AI-ENABLED ALGORITHMIC PERSUASION AND CONSUMER AUTONOMY: A BIBLIOMETRIC AND SYSTEMATIC REVIEW OF PSYCHOLOGICAL IMPLICATIONS IN DIGITAL MARKETING

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ABSTRACT

Artificial intelligence has transformed digital marketing from message-based communication into an infrastructural system in which algorithms continuously shape visibility, attention, and decision outcomes. As personalization, recommendation engines, and adaptive choice architectures become embedded across digital platforms, concerns regarding autonomy, transparency, and manipulation intensify. This study provides a comprehensive synthesis of research on AI-enabled algorithmic persuasion and its psychological implications for consumer autonomy. A hybrid methodology is employed, combining a bibliometric analysis of 310 Web of Science articles with a PRISMA-guided systematic literature review. The bibliometric results reveal four dominant research clusters: personalization intelligence, trust privacy evaluations, digital nudging and influence design, and autonomy–manipulation dynamics. The systematic review highlights five recurring psychological mechanisms: perceived control, awareness of influence, cognitive load, reactance, and perceived manipulation that shape autonomy outcomes in AI-mediated environments. Findings show that algorithmic persuasion operates through opaque, adaptive, and often asymmetrical structures that blur the boundary between supportive guidance and hidden influence. The study contributes a consolidated understanding of how technological architectures and psychological responses jointly determine the extent to which autonomy is supported or undermined. Implications for theory, practice, and policy emphasize the need for transparent system design, responsible personalization, and comprehensive governance frameworks that protect consumer agency.

Key Words: Artificial Intelligence, Algorithmic Persuasion, Consumer Autonomy, Digital Nudging, Personalized Marketing.

1. INTRODUCTION

Rapid advances in artificial intelligence have significantly transformed how digital platforms guide consumer attention, shape preferences, and influence decision-making processes (Rodriguez-Fernandez, 2025). As recommender systems, generative models, and adaptive content engines increasingly mediate online environments, persuasion has shifted from static and rule-based approaches to algorithmic persuasion, a dynamic and continuously optimized form of influence in which AI learns, predicts, and adjusts behavioural outcomes (Arkhipova, 2024). This transformation has significant implications for marketing practice. It supports hyper-personalized content delivery, enables real-time message adaptation, and automates behavioural nudges tailored to consumers' psychological states and contextual cues (Jain & Pandey, 2026). These developments move far beyond traditional targeting and raise important questions about autonomy, agency, and the blurry line between assistance and manipulation.

Consumer autonomy in this context extends well beyond the simple ability to choose independently. It encompasses perceptions of control, self-determination, awareness of persuasive intent, and the capacity to resist unwanted influence (Dubazana, 2024; Pavey & Sparks, 2009). As AI-enabled persuasion systems become embedded across social media feeds, e-commerce platforms, search engines, and digital content ecosystems, concerns intensify regarding opaque decision architectures, reduced consumer awareness, and the possibility of hidden steering (Rovčanin, 2025). These concerns position algorithmic persuasion as one of the most pressing psychological and ethical challenges in contemporary digital marketing.

Despite rising academic interest, research on AI-driven persuasion and consumer autonomy remains conceptually and methodologically fragmented across multiple disciplines, including marketing,

human–computer interaction, data science, behavioural economics, and digital ethics (Iyamu & Edo-Osagie, 2025). This fragmentation hampers efforts to develop a coherent understanding of how algorithmic influence impacts autonomy (Bakes et al., 2023; Cantone et al., 2024; Danaher et al., 2017; Marres & De Rijcke, 2020; Zhang et al., 2025). Empirical work often examines isolated elements such as personalization, trust, privacy, or behavioural targeting but rarely integrates these into a unified framework that captures their psychological interdependencies (Chen et al., 2022; Rosenthal et al., 2020; Sun et al., 2024). A synthesis is needed to address this gap and advance the field.

This fragmentation underscores the need for a systematic, cross-disciplinary synthesis that clarifies the field's conceptual evolution and intellectual structure. Although individual contributions offer valuable insights, the literature lacks a consolidated assessment of dominant themes, influential authors, methodological trajectories, and unresolved theoretical tensions. Moreover, rapid technological acceleration increases the likelihood that early conceptualizations will become outdated, underscoring the need for a longitudinal, integrated perspective.

To address these gaps, this study adopts a dual-method approach that combines a bibliometric analysis of 310 Web of Science articles with a PRISMA-guided systematic literature review. The bibliometric analysis maps the field's intellectual landscape by identifying publication trends, thematic clusters, conceptual linkages, and emerging research streams. The systematic review complements this by providing a qualitative synthesis of psychological constructs, persuasion mechanisms, autonomy-related outcomes, and contextual moderators.

By integrating these two approaches, the study provides a holistic, rigorously structured understanding of how AI-enabled algorithmic persuasion has been conceptualized, operationalized, and empirically examined in digital marketing. The overarching aim is to clarify the psychological implications of algorithmic influence, trace the evolution of debates on autonomy, and identify critical research gaps that will shape future scholarship. By providing this comprehensive synthesis, the study contributes to theoretical advancement, supports ethical marketing practices, and informs policy discussions on transparency, fairness, and consumer rights in AI-mediated decision-making environments.

2. LITERATURE REVIEW

2.1. From Data-Driven Marketing to Algorithmic Influence

Digital marketing has evolved from segmentation-based communication to a computational ecosystem in which artificial intelligence continuously shapes consumer journeys (Karunanayakaa et al., 2025). Early personalization models relied on explicit user inputs and predefined rules (Singh & Kaunert, 2024). Today's AI systems instead operate through real-time learning loops. They infer preferences from behavioural traces, update predictions on the fly, and optimize persuasive cues with minimal human intervention. This evolution has created an environment in which influence is no longer episodic. Instead, it is embedded in the architecture of digital platforms (Orji & Vassileva, 2023). Search rankings, recommendation lists, dynamic pricing engines, and message optimization systems collectively guide what consumers see, how they evaluate information, and which choices they ultimately consider (Hazrati & Ricci, 2024; Mahdavian et al., 2025). This shift marks a transition from traditional persuasion toward algorithmic persuasion, a form of influence produced by adaptive, predictive, and often opaque systems.

2.2. Mechanisms of Algorithmic Persuasion in Digital Platforms

Algorithmic persuasion operates through multiple mechanisms. Ranking algorithms shape visibility and salience, altering the probability that specific options will be chosen (Rezaei et al., 2025). Recommender systems personalize content using collaborative filtering, deep learning, or hybrid models. Interface-level nudges such as defaults, visual emphasis, friction adjustments, or choice restructuring subtly shift behaviour while preserving the appearance of freedom (Sadeghian & Otarkhani, 2024). Behavioural prediction models identify moments of heightened susceptibility and adjust content timing accordingly. Together, these mechanisms create decision environments in which consumers often engage without fully recognizing how the architecture is steering their choices (Callaway et al., 2023). While these systems can enhance convenience and reduce information overload, their adaptive nature makes influence highly individualized and potentially more potent than human-delivered persuasion.

2.3. Psychological Foundations: Attention, Cognition, and Automated Choice Shaping

The psychological implications of algorithmic persuasion extend across attention, cognition, and behavioural regulation (Rose & MacGregor, 2021). Attention is shaped by algorithmic curation that prioritizes some stimuli over others, thereby narrowing cognitive bandwidth (Poleac & Ghergut-Babii, 2024). Cognitive processes are influenced through selective exposure, information filtering, and framing patterns embedded in recommender systems (Atas et al., 2021). Automated choice architectures reduce the need for deliberation, encouraging heuristic shortcuts (Mills & Sætra, 2024). These structures can support users by simplifying complex decisions or overwhelm them by escalating cognitive dependency on automated systems.

The literature consistently highlights that consumers often cannot distinguish between user-driven and system-driven actions (Alslaity et al., 2024; Sánchez-Adame & Mendoza, 2025; Zhang & Noor, 2025). This ambiguity blurs the boundaries of agency and complicates assessments of whether behaviour reflects personal preference or algorithmic influence.

2.4. Consumer Autonomy in AI-Mediated Environments

Consumer autonomy has emerged as a central concern in studies exploring AI-mediated decision-making (Waqas & Qadri, 2025). Autonomy encompasses awareness of persuasive attempts, perceptions of self-determination, control over personal data, and the freedom to accept or resist influence (Nokhiz & Ruwanpathirana, 2025). Research shows that autonomy can be enhanced when AI systems function as supportive tools that align with user goals and provide transparent explanations (Brenncke, 2024; Han & Ko, 2025; Zaheer, 2020). However, autonomy may be diminished when influence becomes opaque, when choices are constrained by platform architecture, or when predictive models exploit cognitive biases. Autonomy is therefore not simply a binary state. It is a dynamic, context-dependent psychological condition shaped by the interplay among system design, personal agency, and situational constraints.

2.5. Trust, Transparency, and Perceived Fairness

A significant body of work examines users' evaluative responses to algorithmic persuasion. Trust plays a pivotal role in determining whether personalized systems are accepted or rejected (Shin, 2020). Trust increases when algorithms behave consistently and provide justifiable recommendations (Wu et al., 2024). Transparency contributes to a sense of fairness by helping consumers understand how their data is used and why certain content is shown (Shin & Park, 2019). Conversely, opaque data practices, personalization without consent, and unexplained recommendations reduce perceived legitimacy. Privacy concerns also interact with perceived fairness (Karwatzki et al., 2017). Consumers may welcome personalization but dislike the level of surveillance required to produce it. Together, trust, transparency, and fairness form a triad that shapes the psychological acceptance of algorithmic systems (Shin, 2023).

