

Building an Intelligent E-commerce Platform: From System Design to Meeting User Emotional Needs

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ABSTRACT

This paper discusses the evolution and development history of online shopping platforms, the core design principles of e-commerce systems and their impacts on user experience. From the beginning of e-commerce to the e-commerce application of mobile devices, transforming consumption patterns has promoted the iteration of technology and design concepts. With interface design, interaction design and accessibility as its core components, this paper analyzes how to use existing technologies to enhance personalized shopping experiences. In addition, the article also emphasizes the importance of integrating logistics systems with platforms, analyzes the emotional trends of user needs that are gradually forming at present, and the potential for future system optimization. Through these contents, this paper aims to provide practical design strategies for optimizing online shopping platforms.

KEYWORDS

Online Shopping Platforms; E-commerce System Design; User Experience (UX); Interface Design (UI); Shopping Experience Interaction Design; Accessibility Design; Artificial Intelligence in E-commerce; Cross-scenario Design; Big Data in E-commerce; E-commerce User Behavior; Emotional Design in E-commerce; Augmented Reality in Shopping

1. THE DEVELOPMENT OF ONLINE MARKETPLACES

In the past two decades, technological advances have gradually shifted the consumption and shopping habits of people in most countries from mainstream offline traditional shopping to online shopping. As a result, e-commerce was born and gradually experienced a major transformation from PC to mobile. This evolution not only changed consumers' shopping habits, making people's consumption and the social economy more active and positive, but also promoted the overall progress of the design concepts and technical architecture of online shopping platforms [1].

Initially, e-commerce platforms were mainly built on PC browsers, relying on the UI interface of the computer web page. This posed certain operational challenges for those who are unfamiliar with online shopping [2]. After a period of development, the iteration of smartphones and the experience of mobile Internet have been improved strongly. Therefore, consumers' shopping habits have gradually shifted to mobile devices. While satisfying shoppers' sense of instant gratification, this irresistible attraction has also greatly increased the profits of online shopping platforms. In most high-income countries and middle-income areas, many merchants have joined forces to create shopping festivals during specific periods, such as Black Friday in Europe and the United States, Christmas Carnival, New Year's Lucky Bag activities in Japan, and Double Eleven Shopping Festival in Asia Pacific [3]. Shopping behavior patterns have become deeply integrated into cultural traditions and everyday life and are closely integrated with the cultural activities of human society. Combining these development trends, Statista's digital market insights show that by 2023, global mobile e-commerce

sales revenue is expected to exceed US\$1.7 trillion, accounting for more than half of all retail e-commerce sales. The revenue generated by mobile device consumption has been increasing over time, from 43% in 2018 to an estimated 63% in 2028 [4].

Since then, mobile devices have brought different challenges, such as smaller screen sizes, unstable network environments, and user experience interaction methods on touch screens. This has forced online shopping platforms to re-examine their design strategies and shift to mobile-first design. In the future technology landscape, it can be boldly predicted that the evolution of online shopping platforms will transcend technology and equipment growth, but will also be committed to optimizing the full-scenario user experience and optimizing the holistic of the overall shopping process. From linear thinking to systematic thinking would all transform. For example, we may shop for various products we like on the street anytime through portable smart identification devices or VR glasses, and then drones could facilitate end-to-end delivery of these from the warehouse to consumers. The operation and ordering resistance throughout the shopping journey will be optimized to the minimal level, closer to the realization of the "instant ownership" shopping experience, and one-to-one private customization and gifting customized services can also be provided. By then, the design of online shopping platforms will pay more attention to real-time interaction and intelligent response, providing users with a more immersive and personalized shopping experience.

2. FUNDAMENTAL PRINCIPLES OF ONLINE SHOPPING DESIGN

In the current fierce competition between e-commerce and the endless emergence of online shopping platforms, the overall design of the e-commerce system has become a key link in cultivating user habits and loyalty. In the overall system design, interface design (UI) and user experience (UX) are indispensable core elements [5]. A successful shopping platform must first have visual attractiveness, satisfy users' visual enjoyment, timely feedback on user actions, and also personalize their experiences and a wide range of tailored advertising guidance for various user groups through carefully designed interaction design and user research [6]. Especially with the support of big data and artificial intelligence (AI) technology in the context of technological progress today, online platforms can access users' historical data and dynamically adjust content and recommendations according to users' preferences and behaviors, thereby providing each user with a unique shopping experience.

