LITERATURE SURVEY

[1] Jindi Fu, Samar Mouakket, and Yuan Sun, "The role of chatbots' human-like characteristics in online shopping", *Electronic Commerce Research and Applications*, vol. 61, p. 101304, August 2023. doi:10.1016/j.elerap.2023.101304. Link.

This study investigates what motivates customers to trust and adopt chatbots in online shopping. It identifies two key factors: customer readiness traits (optimism and innovativeness) and chatbots' human-like characteristics (empathy and social presence). The findings show that both positively influence trust, while excessive anthropomorphism negatively impacts trust. Importantly, trust itself strongly drives customers' willingness to use chatbots. The study highlights that well-designed chatbots can enhance shopping by providing guidance, comparisons, and personalized recommendations, but success depends on building trust through the right balance of human-like qualities without over-humanizing. These insights are valuable for chatbot developers and businesses aiming to improve customer adoption and satisfaction in e-commerce.

[2] Sidlauskiene, Justina, Yannick Joye, and Vilte Auruskeviciene, "AI-based chatbots in conversational commerce and their effects on product and price perceptions", *Electronic Markets*, vol. 33, no. 1, May 2023. doi: 10.1007/s12525-023-00633-8. Available: ResearchGate.

This study by Sidlauskiene, Joye, and Auruskeviciene (2023) explores how anthropomorphic verbal cues in AI-powered chatbots influence consumer perceptions in conversational commerce. Through one pre-test and two online experiments, the researchers found that when chatbots use human-like language and design cues, consumers perceive products as more personalized and, under certain conditions such as situational loneliness, show greater willingness to pay higher prices. The results suggest that anthropomorphism creates a familiar, human-like interaction frame that reduces uncertainty in online shopping. Importantly, the study highlights that the effectiveness of chatbot design depends not only on technical features but also on consumer psychological states like loneliness. For practice, these insights indicate that businesses can strategically design anthropomorphic chatbots to enhance personalization, consumer trust, and potentially revenue in e-commerce.

[3] Badave P, Bhomaj B, Bindu B, Shivarkar R, Prof Dhavase N,"E-commerce website with recommendation system including chatbot and reverse image search", *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, vol. 10, no. 9, pp. 1663-80., Sep, 2022. Available: Link.

Badave et al. (2022) proposed an e-commerce platform enhanced with a recommendation system, chatbot, and reverse image search to improve user experience and reduce information overload. The system integrates two key modules: a recommendation engine and a reverse image search service. The recommendation system applies content-based and collaborative filtering techniques to suggest relevant products based on user profiles and product attributes, while the chatbot leverages NLP algorithms like keyword extraction and text ranking to enable conversational interactions. The reverse image search module, built using Convolutional Neural Networks (CNNs), allows users to upload an image and automatically find visually similar products from the database without manual matching. Their approach demonstrates how combining machine learning, image recognition, and natural language processing can create a virtual shopping assistant that makes online shopping more personalized, efficient, and user-friendly. Future work is aimed at improving system accuracy and reliability for real-world deployment.

[4] M. Rahevar, Maharshi, and S. Darji, "The adoption of AI-driven chatbots into a recommendation for e-commerce systems to targeted customer in the selection of product", *International Journal of Management, Economics and Commerce, vol: 1, no. 2,* 128-137, 2024. Available: Link.

This study explores the adoption of AI-driven chatbots in e-commerce recommendation systems, focusing on their role in product selection, user satisfaction, engagement, retention, and trust. The authors framed five hypotheses around these dimensions and validated them through a quantitative survey of 268 Indian e-commerce users, analyzed using regression and structural equation modeling. The results show that chatbots significantly enhance product selection accuracy ($\beta = 0.480$), improve user satisfaction ($\beta = 0.840$), positively influence engagement and purchase decisions, and contribute to better user experience and retention rates. Additionally, the accuracy of chatbot recommendations was found to strengthen customer trust. Prior literature supports these findings, with studies highlighting AI's role in personalized recommendations (Ebaietaka, 2024; Tran, 2024), customer engagement (Timothy et al., 2024), and trust-building (Butt & Ahmad, 2023; Shahzad et al., 2024). However, the paper identifies a research gap in understanding the direct relationship between chatbot accuracy, user trust, and long-term customer loyalty. The study concludes that AI-powered chatbots are a transformative tool in e-commerce, recommending continuous refinement of chatbot algorithms and user-centric design to maximize business and customer benefits.