2.6. Manipulation, Dark Patterns, and Consumer Vulnerability

Recent research highlights the ethical risks associated with persuasive AI (Mulyono et al., 2024; Rahman & Adaji, 2024; Ramos et al., 2024). Dark patterns design features created to steer users into actions they may not otherwise choose are increasingly operationalized through algorithmic optimization (Lechevalier & Saville, 2025). Vulnerable populations, including children, older adults, individuals with low digital literacy, or those experiencing financial stress, face greater risks because predictive models can identify and exploit behavioural tendencies with high precision (Callanan et al., 2021). These concerns extend beyond individual well-being. They raise systemic issues about power asymmetries between platforms and consumers, prompting debates about the ethical boundaries of personalization, behavioural targeting, and automated persuasion.

2.7. Fragmentation Across Disciplines and the Need for Integrated Synthesis

Despite extensive research, the literature on algorithmic persuasion and autonomy remains dispersed across multiple fields (Jıst, 2024; Sass, 2024; Savolainen & Ruckenstein, 2024). Marketing studies often focus on performance outcomes such as engagement or purchase intention (Hou et al., 2025). Psychology research examines cognitive load, reactance, or perceived control (Oh et al., 2025).

Information systems and HCI studies analyze system design, transparency mechanisms, and explainability (Schor, 2024). Ethics and policy research emphasize fairness, accountability, and regulatory constraints (Williams et al., 2025). This fragmentation results in inconsistent terminology, unaligned conceptual definitions, and siloed empirical approaches. As a consequence, the field lacks a unified framework for understanding the psychological impact of algorithmic persuasion on autonomy.

3. METHODOLOGY

This study employs a hybrid methodology that integrates a PRISMA-guided systematic literature review (Page et al., 2021) with a comprehensive bibliometric analysis (Donthu et al.,2021). The combined structure enables a dual-level understanding of the domain. The bibliometric component maps the intellectual and conceptual evolution of research on AI-enabled algorithmic persuasion. The systematic review provides interpretive depth into the psychological mechanisms that influence consumer autonomy. Following the methodological logic used in leading hybrid SLR-bibliometric studies, the present approach ensures analytical breadth, conceptual precision, and methodological transparency.

3.1. Data Source and Search Strategy

The Web of Science Core Collection served as the sole data source due to its high curation standards and consistent metadata across disciplines. The search strategy was designed to capture publications at the intersection of artificial intelligence, algorithmic persuasion, personalization systems, psychological responses, and consumer behaviour in digital marketing contexts. The search query used the title, abstract, and author keywords fields and was formulated iteratively to maximize sensitivity and specificity. The final query was:

TS = (("artificial intelligence" OR AI OR "machine learning" OR algorithmic) AND

(persua OR "algorithmic persuasion" OR nudge* OR "choice architecture" OR "behavioural target*" OR "recommendation system*" OR personaliz*) AND

(autonom* OR "perceived control" OR reactance OR manipulat* OR "dark pattern*" OR "privacy concern*" OR trust OR transparency) AND

(marketing OR "digital marketing" OR "online advertis*" OR "social media" OR "e-commerce" OR ecommerce OR "electronic commerce"))**

The initial search returned 540 records. Applying the "Article" document-type filter reduced the dataset to 431. Limiting the language to English further reduced the sample to 429. Subsequently, non-relevant Web of Science categories such as physics, engineering, optimization, analytical chemistry, agriculture, and robotics were removed, yielding 390 records. Finally, titles and abstracts were examined to exclude studies unrelated to algorithmic persuasion or lacking consumer-facing psychological constructs. This process resulted in a final corpus of 310 articles.

3.2. PRISMA Screening, Eligibility, and Inclusion Criteria

The systematic review followed the PRISMA 2020 guidelines to ensure transparency and replicability. Figure 1 illustrates the complete PRISMA flow process from identification to inclusion.

Screening consisted of three stages.

First, duplicate checks were performed, although WoS maintains high uniqueness across entries.

Second, a title-abstract screening was conducted to remove papers that addressed AI in purely technical or organizational contexts, without consumer-facing persuasive functions.

Third, full-text evaluation was implemented for records with ambiguous abstracts or poorly defined constructs.

Eligibility was based on four inclusion criteria:

(1) The study examined AI-driven personalization, recommendation, targeting, or decision systems;

(2) the study analysed consumer responses to algorithmic persuasion cues, interface nudges, or adaptive choice architectures;

(3) autonomy-related constructs such as control, reactance, intrusiveness, manipulation, fairness, transparency, or vulnerability were present;

(4) The research context was explicitly situated within digital marketing, e-commerce, social media, or online platform environments.

Studies were excluded if they examined general AI ethics without behavioural or marketing relevance, discussed autonomous decision systems in industrial or medical contexts, or focused exclusively on computational model development. The final corpus of 310 articles served as the foundation for both the bibliometric and the qualitative synthesis.

3.3. Data Cleaning and Standardization

Prepared datasets were exported in BibTeX and plain-text formats. Extensive data cleaning was conducted to ensure consistency. Author names were standardized to avoid fragmentation (for example, merging abbreviated and full names). Journal titles were harmonized across short and long forms. Country names and affiliations were normalized. Keywords were unified by consolidating linguistic variations and semantically similar expressions. Terms related to persuasion, autonomy, psychological responses, and AI techniques were carefully grouped to prevent dispersion in co-word mapping outputs.

3.4. Bibliometric Analysis Procedures

The bibliometric analysis was performed using the Bibliometrix R package. It consisted of two major analytic layers:

(a) Performance Analysis

This step provided descriptive insights into:

• annual scientific production.

• most productive authors and institutions.

• leading journals and sources.

• citation structures.

• geographic distribution and collaboration intensity.

These indicators contextualized the field's growth trajectory and disciplinary composition.

(b) Science Mapping

Science mapping uncovered the latent structure of the knowledge domain. The following techniques were applied:

• co-authorship networks to examine collaboration patterns;

• co-citation networks to identify foundational academic influences;

• bibliographic coupling to reveal emerging conceptual proximity;

• co-word analysis to map thematic evolution, research clusters, and conceptual density;

• historiographic mapping to visualize intellectual progression over time;

• source impact and Bradford’s Law to determine core journals.

These techniques collectively revealed four robust thematic clusters: personalization and recommendation intelligence, trust–privacy–transparency research, digital nudging and influence design, and autonomy–manipulation–vulnerability debates.

3.5. Systematic Literature Review and Coding Framework

The systematic review used a structured coding frame aligned with the research's psychological and behavioural scope. Each of the 310 articles was coded across four categories:

(1) System-Level Features of Algorithmic Persuasion

This included personalization intensity, algorithm type, data sources, interface architecture, adaptation logic, and persuasive strategies.

(2) Autonomy-Related Psychological Constructs

Concepts such as perceived control, agency, decision freedom, reactance, resistance, cognitive overload, and perceived manipulation were recorded.

(3) Evaluative Constructs

These included trust, transparency, fairness, privacy concerns, scepticism, and acceptance.

(4) Behavioural and Attitudinal Outcomes

Engagement, compliance, avoidance, resistance, perceived appropriateness, and regulatory support were coded.

Ambiguous terms were resolved through full-text inspection. Coding emphasized conceptual sensitivity to avoid the misclassification common in automated reviews.

3.6. Integration of Bibliometric and Qualitative Evidence

A sequential integration strategy was employed. Bibliometric clusters identified through science mapping formed the structural backbone of the review. The systematic analysis then elaborated the psychological depth within each cluster, revealing shared assumptions, divergent constructs, and empirical gaps. The convergence of these streams allowed the study to articulate a comprehensive, multi-layered understanding of how algorithmic persuasion affects consumer autonomy at cognitive, emotional, and behavioural levels.

3.7. Ensuring Rigor, Transparency, and Reproducibility

All methodological steps, including search construction, filtering, screening, cleaning, parameter settings, and coding, were documented in detail. Using a single database avoided metadata inconsistencies across sources. PRISMA guidelines strengthened procedural transparency. The hybrid methodological design provided both empirical breadth and conceptual depth. Together, these elements ensured a replicable and academically rigorous assessment of AI-enabled algorithmic persuasion and its implications for consumer autonomy.

4. RESULTS

This section presents the findings of the hybrid bibliometric and systematic analysis. The results are organized into two major components. The first part summarizes the bibliometric performance indicators and science-mapping outcomes derived from the 310-article dataset. The second part synthesizes the qualitative findings from the systematic review, focusing on the psychological mechanisms of algorithmic persuasion and their implications for consumer autonomy.

4.1. Bibliometric Analysis Results

4.1.1. Annual Scientific Production and Growth Trends

The bibliometric analysis demonstrates that scholarly interest in AI-enabled algorithmic persuasion has expanded substantially over the past two decades. The dataset indicates that 310 articles were published across 165 distinct sources between 2005 and 2026, produced by 894 unique authors and supported by 19,871 cited references (Figure 1). The field has experienced a notable annual growth rate of 10.41 percent, confirming its emergence as a rapidly developing research domain. The average number of co-authors per article is 3.28, and the international co-authorship rate of 33.87 percent shows that research activity in this area is increasingly characterized by global collaboration, suggesting a broad and interdisciplinary research ecosystem.

