

E-Commerce Customer Loyalty: The Need for Longitudinal Research.

Auteur 1 : EL MOUNTASSIR El Khalil,

Auteur 1 : JEDDOU Elmehdi,

Auteur 1 : ALLAM Sarah,

EL MOUNTASSIR El Khalil, (0009-0009-8619-868X, PhD)

1 Hassan First University of Settat, Faculty of Economics and Management,
Research Laboratory in Economics, Management, Business Management (LAREGMA). Morocco

JEDDOU Elmehdi, (0009-0006-3347-9435, PhD)

2 Hassan First University of Settat, National School of Commerce and Management,
Research Laboratory in Strategy and Management of Organizations (LASMO). Morocco

ALLAM Sarah, (0009-0005-2582-799X, PhD)

3 Ibn Tofail University of Kenitra, Faculty of Economics and Management,
Research Laboratory in Management and Organizational Sciences (RSGO). Morocco

Déclaration de divulgation : L'auteur n'a pas connaissance de quelconque financement qui pourrait affecter l'objectivité de cette étude.

Conflit d'intérêts : L'auteur ne signale aucun conflit d'intérêts.

Pour citer cet article : EL MOUNTASSIR E., JEDDOU E. & ALLAM S (2025). « E-Commerce Customer Loyalty: The Need for Longitudinal Research », African Scientific Journal « Volume 03, Num 32 » pp: 0551 – 0588.



DOI : 10.5281/zenodo.17321301
Copyright © 2025 – ASJ



Abstract

This review synthesizes research on "implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce" to address the limited understanding of temporal dynamics in customer behavior. The examination sought to appraise the function and effect of longitudinal methodologies, evaluate extant research frameworks, discern pivotal factors affecting loyalty formation, juxtapose longitudinal and cross-sectional perspectives, and evaluate the amalgamation of sophisticated analytics and digital marketing strategies. A thorough investigation of empirical inquiries, literature assessments, and meta-analytical examinations was conducted, focusing on the sphere of retail e-commerce with a particular emphasis on the integration of both longitudinal and cross-sectional methodological paradigms. Findings reveal a scarcity of robust longitudinal research despite its critical value in capturing loyalty erosion, trust evolution, and phase-specific retention effects ; methodological challenges such as attrition and limited multi-year data constrain longitudinal rigor; advanced analytics and machine learning enhance predictive capabilities but are underutilized longitudinally; and digital marketing strategies show promise in fostering loyalty, yet their long-term impacts remain underexplored. These revelations converge to emphasize the imperative of extensive longitudinal paradigms that incorporate conventional and innovative analytical methodologies to clarify the developing loyalty mechanisms. The review highlights significant theoretical and practical implications, advocating for expanded longitudinal research employing big data and AI to inform effective, temporally sensitive marketing strategies in retail e-commerce..

Keywords: E-commerce, Customer retention, Brand loyalty, Longitudinal studies, Customer relationship management.

Introduction

Research on the implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce has emerged as a critical area of inquiry due to the dynamic nature of consumer behavior and the growing importance of sustained customer relationships in digital markets (Huang & Shih, 2021; Chintagunta & Labroo, 2020; Ke et al., 2021; Ascarza et al., 2017; Wattoo, 2025). Over the past two decades, research has evolved from static, cross-sectional analyses to recognizing the need for temporal perspectives that capture changes in loyalty and retention (Hsu et al., 2006; Chintagunta & Labroo, 2020; Dawes et al., 2021; Zaghoul, 2024; Boozary, 2025). This shift is driven by the practical significance of understanding long-term customer engagement, as retention directly impacts profitability and competitive advantage in e-commerce (Ascarza et al., 2018; Hiep et al., 2024). For instance, a multitude of empirical studies and research findings have consistently revealed that the deterioration or erosion of customer loyalty pertaining to repeat purchases can, in fact, escalate to levels exceeding an alarming 70% within a mere span of five years, thereby underscoring the critical necessity for acquiring and analyzing longitudinal insights that can provide a deeper understanding of consumer behavior over extended periods of time (Dawes et al., 2020; Khalifa et al., 2002).

The specific problem addressed is the scarcity of robust longitudinal research that tracks customer retention and brand loyalty trajectories over extended periods in retail e-commerce contexts (Chintagunta & Labroo, 2020; Huang & Tsui, 2016). Despite the acknowledged importance of these constructs, most studies rely on cross-sectional data or short-term observations, limiting understanding of how loyalty evolves and how retention strategies perform over time (Huang & Shih, 2021; Han-yang & Xu-dong, 2010; Ke et al., 2021). There is a notable gap in integrating temporal dynamics with behavioral and attitudinal loyalty measures, compounded by divergent findings on the stability and predictors of loyalty (Dikčius et al., 2022; Dikčius et al., 2024; Samir et al., 2023; Dawes et al., 2021; Ascarza et al., 2017). Controversies exist regarding the relative influence of satisfaction, trust, and emotional attachment on long-term loyalty, with some research emphasizing immediate effects and others highlighting gradual changes (Haumann et al., 2014; Hiep et al., 2024). The lack of longitudinal evidence significantly obstructs and undermines the creation and advancement of robust and efficacious retention models, as well as the implementation of strategic interventions that are vital for ensuring sustained engagement and success within various contexts (Ascarza et al., 2018; Ke et al., 2021).

Conceptually, this review defines customer retention as the sustained repurchase behavior over time and brand loyalty as a multidimensional construct encompassing attitudinal and behavioral components (Dikčius et al., 2022; Dikčius et al., 2024; Kamakura, 2009). The framework integrates relationship marketing theory and dynamic consumer behavior models to elucidate how loyalty develops and erodes longitudinally (Huang & Shih, 2021; Dawes et al., 2020; Han-yang & Xu-dong, 2010). This approach aligns with variance theory perspectives emphasizing quantitative tracking of change to inform retention strategies and brand management (Kehr & Kowatsch, 2015; Kamakura, 2009).

The purpose of this systematic review is to synthesize existing longitudinal research on customer retention and brand loyalty in retail e-commerce, identify methodological challenges, and highlight implications of the current research gap (Chintagunta & Labroo, 2020; Huang & Tsui, 2016). By rectifying this deficiency, the examination aspires to elevate conceptual comprehension and furnish pragmatic insights for professionals endeavoring to augment enduring consumer involvement (Ascarza et al., 2018; Hiep et al., 2024).

The review employs a comprehensive literature search and critical analysis of empirical studies, focusing on quantitative longitudinal designs and their findings (Kehr & Kowatsch, 2015; Huang & Tsui, 2016). The synthesis is organized to first map the evolution of loyalty research, then examine methodological issues, and finally discuss practical implications and future research directions (Chintagunta & Labroo, 2020; Ascarza et al., 2018).

This study specifically addresses the issue of the scarcity of longitudinal research on customer retention and brand loyalty in e-commerce. The main objective is to fill this gap by providing a systematic and critical review of existing studies, in order to identify the contributions and limitations of longitudinal approaches as well as their theoretical and managerial implications. The paper is structured as follows: the first section presents the conceptual framework, defining the key constructs of customer retention and brand loyalty. The second section describes the methodology used for the systematic selection and analysis of the studies. The third section reports the results, providing a descriptive summary and highlighting the main empirical findings. The fourth section develops the discussion, which includes the critical analysis of the literature, thematic and chronological reviews, points of agreement and divergence across studies, as well as the theoretical and practical implications. Finally, the paper concludes by summarizing the main insights, outlining the limitations of the existing literature, and identifying promising directions for future research.

1. Purpose and Scope of the Review

Statement of Purpose

The objective of this report is to examine the existing research on "implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce" in order to elucidate the consequences of insufficient temporal analysis on understanding customer behavior dynamics. This examination is significant owing to the fact that client retention and brand allegiance are pivotal factors of enduring competitive superiority in electronic commerce; nevertheless, the majority of investigations depend on cross-sectional data that do not succeed in encapsulating the dynamic trends and causal associations over temporal intervals. By synthesizing current knowledge and identifying research gaps, the report aims to highlight the necessity of longitudinal methodologies for advancing theoretical frameworks and informing effective marketing strategies that foster long-term customer engagement and loyalty in the digital retail environment.

Specific Objectives:

- To evaluate comprehension of longitudinal studies' roles in consumer retention and brand loyalty research in e-commerce.
- Benchmarking of existing research methodologies to identify the prevalence and quality of longitudinal designs in retail e-commerce studies.
- Identification and synthesis of key factors influencing customer retention and brand loyalty development over time in online retail contexts.
- To compare the insights derived from longitudinal versus cross-sectional studies regarding customer loyalty dynamics and retention strategies.
- To deconstruct the implications of emerging technologies and data analytics on enhancing longitudinal research approaches in e-commerce loyalty studies.

2. Methodology of Literature Selection

Transformation of Query

We take your original research question — "**implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce**"— and expand it into multiple, more specific search statements. By systematically expanding a broad research question into several targeted queries, we ensure that your literature search is

both **comprehensive** (you won't miss niche or jargon-specific studies) and **manageable** (each query returns a set of papers tightly aligned with a particular facet of your topic).

Below were the transformed queries we formed from the original query:

- Implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce
- Exploring longitudinal insights into customer retention and brand loyalty trends in e-commerce: A need for comprehensive research
- The significance of longitudinal research in understanding customer retention and brand loyalty in e-commerce: innovative strategies and technology's impact
- The role of emerging technologies and data analytics in enhancing customer retention and brand loyalty insights in e-commerce through longitudinal research.
- The study examines technology and data analytics' influence on customer retention and brand loyalty in retail e-commerce. It emphasizes the necessity for longitudinal research.

Screening Papers

We then run each of your transformed queries with the applied Inclusion & Exclusion Criteria to retrieve a focused set of candidate papers for our always expanding database of over 270 million research papers. during this process we found 213 papers.

Citation Chaining - Identifying additional relevant works

- **Backward Citation Chaining:** For each of your core papers we examine its reference list to find earlier studies it draws upon. By tracing back through references, we ensure foundational work isn't overlooked.
- **Forward Citation Chaining:** We additionally discern contemporary scholarly articles that have referenced each foundational paper, systematically monitoring the evolution of the discipline as it has expanded upon those findings. This process reveals nascent discussions, efforts in replication studies, and the latest advancements in methodologies.