[5] Valencia-Arias, Alejandro, Hernán Uribe-Bedoya, Juan David González-Ruiz, Gustavo Sánchez Santos, Edgard Chapoñan Ramírez, and Ezequiel Martínez Rojas. "Artificial intelligence and recommender systems in e-commerce. Trends and research agenda." *Intelligent Systems with Applications* 24, p.200435, Dec 2024. doi: 10.1016/j.iswa.2024.200435. DOI

The paper investigates the integration of AI-driven chatbots into e-commerce systems with a focus on enhancing personalized product recommendations and customer decision-making. It emphasizes that AI-powered conversational agents, using Natural Language Processing (NLP), Machine Learning (ML), and recommendation algorithms, enable businesses to deliver real-time, tailored product suggestions and 24/7 customer support. Prior studies cited highlight how chatbots improve customer engagement, satisfaction, and trust by reducing decision fatigue and offering human-like interactions. Research also points to their role in streamlining operations by handling repetitive queries at scale while freeing human agents for complex tasks. However, gaps remain in evaluating long-term impacts on customer loyalty, trust, and purchase behavior, particularly in diverse demographic and cultural contexts. The reviewed work collectively suggests that chatbots are not only a tool for efficient product discovery but also a strategic driver of customer retention and business growth in the evolving digital marketplace.

[6] Priya , and Dr Nidhi Bhagat, "The impact of AI-powered chatbots on shopper experience in e-commerce," *International Journal of Creative Research Thoughts (IJCRT)*, vol. 13, April 2025. Available: Link

This paper has examined the impact of AI-powered chatbots on shopper experience in e-commerce, focusing on customer satisfaction, trust, personalization, and ease of use. Drawing on prior studies, they highlight that chatbots provide clear benefits such as 24/7 availability, quick responses, cost savings, and convenience, which can improve customer engagement and sales. However, the paper also emphasizes persistent challenges, including lack of personalization, limited understanding of complex queries, and reduced emotional connection compared to human agents. Their empirical survey of 100 online shoppers revealed that chatbot speed (avg. 4.2/5) and ease of use (4.0/5) scored highly, while trust (3.9/5) and personalization (3.7/5) were weaker points. These findings suggest that while chatbots enhance overall satisfaction (4.1/5), improvements in human-like interaction and trust-building mechanisms are essential for long-term adoption. The authors identify a research gap in exploring emotional aspects of chatbot interactions and differences across user demographics, recommending future work on advanced NLP, personalization, and user-centric design to make chatbots more effective in shaping positive online shopping experiences.

[7] Dwivedi, Rohit, Abhineet Anand, Prashant Johri, Arpit Banerji, and N.K Gaur. "Product based recommendation system on amazon data." *Int J Creat Res Thoughts–IJCRT, June* 2020. Available: Link

This survey explored the role of AI-based chatbots in enhancing e-commerce recommendation systems, particularly for improving customer decision-making and business outcomes. The study emphasizes that chatbots integrated with Natural Language Processing (NLP) and Machine Learning (ML) enable more accurate product recommendations by analyzing user preferences, purchase history, and browsing patterns. Previous works cited in the study point to chatbots' ability to reduce customer effort, enhance convenience, and provide round-the-clock support, thereby improving overall satisfaction. The authors also highlight that businesses benefit from operational efficiency and reduced customer service costs, while customers gain personalized and seamless shopping experiences. Despite these benefits, the paper identifies challenges such as lack of deep personalization, limited contextual understanding, and user trust concerns, which can restrict full adoption. The review concludes that future advancements should focus on more adaptive algorithms, improved emotional intelligence, and greater transparency in chatbot interactions, to ensure both customer engagement and long-term loyalty in the e-commerce domain.