Figure 1. Descriptive bibliometric indicators of the dataset (2005–2026).

Early contributions between 2005 and 2015 were limited in number and predominantly conceptual, reflecting initial attempts to theorize the psychological and technological implications of algorithmic influence. A gradual increase in publication volume became visible after the widespread adoption of machine-learning–driven recommendation engines, which broadened the relevance of algorithmic persuasion for marketing, information systems, and behavioural science. This upward trend intensified significantly after 2021. As shown in Figure 2, scientific production accelerated sharply during this period, reflecting rising societal debates around autonomy, transparency, privacy, and manipulation as well as the widespread integration of AI-based personalization systems across digital platforms.

The year 2025 represents the peak of publication activity in the dataset, indicating a convergence of technological maturity, policy attention, and heightened academic interest in the psychological and ethical consequences of AI-enabled influence. Although the slight decline observed in 2026 may reflect the temporal boundary of the dataset rather than a substantive decrease in activity, the overall trajectory illustrates a sustained expansion of the field. Collectively, these patterns reveal that algorithmic persuasion has evolved from a niche research topic into a central focus of contemporary digital marketing scholarship, driven by rapid advances in AI capabilities and the growing need to understand their implications for consumer autonomy and decision-making.

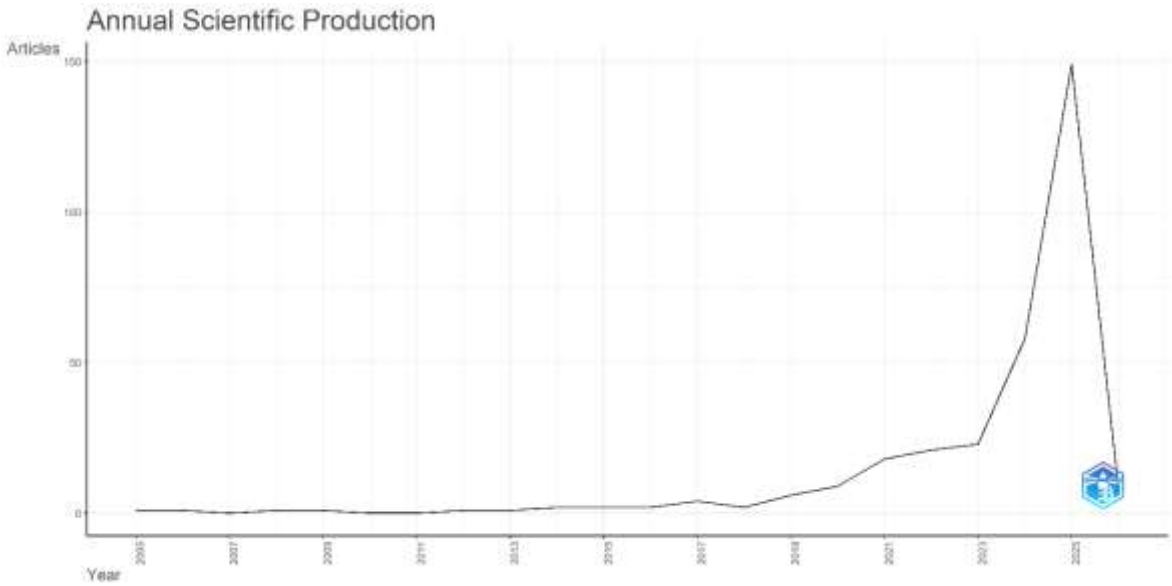

Figure 2. Annual scientific production and growth trends over time.

4.1.2. Most Productive Authors, Institutions, and Countries

The analysis of scientific production at the country level reveals a clear geographical concentration of research activity in AI-enabled algorithmic persuasion. As illustrated in Figure 3, China represents the most prolific contributor to the field, followed by the United States and India. In Europe, the United Kingdom, Germany, and the Netherlands stand out as leading contributors, indicating that the field has

gained substantial traction across both Asian and Western academic ecosystems. The global distribution map demonstrates that research output is broadly international, yet strongly clustered in technologically advanced economies. This pattern suggests that developments in AI infrastructure and digital marketing industries play a critical role in shaping scholarly engagement with algorithmic persuasion.

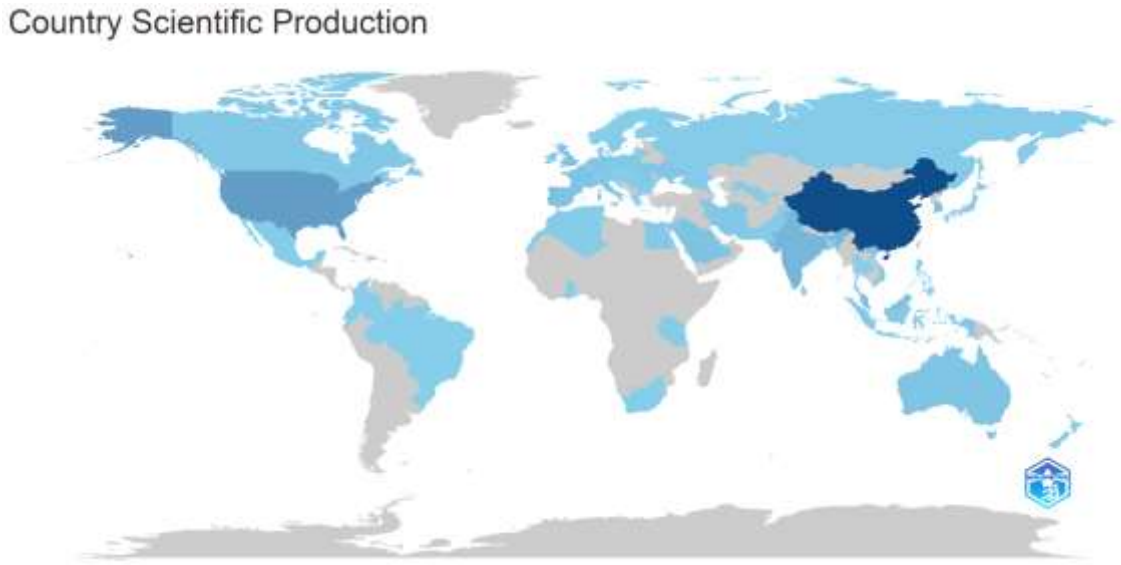

Figure 3. Country-level scientific production and global distribution map.

Author-level metrics further reinforce this geographical pattern. As shown in Figure 4, the most productive and influential researchers are predominantly affiliated with Chinese institutions. Among them, Liu Y. emerges as the most prominent scholar in the dataset, producing 10 publications and achieving the highest local H-index (5). The temporal analysis of author productivity indicates that leading researchers have significantly intensified their output after 2021, which aligns with the overall surge of interest triggered by ethical debates surrounding transparency, manipulation, and autonomy in AI-mediated environments.

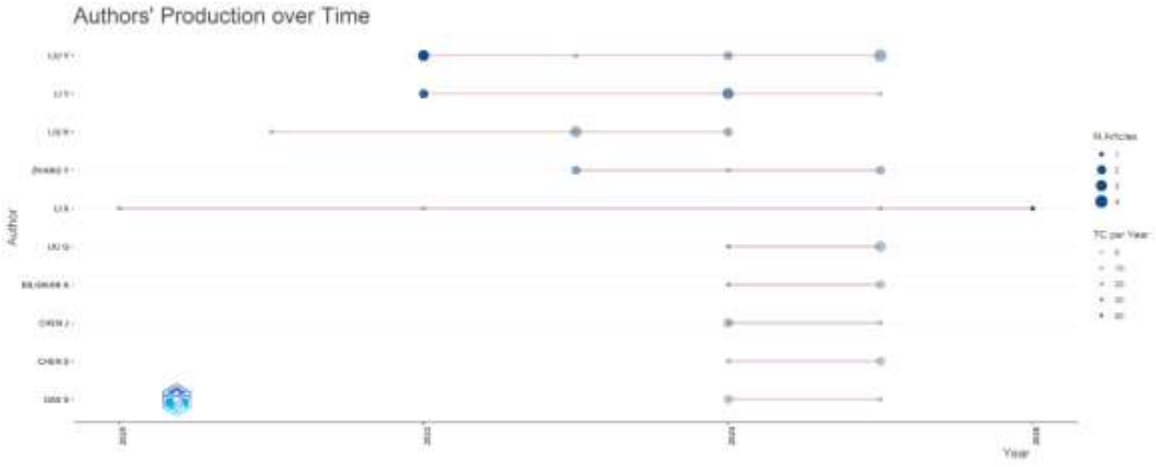

Figure 4. Author productivity, impact metrics, and temporal publishing patterns.

Institutional analysis also highlights the dominance of Asian and North American universities in shaping the intellectual structure of the field. The top institutions, presented in Figure 5, include Tsinghua University (China, 10 publications), Southwestern University of Finance and Economics (China, 9 publications), and the University of Arkansas (United States, 8 publications). Several Malaysian institutions such as Universiti Kebangsaan Malaysia and UCSI University also appear among the most productive contributors, alongside leading European universities such as the University of Amsterdam. This distribution demonstrates that academic engagement with algorithmic persuasion extends beyond

traditional technology hubs, reflecting a wider global concern with AI-driven influence across diverse cultural and regulatory environments.