A total of 89 additional papers are found during this process.

Relevance scoring and sorting

We take our assembled pool of 302 candidate papers (213 from search queries + 89 from citation chaining) and impose a relevance ranking so that the most pertinent studies rise to the top of our final papers table. A total of 287 pertinent papers were identified in relation to the research inquiry. Out of 287 papers, 50 were highly relevant.

3. Results

Descriptive Summary of the Studies

This section maps the research landscape of the literature on implications of the lack of longitudinal studies on customer retention and brand loyalty development over time in retail e-commerce, focusing on diverse methodologies and thematic emphases. In conducting a thorough examination of the existing literature, we identified a diverse array of longitudinal empirical investigations, extensive review articles, and research employing sophisticated analytical techniques, with the majority of the scholarly work concentrating on digital marketing and e-commerce. A notable pattern is the limited but growing use of longitudinal designs, with many studies highlighting methodological challenges and the need for temporal insights to better understand loyalty dynamics. This examination is vital for discerning research deficiencies in consumer conduct, extensive data and artificial intelligence amalgamation, and the assessment of digital marketing methodologies over temporal spans.

Study	Prevalence of Longitudinal Designs	Methodological Rigor	Temporal Insights on Loyalty Development	Integration of Advanced Analytics	Impact of Digital Marketing Strategies
(Huang & Shih, 2021)	Employs longitudinal data to study gratitude and trust velocity effects on loyalty	Moderate sample size; longitudinal survey design	Captures dynamic changes in trust and gratitude influencing loyalty	Limited use of advanced analytics; focuses on relational constructs	Discusses relationship benefits but limited marketing strategy focus
(Theodorakopoulos & Theodoropoulou, 2024)	Notes scarcity of longitudinal studies on big data personalization effects	Systematic review with rigorous PRISMA methodology	Highlights gaps in longitudinal analysis of trust and loyalty over time	Emphasizes big data analytics potential but longitudinal use limited	Calls for longitudinal studies to assess personalization impact
(Zheng et al., 2017)	Uses longitudinal setting to test coupon proneness and value consciousness	Empirical study with 537 users over time	Examines moderating effects on loyalty intentions and repurchase	Traditional statistical methods; no advanced AI techniques	Focuses on price tactics influencing loyalty longitudinally

(Hsu et al., 2006)	Applies two-stage longitudinal survey to extend Theory of Planned Behavior	Strong design with multi-wave data collection	Investigates continuance intention over time	No advanced analytics; theory-driven approach	Limited direct focus on digital marketing strategies
(Chintagunta & Labroo, 2020)	Advocates for more longitudinal consumer research; few existing studies	Discusses challenges and proposes broader longitudinal insights	Emphasizes importance of temporal effects in consumer behavior	Suggests accessible methodologies but limited current use	Calls for longitudinal insights to inform marketing strategies
(Kehr & Kowatsch, 2015)	Reviews IS literature; longitudinal designs underused but encouraged	Provides methodological guidelines for longitudinal IS research	Discusses capturing time-variant phenomena like post-adoption behavior	No direct application of big data or AI	Highlights methodological challenges affecting marketing research
(Fitriani et al., 2024)	Systematic bibliometric review; longitudinal studies not prevalent	Qualitative analysis of 100 articles; bibliometric rigor	Identifies research gaps in customer loyalty trends over time	Limited integration of advanced analytics in reviewed studies	Notes emerging marketing trends but longitudinal evidence sparse
(Dikčius et al., 2022)	Meta-analysis includes time as moderator but mostly cross-sectional data	Large sample meta-analysis; rigorous statistical methods	Finds loyalty levels vary with publication time; limited longitudinal data	No direct use of big data or AI in meta-analysis	Suggests recent studies show stronger loyalty effects
(Yapinski et al., 2024)	Cross-sectional survey with call for longitudinal follow-up	Moderate sample; survey-based analysis	Recognizes need for longitudinal studies on service quality effects	Uses SmartPLS; no advanced AI or big data	Highlights service quality and user experience impact on loyalty
(Brahma & Revi, 2024)	Employs temporal effects in machine learning model for brand loyalty	Uses consumer panel data with	Models purchase behavior	Integrates semi-supervised ML and	Provides actionable marketing insights based

		advanced ML techniques	sequences over time	temporal features	on loyalty segments
(Dawes et al., 2020)	Longitudinal panel study over five years on loyalty erosion	Large consumer panel; multi-year data	Documents erosion of repeat-purchase loyalty over time	Traditional statistical analysis; no AI	Links marketing mix factors to loyalty erosion longitudinally
(Khalifa & Shen, 2009)	Longitudinal survey on eCRM effects on satisfaction and retention	Large sample; temporal phases considered	Differentiates attraction and retention phases over time	No advanced analytics; functional approach	Highlights temporal variation in eCRM effectiveness
(Pee et al., 2019)	Longitudinal comparison of website usefulness and satisfaction	Multi-wave survey design	Examines loyalty changes related to website factors	Traditional statistical methods	Focus on website factors, limited marketing strategy analysis
(Huang & Tsui, 2016)	Proposes quantitative retention assessment using real purchase data	Empirical study with real transactional data	Enables longitudinal monitoring of repatronage behavior	No advanced analytics	Focus on retention measurement rather than marketing tactics
(Huang et al., 2013)	Similar to (Huang & Tsui, 2016), quantitative retention measurement	Empirical with real data; 80th percentile threshold	Supports longitudinal retention studies	No AI or big data use	Focus on retention thresholds, limited marketing strategy focus
(Khalifa et al., 2002)	Longitudinal study on online customer stickiness and repurchase	Empirical model with longitudinal data	Highlights satisfaction and habit effects over time	No advanced analytics	Discusses implications for retention strategies
(Khalifa & Shen, 2005)	Longitudinal survey on eCRM categories and satisfaction phases	Multi-stage survey; temporal model	Differentiates eCRM effects at attraction and retention phases	No AI; IS success model based	Emphasizes temporal shifts in eCRM satisfaction drivers

(Fuad & Abdullah, 2023)	Literature review on E-CRM, experience, and loyalty in e-commerce	Qualitative synthesis; no longitudinal data	Notes limited exploration of temporal relationships	No advanced analytics	Calls for deeper study of E-CRM impact on loyalty
(Setiawan et al., 2024)	Cross-sectional survey on e-brand experience and loyalty	Large sample; survey-based	Focuses on millennials' loyalty drivers	No longitudinal or advanced analytics	Highlights brand experience and trust in loyalty formation
(Dwivedi, 2023)	Post-pandemic study on loyalty dimensions and retention	Regression analysis on primary data	Cross-sectional; suggests need for longitudinal follow-up	No AI or big data	Examines attitudinal vs behavioral loyalty effects
(Dikčius et al., 2024)	Cross-country survey on attitudinal loyalty differences	Large multi-country sample	Cross-sectional; explores loyalty perception differences	No advanced analytics	Highlights affective loyalty dimension
(Rahayu, 2024)	Systematic review of digital marketing strategies and loyalty	Secondary data analysis; no longitudinal studies	Calls for longitudinal research on strategy effectiveness	Limited AI discussion; excludes emerging tech	Emphasizes integrated digital marketing for retention
(Saini & Singh, 2024)	Data-driven tactics for engagement and retention; small experiment	Empirical with analytics focus	Short-term experiment; longitudinal effects not studied	Uses segmentation and personalization analytics	Demonstrates data-driven marketing impact on loyalty
(Raja et al., 2024)	Big data analytics for personalized shopping experiences	Data mining on e-commerce archives	Cross-sectional; suggests longitudinal research needed	Integrates big data analytics with ethical considerations	Focus on personalization's role in loyalty
(Rowi et al., 2024)	Survey on digital marketing, trust, and brand loyalty	Structural equation modeling;	No longitudinal design;	No advanced AI	Highlights trust and perceived

		cross-sectional	mediating effects studied		value in loyalty
(Jalal & Elmaghraby, 2024)	Framework for personalized marketing using time series and ML	Uses ML and counterfactual analysis	Captures customer transitions over time	Advanced ML and time series analytics	Supports personalized retention strategies
(Judijanto et al., 2024)	Quantitative study on anonymous data and loyalty in Indonesia	Survey with statistical analysis	Cross-sectional; privacy and personalization focus	No AI; ethical data use emphasized	Shows anonymous data's positive loyalty impact
(Ike et al., 2023)	Review of ML frameworks for retention and propensity modeling	Comprehensive review; no primary data	Discusses longitudinal data use in ML models	Advanced ML techniques highlighted	Emphasizes ML's role in retention prediction
(Yeske, 2022)	Cohort analysis of customer behavior during COVID-19	Empirical cohort analysis	Captures temporal behavior changes	Uses descriptive and exploratory analytics	Provides insights on loyalty during crisis
(Ascarza et al., 2018)	Review of retention management and future research directions	Conceptual framework; no longitudinal data	Advocates broad retention metrics including temporal views	Discusses ML and new data sources	Highlights gaps in retention research
(Samir et al., 2023)	Systematic review of online consumer stickiness	Qualitative synthesis; no longitudinal data	Notes lack of consistent longitudinal insights	No advanced analytics	Identifies conceptual inconsistencies in stickiness research
(Romano & Fjermestad, 2001)	Literature review of ECCRM research status	Survey dominant; little longitudinal or theoretical development	Notes lack of cumulative longitudinal studies	No advanced analytics	Calls for stronger empirical and longitudinal work
(Slodowy & Klemm, 2015)	Longitudinal study on loyalty indicators	Multi-industry	Compares satisfaction, intention, and	Traditional statistical methods	Provides evidence on loyalty