2.1. Interface Design (UI)

To ensure that users have the best shopping experience possible, user interface (UI) design must be blended with professional design concepts. For example, determining the priority and presentation level of information content requires a sensible information architecture. Then, designers can reorganise the page content based on the significance and relevance settings, allowing users to swiftly scan diverse content when they visit the page, use logic to identify information on the page, and efficiently reach secondary pages [7]. The success of contemporary online shopping platforms largely depends on the interface design's simplicity, responsiveness, and usability. It is evident that interface design is the most direct means for users to interact with the system.

Taking Amazon's web design as an example, Amazon's homepage layout effectively guides users to different functional areas, such as the search bar, banner area, category navigation and personalized recommendation area, through clear visual hierarchy and concise information architecture. When users visit the homepage, a prominent visual focal point is used to highlight the limited-time promotion activities in the banner area, some advertisements and the latest activities are placed in the front of the page layout, which immediately captures the user's attention and guides the secondary click-through rate of the visit. On the search results page, through the clear visual separation page design, users can easily browse the detailed information of different products and filter them again. In addition, the whole design adopts a responsive design method to ensure that the user's browsing

experience is consistent on multiple devices. Ensuring good design consistency and continuity can foster an uninterrupted shopping environment, lead users to locate key functions and complete the entire shopping process effortlessly, especially when browsing on mobile devices.

2.2. Interaction Design (UX)

The optimization goal of e-commerce interaction design is to improve the interaction efficiency and user stickiness between users and the system, improve user satisfaction, and enable users to repeatedly log in to the e-commerce platform to participate in activities, place orders and purchase. Micro-interactions are still a part of the user experience during the entire shopping process. For example, when a user clicks the "Add to Cart" or "Favorites" button, the instant feedback that appears can minimize disruptions to the shopping process, avoiding the modal pop-up window of the dialogue box, and using the Toast feedback style as a non-intrusive prompt for user actions [8]. In addition, the button design of most shopping platforms tends to adopt a single style, which may cause unnecessary misoperations and repeated actions by users. Therefore, a better interactive design should have colour or style changes to provide click feedback.

If the purchase button and page content remain unchanged, the user may click multiple times to confirm whether their operation was successful, at the same time, multiplex data accesses and loads may occur in the system background, resulting in the system loading more slowly and crowdedly. These situations are often prone to occur during shopping festivals and promotions. The design of an effective feedback mechanism can prevent repetitive actions during page updates, navigation interruptions, or slow network connections.

2.3. Cross-Scenario Design

To ensure that the interaction design and interface design can improve user needs, in-depth user research is indispensable. Through various user research, designers can better analyze and optimize the shopping process. Especially in the context of the combination of big data and AI, many smart wearable devices have become popular. For example, shopping applications can be placed in AR glasses. Through the analysis of user behavior, the platform can adjust the content in real-time, such as recommending related products or generating dynamic advertisements, to enhance personalized experience services that are closer to the real needs of each user. The launch of shopping applications for smart devices can also help users scan and record the favourite items they randomly find in daily life record their daily purchase plans at any time, and provide users with more cost-effective products and promotions when needed.

This can not only break the tour and shopping behaviors that depend on a specific period, expand shopping scenarios, improve users' operational perceptions and seamlessly integrate the entire shopping process into fragmented time. Through a reasonably designed data feedback mechanism and the collation of historical data in different time periods and devices, the accuracy and conversion rate of the system can be better improved.

2.4. Accessibility Design

Accessibility design is key to ensuring that the platform works for different user groups, especially in a global user context. The e-commerce system should consider user backgrounds and device access scenarios. For example, eBay's mobile interface has an adaptive layout under different screen sizes and optimizes content display by using a fluid layout and elastic grid system so that users can get a consistent visual experience on different devices. eBay's accessibility design also includes support for multiple languages, and adjustment of font size and contrast, to ensure that all users can shop without obstacles regardless of the device they use or their abilities. Above these, responsive design always needs to ensure that content can be well rendered on most devices. In addition, system design

can further enhance the platform's ease of use and friendliness through the combination of colour contrast testing, voice assistance technology and other technologies, and provide relevant audio-visual services to vulnerable groups and diverse user groups as much as possible to ensure a good user experience and sustainable development [9].

3. THE IMPACT OF USER EXPERIENCE ON ONLINE SHOPPING PLATFORM DESIGN

The online shopping business model (e-commerce) has tremendously promoted and optimised commodity circulation and human society's economic development, as well as assisting many countries in transporting commodities to various areas of the world at low costs. Users can receive special commodities from various regions and cultural backgrounds at home, which greatly satisfies people's curiosity and exposure to the richness and diversity of cultures, while also promoting commodity circulation and e-commerce development, resulting in a positive cycle [10]. Furthermore, based on the convenience of mobile devices and changes in the connection environment of the 24-hour network, changes in user behaviour and emotional demands have influenced the development of e-commerce in a more user-friendly manner.

