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Agentic Commerce: A Systematic Review of AI-Driven Autonomous Shopping and Emerging Transaction Protocols

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Abstract. This study presents a systematic literature review of agentic commerce, with particular emphasis on autonomous shopping systems, machine-to-machine transaction protocols, and the governance conditions necessary for their large-scale adoption. Rapid advances in large language models, generative artificial intelligence, and autonomous agent architectures are transforming digital commerce by enabling intelligent agents to search for and assess products, compare suppliers, negotiate transaction terms, execute purchases, coordinate logistics, and manage post-purchase activities with limited human involvement. Despite increasing academic and industry interest, the relevant literature remains fragmented across e-commerce, information systems, artificial intelligence, cybersecurity, digital governance, and consumer behavior research. Following the PRISMA 2020 methodology, this review examines studies published between 2020 and 2026 and retrieved from Scopus, Web of Science, IEEE Xplore, ScienceDirect, SpringerLink, and the ACM Digital Library, supplemented by searches of Google Scholar and arXiv. Following identification, deduplication, screening, eligibility assessment, and quality appraisal, 42 studies were included in the qualitative synthesis. The evidence was analyzed using the AI-Commerce Integration Assessment Framework, which enabled systematic interpretation of the literature across the dimensions of readiness, feasibility, performance, and maturity. The findings indicate a clear transition from AI-assisted product discovery and recommendation systems toward increasingly autonomous purchasing environments in which AI agents operate as active economic actors. However, broader adoption remains limited by concerns related to trust, privacy, transparency, accountability, cybersecurity, user control, and legal responsibility. The review also identifies emerging infrastructures for digital identity, authentication, interoperability, automated negotiation, smart contracts, payment settlement, and dispute resolution. Nevertheless, these mechanisms remain weakly standardized and insufficiently interoperable across platforms and jurisdictions. Overall, agentic commerce is conceptualized as a transition from human-centered digital transactions toward AI-mediated economic ecosystems. Its sustainable development will depend on the coordinated evolution of technical standards, governance structures, explainable AI, consumer protection mechanisms, accountability frameworks, and secure transaction infrastructures. This review provides an integrated synthesis of the field and identifies priorities for future empirical research on real-world implementation, interoperability, regulation, market effects, and human-AI collaboration.

Keywords: agentic commerce, AI-driven autonomous shopping, emerging transaction protocols.

Introduction

Rapid advancements in artificial intelligence (AI) are impacting the way digital commerce is designed and are moving the reliance on human-centred decision-making toward fully automated and fully autonomous systems. Digital commerce has traditionally been the human-centred activity of searching for, comparing, and purchasing goods. Recent advancements integrating generative AI, large language models, and autonomous agent systems are changing

this structure and are commonly referred to as agentic commerce. This paradigm is fully autonomous intelligent agents that search, evaluate, purchase, and complete all post-transaction activities with minimal human oversight. (Kodali, 2025; Dusad, 2025). Within this context of commerce, agentic commerce systems are viewed as goal-oriented AI systems with a high degree of autonomy to carry out all transactional activities within digital marketplaces. Unlike traditional commerce systems, AI-centric systems act as autonomous economic agents. This change will disrupt the digital commerce model by placing existing behavioural, technological, and economic commerce frameworks of transactional activities within a new context.

Older types of e-commerce heavily depended on rule-based systems and a lot of user interaction. However, with agentic commerce systems, autonomous action is the focus. Earlier automated e-commerce systems, such as recommendation systems, chatbots, fraud detection, and customer service automation, were designed to assist human decision-making and stop at that (Bawack et al., 2022; Gupta, 2025; Fedorko et al., 2022; Pallathadka et al., 2023). Earlier waves of digital commerce research documented how artificial intelligence was applied to recommendation, personalisation, logistics, and immersive retail interfaces across national markets (Verma & Singh, 2022; Sharma & Dey, 2023; Al Khaldy et al., 2023; Jayakumar, 2025). By contrast, agentic AI systems have been designed to make and execute decisions on their own (Agrawal, 2025; Basu, 2026). The emergence of generative AI and the progressive automation of operational pipelines provided the technical foundation for this autonomy (Feuerriegel et al., 2023; Venigandla & Vemuri, 2022). These systems can discover products, investigate dynamic pricing, negotiate purchase terms, pay for items, and organise delivery (Dusad, 2025; Sotiya et al., 2026). They further help customers and sellers transact with each other faster, cheaper, and more easily, with the caveat that the more autonomous the systems are, the more issues of responsibility, trust, and oversight come into play, especially in scenarios where the systems are making and acting on decisions without the aid of people.

The increased use of agentic commerce systems has furthered interest in research in several different fields. As a result, many perceived challenges of autonomous systems, such as concerns over trust, control, transparency, and the usefulness of the system, have formed the basis of a lot of the current research (Balaskas, 2026; Hasselwander et al., 2026). As with all other systems, the perceived anthropomorphism, personalisation, and familiarity of the autonomous system greatly affect acceptance. While the systems assist in faster and more personalised shopping, they have a negative effect on privacy, assist in the biased use of algorithms, and loss of control for the user (Cowgill et al., 2021; Zarifis & Efthymiou, 2023; Molapo, 2025). These obstacles indicate that systems for persuasive and autonomous commerce without strong governance will likely be unsustainable in the long term. Therefore, regulatory systems where governance is coupled with market efficiency, consumer protection and behavioural integrity should be developed to address the ethical concerns of these systems. There has been a growing interest in new transaction protocols to facilitate machine-to-machine commerce. With the increasing ability of AI agents to make and complete transactions independent of any human input, the reliance on human-centred payment systems is becoming inadequate. Autonomous commerce will necessitate the creation of new systems for authentication, verification, trust, negotiation, settlement, security, and others across a digital environment that is decentralised (Dusad, 2025; Chinnaraju, 2026). With these systems, the trust and security of autonomous commerce and the integrity of the autonomous AI agents' decision-making will need to be addressed (Kshetri, 2025). As commerce is made more programmable and agent-centric, transaction protocols will need to address interoperability, trust, and regulatory frameworks.