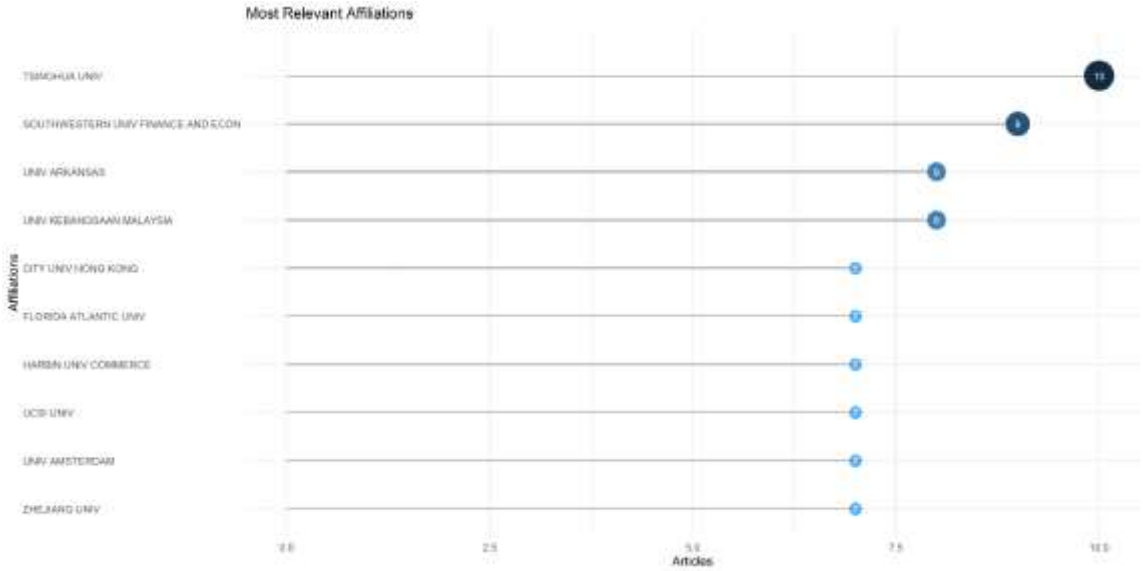

Figure 5. Most productive institutions by publication count.

Collectively, these findings reveal a research landscape characterized by strong international collaboration, high geographical diversity, and the growing prominence of institutions located in Asia and North America. The alignment of author-level, institution-level, and country-level patterns suggests that algorithmic persuasion has rapidly evolved into a strategically significant domain for scholars working at the intersection of artificial intelligence, digital marketing, and consumer psychology..

4.1.3. Core Journals and Source Impact

The source analysis identifies a concentrated cluster of journals that form the intellectual core of research on AI-enabled algorithmic persuasion. As shown in Figure 6, Journal of Theoretical and Applied Electronic Commerce Research stands out as the most influential source with an H-index of 5. Its prominence reflects the centrality of AI–commerce intersections, particularly the rapidly expanding line of research on personalization systems, algorithmic decision-making, and digital persuasion within e-commerce environments.

A second group of journals displays a balanced level of impact (H-index = 4), including Asia Pacific Journal of Marketing and Logistics, Frontiers in Psychology, International Journal of Hospitality Management, and Journal of Business Research. Although these journals represent different disciplinary traditions, they collectively channel research that bridges artificial intelligence, consumer psychology, behavioural responses, and service management. Their shared H-index level indicates that algorithmic persuasion is not confined to a single field but spans diverse domains concerned with digital consumer behaviour and technological influence.

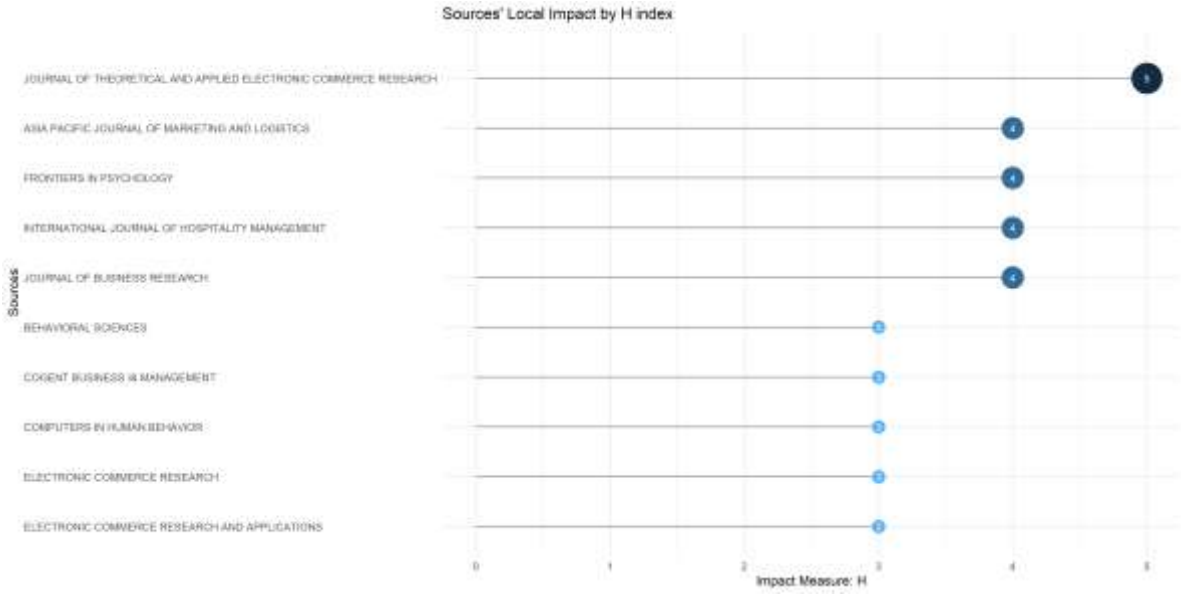

Figure 6. Most influential journals and H-index distribution in the dataset.

A third cluster, illustrated in Figure 7, consists of sources with an H-index of 3, such as Behavioral Sciences, Cogent Business & Management, Computers in Human Behavior, Electronic Commerce Research, and Electronic Commerce Research and Applications. Despite their relatively lower H-index values, these journals maintain steady and frequent publication activity in the domain. They contribute substantively to discussions surrounding user experience, algorithmic fairness, digital nudging, and the psychological underpinnings of AI-driven platform behaviour.

Together, these journal clusters reveal the multidisciplinary orientation of the field. Bradford's Law analysis confirms that a small set of high-impact journals accounts for a substantial share of the literature, yet the continued involvement of journals from psychology, business, hospitality, marketing, and information systems demonstrates broad disciplinary engagement. The distribution also shows that the most influential outlets lie at the intersection of marketing, AI, and digital consumer research, reflecting the growing scholarly recognition of algorithmic persuasion as a core topic within digital marketing and technology-mediated decision-making.

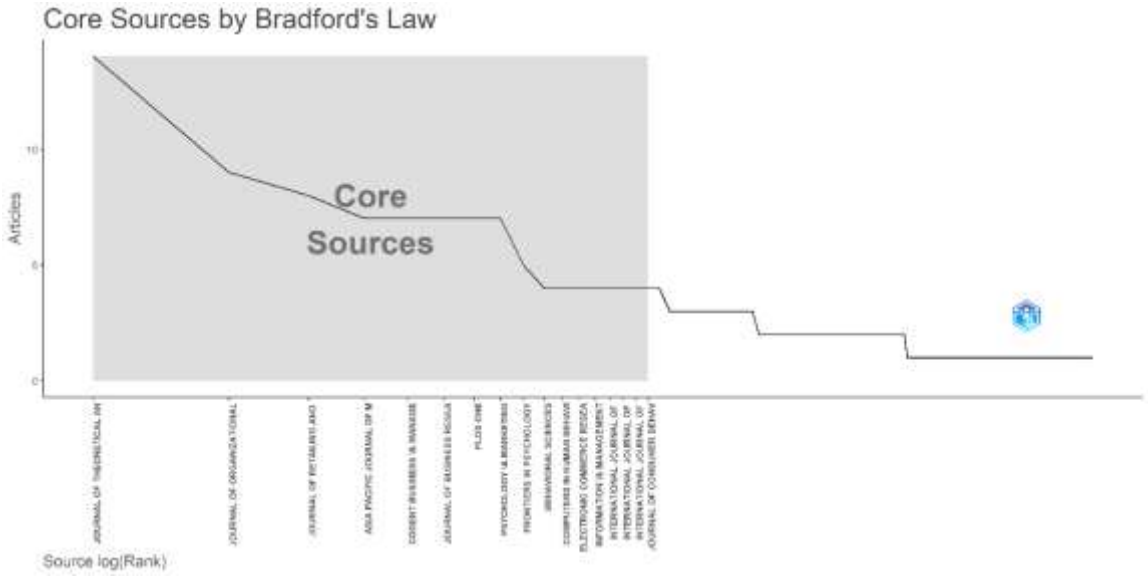

Figure 7. Most relevant publication sources by number of documents.