In this sense, user experience design (UX) has a significant impact on the user's working efficiency as well as his or her emotional demands. The core of user experience design lies in how to seamlessly combine user needs with technology to improve user satisfaction and participation in the entire shopping process. In the design of modern online shopping platforms, interface design (UI) and user experience (UX) are inseparable cores. A successful shopping platform should be visually appealing while providing a personalized experience through carefully designed interaction design and user research. In particular, with the support of big data and artificial intelligence (AI) technology, online platforms can dynamically adjust content and recommendations based on user preferences and behaviors, thereby providing each user with a unique shopping experience [11]. For example, in the whole online shopping process, an important aspect of user experience design is how to guide users to quickly find the desired products and complete the checkout in as few steps as possible.

By optimizing the shopping cart, checkout process and overall payment experience, the user's operation steps are reduced to no more than three steps, thereby improving the overall smoothness of the user experience. Especially on the mobile side, with a focus on micro-interactions, where the sense of interaction between users and the system is enhanced through instant feedback, such as dynamic reminders when products are added to the shopping cart [12]. As users gradually rely on smartphones for daily communication and handling of various affairs, in addition to searching for the items they need on time, users will also compare and browse between various online merchants and shopping live broadcast rooms. Users hope to communicate and interact directly with the influencers and bloggers who use them to buy items. This shows that user-emotional design is becoming more and more important. Designers can meet users' emotional needs and enhance entertainment and participation in the shopping process by introducing functions such as live broadcast interaction and social shopping. These changes reflect that the development of e-commerce has to meet the emotional needs of shoppers to a certain extent; otherwise, it may face challenges such as a lack of competitiveness and difficulties in driving traffic [13].

The design of online shopping platforms must adapt to this new user demand, improve the user interface and users' experience of the shopping platform, meet users' immediate sense of gain and emotional needs as much as possible, and provide areas and channels for communication and discussion. User experience design needs to be continuously modified and improved in response to user feedback and technology advancements in order to sustain user engagement and boost platform usage frequency. Through improved design, this will increase user satisfaction and loyalty in addition to ensuring that the platform can adjust to changing user needs. Gathering user feedback and usage

statistics, examining user behaviour and preferences, and spotting possible issues and pain areas are all part of the routine optimisation process [14].

4. CREATE AN INTEGRATED LOGISTICS AND E-COMMERCE SYSTEM.

In e-commerce operations, a platform with a strong user experience will assess the whole integration and feedback information of the logistics system and the platform at the outset of the design phase. Feedback on logistics and delivery status improves the shopping experience and affects customer perception of the site. If problems emerge during delivery and are not resolved in a timely manner, or if the delivery party's delivery service is insufficient, the user's overall purchasing experience in the last segment of the end-to-end service will suffer, resulting in irreversible losses. In this regard, the system design must ensure that, from the order of products to the commodities entering and exiting the warehouse, every link in the logistics supply chain can execute its obligations and achieve effective and seamless operation and integration. As a result, the smooth connection between the logistics system and the platform system is an essential component of the platform architecture that cannot be overlooked.

A warehouse management system (WMS) is an important part of the logistics system and an important link in the e-commerce chain. Data synchronisation and platform integration are necessary. From inventory control to delivery, it is in charge of overseeing the complete procedure [15]. In order to ship the goods out of the warehouse, the platform must query the address and inventory, send the data to the WMS system via the interface, and connect with the delivery logistics when a user places an order.

As e-commerce becomes more globalized, system design must also take into account differences in distribution services and regulations across countries, such as cross-regional distribution, customs clearance, cross-border transportation integration, etc. Setting up a screening mechanism for products that can be purchased and delivered in different regions at the beginning of the design will improve logistics efficiency, provide users with the best experience when purchasing overseas in different countries, and save users' screening time and order efficiency. In the selection of cross-border logistics transportation and service providers, the e-commerce system can provide users with a variety of delivery options by integrating different logistics service providers, and guide users to choose appropriate logistics solutions through interface design. Such a design can effectively improve User experience provide users with a personalized service experience and standardize charging standards [16].

5. UPCOMING DEVELOPMENTS IN THE DESIGN OF E-COMMERCE SYSTEMS

In future development, mobile e-commerce will continue to develop and derive new functions with the iterative progress of technology and the real-time changes in user needs, deepen the integration of mobile online shopping and life, and promote further innovation in system design. While technologies such as artificial intelligence (AI) and augmented reality/virtual reality (AR/VR) have not yet reached widespread application and certain technical challenges and user experience issues are still being refined, it is foreseeable that these technologies will impact both the shopping experience and e-commerce system design, thereby affecting user experience [17]. For example, through the AI-driven personalized recommendation system, the platform can dynamically adjust the product display based on the user's historical data and real-time offline life behavior to achieve a more accurate personalized experience. AR/VR technology may give customers an immersive buying experience, such as "virtual fitting" or "home furnishing simulation" without leaving their homes, reducing decision-making time and increasing purchase confidence in all areas.