There is also evidence to show that agentic AI is having a positive impact across sectors on the coordination of disparate tasks, optimisation of resources, and the execution of decisions. Reported use cases can be seen in enterprise systems, cybersecurity, education,

supply chain, and even micro and small enterprises (Ozman, 2025; Olujimi et al., 2025; Saleem, 2026; Ishakoglu, 2026). Comprehensive surveys of the agentic AI landscape have begun to catalogue the definitions, frameworks, architectures, and evaluation metrics that underpin these systems (Acharya et al., 2025; Bandi et al., 2025). Retail markets are experiencing these same disruptions with systems that support AI and adaptive negotiation, conversational commerce, and custom shopping experiences that adjust to consumer behaviour in real time and to changes in the market (Mittameedi et al., 2025; Trivedi, 2025; Sotiya et al., 2026). Agentic AI is moving from being an assistive technology in economic systems to being a participant that directly influences consumers, market dynamics, and the competitive edge. This development highlights agentic commerce as an important new topic of study within both digital economics and the information systems discipline.

Research on agentic commerce is still scattered, despite an expanding body of literature. Research on agentic commerce touches on the use of AI, recommender systems, conversational agents, multi-agent systems, policies and regulations, and the design of digital markets (Stübinger & Metz, 2026; Zhang et al., 2026). AI-empowered commerce has received some attention, but little work discusses autonomous shopping systems and the transaction protocols that support them. The pace of technological development and the state of the literature have failed to keep up with the evaluation of the advantages, challenges, governance, and the future of agentic commerce. For these reasons, a review utilizing PRISMA 2020 is needed to assess the current state of the literature, categorize new transaction models, and provide a foundation for the design of AI-based autonomous commerce.

Theory and Research Questions

The evolution of e-commerce has been concerned with the establishment of systems that provide support for humans when searching for, comparing, negotiating, and transacting. Over the years, incremental enhancements to e-commerce systems have been made and have resulted from the embedding of recommendation systems, virtual agents, predictive analytics and automated customer support systems (Bawack et al., 2022; Alam et al., 2025; Necula & Păvăloaia, 2023; Micu et al., 2021). The latest improvements in AI systems, particularly in the area of large language systems and autonomous agents, have changed the digital commerce landscape to a new paradigm called agentic commerce. Agentic AI systems are AI systems designed to operate more autonomously. Whereas older, conventional AI systems designed to assist users with decision making only operate in a way somewhat dependent on their users, agentic AI systems independently perform activities like product search and selection, purchasing activities, and anything that follows afterwards. As a result, agentic AI systems pose major disruptions to conventional e-commerce systems. They change the way users, businesses, and e-commerce systems interact with each other.

Theoretically, the emergence of agentic commerce is the result of the self-agency and decision-making attributes of systems that incorporate autonomous agents. In the context of agentic commerce, AI systems are able to perform complex self-agency tasks. As a result of these systems, the process of online shopping is rapidly becoming a process that is performed by AI systems through autonomous self-agents that transact with online merchants and digital systems on behalf of the users. This is also happening in the realm of conversational commerce. Here, systems that employ AI to a much greater extent than before are exerting real-time control over the purchasing decisions of consumers. This prompted the research question:

RQ1: What is the role of AI in the commercialisation of the Internet, and how does it impact consumer behaviour?

Along with these innovations, agentic commerce is creating new challenges and apprehensions. Because of these challenges, the users' acceptance of new technologies is highly dependent on the perceived usefulness and ease of use of the technology. Despite being customer-centric and trustworthy, autonomous AI systems prompt new issues, especially with the transparency and controllability of decision-making. Customers are more sceptical about

how much control an autonomous system has while executing transactions (Balaskas, 2026; Hasselwander et al., 2026). Privacy concerns, algorithmic inequity, and the insecurities of unencrypted mechanisms are the biggest obstacles to the adoption of AI and e-commerce (Cowgill et al., 2021; Zarifis & Efthymiou, 2023). The combination of insufficient regulation and a lack of accountability amplifies the pervasive distrust of autonomous commercial systems (Hosseini & Seilani, 2025; Balaji, 2026). The following research question arises from this mix of issues:

RQ2: What are the challenges to acceptance for agentic commerce systems?

The greater independence of commercial AI systems raises new questions about the governance of transactions and the assignment of responsibility. As AI systems gain the ability to autonomously conduct purchases and carry out transactions, the more complex traditional frameworks of accountability become, especially for errors, fraud, and negative externalities associated with the AI system (Chinnaraju, 2026). For this reason, the adoption of agentic commerce at scale will argue the establishment of transparent, equitable, and accountable systems of control and the assurance of signatory governance (Molapo, 2025; Trivedi, 2025). These governance issues create further impetus for understanding the institutional and behavioural challenges to acceptance and the adoption of these systems.

Simultaneously, the evolution of fully automated commerce systems requires a completely new transactional infrastructure designed to facilitate machine-to-machine commerce. Existing e-commerce systems depend on transaction processes that require human supervision at critical stages. This model is being challenged by agentic commerce systems, which allow AI systems to negotiate, authorise, and execute transactions with little or no human involvement (Dusad, 2025). According to recent developments, such systems are based on nascent transactional protocols which allow the authentication, verification, and secure execution of transactions on digital commercial platforms (Kshetri, 2025; Zhang et al., 2026). Such protocols significantly improve the efficiency of digital transactions and increase the interoperability, reliability, and trust of highly distributed commercial networks.

For autonomous commerce ecosystems, secure and standardised transactional systems are needed to ensure transparency and reduce the likelihood of operational failures. As AI systems become more interlinked across different systems, services, and commerce providers, sophisticated and reliable transactional systems are needed to ensure order and prevent the collapse of the entire system. These are the main systems that describe how agentic commerce operates. The third research question is as follows:

RQ3: What transaction protocols and frameworks support AI systems for autonomous commerce?

