling interaction. Overall, Agent AI creates value through coordination across the consumer journey, rather than through any single function.

5. Discussion and inspiration

Case findings show that AI applications in fashion and beauty e-commerce are driving the transformation of service logic, yet this shift is still in its early stage. Traditional e-commerce relies on consumers to proactively complete search, comparison, ordering, and after-sales consultation. Current AI applications have made services more proactive, covering scenarios such as personalized recommendation, virtual try-on, skin analysis, and shopping assistance, indicating a potential trend from consumer-initiated product search to product-to-consumer matching. Relevant research confirms that AI-enabled products are creating new forms of customer experience and service interaction [9]. However, the three cases have not formed mature multi-agent systems, with most existing applications remaining single-function tools. These functions demonstrate clear potential to evolve toward a coherent service system, and the next development direction is to coordinate various agents to form integrated service logic.

Theoretically, this study reinterprets AI from isolated technical tools to a potential form of collaborative intelligence, though this transformation is a forward-looking direction rather than a

fully realized reality in current cases. In practice, fashion and beauty enterprises should not rely solely on scattered AI tools or general-purpose large language models. A coordination center is required to integrate agents for user profiling, search, recommendation, visual experience, and customer support. These agents should rely on domain-specific data, product knowledge, and consumer feedback, as retrieval-based domain-specific systems can enhance contextual grounding and reduce hallucination [10]. Enterprises should treat relevant user data as core assets, and organize scattered AI tools into consumer-journey-centered collaborative systems to release long-term value.

6. Conclusion

This study analyzes the application of agent AI in fashion and beauty e-commerce through three cases of Alibaba Tmall, L'Oréal, and Gucci. The study found that the current AI applications are mostly single-function applications, such as recommendation, virtual try-on, skin analysis, and shopping assistance, which cannot prove that complete multi-agent systems have been formed, but show the possibility of moving towards coherent service logic. This paper proposes a consumer-journey-based multi-agent framework, which shifts the research focus from single AI functions to agent AI coordination, making up for the shortcomings of scattered discussions of recommendation, virtual try-on, and customer service in existing studies, and also provides a reference for user profiling, search, recommendation, customer support, and marketing agents. Because this study is limited by the number of cases and public information, future studies can add more enterprises, user interviews, internal data, or performance indicators to verify the impact of agent AI collaboration on conversion, retention, and customer satisfaction.

This study has certain limitations. The research scope is confined to the fashion and beauty e-commerce sector, and conclusions drawn from three cases cannot be generalized to all enterprises in the industry. Furthermore, the analysis relies on publicly available secondary data, which is restricted by data availability and corporate disclosure levels, and internal system architecture, algorithmic logic, and business performance data are not accessible. Future research can expand the case sample to cover more regional markets and enterprises of varying scales. Qualitative methods such as interviews and surveys, or internal enterprise operation data, can be adopted to further verify the applicability of the multi-agent framework in real business contexts.

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