Furthermore, the design of future e-commerce systems can incorporate more social responsibility into their growth. E-commerce platforms may help users adapt and provide new functionalities for sustainable consumption by analysing data and optimising designs. By showing the carbon footprint of items in the interface or offering ecologically friendly alternatives, people might subconsciously shift towards green consumption. These technology and design advancements will not only impact the market structure of e-commerce in all aspects but will also alter how consumers engage with the platform, opening up new avenues for user experience and company development.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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REFERENCES

- [1] LI, L. C. (2023). Technological Advancements and Consumer-Centric Transformation: The Evolution of Online Shopping Platforms. *Highlights in Business, Economics and Management*, 23, 706-711.
- [2] Fernie, J. (2005). *Online shopping*. Bradford, England: Emerald Group Publishing.
- [3] Zeng, M., Cao, H., Chen, M., & Li, Y. (2019). User behaviour modeling, recommendations, and purchase prediction during shopping festivals. *Electronic Markets*, 29, 263-274.
- [4] Statista. (2024). Mobile commerce revenue and share of total retail e-commerce worldwide from 2017 to 2028. Statista. <https://www.statista.com/statistics/1449284/retail-mobile-commerce-revenue-worldwide/>
- [5] King, D. (2024). *Complete website planning guide*. Ireckon.
- [6] Matous, F. (2017). *How to get your website noticed*. Pan Macmillan.
- [7] Moritz, T., Schewe, K. D., & Thalheim, B. (2005). Strategic modelling of web information systems. *International Journal of Web Information Systems*, 1(4), 223-240.
- [8] Saffer, D. (2013). *Microinteractions: designing with details*. " O'Reilly Media, Inc.".[9] Matuzović, M. (2024) *Web accessibility cookbook: Creating inclusive experiences*. Sebastopol, CA: O'Reilly Media, Inc.
- [9] Laudon, K. (2023) *E-commerce 2023-2024: Business. Technology. society., Global Edition*. PEARSON EDUCATION LIMITED.
- [10] Karat, C.-M., Blom, J.O. and Karat, J. (2010) *Designing personalized user experiences in Ecommerce*. Dordrecht: luwer, c2010.
- [11] Han, M. C. (2023). Checkout button and online consumer impulse-buying behavior in social commerce: A trust transfer perspective. *Journal of Retailing and Consumer Services*, 74, 103431.
- [12] Sheng, H., & Joginapelly, T. (2012). Effects of web atmospheric cues on users' emotional responses in e-commerce. *AIS Transactions on Human-Computer Interaction*, 4(1), 1-24.
- [13] Di Fatta, D., Patton, D., & Viglia, G. (2018). The determinants of conversion rates in SME e-commerce websites. *Journal of Retailing and Consumer Services*, 41, 161-168.
- [14] Lorenc, A., & Burinskiene, A. (2021). Improve the Orders Picking in e-Commerce by Using WMS Data and BigData Analysis. *FME Transactions*, 49(1).
- [15] Saskia, S., Marei, N., & Blanquart, C. (2016). Innovations in e-grocery and Logistics Solutions for Cities. *Transportation Research Procedia*, 12, 825-835.
- [16] Billewar, S. R., Jadhav, K., Sriram, V. P., Arun, D. A., Mohd Abdul, S., Gulati, K., & Bhasin, D. N. K. K. (2022). The rise of 3D E-Commerce: the online shopping gets real with virtual reality and augmented reality during COVID-19. *World Journal of Engineering*, 19(2), 244-253.
- [17] Kowalczuk, P., Siepmann, C., & Adler, J. (2021). Cognitive, affective, and behavioral consumer responses to augmented reality in e-commerce: A comparative study. *Journal of Business Research*, 124, 357-373.

- [18] Saeed, A., Zahoor, A., Husnain, A., & Gondal, R. M. (2024). Enhancing E-commerce furniture shopping with AR and AI-driven 3D modeling. *International Journal of Science and Research Archive*, 12(2), 040-046.
- [19] Uhm, J. P., Kim, S., Do, C., & Lee, H. W. (2022). How augmented reality (AR) experience affects purchase intention in sport E-commerce: Roles of perceived diagnosticity, psychological distance, and perceived risks. *Journal of Retailing and Consumer Services*, 67, 103027.