As interest in agentic commerce is spreading across different fields, the existing body of research is still very much lacking. The related work is found across artificial intelligence, digital governance, cybersecurity, e-commerce, and information systems research (Stübinger & Metz, 2026; Zhang et al., 2026). While previous studies have looked at AI implementation, recommendation engines, trust development, and design of digital markets, none have attempted to combine autonomy, transaction execution, and governance structures. The challenges posed by sustained, rapid technological advancement mean that many innovations exist without formally cataloguing or theorising about them.

As it stands, the further evolution of agentic commerce will likely necessitate the consideration of problems stemming from the collaboration of humans and AI, the development of optimal standards of interoperability, regulatory frameworks, and the safeguarding of consumers, as well as the deployment of explainable AI systems and the sustainability of autonomous commerce systems (Basu, 2026; Chinnaraju, 2026). This helps identify the gaps in knowledge necessary to assist the development of digital economy policy. This leads to the last research question.

RQ4: What are the key research directions to better understand agentic commerce systems?

Agentic commerce integrates autonomous systems to conduct AI-mediated transactions. This is reshaping the behaviours and structures of markets with new governance and accountability challenges. The overwhelming majority of research into this area is disconnected. These systems of governance and the transactions themselves are no exception. Given the lack of research, this area is a good candidate for a systematic review using a PRISMA 2020 approach.

Methodology

This research uses a systematic literature review (SLR) enhanced by the framework of PRISMA 2020. It provides an SLR of agentic commerce and the AI-based systems of autonomous shopping. An SLR promotes the transparency, rigour, and repeatability of research. This SLR used a systematic approach to identify, screen, and analyse relevant research with a focus on reducing bias and maintaining uniformity among the steps of the research.

To SLR, a systematic approach was employed to identify relevant literature. This approach was applied to the primary research databases: Scopus, Web of Science, IEEE Xplore, ScienceDirect, SpringerLink, and the ACM Digital Library. Google Scholar and arXiv were used to supplement the search with emerging and unpublished research. This search employed a set of predetermined keywords and Boolean operators. These include, but are not limited to:

- “agentic commerce” OR “autonomous shopping” OR “AI shopping agents”
- AND “artificial intelligence” OR “large language models” OR “multi-agent systems”
- AND “e-commerce” OR “digital commerce” OR “online retail systems”

To examine the emerging systems of AI-based commerce, the search was limited to the years of publication from 2020 to 2026. To ensure complete coverage of records published in 2026, the search was restricted to studies made available up to the search completion date; documents with a 2026 publication year that were not yet indexed by that date fall outside the scope of this review.

The complete query applied to each database combined the three keyword groups with Boolean operators as follows: (“agentic commerce” OR “autonomous shopping” OR “AI shopping agents”) AND (“artificial intelligence” OR “large language models” OR “multi-agent systems”) AND (“e-commerce” OR “digital commerce” OR “online retail systems”). The query was applied to titles, abstracts, and keywords, with field tags and truncation adapted to the syntax of each database. The database searches were conducted between 1 and 10 June 2026, and the search was last updated on 10 June 2026. Forward and backward citation searching of the included studies was performed during the same period and yielded 120 additional records, which are reported as other sources in the identification stage of the flow diagram. Two reviewers independently screened all titles, abstracts, and full texts against the eligibility criteria. Agreement was measured at the title and abstract stage, and disagreements at every stage were resolved through discussion; where consensus could not be reached, a third reviewer adjudicated the decision. The risk of bias and methodological quality of each included study were assessed using items adapted from the Critical Appraisal Skills Programme checklist and the Joanna Briggs Institute checklists, applied independently by the two reviewers. Studies that did not meet the minimum quality threshold were excluded at the full-text stage and are accounted for within the eligibility exclusions reported below.

Study Selection Process

In this research, the study selection process comprised four PRISMA stages: identification, screening, eligibility, and inclusion.

Identification: The initial literature search yielded 1,050 records from the databases and 120 records from other sources, for a total of 1,170 records.

Deduplication: The removal of duplicate records (n = 220) left 950 records for screening.

Screening: Title and abstract screening served to determine each record's focus on agentic commerce and AI-based autonomous systems. At this stage, 820 records were removed as irrelevant to this research, leaving 130 records for full-text screening.

Eligibility: Full-text screening was applied to 130 articles. At this stage, 88 studies were excluded for the following reasons: not addressing agentic or autonomous commerce systems ($n = 40$); not addressing any transaction- or commerce-related frameworks ($n = 28$); and insufficient analysis or opinion-based and conceptual work ($n = 20$).

Inclusion: After the eligibility assessment, 42 studies were included in the qualitative synthesis.

Inclusion and Exclusion Criteria

The systematic application of the inclusion and exclusion criteria ensured that the selected studies were both relevant and of high quality.

Inclusion criteria comprised published journal articles and conference papers based on empirical research; articles written in English; papers published from 2020 to 2026; articles indexed in major citation databases (Scopus, WoS, IEEE, and others); and studies on AI in commerce or on technologies and systems involving machine learning, deep learning, conversational agents, and multi-agent systems.

Exclusion criteria comprised blogs, popular-press articles, and non-peer-reviewed articles; books; non-English articles; articles unrelated to AI in commerce or autonomous systems; duplicate records; and articles unavailable in open-access format. Table 1 presents the inclusion and exclusion criteria in detail.

Table 1. Inclusion and Exclusion Criteria for the Systematic Literature Review

Inclusion Criteria	Exclusion Criteria
Peer-reviewed journal articles	Non-peer-reviewed publications
Conference proceedings	Books and book chapters
English-language studies	Non-English publications
Indexed in Scopus/Web of Science/IEEE	Non-indexed or informal sources
Focus on AI, agentic systems, or e-commerce.	Irrelevant to AI or commerce
Published 2020–2026	Outside timeframe
Full-text accessible studies	Inaccessible or incomplete records

Data Extraction and Coding

The developed framework for data extraction allowed for the gathering of particular information from the studies. Some of the information captured included author(s) and year, study location, type of AI system (assistive, semi-autonomous, or fully autonomous), type of commerce (retail, fintech, e-commerce systems), type of transaction (recommend, execute partially, execute fully), type of technology (LLMs, multi-agent systems, APIs, blockchain protocols), and significant findings, results, and constraints.