[8] Illescas-Manzano, María, Sergio Martínez-Puertas, Paulo Ribeiro Cardoso, and Cristina Segovia-López. "Use of Online Shop Chatbots: How Trust in Seller Moderates Brand Preference and Purchase Intention." In *International Conference on Advanced Marketing Practice*, pp. 151-171. Cham: Springer Nature Switzerland, Nov 2024. DOI

They have investigated the role of AI-powered chatbots in e-commerce with a focus on how they influence trust in sellers, brand preference, and purchase intention. Building on the Technology Acceptance Model (TAM) and the Information System Success (IS) model, the study proposed that chatbot characteristics—usefulness, ease-of-use, and responsiveness—act as antecedents of trust in the seller, which then impacts brand preference and purchase intention. Survey data from 173 Spanish consumers revealed that usefulness and responsiveness significantly enhanced trust, while ease-of-use was not significant, likely due to the young, tech-savvy sample being comfortable with digital tools. The findings highlight trust as a mediating variable: consumers who perceive chatbots as reliable and responsive are more likely to prefer a brand and intend to purchase from it.

The study extends previous research by shifting focus from customer satisfaction and intention to use chatbots toward understanding trust as a bridge between chatbot interaction and brand outcomes. The authors stress that well-designed chatbots that provide useful and quick responses

can reduce consumer uncertainty, build stronger brand-consumer relationships, and drive sales. However, the paper notes limitations in its cultural and demographic scope (Spanish, young consumers) and suggests future research across different age groups, cultural contexts, and longitudinal settings. Practically, the study advises businesses—especially small and medium enterprises—to prioritize chatbot responsiveness and utility in design to strengthen trust and customer loyalty.

[9] Haque, Md Zahurul. "E-commerce product recommendation system based on ml algorithms." *arXiv preprint arXiv:2407.21026* (2024).DOI

This study evaluates different machine learning algorithms—Random Forest, Decision Tree, Logistic Regression, and Gaussian Naive Bayes—for building an effective e-commerce product recommendation system, with Principal Component Analysis (PCA) used for feature reduction. By comparing the models on regression and classification metrics (R^2, MSE, MAE, accuracy), the research found that Random Forest consistently outperformed the others, achieving very high accuracy and robust predictive power, while PCA improved efficiency without significant accuracy loss. The work contributes by showing that ensemble-based approaches are particularly effective in handling the complexity of e-commerce recommendation data. However, the study is limited in scope, as it focuses on algorithmic performance in a controlled dataset rather than large-scale, real-world settings with issues like cold-start and temporal drift. The paper highlights that dimensionality reduction combined with robust classifiers can optimize recommendation accuracy, providing valuable insights for scalable e-commerce systems.

[10] Udokwu, Chibuzor, Robert Zimmermann, Farzaneh Darbanian, Tobechi Obinwanne, and Patrick Brandtner. "Design and implementation of a product recommendation system with association and clustering algorithms." *Procedia Computer Science* 219 (2023): 512-520. DOI

This paper presents a hybrid recommendation framework that integrates **association rule mining (Apriori)** with **K-means clustering** to enhance e-commerce product suggestions. Association rules were used to identify frequently co-purchased products, while clustering mapped customer demographic profiles linked to each rule, enabling more targeted and personalized recommendations. Applied in a case study of a B2B hygiene retailer, the approach successfully produced actionable product associations alongside distinct customer profiles, demonstrating how businesses could tailor cross-selling strategies to specific user segments. The study extends prior recommendation work by explicitly connecting *who* buys with *what* associations, offering richer insights than product-level rules alone. Its limitations include reliance on a single dataset and restricted demographic attributes, which may reduce generalizability. Still, the findings emphasize that combining association analysis with customer profiling strengthens the

explanatory power of recommendations and opens opportunities for more personalized e-commerce solutions.