	predicting future behavior	longitudinal data	NPS as predictors		indicator validity
(Li et al., 2023)	ML approach to predict modern customer loyalty	Uses diverse data and ML algorithms	Cross-sectional data; suggests dynamic loyalty modeling	Advanced ML including social media data	Highlights online behavior's role in loyalty
(Han-yang & Xu-dong, 2010)	Longitudinal exploration of trust evolution in B2C e-business	Dynamic and static models over time	Captures trust changes across purchase phases	No AI; theoretical modeling	Emphasizes trust dynamics in loyalty development
(Haumann et al., 2014)	Longitudinal analysis of satisfaction and company identification	Latent growth modeling over 43 weeks	Compares long-term effects on loyalty	Traditional statistical methods	Shows differential long-term loyalty drivers
(Hiep et al., 2024)	Survey on emotional marketing, loyalty, and retention	Structural equation modeling; cross-sectional	No longitudinal design; suggests digital innovativeness role	No advanced analytics	Highlights emotional marketing's loyalty impact
(Allaway et al., 2017)	Trajectory modeling of loyalty program customer segments	Uses trajectory analysis on loyalty card data	Captures behavioral segments over time	Statistical trajectory modeling	Supports customized CRM strategies
(Fadhila et al., 2024)	Churn analysis and prediction using RFM and ML	Evaluates seven ML algorithms for churn prediction	Cross-sectional with predictive modeling	Advanced ML with Random Forest	Provides actionable retention recommendations
(Beatrice, 2023)	AI-based literature review on omnichannel retail loyalty	Quantitative and qualitative analysis	Notes limited long-term loyalty research	AI discussed in literature trends	Identifies emerging loyalty trends in omnichannel
(Lim & Lee, 2015)	Game-theoretic model of loyalty programs in online markets	Theoretical model; no empirical	Discusses dynamic consumer preferences	No AI; economic modeling	Shows loyalty programs' higher success online

		longitudinal data			
(Klepek & Kvičala, 2022)	Empirical study on e-store market share growth	Large transactional dataset analysis	Observes market penetration effects over time	No AI; statistical analysis	Finds acquisition more critical than loyalty for growth
(Librado et al., 2024)	Quantitative study on AI effectiveness in consumer behavior	Regression on simulated data	Cross-sectional; AI's role in loyalty examined	AI-based personalization focus	Demonstrates AI's positive impact on loyalty
(Allaway et al., 2014)	Dynamic segmentation of loyalty program behavior	Group trajectory modeling on loyalty data	Captures spending trajectories over time	Statistical trajectory analysis	Provides managerial insights for loyalty programs
(Kamakura, 2009)	Framework for customer lifecycle and segmentation	Uses historical transaction data	Models customer state transitions over time	No AI; segmentation and lifecycle focus	Integrates segmentation with lifecycle evolution
(Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022)	Integrates big data and traditional methods for loyalty	Conceptual chapter; no primary data	Advocates combined methods for dynamic loyalty	Big data, AI, and machine learning integration	Suggests integrated approach enhances loyalty insights
(Ijomah et al., 2024)	Big data analytics in CRM for engagement and retention	Conceptual and empirical discussion	Highlights predictive analytics and real-time data	Advanced big data and ML techniques	Emphasizes big data's role in loyalty programs
(Ke et al., 2021)	Empirical study on repurchase after non-5/5 ratings	Large Amazon review dataset; regression analysis	Examines repurchase frequency and timing	No AI; statistical modeling	Shows emotional stability and relationship proneness effects

(Felix & Rembulan, 2023)	Qualitative study on customer experience and loyalty in Indonesia	Multi-platform data; qualitative analysis	Calls for longitudinal studies to test strategies	No advanced analytics	Recommends personalization and responsiveness for loyalty
-------------------------------------	---	---	---	-----------------------	---

Prevalence of Longitudinal Designs

Approximately 15 studies explicitly employ longitudinal designs, using multi-wave surveys, panel data, or cohort analyses to capture temporal dynamics in loyalty and retention (Hsu et al., 2006; Dawes et al., 2020; Huang & Shih, 2021).

Several reviews and empirical studies highlight the scarcity of longitudinal research in e-commerce loyalty, emphasizing the predominance of cross-sectional designs (Samir et al., 2023; Theodorakopoulos & Theodoropoulou, 2024; Fitriani et al., 2024).

Numerous scholarly investigations and academic inquiries fervently promote the necessity of adopting more expansive and inclusive definitions when it comes to the interpretation and understanding of longitudinal insights, which encompasses a wide array of accessible methodological frameworks that extend well beyond the traditional confines and limitations of classic panel studies that have long been the standard in this field of research (Chintagunta & Labroo, 2020).

Methodological Rigor

This research adopts a positivist epistemological stance, as it seeks to identify generalizable patterns and relationships across prior studies of customer retention and brand loyalty. The mode of reasoning is primarily deductive, moving from established theories of relationship marketing and consumer behavior toward an evaluation of how these theories have been operationalized in longitudinal research designs. At the same time, the review incorporates an inductive dimension, since synthesizing heterogeneous findings allows for the emergence of new insights and conceptual refinements. The choice of a systematic literature review is therefore justified by the fragmentation of existing knowledge and the scarcity of longitudinal studies, which require a rigorous and transparent method to assess the state of research, evaluate methodological rigor, and identify consistent gaps that can inform future empirical investigations.

Longitudinal studies vary in rigor, with some employing large consumer panels over multiple years (Dawes et al., 2020), while others use shorter multi-stage surveys or smaller samples (Hsu et al., 2006; Huang & Shih, 2021).

Methodological guidelines, along with various critiques from the scholarly community, underscore the numerous challenges that researchers face, including but not limited to issues related to participant attrition, the frequency and timing of data collection intervals, as well as the critical aspect of ensuring that the sample used in studies is truly representative of the larger population from which it is drawn. (Kehr & Kowatsch, 2015).

Systematic reviews and meta-analyses apply rigorous protocols but often rely on cross-sectional data due to limited longitudinal availability (Dikćius et al., 2022; Theodorakopoulos & Theodoropoulou, 2024).

Temporal Insights on Loyalty Development

Longitudinal research provides valuable insights into loyalty erosion, trust evolution, and the dynamic effects of satisfaction and identification over time (Dawes et al., 2020; Han-yang & Xu-dong, 2010; Haumann et al., 2014).

Studies reveal that loyalty is not static; customer retention and brand loyalty fluctuate due to factors like marketing mix, emotional attachment, and digital innovativeness (Hiep et al., 2024; Ke et al., 2021; Huang & Shih, 2021).

Certain investigative frameworks delineate temporal stages distinctly, such as allure versus preservation, in order to enhance comprehension of allegiance cultivation (Khalifa & Shen, 2009; Khalifa & Shen, 2005).

Integration of Advanced Analytics

Advanced analytics, including machine learning and big data, are increasingly applied to model customer behavior and loyalty, though often in cross-sectional or short-term contexts (Brahma & Revi, 2024; Jalal & Elmaghraby, 2024; Ike et al., 2023).

Reviews call for more longitudinal applications of AI and big data to capture evolving customer patterns and improve predictive accuracy (Theodorakopoulos & Theodoropoulou, 2024; Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022; Ijomah et al., 2024).

Some studies demonstrate successful use of ML algorithms for churn prediction and loyalty segmentation, highlighting potential for longitudinal extensions (Fadhila et al., 2024; Li et al., 2023).

Impact of Digital Marketing Strategies

Longitudinal studies assessing digital marketing's impact on loyalty are limited but suggest that personalized content, eCRM functions, and emotional marketing significantly influence retention (Yapinski et al., 2024; Khalifa & Shen, 2005; Hiep et al., 2024).

Reviews and empirical research emphasize the need for integrated digital marketing strategies combining CRM, social media, and personalization to enhance long-term loyalty (Rahayu, 2024; Rowi et al., 2024).

Emerging technologies like AI and big data analytics are recognized as transformative for tailoring marketing efforts and fostering sustained customer engagement (Raja et al., 2024; Librado et al., 2024).

Certain conceptual frameworks underscore the efficacy of fidelity schemes and fluctuating consumer inclinations within digital marketplaces (Lim & Lee, 2015).

4. Discussion

Critical Analysis and Synthesis

The ongoing discourse within the academic community is increasingly acknowledging and emphasizing the indispensable significance of conducting longitudinal research, which is a methodological approach that involves repeated observations of the same variables over extended periods of time, in elucidating and shedding light on the multifaceted issues surrounding customer retention and brand loyalty, particularly within the ever-evolving landscape of retail e-commerce, where consumer behaviors and preferences are subject to rapid changes influenced by a myriad of factors. A multitude of academic works underscores the dynamic characteristics of consumer relationships and accentuates the shortcomings of cross-sectional methodologies in accurately reflecting temporal variations and causal linkages. Nevertheless, notwithstanding advancements in methodological approaches and the integration of big data analytics and machine learning techniques, a notable deficiency persists in the realm of comprehensive longitudinal research, particularly studies that adeptly combine traditional methodologies with innovative analytical frameworks. Moreover, scholars persistently emphasize the necessity for the implementation of more rigorous data quality benchmarks, improved methodological precision, and clearer channels for the conversion of empirical insights into practical digital marketing approaches in the context of swiftly changing environments. Overall, the synthesis points to a critical need for more comprehensive longitudinal frameworks that can better inform theory and practice in e-commerce loyalty management.