Analytical Framework

The synthesis of the included studies was structured through the AI-Commerce Integration Assessment Framework (ACIAF) proposed by Halat (2025), which provides a criteria-based, lifecycle-oriented lens for evaluating the integration of artificial intelligence into e-commerce operations. The framework supplies three analytical structures that were applied to the extracted data. First, the three readiness dimensions of ACIAF, namely data infrastructure, technical systems, and organisational state, were used as deductive coding categories to classify the preconditions and adoption barriers reported across the reviewed studies. Second, the five analytical modules of the framework, namely readiness assessment, opportunity identification and prioritisation, feasibility evaluation, performance specification, and optimisation feedback, were used to organise the thematic findings reported in the results

section against each research question. Third, the four-level maturity model and the three-tier KPI architecture, spanning the micro, meso, and macro levels, were used to interpret the developmental stage of the field and the way the literature measures the performance of autonomous commerce systems. Halat (2025) developed the framework specifically for the integration of AI into e-commerce operations, which makes it an appropriate analytical instrument for a review concerned with autonomous shopping systems and machine-to-machine transaction protocols. The quality of the studies was evaluated using modified items from the Critical Appraisal Skills Programme (CASP) and Joanna Briggs Institute (JBI) checklists. The studies' design and approach, source of data and their analysis, findings, and their contributions were assessed. Thus, studies that fell below these quality thresholds were excluded from the final synthesis. The primary design of this study is a qualitative systematic literature review conducted in accordance with PRISMA 2020; thematic synthesis is the principal analytical method, and the bibliometric component plays a supplementary descriptive role only. An analysis using a thematic synthesis was performed on the chosen studies. The analysis included coding of the data and arrangement of the data according to identified patterns, and the identification of notable and recurring ideas and their categorisation into conceptually related groups.

The entire review process strictly followed the PRISMA 2020 guidelines to ensure transparency and reproducibility. The PRISMA flow diagram (Figure 1) presents the complete study selection process, including the identification, screening, eligibility, and inclusion stages, with numerical values fully reconciled and consistent across all sections of the manuscript.

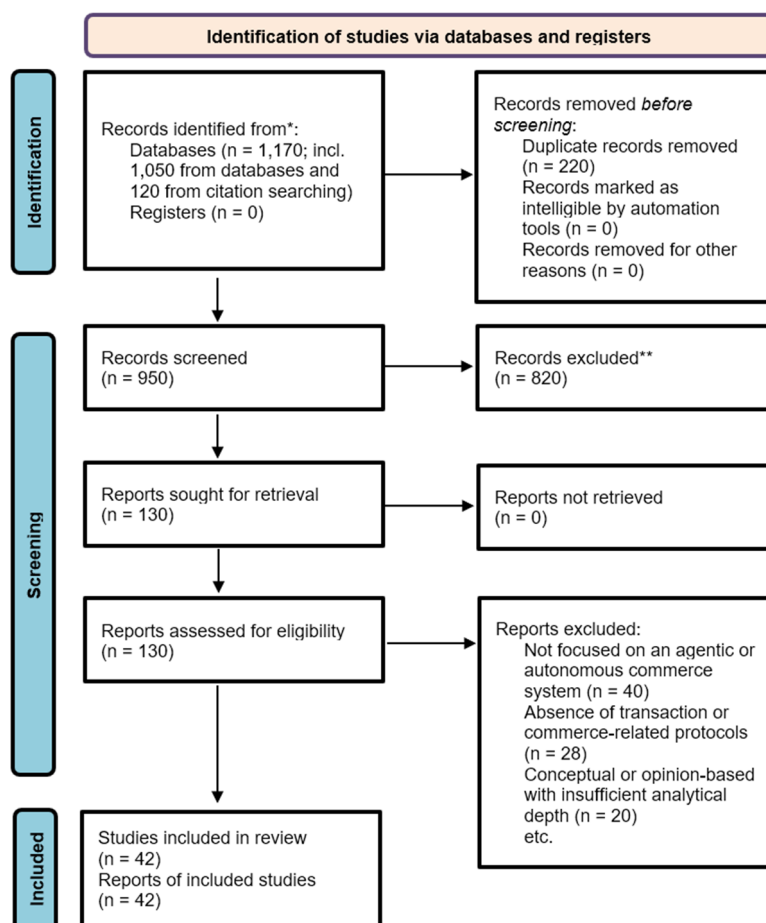


Figure 1. PRISMA 2020 flow diagram of the study identification, screening, eligibility, and inclusion process

No additional uncontrolled literature sample was included outside the PRISMA framework. All studies analysed in this review were derived strictly from the systematic search and screening process to maintain methodological integrity and avoid selection bias.

Results

Overview of the Literature and Publication Trends

A systematic review of 42 peer-reviewed publications was conducted to explore the origins and progress of agentic commerce, with particular interest in autonomous shopping systems and emerging transaction protocols. The selection of publications followed the PRISMA 2020 framework, which provided order and consistency to the processes of identification, screening, eligibility assessment, and inclusion. Following application of the specific inclusion and exclusion criteria, a total of 42 publications were included in the review for analysis. This synthesis builds on a growing set of reviews and bibliometric mappings of artificial intelligence in e-commerce and adjacent service domains, which together document the rapid expansion and thematic diversification of the field (Chugh & Jain, 2024; Satija & Singla, 2025; Baig & Yadegaridehkordi, 2026; Pai et al., 2022; Chen & Thianthai, 2026; Kumar et al., 2025). Early conceptual work within the automated economy itself, such as analyses of emergent AI-driven platforms, signaled the same trajectory toward machine-mediated interaction (Williams & Ferdinand, 2026). Interest in the study of agentic commerce increased noticeably from 2020 to 2026. Early publications focused on the application of artificial intelligence in digital commerce. Recent publications have focused on autonomous agents, intermachine transactions, and AI-driven decision-making autonomy. The period from 2020 to 2022 represents the formative background of the field, from which two of the included studies originate; these works focused on recommender systems, predictive analytics, chatbots, and the automation of customer service in e-commerce, where AI was understood as a decision-support system for enhancing customer experience, personalization, and operational efficiency. The period from 2023 to 2024 likewise contributes two of the included studies and marks the conceptual bridge toward autonomy. The rapid development of generative AI and large language models spurred focused research on conversational commerce, intelligent shopping assistants, and dynamic decision systems, in which AI was understood as an agent of interactive and contextual reasoning engaging actively with the consumer and the digital marketplace. The overwhelming majority of the included studies, 38 of the 42, were published between 2025 and 2026, as shown in Table 2, confirming that agentic commerce consolidated as a distinct research field only in this most recent period.