4.1.4. Co-Authorship and Collaboration Networks

Co-authorship patterns indicate that research on AI-enabled algorithmic persuasion is increasingly produced within dense international collaboration networks rather than in isolated national communities. The overall international co-authorship rate of 33.87 percent already points to a relatively high level of cross-border teamwork. The country collaboration map in Figure 8 shows that China functions as a central hub in these networks, maintaining strong collaborative ties with institutions in the United States, the United Kingdom, Germany, the Netherlands, Australia, and several East and Southeast Asian countries. The United States similarly occupies a key bridging position, linking North American research teams with partners in Europe and Asia.

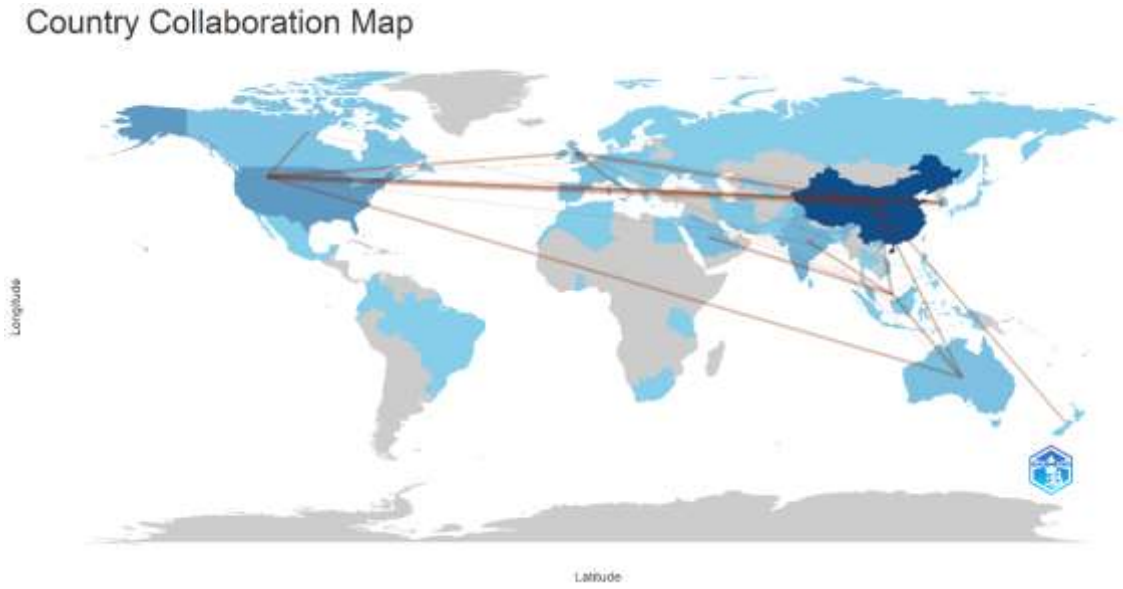

Figure 8. Country-level collaboration map showing international co-authorship networks

These collaboration flows suggest that the field is shaped by a small number of highly connected countries that anchor global research clusters and facilitate the diffusion of ideas, methods, and data across regions. The prominence of cross-regional links between Asia, Europe, and North America further supports the observation that algorithmic persuasion has emerged as a genuinely international research topic. Thematically, these networks often bring together expertise from marketing, computer science, behavioural psychology, and human–computer interaction, reinforcing the interdisciplinary character of the domain and enabling more nuanced examinations of autonomy, transparency, and manipulation in AI-mediated environments..

4.1.5. Co-Citation Structure and Intellectual Foundations

The co-citation analysis reveals a highly structured intellectual landscape composed of three dominant and interrelated knowledge pillars. As illustrated in Figure 9, the first and most prominent cluster is technologically oriented, centered around foundational studies in personalization, recommender systems, and adaptive choice architectures. Seminal contributions by Davis (1989), Venkatesh (2000, 2003, 2012), Adomavicius (2005), and Xiao (2007) form the core of this cluster. These works establish the technological bases of algorithmic influence through models of technology acceptance, recommender system design, and automated decision support. The second major cluster consists of psychological theories of persuasion, information processing, trust, and behavioural influence. Influential frameworks from Mayer et al. (1995), Ajzen (1991), and Mehrabian (1974) appear centrally within this structure, alongside empirical contributions by Haubl (2000), Epley (2007), and Dinev (2008). This cluster forms the conceptual foundation for understanding how consumers interpret algorithmic cues, process personalized information, and respond affectively and behaviourally to AI-generated content.

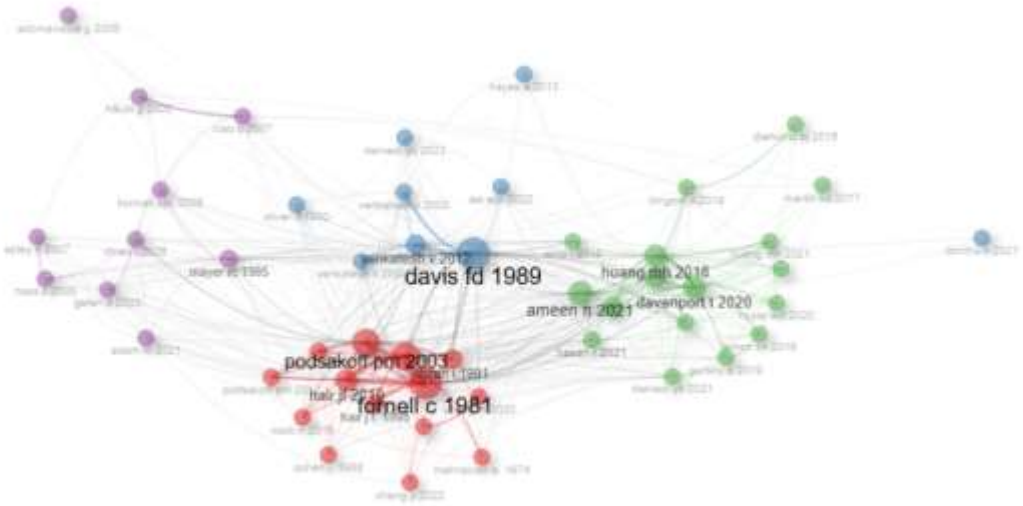

Figure 9. Co-citation network of foundational authors.

The third cluster, which has grown significantly in recent years, reflects the normative dimensions of algorithmic persuasion. This includes scholarship on autonomy, fairness, transparency, privacy, and ethical design. Prominent contributions by Podaskoff (2003), Huang (2018), Davenport (2020), and Ameen (2021) anchor this emerging structure. The prominence of these authors in Figure 10 highlights a clear epistemic shift from early efficiency-oriented work toward concerns about manipulation, dark patterns, and consumer rights.

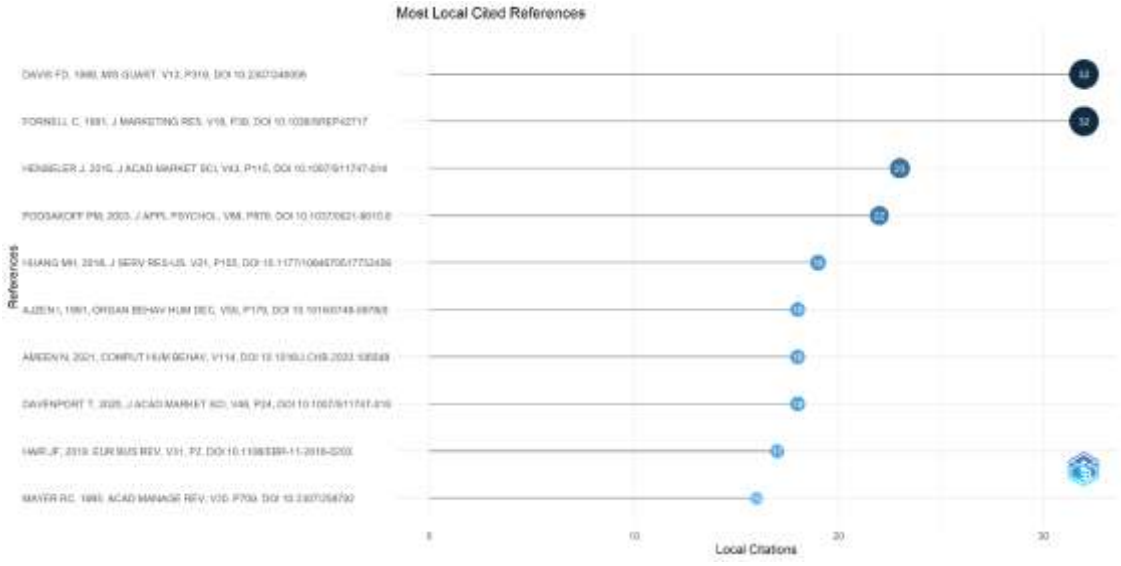

Figure 10. Most locally cited references anchoring the field's theoretical base.

Insights from global and local citation patterns further refine this picture. Figure 11 shows that the most globally cited studies such as Akehurst (2009), Kim (2021), Hauser (2014), Yang (2022), and Li (2015) span marketing, information systems, hospitality, and behavioural science. This diversity reinforces the field's multidisciplinary character. Meanwhile, the most highly cited countries (China, USA, the Netherlands, Korea, and Italy) demonstrate that algorithmic persuasion research is concentrated in regions with mature AI ecosystems and strong regulatory discourse.