Aspect	Strengths	Weaknesses
Methodological Approaches	Several studies employ rigorous longitudinal designs that capture temporal dynamics in customer loyalty and retention, such as multi-stage surveys and panel data analyses, providing richer insights than cross-sectional studies (Huang & Shih, 2021; Hsu et al., 2006; Khalifa & Shen, 2009). The use of trajectory modeling and semi-supervised machine learning approaches further advances the methodological toolkit for analyzing customer behavior over time (Brahma & Revi, 2024; Allaway et al., 2017).	Notwithstanding these advancements, numerous inquiries continue to depend profoundly on cross-sectional data or restricted longitudinal intervals, thereby limiting the capacity to discern the protracted evolution of loyalty (Fitriani et al., 2024; Dikćius et al., 2022; Yapinski et al., 2024). Attrition, limited repeated assessments, and impediments in maintaining data fidelity over temporal spans are ubiquitous methodological deficiencies (Kehr & Kowatsch, 2015). Moreover, particular longitudinal studies demonstrate a lack of theoretical coherence or fail to engage with causality in a meticulous fashion (Chintagunta & Labroo, 2020; Romano & Fjermestad, 2001).
Integration of Big Data and Machine Learning	The incorporation of big data analytics and machine learning techniques has enhanced the granularity and predictive power of loyalty research, enabling personalized marketing and dynamic segmentation (Brahma & Revi, 2024; Raja et al., 2024; Ike et al., 2023; Li et al., 2023). These approaches facilitate real-time analysis and the identification of subtle behavioral patterns that traditional methods might miss (Jalal & Elmaghraby, 2024; (Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022).	However, the literature reveals a gap in longitudinal applications of big data and AI, with few studies effectively leveraging these technologies to track loyalty development over extended periods (Theodorakopoulos & Theodoropoulou, 2024; Rahayu, 2024; Ijomah et al., 2024). Ethical considerations, the safeguarding of data privacy, and the interpretability of models remain insufficiently examined, thereby constraining their practical implementation (Ike et al., 2023; Ijomah et al., 2024). Furthermore, the intricate nature of amalgamating various data sources presents significant obstacles to achieving consistent longitudinal analyses (Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022).

<p>Conceptualization of Loyalty and Retention</p>	<p>Research has expanded the conceptual understanding of loyalty by distinguishing between attitudinal and behavioral dimensions and emphasizing emotional and experiential factors (Zheng et al., 2017; Setiawan et al., 2024; Dikčius et al., 2024; Dwivedi, 2023). Longitudinal studies have demonstrated how constructs like trust, satisfaction, and emotional attachment evolve and influence retention over time (Huang & Shih, 2021; Han-yang & Xu-dong, 2010; Haumann et al., 2014).</p>	<p>Nonetheless, inconsistencies in loyalty definitions and measurement approaches persist, complicating cross-study comparisons and synthesis (Samir et al., 2023; Dikčius et al., 2022). Some studies report paradoxical findings, such as high attitudinal loyalty among disloyal customers, indicating conceptual ambiguities (Dikčius et al., 2024). The dynamic interplay between loyalty antecedents and outcomes is often insufficiently modeled longitudinally (Han-yang & Xu-dong, 2010).</p>
<p>Temporal Insights and Dynamics</p>	<p>Longitudinal research has illuminated critical phenomena such as the erosion of repeat-purchase loyalty, the velocity of relational constructs, and phase-specific effects of eCRM functions on satisfaction and retention (Dawes et al., 2020; Huang & Shih, 2021; Khalifa & Shen, 2009). These profound insights significantly illuminate and emphasize the crucial importance of adopting comprehensive temporal perspectives, which are instrumental in accurately capturing the intricate trajectories of customer loyalty over time, as well as in effectively informing and guiding the design of targeted interventions aimed at enhancing customer retention and satisfaction (Khalifa et al., 2002; Khalifa & Shen, 2005)..</p>	<p>Despite these contributions, many studies cover relatively short time frames or focus on specific phases, limiting understanding of long-term loyalty patterns (Haumann et al., 2014; Khalifa et al., 2002). The scarcity of multi-year panel data and challenges in sustaining longitudinal cohorts hinder comprehensive temporal analyses (Chintagunta & Labroo, 2020; Huang & Tsui, 2016). Moreover, the dynamic effects of emerging digital marketing strategies over time remain underexamined (Rahayu, 2024; Rowi et al., 2024).</p>
<p>Practical Implications and Marketing Strategies</p>	<p>The literature offers actionable insights for enhancing customer retention through personalized digital marketing, loyalty programs, and improved service quality, supported by longitudinal evidence (Yapinski et al., 2024; Rahayu, 2024; Rowi et al., 2024; Lim & Lee, 2015). Research has consistently underscored the significant importance of emotional</p>	<p>However, the translation of longitudinal findings into practice is often limited by the lack of industry-specific longitudinal case studies and the predominance of secondary data analyses (Rahayu, 2024; Saini & Singh, 2024; Felix & Rembulan, 2023). The continuously evolving and transformative nature of e-commerce platforms, coupled with the dynamic</p>

	<p>marketing strategies, as well as the adoption of digital innovation, in cultivating and maintaining a strong sense of loyalty among consumers over extended periods of time, as evidenced by the findings presented by Hiep et al. in their 2024 study. Furthermore, the implementation of data-driven methodologies has proven to facilitate not only a more strategic allocation of resources but also an enhanced capacity for the segmentation of customers, thereby optimizing marketing efforts and improving overall business performance, as articulated in the works of Brahma & Revi (2024), Allaway et al. (2017), and Fadhila et al. (2024).</p>	<p>shifts in consumer behavior, poses significant challenges to the generalizability and applicability of existing theoretical models that have been established in prior academic literature (Klepek & Kvičala, 2022). Moreover, the inherent cost implications and the considerable complexity associated with conducting longitudinal research studies serve to significantly constrain and limit the feasibility of such methodologies being adopted by practitioners who are seeking to apply them in real-world settings (Chintagunta & Labroo, 2020).</p>
<p>Research Gaps and Future Directions</p>	<p>The review identifies a clear need for more longitudinal studies that integrate big data, machine learning, and traditional methods to capture the complexity of loyalty development (Chintagunta & Labroo, 2020; Ike et al., 2023; (Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022). Methodological guidelines and conceptual frameworks are essential for improving research quality (Kehr & Kowatsch, 2015; Ascarza et al., 2018; Zaghoul, 2024; Boozary, 2025). Emerging themes such as ethical data use and real-time analytics are gaining attention (Raja et al., 2024; Ijomah et al., 2024).</p>	<p>Despite these calls, the field remains fragmented with limited cumulative tradition and theoretical development in longitudinal loyalty research (Romano & Fjermestad, 2001). Many studies overlook the mediating and moderating roles of contextual factors, such as cultural differences and technological adoption (Dikčius et al., 2024; Judijanto et al., 2024). The underrepresentation of diverse markets and product categories further limits comprehensive understanding (Klepek & Kvičala, 2022; Felix & Rembulan, 2023).</p>

Thematic Review of Literature

The literature on customer retention and brand loyalty in retail e-commerce reveals several prominent themes centered on the critical role of longitudinal studies to capture evolving customer behaviors over time. A major focus is on the methodological challenges and the scarcity of longitudinal research, which limits understanding of loyalty dynamics and retention

strategies. The integration of advanced data analysis methodologies, including but not limited to the utilization of extensive datasets commonly referred to as big data and the implementation of machine learning algorithms, is of paramount importance for enhancing our comprehensive understanding over extended periods and for the development of highly personalized marketing strategies that cater to individual consumer preferences. Furthermore, the exploration of digital marketing approaches, alongside the critical examination of emotional and experiential dimensions as well as the inherently fluid characteristics of loyalty programs, emerges as a significant factor that drives sustained customer engagement and fosters long-term retention within a competitive marketplace.

Theme	Appears In	Theme Description
Importance and Impact of Longitudinal Studies on Customer Retention and Loyalty	18/50 Papers	Longitudinal methodologies are essential to capture the temporal dynamics of customer retention and brand loyalty, revealing evolving patterns and causal relationships missed by cross-sectional studies. Several studies emphasize the need for extended temporal analysis to understand loyalty erosion, satisfaction, and repurchase behavior over time, uncovering factors like trust velocity and sustained satisfaction (Huang & Shih, 2021; Hsu et al., 2006; Chintagunta & Labroo, 2020; Dawes et al., 2020; Huang & Tsui, 2016; Huang et al., 2013; Khalifa et al., 2002; Khalifa & Shen, 2005; Han-yang & Xu-dong, 2010; Haumann et al., 2014). The absence of such investigations restricts theoretical progression and pragmatic utilization in e-commerce environments.
Methodological Challenges and Guidelines in Conducting Longitudinal Research	14/50 Papers	Research highlights common difficulties in longitudinal designs, such as sample attrition, repeated measurements, and data collection intervals, which affect study validity and reliability. Discussions include guidelines to improve longitudinal research quality, stressing the need for appropriate temporal spacing and handling complex data (Chintagunta & Labroo, 2020; Kehr & Kowatsch, 2015; Allaway et al., 2014; Kamakura, 2009). The insufficiency of validated instruments and reliance on cross-sectional studies obstruct the evolution of knowledge. (Romano & Fjermestad, 2001).
Role of Big Data Analytics and Machine Learning in Enhancing Longitudinal Insights	13/50 Papers	Big data and machine learning are transforming the study of customer retention and loyalty by enabling detailed temporal tracking and prediction of customer behaviors. Studies demonstrate how advanced analytics facilitate personalized marketing, customer segmentation, and behavior forecasting over time, thereby augmenting traditional longitudinal methods (Theodorakopoulos & Theodoropoulou, 2024; Brahma & Revi, 2024; Saini & Singh, 2024; Raja et al., 2024; Jalal & Elmaghraby, 2024; Ike et al., 2023; Li et al., 2023; (Capturing Complex,

		Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022); Ijomah et al., 2024). Ethical deliberations and data confidentiality arise as significant issues in the implementation of these technologies.
Digital Marketing Strategies and Customer Engagement for Loyalty Development	12/50 Papers	Integrated digital marketing strategies, including personalized content, CRM systems, and social media, are shown to significantly enhance customer engagement and foster brand loyalty over time. Empirical findings underscore the mediating roles of trust and perceived value, with calls for longitudinal research to validate the long-term effects of these strategies (Fuad & Abdullah, 2023; Rahayu, 2024; Rowi et al., 2024; Hiep et al., 2024). The rise of omnichannel approaches and emotional marketing further enrich loyalty development in digital retail (Hiep et al., 2024; Beatrice, 2023).
Dynamics and Erosion of Customer Loyalty Over Time	11/50 Papers	Longitudinal studies reveal that customer loyalty is dynamic, with repeat-purchase loyalty eroding progressively despite stable market share. Factors influencing erosion include price promotions, category penetration, and brand characteristics, highlighting the continuous need for acquisition alongside retention efforts (Dawes et al., 2020; Lim & Lee, 2015; Klepek & Kvičala, 2022). This theme emphasizes the non-static nature of loyalty and the importance of understanding its decay to inform retention strategies.
Emotional and Experiential Factors Influencing Brand Loyalty	8/50 Papers	Emotional marketing, customer satisfaction, perceived value, and brand experience significantly impact brand loyalty and customer retention in e-commerce. Longitudinal research shows these affective factors evolve over time, influencing repurchase behaviors and trust formation (Huang & Shih, 2021; Setiawan et al., 2024; Haumann et al., 2014; Hiep et al., 2024). The intricate variations in attitudinal loyalty that exist across diverse cultures, particularly within the context of emerging markets, serve to underscore the multifaceted and nuanced nature of loyalty constructs, which are often influenced by a myriad of sociocultural factors and consumer behaviors (Dikčius et al., 2024).
Customer Segmentation and Behavioral Trajectories in Loyalty Programs	7/50 Papers	Trajectory-based segmentation and dynamic analysis of loyalty program data reveal diverse customer loyalty patterns over time. These approaches identify distinct loyalty segments with unique behavioral paths, enabling tailored CRM strategies to maximize profitability and retention (Allaway et al., 2017; Allaway et al., 2014; Kamakura, 2009). Merging these insights with extensive datasets significantly boosts the grasp of customer progression and the distinct stages of their lifecycle.
Quantitative Measurement and Assessment of	7/50 Papers	Quantitative methods, including inter-purchase time analysis and RFM frameworks, are used in longitudinal contexts to measure retention and repurchase behavior. These approaches aid in defining retention thresholds and predicting churn, offering practical tools for e-commerce

Customer Retention		practitioners to monitor customer loyalty dynamics (Huang & Tsui, 2016; Huang et al., 2013; Fadhila et al., 2024; Ke et al., 2021).
Integration of Traditional and Big Data Methods for Loyalty Research	5/50 Papers	The integration of conventional methodologies that rely on survey instruments with the advanced techniques of big data analytics facilitates a significantly more thorough and nuanced comprehension of the intricate processes involved in the formation of customer loyalty, as well as the far-reaching implications that such loyalty entails for businesses and markets alike. This integrated methodological approach captures the complexity and dynamism of customer loyalty better than either method alone (Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022).
Regional and Cross-Cultural Variations in E-Commerce Loyalty	4/50 Papers	Studies focusing on specific countries or regions, such as Indonesia and Vietnam, reveal unique factors influencing e-commerce loyalty, such as digital innovativeness and cultural attitudes toward trust and brand experience. These findings stress the importance of contextualizing longitudinal loyalty research across diverse markets (Setiawan et al., 2024; Judijanto et al., 2024; Hiep et al., 2024; Felix & Rembulan, 2023).

Chronological Review of Literature

Research on customer retention and brand loyalty in retail e-commerce has evolved significantly, revealing critical insights into the need for longitudinal studies to capture dynamic customer behaviors over time. In the initial stages of scholarly inquiry, the predominant emphasis was placed upon the exploration of theoretical frameworks alongside the application of static evaluations, which were inherently limited by the constraints imposed by cross-sectional data analyses; however, in the course of subsequent research endeavors, there has been a noticeable shift towards the integration of more sophisticated and advanced methodologies that encompass the utilization of big data analytics, the implementation of machine learning techniques, and the adoption of temporal modeling approaches that enable a more nuanced understanding of complex phenomena. In contemporary academic investigations, there is an increasing emphasis on the critical importance of longitudinal data, which is essential for a comprehensive understanding of the intricate dynamics associated with customer loyalty, the profound impact of various digital marketing strategies, and the significant effects that emerging technologies exert on retention outcomes, thereby facilitating a more thorough analysis of these multifaceted relationships. Despite advances, gaps remain regarding the comprehensive application of longitudinal approaches to fully decipher long-term customer engagement and loyalty development in e-commerce.

Year Range	Research Direction	Description
2001–2006	Foundations of Longitudinal Customer Behavior Models	The initial stages of academic inquiry predominantly concentrated on the formulation and establishment of comprehensive theoretical frameworks aimed at elucidating the complex constructs associated with customer satisfaction, electronic loyalty, and the ongoing engagement in online shopping behaviors, employing longitudinal research methodologies to facilitate a deeper understanding of these phenomena over extended periods. Studies extended traditional behavior theories to include dynamic relationship constructs and temporal phases such as attraction and retention, highlighting the necessity of measuring change over time rather than static snapshots.
2009–2010	Temporal Dynamics in eCRM and Trust Evolution	This period emphasized the temporal effects in electronic customer relationship management and the evolution of consumer trust in B2C e-commerce. Research revealed that satisfaction and trust are dynamic and influenced by different factors at various stages of the customer lifecycle, underscoring the need for longitudinal surveys to capture these shifts.
2013–2017	Quantitative Longitudinal Analyses and Segmentation	Quantitative longitudinal research gained momentum with guidelines for methodological rigor and application in customer retention studies. Research explored loyalty program dynamics, trajectory-based customer segmentation, and the moderating roles of coupon proneness and value consciousness in e-loyalty, emphasizing the importance of repeated behavioral data for accurate modeling.
2018–2020	Recognition of Longitudinal Research Gaps and Loyalty Erosion	Scholars highlighted the scarcity and challenges of conducting longitudinal consumer research despite its high value, advocating for broader adoption and methodological innovation. Studies demonstrated long-term erosion of repeat-purchase loyalty and distinguished between short-term and long-term retention strategies, spotlighting the complexity and temporal variability of loyalty dynamics.
2022–2024	Integration of Big Data, Machine Learning, and Digital Strategies	Recent literature focuses on harnessing big data analytics, machine learning, and AI to enhance personalized marketing, customer segmentation, and predictive modeling of loyalty and retention. The research inquiry additionally examines the function of digital marketing methodologies, the implications of emotional marketing, and the concept of anonymity in data utilization for the purpose of fostering enduring customer engagement, accompanied by a compelling appeal for an increased number of longitudinal studies to substantiate these evolving effects across temporal dimensions.

Agreement and Divergence Across Studies

The reviewed literature shows a clear consensus on the importance of longitudinal studies for understanding customer retention and brand loyalty development over time in e-commerce. Many authors concur that cross-sectional designs restrict understanding of customer behavior dynamics, suggesting that advanced analytics could improve research quality and applicability. Nonetheless, there is disagreement about the availability and methodological robustness of longitudinal studies and the aspects of loyalty they capture. Certain scholars within the academic community passionately support the notion of employing thorough and comprehensive longitudinal methodologies that leverage expansive and intricate datasets, while an opposing faction highlights significant concerns such as the financial implications and the pervasive issue of publication bias, which collectively culminate in a predominance of findings that are either cross-sectional in nature or characterized by limited longitudinal scope. Moreover, there exists a notable divergence of opinions among experts regarding the substantial impact that various digital marketing strategies and the integration of cutting-edge technologies have on the evolution and cultivation of customer loyalty over an extended temporal framework.

Comparison Criterion	Studies in Agreement	Studies in Divergence	Potential Explanations
Prevalence of Longitudinal Designs	Several papers recognize the scarcity but critical role of longitudinal studies in e-commerce loyalty research, emphasizing their value in capturing dynamic consumer behavior and temporal loyalty development (Huang & Shih, n.d.; Chintagunta & Labroo, 2020; Huang & Tsui, 2016; Huang et al., 2013).	Some systematic reviews and bibliometric analyses point to a limited presence of longitudinal designs, noting their underrepresentation compared to cross-sectional studies in the field (Kehr & Kowatsch, 2015; Fitriani et al., 2024; Samir et al., 2023).	Discrepancies emerge as a consequence of variations in research emphasis (some investigations specifically examine longitudinal studies, while others encompass a wider scope of loyalty research), methodological obstacles, and limitations in available resources.
Methodological Rigor	Agreement that rigorous longitudinal designs require adequate sample sizes, repeated measurements, and attention to attrition, as detailed in guidelines and	Some studies report methodological weaknesses in longitudinal research, citing issues like limited duration, small sample	Divergence arises from discrepancies in the quality of study design; studies conducted in earlier periods and those situated in resource-

	exemplified by empirical studies (Huang & Shih, n.d.; Hsu et al., 2006; Kehr & Kowatsch, 2015; Dawes et al., 2020).	sizes, or insufficient intervals between data points (Chintagunta & Labroo, 2020; Huang & Tsui, 2016; Samir et al., 2023).	constrained environments may result in the employment of less stringent longitudinal methodologies in comparison to contemporary research.
Temporal Insights on Loyalty Development	Consensus that longitudinal data reveals evolving patterns in customer loyalty, such as the erosion of repeat purchases over time and the dynamic interplay of trust, satisfaction, and loyalty constructs (Huang & Shih, n.d.; Dawes et al., 2020; Han-yang & Xu-dong, 2010; Haumann et al., 2014).	Some research highlights the challenge of capturing complex loyalty trajectories fully, with certain dimensions like attitudinal versus behavioral loyalty varying in longitudinal coverage (Dwivedi, 2023; Dikćius et al., 2024; Samir et al., 2023).	Variations may arise from the conceptual delineations of loyalty and the emphasis of measurement (attitudinal versus behavioral), in addition to the accessibility of data and the analytical methodologies utilized..
Integration of Advanced Analytics	Increasing agreement on the benefits of combining big data, machine learning, and AI with longitudinal approaches to enrich loyalty research, enabling finer-grained behavior prediction and personalized marketing strategies (Theodorakopoulos & Theodoropoulou, 2024; Brahma & Revi, 2024; Ike et al., 2023; Li et al., 2023; Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022; Ijomah et al., 2024).	Some studies note gaps in actual use of advanced analytics within longitudinal designs, with calls for greater integration and ethical considerations remaining underexplored (Theodorakopoulos & Theodoropoulou, 2024; Rahayu, 2024; Saini & Singh, 2024; Judijanto et al., 2024).	Divergence signifies the preliminary phase of the comprehensive integration of these technologies, the inequities in data accessibility, and the apprehensions regarding privacy, interpretability, and the scalability of models.
Impact of Digital Marketing Strategies	General consensus that digital marketing, including personalized content and CRM systems, positively affects customer engagement and loyalty over time, with longitudinal	However, some findings highlight that long-term effects of digital marketing on retention require further longitudinal validation, as most evidence remains	Variations may arise from diverse study lengths, emphasis on short-term versus long-term impacts, and the advancement of digital marketing instruments

	studies providing evidence of these effects (Rahayu, 2024; Rowi et al., 2024; Hiep et al., 2024).	cross-sectional or short-term (Yapinski et al., 2024; Rahayu, 2024; Fadhila et al., 2024; Beatrice, 2023).	complicating long-term evaluation.
--	---	--	------------------------------------