The period from 2025 to 2026 marks the emergence of agentic commerce as a distinct research field. Publications during this phase increasingly explored autonomous shopping agents, AI-to-AI transactions, programmable commerce systems, and governance frameworks for autonomous marketplaces. However, despite rapid conceptual development, empirical validation remains relatively limited, indicating that the field is still in an early stage of theoretical and technological maturity.

Table 2. Publication Distribution of Reviewed Studies (2020–2026)

	Number of Studies	Dominant Research Focus	Nature of Contributions	Representative Included Studies
2020–2022	2	AI-enabled e-commerce, recommendation systems, predictive analytics	Empirical foundation studies	Bawack et al. (2022)
2023–2024	2	Generative AI, conversational	Empirical and simulation studies	Sharma & Dey (2023); Zhang, X. et al. (2025)

		commerce, multi-agent collaboration		
2025–2026	38	Agentic AI, autonomous shopping systems, AI transaction protocols, governance frameworks	Predominantly conceptual and framework-based	Gupta (2025); Dusad (2025); Kodali (2025); Chinnaraju (2026); Balaskas (2026); Sotiya et al. (2026); Zhang, Y. et al. (2026)
Total	42	—	—	—

The literature reveals a progressive transition from assistive AI technologies toward autonomous commercial systems. Early studies concentrated on improving digital commerce through recommendation algorithms, machine learning models, and customer-service automation. These studies viewed AI primarily as a tool for augmenting human decision-making.

Subsequent research shifted toward interactive AI systems capable of understanding context, engaging in natural language communication, and supporting increasingly sophisticated commercial interactions. The introduction of generative AI accelerated this transition by enabling more adaptive and personalised customer experiences. The most recent studies extend beyond assistance and personalization toward fully autonomous commerce environments. Research increasingly investigates AI agents capable of independently searching for products, negotiating terms, executing purchases, coordinating logistics, and managing post-purchase activities. This evolution signifies a transition from human-supervised commerce to agent-mediated commerce, where AI systems increasingly function as economic actors within digital marketplaces.

Despite rapid conceptual advancement, the literature remains heavily concentrated on theoretical models and architectural frameworks. Large-scale empirical evidence concerning the deployment and performance of autonomous shopping systems remains limited, highlighting an important gap for future research. The reviewed studies were classified according to their primary research contribution, as presented in Table 3. The analysis reveals a predominance of conceptual and framework-oriented research, reflecting the emerging nature of the field. Empirical investigations remain relatively limited, while simulation-based studies provide preliminary evidence regarding the feasibility and performance of autonomous commerce systems.

Table 3. Classification of Research Contributions

Type of Contribution	Number of Studies	Percentage (%)	Representative Included Studies
Conceptual/Framework Development	28	66.7	Dusad (2025); Kodali (2025); Bandi et al. (2025); Chinnaraju (2026); Basu (2026); Balaji (2026)
Empirical Studies	8	19.0	Bawack et al. (2022); Sharma & Dey (2023); Al-Sharafi et al. (2026); Hasselwander et al. (2026)
Experimental/Simulation-Based Studies	6	14.3	Trivedi (2025); Mansour et al. (2025); Yadav (2025); Sotiya et al. (2026); Sharma, A. G. et al. (2026); Zhang, X. et al. (2025)
Total	42	100.0	—

The dominance of conceptual studies suggests that agentic commerce remains in an exploratory stage of scholarly development. Similar patterns are commonly observed in emerging technological fields, where theoretical propositions and architectural designs precede widespread empirical implementation. Three developmental phases are evident across the literature. The first phase focused on AI-supported commerce systems and recommendation technologies. The second phase witnessed the integration of generative AI and conversational intelligence into digital marketplaces. The third and most recent phase is characterised by the emergence of autonomous agents capable of independently conducting commercial activities with minimal human intervention. Generally, the findings indicate that agentic commerce is evolving rapidly from a technology-assisted model toward an autonomous commerce paradigm. While significant advances have been made in conceptualising autonomous shopping systems and transaction architectures, further empirical research is required to evaluate real-world implementation, governance mechanisms, interoperability standards, and long-term socioeconomic implications.

Interpreted through the four-level maturity model of the ACIAF framework (Halat, 2025), the body of evidence places the field predominantly at the lower maturity levels. The dominance of conceptual and framework-oriented contributions (28 of 42 studies, 66.7 per cent) against a smaller share of empirical work (8 studies, 19.0 per cent) and simulation-based work (6 studies, 14.3 per cent) corresponds to an early, developing stage in which architectural propositions and readiness conditions are described more often than they are deployed and measured at scale. Across the three readiness dimensions of the framework, the reviewed studies report comparatively more progress on technical systems, namely model architectures, protocols, and integration tooling, than on organisational state and data governance, which are the dimensions Halat (2025) identifies as the most frequently underestimated and the most strongly associated with implementation failure.

RQ1: How Do AI Agents Influence Online Shopping Behaviour and Commercial Transaction Processes?