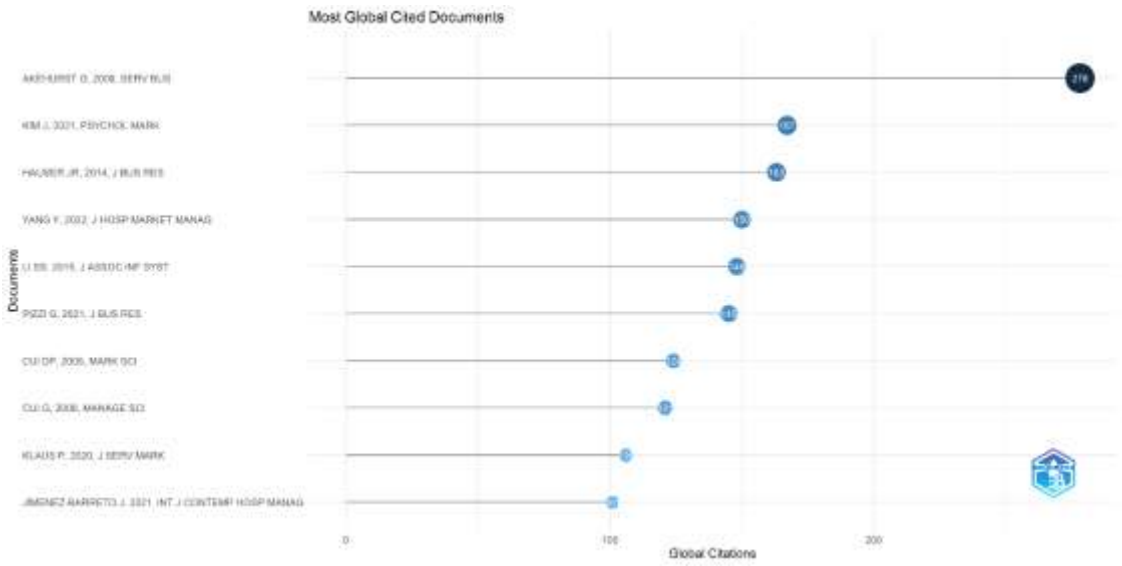

Figure 11. Most globally cited documents shaping conceptual development.

Bibliographic coupling results reveal a distinct contemporary convergence around transparency, algorithmic accountability, and autonomy-related risks. Clusters formed after 2020 increasingly focus on dark patterns, behavioral data governance, and the ethics of personalized influence. This suggests that scholarly attention has shifted meaningfully from performance and optimization toward the protection of consumer agency and the normative evaluation of AI-mediated persuasion.

Together, these findings indicate that the intellectual foundations of algorithmic persuasion rest on:

1. Technological frameworks for personalization and automated decision-making.

2. Psychological theories explaining how algorithmic cues shape perceptions, cognition, and behaviour.

3. Ethical and regulatory perspectives addressing fairness, autonomy, and consumer protection.

This triadic structure highlights the field's evolution from technology-centric origins to a multidisciplinary research domain deeply concerned with the psychological and societal implications of AI-driven marketing.

4.1.6. Co-Word Networks and Thematic Evolution

The co-word analysis provides a detailed overview of the conceptual structure and thematic development of research on AI-enabled algorithmic persuasion. As illustrated in Figure 12, the most frequent and central keywords include artificial intelligence, e-commerce, and consumer behavior, indicating that the literature is positioned at the intersection of AI technologies, digital commerce environments, and psychological responses. Additional high-frequency terms such as trust, impact, model, social media, and machine learning show that consumer reactions to algorithmic systems constitute a dominant research focus.

Figure 12. Keyword co-occurrence and dominant conceptual terms (word cloud).

The thematic map in Figure 13 reveals a four-quadrant structure that reflects the field's intellectual maturity. Motor themes, represented by artificial intelligence and adoption, show high centrality and strong developmental density. These themes function as the driving force of the domain and anchor the technological foundations of algorithmic persuasion. Basic themes such as impact, behavior, and social media exhibit high relevance but lower density, suggesting that they form widely used but still theoretically expandable components of the field. Niche themes, including marketing, internet, business, and augmented reality, display strong internal development but limited centrality, indicating that they reside on the periphery of mainstream research trajectories. Emerging or declining themes—such as model, machine learning, and information—show lower relevance and developmental density, suggesting either early-stage conceptual growth or diminishing scholarly attention.

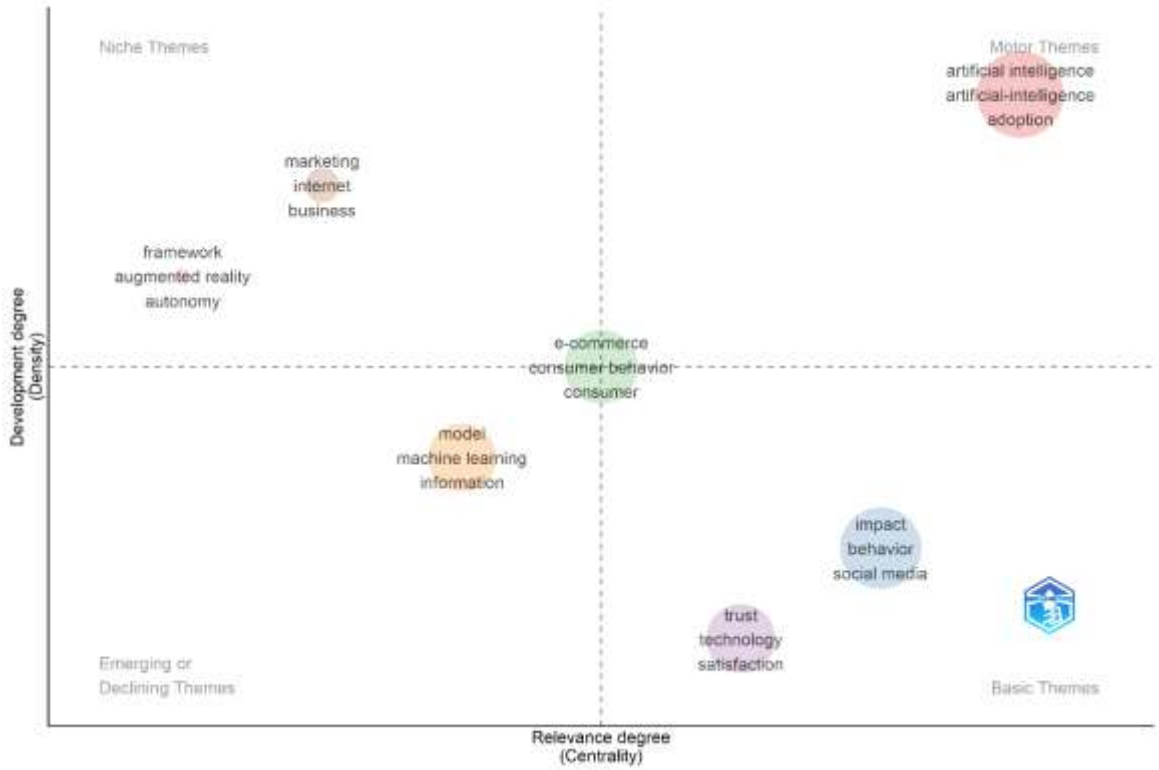

Figure 13. Thematic map showing motor, basic, niche, and emerging themes.

The longitudinal analysis of term dynamics, presented in Figure 14, shows a clear evolution of research priorities over time. In earlier years, the literature concentrated on personalization systems, recommender intelligence, and predictive modelling. As AI became more pervasive in consumer-facing platforms, the thematic focus shifted toward psychological constructs such as trust, perceived risk, privacy concerns, and consumer satisfaction. This stage reflects a deeper engagement with the behavioural and experiential implications of AI-mediated decision environments.

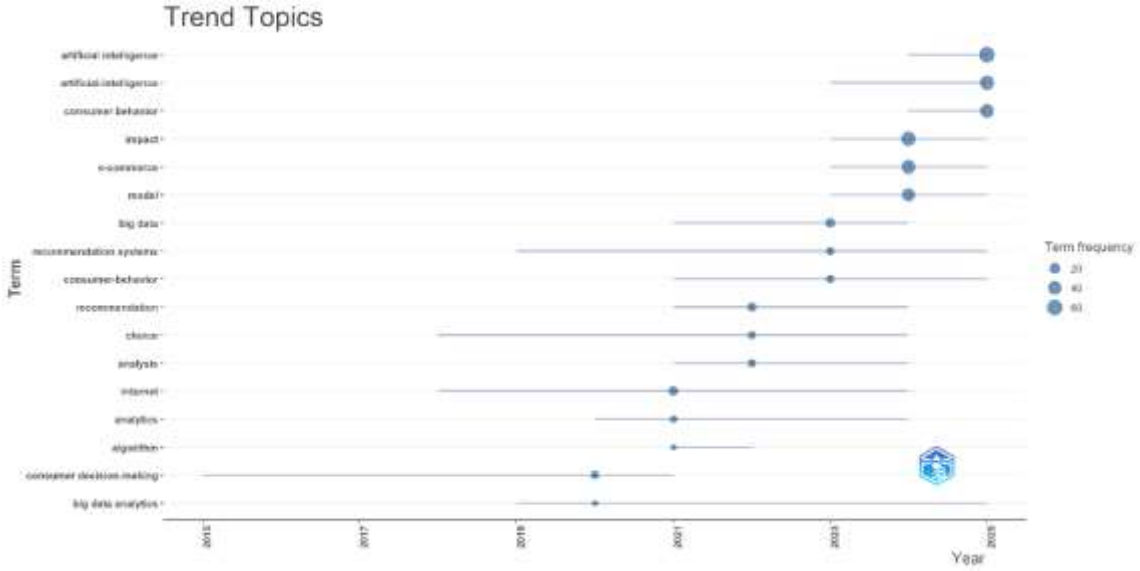

Figure 14. Trend topic evolution illustrating longitudinal shifts in research focus.