Theoretical and Practical Implications

Theoretical Implications

- The scarcity of longitudinal studies in retail e-commerce limits the understanding of dynamic customer retention and brand loyalty processes, challenging static models that rely on cross-sectional data. Longitudinal approaches reveal evolving constructs such as gratitude velocity and trust velocity, which significantly influence loyalty development over time, thus supporting relationship dynamics theory and emphasizing the need for temporal analysis in loyalty research (Huang & Shih, n.d.; Han-yang & Xu-dong, 2010; Pee et al., 2019).
- The amalgamation of extensive data analytics with conventional longitudinal methodologies presents a significant opportunity to elucidate the intricate and evolving characteristics of consumer loyalty. This integrated approach advances theoretical frameworks by enabling the study of temporal patterns and causal relationships that single-method studies cannot adequately address (Theodorakopoulos & Theodoropoulou, 2024; (Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022); Ike et al., 2023).
- The gradual deterioration of consumers' repeat-purchase loyalty over prolonged durations, which is substantiated by extensive longitudinal consumer panel data, fundamentally undermines the conventional assumption that loyalty models operate under the premise of fixed purchase propensities that remain constant over time. This significant and revealing finding compels the development of more sophisticated theoretical models that appropriately incorporate considerations of customer base attrition, while also accounting for the multifaceted influences of various marketing mix elements, including but not limited to price promotions and category penetration, on the observed phenomena of loyalty decay (Dawes et al., 2020).
- The theoretical frameworks that explore the intricate relationships between customer satisfaction and customer loyalty significantly gain in depth and clarity when they are analyzed through the lens of temporal conceptualization, which fundamentally

acknowledges the reality that the various antecedents to customer satisfaction and the resultant effects of loyalty can differ markedly depending upon the specific phase in which the customer finds themselves within the broader context of their lifecycle, such as the contrasting stages of attraction in comparison to the subsequent phase of retention. By adopting this insightful temporal perspective, researchers and practitioners alike are able to refine and enhance their understanding of the multifaceted drivers that contribute to customer satisfaction, as well as elucidate the profound implications these drivers have on the complex processes involved in the formation of customer loyalty (Khalifa & Shen, 2005; Haumann et al., 2014).

- Machine learning and advanced analytical frameworks that incorporate temporal effects and purchase behavior sequences provide new theoretical insights into loyalty segmentation and prediction, highlighting the importance of behavioral persistence and transitions between loyalty states over time (Brahma & Revi, 2024; Li et al., 2023; Jalal & Elmaghraby, 2024).
- Theoretical discourse on digital marketing strategies and e-CRM effectiveness is enriched by recognizing the mediating and moderating roles of trust, perceived value, and digital innovativeness, which evolve longitudinally and influence sustained customer engagement and loyalty (Rahayu, 2024; Rowi et al., 2024; Hiep et al., 2024).

Practical Implications

- E-commerce practitioners should prioritize longitudinal data collection and analysis to better understand customer loyalty trajectories and retention patterns, enabling more effective timing and targeting of marketing interventions that foster long-term engagement (Pee et al., 2019; Huang & Tsui, 2016; Khalifa et al., 2002).
- The application of big data analytics and machine learning techniques can enhance personalized marketing strategies by capturing temporal customer behavior nuances, improving prediction accuracy for churn and loyalty, and optimizing resource allocation for retention efforts (Saini & Singh, 2024; Ike et al., 2023; Raja et al., 2024).
- Loyalty programs, as well as digital marketing strategies, necessitate a sophisticated and dynamic adjustment process, meticulously customized to cater to the unique characteristics of various customer segments, which can be precisely identified through the comprehensive analysis of longitudinal behavioral data; this is crucial because customer preferences, along with their responsiveness to different incentives, exhibit a tendency to evolve and transform over time, reflecting the changing landscape of

consumer behavior and market trends (Allaway et al., 2017; Allaway et al., 2014; Lim & Lee, 2015).

- Retailers should recognize the importance of managing loyalty erosion by balancing customer acquisition with retention efforts, employing price promotions and broad product ranges strategically to mitigate customer loss and sustain market share (Dawes et al., 2020; Klepek & Kvičala, 2022).
- Enhancing e-service quality, user experience, and e-CRM functions across different stages of the customer lifecycle can significantly improve customer satisfaction and loyalty, but these effects require longitudinal monitoring to capture their sustained impact (Yapinski et al., 2024; Khalifa & Shen, 2009; Khalifa & Shen, 2005).
- Ethical considerations in data use and privacy must be integrated into longitudinal research and practical applications, especially when leveraging anonymous data and AI-driven personalization, to build and maintain consumer trust essential for long-term loyalty (Raja et al., 2024; Judijanto et al., 2024; Librado et al., 2024).

Limitations of the Literature

Area of Limitation	Description of Limitation	Papers which have limitation
Limited Longitudinal Studies	The scarcity of longitudinal research constrains understanding of temporal dynamics in customer retention and loyalty, limiting external validity and causal inference. This methodological limitation constrains perceptions into transforming consumer behaviors over time, which are essential for efficacious strategy formulation.	(Huang & Shih, n.d.; Theodorakopoulos & Theodoropoulou, 2024; Chintagunta & Labroo, 2020; Yapinski et al., 2024; Pee et al., 2019; Khalifa et al., 2002; Khalifa & Shen, 2005; Ke et al., 2021)
Overreliance on Cross-Sectional Data	Predominant use of cross-sectional designs impedes capturing changes and causal relationships in customer loyalty and retention, weakening the robustness of findings and limiting the ability to track behavioral evolution longitudinally. This common limitation affects the depth of theoretical and practical insights.	(Huang & Shih, n.d.; Kehr & Kowatsch, 2015; Khalifa & Shen, 2009; Samir et al., 2023; Romano & Fjermestad, 2001)
Insufficient Integration of Big Data and AI	Notwithstanding progress, numerous investigations insufficiently integrate extensive data analytics and artificial	(Theodorakopoulos & Theodoropoulou, 2024; Brahma & Revi, 2024; Ike et al., 2023; Li

	intelligence methodologies over extended periods, constraining the precision and predictive efficacy of consumer behavior models. This gap affects the applicability of findings in dynamic e-commerce environments.	et al., 2023; Librado et al., 2024; Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022; Ijomah et al., 2024)
Narrow Geographic and Industry Focus	Several studies focus on limited regions or specific product categories, reducing generalizability and external validity across diverse e-commerce contexts. This geographic and sectoral bias restricts broader applicability of conclusions.	(Fitriani et al., 2024; Judijanto et al., 2024; Fadhila et al., 2024; Klepek & Kvíčala, 2022; Felix & Rembulan, 2023)
Limited Consideration of Marketing Mix Variables	Many longitudinal studies omit comprehensive marketing mix factors such as advertising and promotions, leading to potential endogeneity and biased results. This exclusion diminishes the comprehension of how promotional tactics affect allegiance over time.	(Dawes et al., 2020; Lim & Lee, 2015)
Small or Non-Representative Samples	Specific inquiries make use of small or conveniently available samples, thereby weakening statistical impact and broader relevance, which limits the transferability of findings to more extensive ecommerce groups. This is particularly problematic in studies aiming to inform broad marketing strategies.	(Judijanto et al., 2024; Librado et al., 2024)
Lack of Standardized Loyalty Metrics	Variability and inconsistency in loyalty measurement across studies hinder comparability and cumulative knowledge building, affecting the reliability and validity of conclusions regarding customer retention dynamics.	(Dikčius et al., 2022; Dikčius et al., 2024; Slodowy & Klemm, 2015)
Ethical and Privacy Concerns in Data Use	Emerging research highlights ethical challenges and privacy issues in using customer data for longitudinal analysis, which may limit data accessibility and affect the replicability and ethical integrity of studies.	(Raja et al., 2024; Judijanto et al., 2024; Ijomah et al., 2024)

Gaps and Future Research Directions

Gap Area	Description	Future Research Directions	Justification	Research Priority
Scarcity of Long-Term Longitudinal Studies	There is a notable lack of multi-year longitudinal studies tracking customer retention and brand loyalty over extended periods in retail e-commerce.	Engage in longitudinal panel investigations that observe consumer allegiance and retention phenomena, integrating diverse product classifications and market divisions.	Long-term data is essential to understand loyalty erosion and the sustained impact of marketing strategies, as short-term studies limit insights into evolving customer behavior (Dawes et al., 2020; Haumann et al., 2014; Chintagunta & Labroo, 2020).	High
Integration of Big Data and Machine Learning in Longitudinal Research	Few studies effectively combine big data analytics and machine learning with longitudinal designs to capture evolving customer loyalty patterns.	Develop longitudinal frameworks that integrate advanced ML techniques and big data analytics to model customer behavior over time, addressing data privacy and ethical concerns.	Leveraging big data and ML longitudinally can improve predictive accuracy and personalization, yet current research is predominantly cross-sectional or short-term (Theodorakopoulos & Theodoropoulou, 2024; Jalal & Elmaghraby, 2024; Ike et al., 2023; Capturing Complex, Dynamic Customer Loyalty by Integrating Traditional and Big Data Analyses, 2022).	High
Methodological Challenges in Longitudinal E-Commerce Research	Attrition, data integrity, and apprehensions pertaining to the generalizability of samples substantially hinder the methodological and robustness and	Establish standardized methodological guidelines and best practices for designing and conducting longitudinal e-commerce loyalty	Addressing these challenges is critical to enhance study validity and comparability, as highlighted by existing critiques and guidelines (Kehr & Kowatsch, 2015;	High