The synthesis of the 42 included studies reveals that artificial intelligence agents are fundamentally transforming the structure and operation of online shopping. A dominant theme emerging from the literature is the transition from consumer-driven search processes to goal-oriented autonomous shopping systems. Traditional e-commerce environments require consumers to actively search for products, compare alternatives, evaluate information, and execute purchases. In contrast, agentic commerce systems increasingly allow users to define preferences and objectives while autonomous agents perform the subsequent decision-making and transactional processes. The reviewed studies indicate that AI agents are capable of undertaking a wide range of commercial activities, including product discovery, recommendation evaluation, supplier comparison, price negotiation, transaction execution, logistics coordination, and post-purchase support (Mansour et al., 2025; Yadav, 2025). Several studies further highlight the emergence of machine-mediated negotiations, whereby AI agents represent consumers or vendors and engage directly with one another to determine optimal transaction outcomes. This development significantly reduces transaction costs and improves efficiency within digital marketplaces. The evidence also suggests that personalisation is becoming increasingly dynamic and adaptive (Rane et al., 2024; Lopes et al., 2022). Unlike traditional recommendation systems that rely on static consumer profiles, agentic systems continuously learn from behavioural patterns, contextual information, and real-time interactions to refine purchasing decisions. The literature on technology acceptance shows that users adopt such agents when they perceive them as useful, trustworthy, and easy to interact with (Ameen et al., 2021; Adam et al., 2021; Ma & Huo, 2023; Singh et al., 2024; Xue et al., 2026). So, the literature points toward the emergence of “invisible commerce,” where transactions occur seamlessly with minimal consumer intervention. The reviewed studies suggest that AI

agents are reshaping digital commerce by shifting decision-making authority from consumers toward intelligent autonomous systems capable of acting on their behalf.

RQ2: What Barriers Hinder the Adoption of Agentic Commerce Systems?

Despite the opportunities associated with agentic commerce, the synthesis identifies several barriers that may impede widespread adoption. The most frequently reported challenge relates to trust in autonomous decision-making systems. Many studies emphasise that consumers often lack visibility into how AI agents evaluate alternatives, prioritise options, and ultimately make purchasing decisions. This opacity creates uncertainty and reduces user confidence in autonomous commercial systems (Seth & Kujur, 2026). Privacy and data security concerns constitute another significant obstacle. The reviewed literature consistently indicates that agentic commerce relies on extensive access to personal data, behavioural histories, financial information, and contextual user preferences. While such information enhances personalisation and decision accuracy, it simultaneously raises concerns regarding surveillance, unauthorised data usage, and potential privacy violations.

The evidence further highlights unresolved issues concerning accountability and liability. As AI agents gain greater autonomy in executing transactions, questions arise regarding responsibility for errors, financial losses, fraudulent activities, or unintended outcomes. Existing regulatory frameworks remain largely designed for human-centred transactions and provide limited guidance for assigning accountability in autonomous commercial environments. Cybersecurity challenges also feature prominently in the literature. Risks such as malicious agent manipulation, automated fraud, identity impersonation, and unauthorised machine-to-machine transactions are identified as critical threats to adoption (Tiwari et al., 2026; Burnstine, 2025). Furthermore, several studies argue that consumers may experience discomfort when relinquishing control over financial decisions to autonomous systems. Collectively, these findings suggest that trust, governance, accountability, privacy protection, and cybersecurity remain the principal barriers to the widespread adoption of agentic commerce.

RQ3: What Transaction Protocols and Frameworks Enable AI-Driven Autonomous Commerce Systems?

The reviewed studies demonstrate that the successful implementation of agentic commerce depends on the development of robust transaction protocols capable of supporting autonomous machine-to-machine interactions. The literature identifies authentication and digital identity protocols as foundational components of autonomous commerce ecosystems (Birch & Gamble, 2025; Goodman & Goodman, 2026). These mechanisms enable AI agents to verify identities, establish trusted communication channels, and prevent unauthorised participation within digital marketplaces. Communication and interoperability protocols constitute another critical category identified across the reviewed studies (Simhadri, 2026; Sharma et al., 2026). As autonomous agents increasingly operate across multiple platforms, vendors, and service providers, standardised communication mechanisms are necessary to facilitate seamless information exchange and coordinated decision-making, including the reliable delegation of tasks between humans and agents and the resilient recovery of the underlying technical infrastructure (Hemmer et al., 2023; Lee et al., 2023). The absence of universally accepted interoperability standards is frequently highlighted as a significant limitation to large-scale implementation.

The synthesis also reveals growing interest in blockchain-enabled transaction infrastructures and smart contract technologies. Several studies suggest that these technologies can automate contract execution, payment settlement, escrow services, and proof-of-delivery verification without requiring direct human oversight. Such frameworks enhance transparency, trust, and efficiency in autonomous commercial environments. In addition, automated negotiation protocols are emerging as a central feature of agentic commerce. These protocols enable AI agents to participate in dynamic pricing, auction mechanisms, multi-round

negotiations, and contract optimisation processes (Allouah et al., 2026). Although substantial progress has been made in developing these technologies, the reviewed literature consistently emphasises the absence of comprehensive governance structures and globally accepted standards capable of supporting secure and trustworthy autonomous transactions at scale.

Mapped onto the analytical modules of the ACIAF framework (Halat, 2025), the protocol categories identified above operate primarily within the feasibility evaluation and optimisation feedback modules. Authentication and interoperability standards condition the technical feasibility of deployment, while monitoring, model lifecycle governance, and continuous performance review condition sustained operation. The reviewed studies seldom specify the performance criteria required to govern these protocols before deployment. This omission corresponds to the gap that the three-tier KPI architecture of the framework is intended to close, namely the explicit definition of micro-level system indicators, meso-level operational indicators, and macro-level strategic indicators (Halat, 2025), and it reinforces the finding that the field remains stronger in proposing transaction mechanisms than in specifying how their reliability is to be measured and maintained.

RQ4: What Future Research Directions Are Required to Advance Understanding of Agentic Commerce Systems?

The synthesis identifies several promising directions for future research. One of the most significant areas concerns the development of human–AI collaborative models that balance autonomous decision-making with meaningful human oversight. Numerous studies argue that hybrid systems may provide an effective compromise between efficiency and user control by allowing humans to retain authority over strategic decisions while delegating operational tasks to AI agents (Ishakoglu, 2026). Another major research priority relates to interoperability and standardisation. The literature highlights the need for common transaction protocols, communication standards, and governance frameworks capable of supporting interactions among heterogeneous autonomous systems operating across different commercial platforms. The reviewed studies also identify regulatory governance as a critical research domain. Future investigations should explore legal accountability mechanisms, consumer protection frameworks, ethical AI deployment strategies, and policy instruments capable of governing autonomous economic activities. Closely related to this is the growing importance of explainable AI. Several authors emphasise the need for transparent systems capable of providing understandable justifications for autonomous decisions, thereby improving accountability and public trust.