In the most recent period, the thematic trajectory has moved decisively toward autonomy-related constructs. Keywords such as manipulation, autonomy, reactance, vulnerability, dark patterns, and ethical AI have increased sharply in frequency and centrality. This shift signals growing scholarly

concern with the societal, normative, and psychological consequences of persuasive AI. The emergence of these terms indicates that research has progressed beyond evaluating technological efficiency and is now more attentive to questions of consumer agency, transparency, fairness, and responsible AI design.

Overall, the co-word network and thematic evolution analysis demonstrate that the field has transitioned from a technology-driven phase to a psychologically and ethically oriented phase. This transformation highlights an increasing recognition of consumer autonomy and well-being as central considerations in the study of algorithmic persuasion..

4.2. Systematic Literature Review Results

4.2.1. System-Level Features of AI-Enabled Persuasion

Across the corpus, algorithmic persuasion operates through several system-level mechanisms. These include personalized recommendation engines, ranking algorithms, adaptive message framing, engagement optimization models, and interface-level nudging strategies. Many systems rely on continuous data extraction to refine predictions and adjust persuasive cues. The review shows that persuasive outcomes emerge not only from message content but also from architectural features embedded within platforms.

4.2.2. Psychological Mechanisms Shaping Consumer Autonomy

Five core psychological mechanisms recur across studies:

(a) Perceived Control:

Autonomy increases when consumers feel able to influence recommendations or understand algorithmic logic. It diminishes when personalization appears intrusive or unmodifiable.

(b) Awareness of Influence:

Consumers rarely recognize when algorithms are steering their decisions. Lack of awareness creates ambiguity between “freely made choices” and “machine-shaped choices.”

(c) Cognitive Load and Dependency:

As digital environments become more complex, reliance on automated decision aids grows. This can support decision-making but may also reduce reflective thinking.

(d) Reactance and Resistance:

Overly assertive algorithmic prompts, unavoidable defaults, or repetitive nudges trigger psychological reactance, leading to rejection or avoidance behaviors.

(e) Perceived Manipulation:

Opaque systems and dark patterns generate feelings of being manipulated, which reduce trust and weaken autonomy.

4.2.3. Evaluative Constructs: Trust, Transparency, Fairness, and Privacy

Trust emerges as a multidimensional evaluative response to AI-driven persuasion. Transparency plays a crucial role in developing trust, yet most systems offer little explanation about data usage or recommendation rationale. Perceived fairness relates to whether individuals believe the algorithm treats them appropriately. Privacy concerns arise when personalization requires extensive behavioral surveillance. These constructs interact to shape acceptance, skepticism, or resistance toward persuasive systems.

4.2.4. Vulnerable Consumers and Asymmetric Power Dynamics

The review indicates heightened risks for vulnerable groups, including low digital literacy users, adolescents, older adults, and individuals under economic or emotional strain. AI systems can identify susceptibility patterns with high precision, enabling targeted persuasion that disproportionately affects vulnerable populations. This raises concerns about structural power asymmetries between consumers and digital platforms.

4.2.5. Behavioural and Attitudinal Outcomes

Algorithmic persuasion influences behaviors such as clicking, engaging, purchasing, subscribing, or sharing. Attitudinal responses vary from acceptance and satisfaction to avoidance, distrust, or calls for regulation. Studies consistently show that behavioural outcomes cannot be interpreted independently of psychological responses and autonomy perceptions.

4.3. Integrative Findings

Integrating bibliometric mapping with systematic review results reveals three central insights.

First, the field has matured from focusing on efficiency and optimization toward examining psychological consequences and ethical boundaries.

Second, autonomy-related constructs perceived control, manipulation, transparency, and fairness form the conceptual core connecting most research streams.

Third, despite significant growth, the field lacks a unified framework that integrates technological, psychological, and ethical dimensions of algorithmic persuasion.

These findings highlight the need for a cohesive theoretical model that clarifies how AI-enabled persuasive systems shape consumer autonomy and under which conditions influence shifts from supportive to manipulative.

5. DISCUSSION

The integrated results of this study reveal a field that has rapidly evolved from performance-oriented investigations of personalization technologies toward deeper examinations of the psychological and ethical implications of AI-enabled persuasion (Dutta & Kannan Poyil, 2024; Prodhan & Mukherjee, 2024). Across the bibliometric and systematic findings, the most striking pattern is the gradual reorientation of scholarly attention from algorithmic efficiency to consumer autonomy. This trajectory reflects broader societal concerns regarding transparency, manipulation risks, and the legitimacy of automated influence in digital markets (De Fine Licht & De Fine Licht, 2020; Harness et al., 2024; Susser et al., 2019a).

The bibliometric analysis demonstrates that the intellectual structure of the field is composed of four dominant research clusters: AI-driven personalization and recommendation systems (Chugh & Jain, 2024; Rosário & Dias, 2025), evaluative constructs such as trust and privacy (Qadri & Moustafa, 2025; Teepapal, 2025), digital nudging and choice architecture (Luo et al., 2025; Mele et al., 2021), and autonomy-related constructs including reactance (Oh et al., 2025; Oha et al., 2025), vulnerability, and perceived manipulation (Choudhary, 2025). The temporal evolution of keywords further highlights the conceptual shift. Early studies focused primarily on technical design and prediction accuracy (Rose & MacGregor, 2021, Usman et al., 2024; Xie et al., 2022). Over time, research expanded toward attitudinal constructs such as fairness, transparency, and trust (Oyekunle et al., 2024; Shabankareh et al., 2025). In the most recent period, autonomy, manipulation, and dark patterns emerged as front-line topics, signaling a conceptual deepening of concerns about human agency in algorithmically curated environments (Batchulor, 2025; Kumar et al., 2025; Starke & Willemsen, 2024).

The systematic review reinforces this evolution by illustrating how algorithmic persuasion interacts with cognitive, emotional, and psychosocial dimensions of consumer decision-making. The psychological analysis reveals that consumers often struggle to differentiate between their own preferences and system-driven recommendations (Wang & Zhang, 2024). The adaptive and opaque nature of algorithmic systems blurs the boundary between supportive guidance and implicit steering. When persuasive influence operates beneath conscious awareness, consumers may be left without a clear sense of how choices are shaped (Dubazana, 2024). This ambiguity weakens perceived autonomy and complicates ethical evaluations of digital marketing practices.

Several psychological mechanisms emerge as central to understanding these dynamics. Perceived control functions as a primary determinant of autonomy-supportive versus autonomy-undermining persuasion. When consumers feel they can modify, reject, or question recommendations, autonomy remains intact. When algorithmic cues appear intrusive, unavoidable, or overly tailored, perceptions of

freedom diminish (Fink et al., 2024; Nokhiz & Ruwanpathirana, 2025). Similarly, cognitive load plays a dual role. AI-driven filters can reduce complexity and improve decision quality, yet they may also increase cognitive dependency on automated systems, reducing reflective thinking and fostering overreliance on algorithmic suggestions (Khan & Shehawy, 2025).

The findings also underscore a growing tension between personalization and manipulation. While many systems aim to increase relevance and convenience, the same mechanisms can be optimized to influence behaviour in ways that prioritize platform goals over consumer welfare. This raises concerns about the exploitation of vulnerabilities, particularly when predictive models identify susceptibility patterns or emotional states. The use of dark patterns, subtle coercive structures, or persuasion without awareness challenges conventional assumptions about informed choice in digital contexts.

Another notable insight is the asymmetry between consumer expectations and actual system behaviour. Consumers often assume that recommendation systems act neutrally or align with their interests. However, algorithmic architectures frequently incorporate commercial priorities that may not align with autonomy-enhancing outcomes. This discrepancy contributes to distrust, perceived unfairness, and the sense that algorithms operate as black boxes beyond user understanding.

From a broader theoretical standpoint, the results indicate that consumer autonomy in AI-mediated environments is not a static characteristic. Instead, it is shaped dynamically by interactions between system design, user cognition, and contextual features of digital platforms. Autonomy emerges as a continuum rather than a dichotomy, fluctuating depending on the degree of transparency, controllability, and alignment between consumer goals and algorithmic intentions. This perspective challenges traditional models of persuasion that assume stable individual agency and highlights the need to incorporate design-level variables into psychological explanations.

The integration of bibliometric and systematic findings therefore reveals a fragmented but converging landscape. Although research streams originate from distinct disciplinary traditions marketing, information systems, psychology, HCI, and ethics they increasingly intersect around shared concerns about power asymmetry, informed consent, and the psychological boundaries of acceptable influence. This convergence indicates that algorithmic persuasion has matured beyond a technological curiosity and now represents a critical domain for understanding the future of digital consumer behaviour.