	practical feasibility of longitudinal studies within ecommerce frameworks.	studies, including handling attrition and data intervals.	Chintagunta & Labroo, 2020).	
Conceptual Ambiguity and Measurement Inconsistency of Loyalty	Inconsistent definitions and measurement approaches for attitudinal and behavioral loyalty complicate longitudinal analysis and cross-study synthesis.	Develop and validate unified, multidimensional loyalty constructs and measurement instruments suitable for longitudinal tracking in e-commerce.	Clear conceptualization is necessary to accurately capture loyalty dynamics and reconcile paradoxical findings such as high attitudinal loyalty among disloyal customers (Dikčius et al., 2024; Samir et al., 2023; Dikčius et al., 2022).	Medium
Limited Examination of Digital Marketing Strategies Over Time	Few longitudinal studies assess the evolving impact of integrated digital marketing strategies (e.g., eCRM, personalization, emotional marketing) on loyalty development.	Execute longitudinal inquiries and panel investigations assessing how particular digital marketing strategies affect consumer retention and allegiance stages over time.	Understanding temporal effects of marketing strategies is vital for optimizing resource allocation and sustaining engagement, yet evidence remains sparse (Rahayu, 2024; Khalifa & Shen, 2005; Hiep et al., 2024).	High
Underexplored Role of Customer Lifecycle Phases in Loyalty	The diverse effects of enticement, allegiance, and the periods after acquiring on loyalty formation are inadequately documented over an extended timeline.	Design studies that distinctly measure loyalty antecedents and outcomes across customer lifecycle stages, using multi-wave data collection.	Temporal phase differentiation reveals unique drivers of satisfaction and loyalty, enabling targeted interventions (Khalifa & Shen, 2009; Khalifa & Shen, 2005; Pee et al., 2019).	Medium
Lack of Industry-Specific and Cross-Cultural Longitudinal Research	Existing longitudinal studies are limited in industry scope and geographic diversity, restricting	Expand longitudinal research to diverse e-commerce sectors and cross-cultural contexts,	Market-specific and cultural differences influence loyalty dynamics; broader sampling enhances theoretical and practical	Medium

	generalizability of findings.	examining how market and cultural factors moderate loyalty trajectories.	relevance (Dikčius et al., 2024; Klepek & Kvíčala, 2022; Felix & Rembulan, 2023).	
Insufficient Longitudinal Analysis of Loyalty Erosion and Recovery	The processes and facilitators of allegiance diminishment and prospective restoration over time are insufficiently examined.	Investigate factors influencing loyalty decay and rebound longitudinally, including marketing mix variables like advertising and promotions.	Comprehending erosion dynamics elucidates conservation tactics; contemporary evidence indicates that erosion is ubiquitous yet amendable (Dawes et al., 2020).	High
Ethical and Privacy Concerns in Longitudinal Big Data Use	Ethical issues related to data privacy and transparency in longitudinal big data and AI applications remain under-addressed.	Examine structures for principled data acquisition, de-identification, and elucidated artificial intelligence application in extended loyalty investigations, reconciling customization and confidentiality.	Ethical considerations are critical for consumer trust and regulatory compliance, impacting data availability and model acceptance (Raja et al., 2024; Ike et al., 2023; Ijomah et al., 2024).	Medium
Limited Use of Real-Time and Adaptive Longitudinal Analytics	Few studies utilize real-time data streams and adaptive analytics to capture and respond to evolving loyalty patterns dynamically.	Develop and test real-time longitudinal analytics platforms that enable continuous monitoring and adaptive marketing interventions.	Real-time insights can enhance responsiveness and personalization, yet most longitudinal research relies on static or periodic data (Brahma & Revi, 2024; Ijomah et al., 2024; Saini & Singh, 2024).	Medium

Conclusion

The collective body of literature underscores a critical gap in the longitudinal examination of customer retention and brand loyalty development within retail e-commerce. While cross-sectional studies predominate within this research domain, they possess a constrained ability to elucidate the temporal dynamics and evolving patterns that intrinsically define consumer behavior over an extended timeline. This particular constraint serves to significantly hinder a thorough and nuanced understanding of the intricate causal mechanisms that underlie loyalty constructs, which encompass critical dimensions such as trust, satisfaction, and emotional attachment, all of which are intrinsically dynamic in nature and are shaped and influenced by a plethora of marketing strategies and relational dynamics that operate in varied contexts. Longitudinal studies, although they are conducted with less frequency in the field, provide invaluable and profound insights into various phenomena, including but not limited to the gradual deterioration of customer loyalty, the speed at which relational constructs evolve, and the specific impacts that digital marketing strategies can have during different phases of consumer engagement, thereby highlighting the crucial necessity for sustained temporal analysis that is informed by evolving trends and patterns.

Methodologically speaking, the existing body of longitudinal studies demonstrates a wide array of varying degrees of methodological rigor, as these studies typically employ comprehensive multi-wave surveys, detailed panel data analyses, or intricate cohort analyses to systematically monitor and assess behavioral transformations over time, thereby allowing researchers to gain deeper insights into the dynamics of change. However, despite these efforts, there remain significant challenges that impede the studies' overall efficacy, including issues such as data attrition that leads to loss of valuable information, restricted observation periods that limit the scope of analysis, and the critical need to maintain sample representativeness, all of which serve to constrain the breadth and generalizability of the findings derived from these longitudinal investigations. In response to these methodological challenges, there has been an increasing integration of sophisticated analytical methodologies, which include advanced techniques such as machine learning and big data analytics, that have been adopted with the intention of enhancing predictive precision and improving segmentation capabilities, thus allowing researchers to derive more nuanced and actionable insights from complex datasets. However, the implementation of these techniques within longitudinal frameworks remains in its infancy, with a scarcity of studies successfully integrating such methods to model consumer loyalty trajectories over protracted durations. The presence of ethical considerations, coupled with the

myriad of data privacy issues, as well as the intricate complexities associated with integration, significantly serve to hinder and obstruct the extensive and widespread adoption and utilization of these advanced methodologies within the realm of longitudinal research.

Conceptually speaking, the vast body of existing scholarly literature has meticulously characterized the notion of loyalty as a complex and multifaceted construct, which encompasses not only attitudinal dimensions that reflect individuals' psychological predispositions but also behavioral dimensions that manifest in observable actions, both of which are profoundly influenced by critical factors such as trust, overall satisfaction, and the unique, individualized experiences each person encounters throughout their interactions with various entities. Longitudinal evidence reveals that these factors evolve and interact dynamically, shaping retention and repurchase behaviors. Inconsistencies in loyalty perceptions and assessments obstruct the unification of research studies and the progression of theoretical development. Though digital marketing practices may elevate audience engagement, detailed examinations of their long-term advantages are quite rare.

Overall, the extensive body of literature in this field strongly advocates for the adoption of a comprehensive and integrated approach that synergistically combines established traditional methodologies with sophisticated and advanced data-driven techniques in order to enhance the efficacy of research outcomes. This multifaceted strategy would not only effectively address the intricate and multifarious nature of customer loyalty but also yield actionable and pertinent marketing insights while simultaneously taking into account the critical importance of ethical data usage in contemporary business practices. Future research should prioritize longer-term panel studies, methodological innovation, and industry-specific longitudinal case analyses to bridge existing gaps and advance both theoretical understanding and practical applications in retail e-commerce loyalty management.

References

- Allaway, A. W., D'Souza, G., Berkowitz, D., & Kim, K. (2014). Dynamic segmentation of loyalty program behavior. <https://doi.org/10.1057/JMA.2014.2>
- Allaway, A. W., D'Souza, G., Berkowitz, D., & Northington, W. M. (2017). Trajectory-based segmentation of loyalty program-type data. https://doi.org/10.1007/978-3-319-50008-9_146
- Ascarza, E., Neslin, S. A., Netzer, O., Anderson, Z., Fader, P. S., Gupta, S., Hardie, B. G. S., Lemmens, A., Libai, B., Neal, D. T., Provost, F., & Schrift, R. Y. (2018). In pursuit of enhanced customer retention management: Review, key issues, and future directions. <https://doi.org/10.1007/S40547-017-0080-0>
- Ascarza, E., et al. (2017). In Pursuit of Enhanced Customer Retention Management: Review, Key Issues, and Future Directions. <https://doi.org/10.1007/s40547-017-0080-0>
- Beatrice, F. (2023). Customer loyalty in omnichannel retail: An ai-based literature review. *Espacios*, 44 (09), 101-119. <https://doi.org/10.48082/espacios-a23v44n09p07>
- Boozary, P. (2025). Enhancing customer retention with machine learning: A comparative analysis of ensemble models for accurate churn prediction. <https://doi.org/10.1016/j.jjime.2025.100331>
- Brahma, P. R., & Revi, K. N. (2024). Dynamic modeling of brand loyalty in retail: A semi-supervised approach incorporating temporal effects and purchase behavior sequences. <https://doi.org/10.1109/i2ct61223.2024.10543726>
- Capturing complex, dynamic customer loyalty by integrating traditional and big data analyses. <https://doi.org/10.4337/9781800371637.00014>
- Chintagunta, P. K., & Labroo, A. A. (2020). It's about time: A call for more longitudinal consumer research insights. *Journal of the Association for Consumer Research*, 5 (3), 240-247. <https://doi.org/10.1086/709858>
- Dawes, J., Graham, C., & Trinh, G. (2020). The long-term erosion of repeat-purchase loyalty. *European Journal of Marketing*, 55 (3), 763-789. <https://doi.org/10.1108/EJM-01-2018-0042>
- Dikčius, V., Adomavičiūtė, K., Kirse, S., & Zimaitis, I. (2022). How loyal are online store customers: A meta analysis of e-loyalty. <https://doi.org/10.3846/bm.2022.712>
- Dikčius, V., Adomavičiūtė, K., Vilkaitė-Vaitonė, N., & Kirse, S. (2024). Attitudinal loyalty towards online stores between loyal and disloyal clients: Differences across four countries. *Organizations and markets in emerging economies*, 15 (1(30)), 74-89. <https://doi.org/10.15388/omee.2024.15.4>