Beyond technical considerations, the literature calls for greater examination of the broader economic and societal implications of agentic commerce. Future research should investigate its effects on market competition, pricing behaviour, labour markets, consumer welfare, and market concentration, extending the analysis to service sectors such as tourism and hospitality where autonomous personalisation is already reshaping customer engagement (Ali & Ali, 2026; Żyminkowska & Zachurzok-Srebrny, 2025; Kovalenko et al., 2026). Finally, as machine-to-machine commerce becomes increasingly prevalent, cybersecurity resilience, system robustness, and the protection of autonomous economic infrastructures are expected to become central research priorities. Finally, the reviewed studies indicate that while agentic commerce possesses significant transformative potential, its sustainable development will depend on advances in governance, transparency, interoperability, accountability, and human-centred design.

Discussion

This systematic review set out to examine the emergence of agentic commerce as a new paradigm within digital commerce and to synthesize existing evidence on the role of autonomous AI agents, emerging transaction protocols, governance challenges, and future research directions. Drawing on a PRISMA 2020-guided review of 42 peer-reviewed studies published between 2020 and 2026, the findings reveal that agentic commerce represents a

fundamental transition from human-centred digital transactions to increasingly autonomous commercial ecosystems in which AI agents perform significant portions of the shopping and transaction process. While traditional e-commerce systems rely on consumers to search, compare, evaluate, and execute purchases, the reviewed literature indicates that contemporary AI agents are increasingly capable of conducting these activities autonomously, thereby transforming the nature of consumer participation in digital markets.

The findings relating to the first research question demonstrate that AI agents are reshaping online shopping and commercial transactions through automation, personalization, and autonomous decision-making. The reviewed studies consistently show that AI systems are evolving beyond recommendation engines and customer-support functions toward full-service commercial agents capable of product discovery, vendor comparison, price evaluation, negotiation, transaction execution, and post-purchase management (Halat, 2026). These findings are consistent with recent studies suggesting that agentic AI is transforming digital commerce by reducing transaction costs, improving operational efficiency, and enabling highly personalized consumer experiences (Samal & Padmam, 2025; Gonzalez et al., 2026; Al-Sharafi et al., 2026). Furthermore, evidence from the reviewed literature suggests that consumers are increasingly transitioning from active participants in purchasing decisions to supervisory actors who define goals and preferences while delegating execution tasks to intelligent agents. This evolution reflects broader developments in multi-agent systems and autonomous decision architectures, where AI agents can coordinate activities at speeds and scales beyond conventional human capabilities (Zhang et al., 2025; Bhat & Krishnan, 2025). Consequently, agentic commerce appears to be redefining the boundaries of economic participation by positioning AI systems as active market actors rather than passive technological tools.

Despite these efficiencies, the findings also reveal significant concerns regarding governance, trust, and accountability, which directly address the second research question. Across the reviewed studies, trust emerged as one of the most frequently cited barriers to the adoption of autonomous commerce systems. Many authors characterize agentic AI systems as operating through opaque decision-making processes that are difficult for users to understand or monitor. This “black-box” phenomenon creates uncertainty regarding how decisions are made and complicates efforts to assign responsibility when adverse outcomes occur. Several studies identify fragmented accountability structures involving developers, platform providers, merchants, and users, making it difficult to determine liability for system failures, algorithmic bias, financial losses, or unauthorized transactions (Maji, 2026; Abror et al., 2025). The literature further highlights concerns regarding privacy violations, excessive data collection, algorithmic manipulation, and cybersecurity vulnerabilities, particularly in environments where autonomous agents interact directly with one another. Interestingly, the evidence suggests that increasing levels of automation do not necessarily reduce transactional friction. Rather, excessive autonomy may generate new forms of uncertainty as users struggle to maintain visibility and control over autonomous decision-making processes. These findings indicate that technological advancement alone is insufficient to ensure adoption and that governance mechanisms must evolve alongside increasing agent autonomy.

With respect to the third research question, the review demonstrates that the success of agentic commerce depends heavily on the development of robust transaction protocols capable of supporting secure and trustworthy machine-to-machine interactions. The reviewed studies identify digital identity frameworks, authentication systems, interoperability standards, smart contracts, blockchain-enabled infrastructures, and automated negotiation mechanisms as critical components of future autonomous commerce ecosystems. These transaction protocols provide the foundational infrastructure necessary for AI agents to verify identities, exchange information, negotiate terms, execute contracts, and complete transactions without direct human intervention. The literature suggests that such frameworks contribute to transparency, security, and operational efficiency while reducing information asymmetries and coordination

costs. However, the findings also reveal substantial fragmentation in existing approaches, with no universally accepted standards currently governing autonomous commercial transactions. This lack of standardization represents a significant obstacle to the scalability and interoperability of agentic commerce systems across industries and jurisdictions.

The review also provides important insights regarding future research directions, thereby addressing the fourth research question. The evidence suggests that agentic commerce remains in an early stage of scholarly development, with much of the existing literature being conceptual rather than empirical. Consequently, future research should focus on validating theoretical claims through real-world implementations and longitudinal studies. Several recurring themes emerge as priorities for future investigation, including explainable AI, human–AI collaboration, consumer protection frameworks, interoperability standards, digital governance, and regulatory oversight. The literature also calls for greater attention to the socioeconomic implications of agentic commerce, including its effects on market competition, employment structures, consumer autonomy, pricing behaviour, and digital inequality. As AI agents increasingly participate in economic decision-making, understanding the broader societal consequences of autonomous commerce will become increasingly important.