In summary, the discussion highlights the transformation of the field from technical optimization to autonomy-centered inquiry. It shows that psychological processes underlying algorithmic persuasion are intertwined with design architectures, data flows, evaluative judgments, and structural inequities. These findings create a foundation for establishing theoretical contributions, developing managerial guidelines, and proposing ethical safeguards that ensure AI-mediated persuasion supports rather than undermines consumer agency.

6. THEORETICAL CONTRIBUTIONS

This study provides several theoretical contributions that advance current understanding of AI-enabled algorithmic persuasion and consumer autonomy in digital marketing environments.

(1) A conceptual reframing of algorithmic persuasion as an infrastructural process rather than a message-based interaction.

Existing persuasion theories are largely grounded in human-delivered influence, where intentionality, awareness, and communication cues are observable (Klüber, 2025; Slater, 2010; Springston et al., 2010). The findings of this study challenge this paradigm by conceptualizing algorithmic persuasion as a structural component of digital platforms. Influence becomes embedded in ranking systems, interface architecture, and prediction models (Susser et al., 2019b; Weinmann et al., 2016). This reframing expands the theoretical scope of persuasion research by establishing algorithms not human agents as central actors in shaping consumer cognition and behaviour (Beer, 2017; Danaher et al., 2020).

(2) A multi-level definition of consumer autonomy for AI-mediated decision environments.

he review identifies autonomy as a dynamic, context-dependent construct influenced by system transparency, perceived control, cognitive load, degree of awareness, and the alignment between algorithmic goals and user goals (Grafanaki, 2017; Lanzing, 2019). This contributes to theory by

positioning autonomy as a continuum shaped simultaneously by psychological factors and platform design variables (Burr et al., 2018). Traditional models that treat autonomy as a stable personal trait are insufficient for understanding decisions made within algorithmically curated environments (André et al., 2018; Puntoni et al., 2021).

(3) Integration of psychological and technological mechanisms into a unified explanatory structure.

While prior research often isolates psychological variables (e.g., reactance, trust) from system-level features (e.g., personalization intensity, interface nudges) (Glikson & Woolley, 2020), this study shows that autonomy outcomes cannot be understood without examining how algorithmic structures interact with cognitive processes (Sundar, 2020). Theoretical integration offers a more comprehensive framework for explaining how influence emerges, when it strengthens or weakens autonomy, and why consumers exhibit asymmetric responses to similar persuasive cues (Hildebrand & Bergner, 2021; Shin, 2021).

(4) Identification of four converging research clusters and their shared conceptual core.

Bibliometric analysis reveals that distinct research traditions personalization intelligence (Wedel & Kannan, 2016), trust privacy research (Martin et al., 2017), digital nudging (Weinmann et al., 2016), and autonomy manipulation scholarship (Susser et al., 2019b) are gradually merging around concerns related to agency, fairness, and opaque influence. This finding contributes to theoretical consolidation by mapping how dispersed scholarly conversations are converging into a cohesive interdisciplinary domain (Hermann, 2022).

(5) Recognition of power asymmetry as a central theoretical dimension in digital persuasion.

Traditional persuasion models assume symmetric information and balanced communicative roles (Friestad & Wright, 1994). This study demonstrates that algorithmic systems create structural asymmetries between platforms and consumers, which fundamentally alter the conditions of persuasive influence (Zuboff, 2019; Andrejevic, 2019). By foregrounding power asymmetry as a theoretical dimension, the study expands the explanatory boundaries of marketing persuasion theory (Labrecque et al., 2013).

7. PRACTICAL IMPLICATIONS

The findings also generate important implications for practitioners, platform designers, policymakers, and managers seeking to align AI-driven persuasion with consumer welfare and ethical digital marketing practices.

(1) Designing AI-enabled systems that support rather than undermine autonomy.

Platforms can enhance autonomy by increasing user control over personalization settings, allowing the modification or rejection of recommendations, and providing transparent explanations for algorithmic outputs. Autonomy-supportive environments strengthen trust and reduce perceptions of manipulation.

(2) Implementing transparent data practices and clear communication mechanisms.

Users' trust increases when platforms clearly communicate what data is collected, how it is used, and why specific recommendations are shown. Providing user-friendly explanations and justification layers can reduce uncertainty and improve the legitimacy of algorithmic influence.

(3) Reducing manipulative design through ethical interface architecture.

Digital nudges should enhance decision quality rather than exploit cognitive vulnerabilities. Removing dark patterns, avoiding forced engagement strategies, and reducing friction in opt-out processes help maintain consumer agency. Designing "choice architectures for autonomy" can differentiate responsible firms in competitive digital markets.

(4) Monitoring and mitigating risks for vulnerable users.

Given that AI systems can identify susceptibility patterns with high precision, firms should implement safeguards against targeting individuals based on emotional distress, impulsivity, low digital literacy, or

financial vulnerability. Ethical guidelines and auditing tools can prevent exploitation and reduce reputational and regulatory risks.

(5) Aligning recommender and targeting systems with long-term consumer relationships.

Short-term optimization for clicks, engagement, or purchases can erode trust if users perceive manipulation. Platforms should balance behavioural optimization with long-term relational outcomes by adopting fairness-aware and well-being-aware recommendation strategies.

(6) Supporting regulation and standardization practices.

Policymakers can use insights from this study to develop guidelines that ensure transparent personalization, limit covert persuasion, and require accountability for algorithmic decisions. Firms that proactively adopt such standards may gain competitive advantage through trustworthiness and responsible innovation.

8. LIMITATIONS

Although this study integrates bibliometric mapping with a systematic literature review to provide a comprehensive understanding of AI-enabled algorithmic persuasion, several limitations should be acknowledged.

First, the dataset is based exclusively on the Web of Science Core Collection. While this ensures consistent metadata and high-quality indexing, it may exclude relevant publications indexed in alternative databases or emerging interdisciplinary outlets. Second, bibliometric techniques rely on keyword co-occurrence and citation patterns that may not fully capture conceptual nuance or theoretical innovation occurring in smaller subfields.

Third, despite the use of PRISMA guidelines, the inclusion of studies is dependent on how authors describe constructs in titles, abstracts and keywords. Subtle psychological or design-level constructs may be underrepresented if they are not explicitly articulated in metadata.

Fourth, the rapidly evolving nature of AI technologies means that recent developments such as generative agents, multimodal persuasion, or real-time emotional inference may not yet be fully reflected in the publication record.

Finally, as with all qualitative syntheses, thematic interpretations are shaped by conceptual judgments. Although the coding procedure sought to minimize subjectivity, alternative analytical perspectives may categorize constructs differently.

9. FUTURE RESEARCH DIRECTIONS

Building on the findings and limitations, several promising directions emerge for future scholarship:

(1) Development of an integrated theoretical framework for algorithmic persuasion and autonomy.

There is a need for models that synthesize psychological, technological and ethical dimensions, capturing how autonomy shifts dynamically across digital contexts.

(2) Empirical measurement of autonomy in AI-mediated environments.

Future work should operationalize autonomy through multidimensional scales that reflect perceived control, awareness, transparency, manipulation, and decision ownership.

(3) Examination of design-level variables within platform architectures.

More research is needed to understand how interface structures, ranking configurations, and feedback loops alter consumer agency and behavioural trajectories.

(4) Longitudinal and experimental studies.

Most existing research is cross-sectional. Longitudinal designs and controlled experiments can provide stronger causal inference regarding how AI-driven persuasion influences behaviour and autonomy over time.

(5) Investigating generative AI and multimodal persuasion.

New persuasive agents such as conversational AI, synthetic influencers, and adaptive avatars create complex psychological dynamics that require deeper exploration.

(6) Vulnerability-focused research.

Future studies should analyze how algorithmic persuasion affects individuals with varying levels of digital literacy, emotional fragility, socioeconomic constraints or developmental sensitivity.

(7) Fairness, accountability, and governance models.

As regulatory interest grows, research should examine how transparency mechanisms, auditing tools, and governance frameworks can mitigate risks while preserving personalization value.

(8) Cross-cultural and comparative studies.

Given that autonomy perceptions vary across cultures, comparative analyses can illuminate how societal norms shape responses to algorithmic influence.

10. CONCLUSION

This study provides a comprehensive and multidimensional assessment of AI-enabled algorithmic persuasion and its implications for consumer autonomy. By combining bibliometric analysis with a PRISMA-guided systematic review of 310 peer-reviewed articles, the research maps the intellectual structure of the field while offering an in-depth synthesis of psychological, behavioural and ethical dimensions.

The findings demonstrate that algorithmic persuasion has evolved from a set of technical optimization techniques into a pervasive infrastructural force shaping digital consumer experiences. As personalization, recommendation engines, and adaptive choice architectures become embedded within everyday digital interactions, concerns about autonomy, transparency, manipulation and fairness increasingly define the research agenda.

The integrated results reveal that consumer autonomy is not a static construct but a dynamic condition influenced by system design, cognitive processes, and contextual cues. Algorithmic persuasion holds the potential to support informed decision-making, yet it also carries the risk of hidden influence, behavioural steering, and exploitation of vulnerabilities.

By synthesizing these insights, the study contributes to ongoing debates about the psychological boundaries of acceptable influence, the ethical responsibilities of AI-driven marketing systems, and the future governance of digital persuasion. Ultimately, the research underscores the need for theoretical integration, responsible design practices, and regulatory frameworks that safeguard consumer autonomy while enabling meaningful innovation in AI-mediated marketing environments.

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