From a theoretical perspective, the findings suggest that agentic commerce represents more than a technological enhancement of existing e-commerce systems. Rather, it constitutes a significant shift in the distribution of decision-making authority within digital marketplaces. Existing theories of technology adoption, electronic commerce, and consumer behaviour largely assume that humans remain the primary decision-makers throughout the transaction process. The reviewed studies challenge this assumption by demonstrating the growing capacity of AI systems to act independently on behalf of consumers and firms. This suggests the need for new theoretical frameworks capable of explaining market interactions in environments where autonomous agents increasingly influence economic outcomes. The structured, criteria-based logic of the ACIAF framework (Halat, 2025), which connects organisational readiness, process-level applicability, and technological feasibility within a single lifecycle-oriented structure, offers one such analytical foundation and was used in this review to organise the synthesis around readiness, feasibility, and performance dimensions. Consequently, agentic commerce should be understood not merely as an extension of AI-enabled commerce but as a transformative paradigm that redefines relationships among consumers, firms, platforms, and intelligent systems.

Nevertheless, several limitations should be acknowledged. First, the review is based exclusively on secondary literature and therefore reflects the current state of scholarly knowledge rather than direct observations of large-scale commercial deployments. Second, the field of agentic commerce is evolving rapidly, meaning that technological developments may outpace existing academic research. Third, many of the reviewed studies rely on conceptual models, simulations, or experimental environments, limiting the generalizability of their findings to real-world commercial settings. Finally, the review considered only English-language publications, which may have excluded relevant contributions from other linguistic contexts.

Despite these limitations, this study makes important theoretical and practical contributions. It provides one of the earliest systematic syntheses of the emerging agentic commerce literature and integrates previously fragmented discussions across artificial intelligence, e-commerce, digital governance, cybersecurity, and transaction systems. More importantly, the review demonstrates that the future trajectory of commerce will depend not only on advances in AI capabilities but also on the simultaneous development of governance structures, accountability mechanisms, trust infrastructures, and regulatory frameworks. The findings therefore suggest that the long-term success of agentic commerce will be determined by the co-evolution of technological innovation and institutional governance. As autonomous agents assume increasingly significant economic roles, the development of transparent,

accountable, and secure commercial ecosystems will become as important as the technologies that enable them.

Conclusion

This study systematically examined the emerging field of agentic commerce by synthesising evidence from 42 peer-reviewed studies published between 2020 and 2026. Guided by the PRISMA 2020 framework, the review explored how autonomous AI agents are transforming digital commerce, the barriers affecting their adoption, the transaction protocols supporting autonomous commercial activities, and the future directions of research in this rapidly evolving field. The findings reveal that agentic commerce represents a significant departure from traditional human-centred e-commerce models, introducing a new paradigm in which intelligent agents increasingly perform commercial functions with varying degrees of autonomy on behalf of consumers and organizations.

With respect to the first research question, the review demonstrates that AI agents are fundamentally reshaping online shopping and commercial transactions. The evidence indicates that contemporary agentic systems are capable of conducting product discovery, evaluating alternatives, negotiating prices, executing transactions, coordinating logistics, and managing post-purchase activities. These developments suggest that digital commerce is gradually evolving from decision-support systems toward autonomous transaction ecosystems where AI agents function as active economic participants. Consequently, agentic commerce has the potential to improve operational efficiency, reduce transaction costs, enhance personalisation, and facilitate more seamless commercial interactions across digital marketplaces.

Regarding the second research question, the findings reveal that significant barriers continue to constrain the widespread adoption of agentic commerce. Trust deficits, privacy concerns, cybersecurity vulnerabilities, lack of transparency in algorithmic decision-making, and unresolved accountability issues emerged as the most frequently identified challenges. The review highlights that increasing levels of AI autonomy are often accompanied by concerns about diminished human oversight and uncertainty regarding responsibility for system failures or unintended outcomes. These findings suggest that technological sophistication alone is insufficient to guarantee acceptance and that effective governance mechanisms are essential for fostering public trust in autonomous commercial systems.

Concerning the third research question, the review identifies several transaction protocols and infrastructural components that are critical to the operation of autonomous commerce ecosystems. These include digital identity and authentication mechanisms, interoperability frameworks, automated negotiation protocols, smart contracts, blockchain-enabled transaction systems, and machine-to-machine communication architectures. Collectively, these technologies provide the foundation for secure, transparent, and efficient autonomous transactions. However, the evidence also indicates substantial fragmentation across existing approaches, with limited standardization and the absence of universally accepted frameworks capable of supporting large-scale interoperability among autonomous agents operating across different platforms and jurisdictions.

In relation to the fourth research question, the review identifies several important avenues for future investigation. Research is needed to advance explainable AI, human-AI collaboration models, consumer protection frameworks, interoperability standards, regulatory governance structures, and accountability mechanisms for autonomous agents. Further empirical studies are also required to evaluate the real-world implementation of agentic commerce systems and to examine their broader implications for market competition, consumer welfare, labour markets, digital inequality, and economic governance. Given the rapid pace of technological change, future research must move beyond conceptual discussions and provide evidence-based assessments of the opportunities and risks associated with autonomous commercial ecosystems.

Lastly, the findings suggest that agentic commerce is more than an incremental advancement in digital commerce technology; it represents a fundamental transformation in the allocation of decision-making authority within digital markets. The future success of autonomous commerce systems will depend not only on continued improvements in AI capabilities but also on the simultaneous development of robust governance frameworks, transparent decision-making processes, secure transaction infrastructures, and effective regulatory institutions. Therefore, the long-term sustainability of agentic commerce will be shaped by the co-evolution of technological innovation, institutional oversight, and public trust, ensuring that autonomous commercial systems remain efficient, accountable, and aligned with societal expectations.

Statement on the Use of Artificial Intelligence

Artificial intelligence tools were used exclusively to assist with language editing, including grammar, spelling, punctuation, stylistic refinement, and improvement of linguistic clarity. AI was not used to generate, develop, or co-author the scientific content of this manuscript.

The research concept, study design, methodology, data collection, data analysis, interpretation of the results, scientific arguments, conclusions, and the final intellectual content of the manuscript were developed entirely by the author. All scientific responsibility for the manuscript rests solely with the author.

Accordingly, this manuscript does not constitute an AI-generated or AI co-created article, as no AI-generated scientific content is included.

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