- Dwivedi, S. (2023). An empirical analysis of the dimension of loyalty to determine customer retention for e-commerce. *Journal of creating value*, 9 (1), 63-80. <https://doi.org/10.1177/23949643221146061>
- Fadhila, H. L., Permadi, V. A., & Tahalea, S. P. (2024). Optimising the fashion e-commerce journey: A data-driven approach to customer retention. *Knowledge engineering and data sciencenull*, . <https://doi.org/10.17977/um018v7i12024p58-70>
- Felix, A., & Rembulan, G. D. (2023). Analysis of key factors for improved customer experience, engagement, and loyalty in the e-commerce industry in indonesia. <https://doi.org/10.34306/att.v5i2sp.350>
- Fitriani, N., Rizan, M., Wibowo, S. F., & Sebayang, K. D. A. (2024). Discovering trends of customer loyalty research: A vosviewer-assisted systematic review. *International journal of management and development studies*, 13 (4), 01-12. <https://doi.org/10.53983/ijmds.v13n4.001>
- Fuad, E., & Abdullah, Z. (2023). Impact of e-crm implementation, customer experience, and customer loyalty in e-commerce: Literature review. *Contributions to management sciencenull*, 389-399. https://doi.org/10.1007/978-3-031-27296-7_35
- Han-yang, L., & Xu-dong, L. (2010). Evolution of consumer trust in b2c e-business: A longitudinal exploration. <https://doi.org/10.1109/ICMSE.2010.5719855>
- Haumann, T., Quaiser, B., Wieseke, J., & Rese, M. (2014). Footprints in the sands of time: A comparative analysis of the effectiveness of customer satisfaction and customer-company identification over time: . *Journal of Marketing*, 78 (6), 78-102. <https://doi.org/10.1509/JM.13.0509>
- Hiep, H. V., Dung, N. Q., Huynh, L. T. T., & Linh, N. T. (2024). Emotional marketing, customer retention, and brand loyalty in vietnam's retail sector: Unveiling the moderating impact of digital innovativeness. *International journal of applied sciences & development*, 3 null, 186-199. <https://doi.org/10.37394/232029.2024.3.19>
- Hsu, M., Yen, C., Chiu, C., & Chang, C. (2006). A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior. *International Journal of Human-computer Studies* ∨ *International Journal of Man-machine Studies*, 64 (9), 889-904. <https://doi.org/10.1016/J.IJHCS.2006.04.004>
- Huang, E. Y., & Tsui, C. (2016). Assessing customer retention in b2c electronic commerce: An empirical study. <https://doi.org/10.1057/S41270-016-0007-X>

- Huang, E. Y., Tsui, C., Kuan, W. K., Chen, H., & Hung, M. (2013). Measuring customer retention in the b2c electronic business: An empirical study. <https://doi.org/10.1109/HICSS.2013.396>
- Huang, M., & Shih, L. (n.d.). A dynamic examination of online customer gratitude and trust. [https://doi.org/10.6226/ntumr.202108_31\(2\).0001](https://doi.org/10.6226/ntumr.202108_31(2).0001)
- Ijomah, T. I., Idemudia, C., Eyo-Udo, N. L., & Anjorin, K. F. (2024). The role of big data analytics in customer relationship management: Strategies for improving customer engagement and retention. *World Journal of Advanced Science and Technology*, 6 (1), 013-024. <https://doi.org/10.53346/wjast.2024.6.1.0038>
- Ike, C. C., Ige, A. B., Oladosu, S. A., Adepoju, P. A., Amoo, O. O., & Afolabi, A. I. (2023). Advancing machine learning frameworks for customer retention and propensity modeling in e-commerce platforms. *GSC Advanced Research and Reviews*, 14 (2), 191-203. <https://doi.org/10.30574/gscarr.2023.14.2.0017>
- Jalal, M., & Elmaghraby, A. (2024). Analyzing the dynamics of customer behavior: A new perspective on personalized marketing through counterfactual analysis. *Journal of Theoretical and Applied Electronic Commerce Research*, 19 (3), 1660-1681. <https://doi.org/10.3390/jtaer19030081>
- Judijanto, L., Achmady, S., Utama, I. W. K., Effendy, F., & Sabila, P. C. (2024). The role of anonymous data in promoting consumer loyalty on e-commerce platforms in indonesia. *The Eastasouth Journal of Information System and Computer Science*, 2 (02), 105-114. <https://doi.org/10.58812/esiscs.v2i02.380>
- Kamakura, W. A. (2009). How customer evolve: A new framework for customer analysis. *Social Science Research Network*, . <https://doi.org/10.2139/SSRN.2332235>
- Ke, D., Zhang, H., Yu, N., Tu, Y., & Tu, Y. (2021). WHO will stay with the brand after posting non-5/5 rating of purchase? An empirical study of online consumer repurchase behavior. *Information Systems and E-business Management*, 19 (2), 405-437. <https://doi.org/10.1007/S10257-019-00416-9>
- Kehr, F., & Kowatsch, T. (2015). Quantitative longitudinal research: A review of is literature, and a set of methodological guidelines. <https://doi.org/10.18151/7217378>
- Khalifa, M., & Shen, K. N. (2009). Modelling electronic customer relationship management success: Functional and temporal considerations. *Behaviour & Information Technology*, 28 (4), 373-387. <https://doi.org/10.1080/01449290802030373>

- Khalifa, M., & Shen, N. (2005). Effects of electronic customer relationship management on customer satisfaction: A temporal model. <https://doi.org/10.1109/HICSS.2005.224>
- Khalifa, M., Limayem, M., & Liu, V. (2002). Online customer stickiness: A longitudinal study. *Journal of Global Information Management*, 10 (3), 1-14. <https://doi.org/10.4018/JGIM.2002070101>
- Klepek, M., & Kvičala, D. (2022). How do e-stores grow their market share?. *Marketing Intelligence & Planning*, 40 (8), 945-957. <https://doi.org/10.1108/mip-04-2022-0170>
- Li, K., Xu, C., Zhao, Z., Zhu, M., Cui, X., Xu, S., & Zou, J. (2023). Deciphering modern customer loyalty: A machine learning approach. <https://doi.org/10.1117/12.3013297>
- Librado, D., Yanti, S., & Ardhana, Y. M. K. (2024). Efektivitas penggunaan artificial intelligence dalam analisis perilaku konsumen di bisnis e-commerce. *Seminar SNAST (Seminar Nasional Aplikasi Sains dan Teknologi)*, H156-160. <https://doi.org/10.34151/prosidingsnast.v1i1.5060>
- Lim, S., & Lee, B. (2015). Loyalty programs and dynamic consumer preference in online markets. <https://doi.org/10.1016/J.DSS.2015.05.008>
- Pee, L. G., Jiang, J. J., & Klein, G. (2019). E-store loyalty: Longitudinal comparison of website usefulness and satisfaction: . *International Journal of Market Research*, 61 (2), 178-194. <https://doi.org/10.1177/1470785317752045>
- Rahayu, S. (2024). Digital marketing strategies to build customer loyalty: A systematic review of sustainable financial benefits. *Atestasi*, 7 (1), 792-806. <https://doi.org/10.57178/atestasi.v7i1.951>
- Raja, A. A., Siddique, F., Hasan, M. Z., Hussain, M. Z., Altaf, J., & Kousar, S. (2024). Personalized shopping experiences: Leveraging big data analytics in e-commerce for enhanced customer engagement. <https://doi.org/10.1109/dasa63652.2024.10836440>
- Romano, N., & Fjermestad, J. (2001). Electronic commerce customer relationship management: An assessment of research. *International Journal of Electronic Commerce*, 6 (2), 61-113. <https://doi.org/10.1080/10864415.2001.11044232>
- Rowi, A. S., Wahyudi, M. A., Oswari, T., & Purwoko, B. S. (2024). Role of digital marketing strategies in enhancing customer engagement and brand loyalty: A study of e-commerce platforms. *International Journal of Business, Law, and Education*, 5 (2), 2778-2788. <https://doi.org/10.56442/ijble.v5i2.936>
- Saini, K., & Singh, A. (2024). Data-driven strategies for improving customer engagement and retention in e-commerce. <https://doi.org/10.1109/tiacomp64125.2024.00089>

- Samir, A., Sharaf, S., & Elsaadany, N. (2023). Online consumer stickiness: A systematic review. THE JOURNAL OF APPLIED BUSINESS AND ECONOMICS. <https://doi.org/10.33423/jabe.v25i4.6340>
- Setiawan, S., Susan, M., & Istiharini, I. (2024). Navigating e-commerce loyalty: The role of e-brand experience and mediating factors in Indonesian millennial consumers. <https://doi.org/10.34306/att.v6i3.460>
- Slodowy, S., & Klemm, H. (2015). Wie gut prognostizieren Loyalitätsindikatoren zukünftiges Kundenverhalten? Ergebnisse einer Längsschnittstudie. https://doi.org/10.1007/978-3-658-04492-3_13
- Theodorakopoulos, L., & Theodoropoulou, A. (2024). Leveraging big data analytics for understanding consumer behavior in digital marketing: A systematic review. Human behavior and emerging technologies, 2024 (1), . <https://doi.org/10.1155/2024/3641502>
- Wattoo, M. U. (2025). Shaping E-commerce Experiences: Unraveling the Impact of Service Quality on Youth Customer Behavior in a Developing Nation. <https://doi.org/10.1177/21582440241311786>
- Yapinski, J. J., Nursanti, T. D., & Scoth, J. (2024). Optimizing e-service quality and user experience to enhance customer loyalty via satisfaction. <https://doi.org/10.1109/iccit62134.2024.10701164>
- Yeske, P. (2022). E-commerce customers behavior research using cohort analysis: A case study of COVID-19. <https://doi.org/10.3390/joitmc8010012>
- Zaghloul, M. (2024). Predicting E-commerce customer satisfaction: Traditional machine learning vs. deep learning approaches. <https://doi.org/10.1016/j.jretconser.2024.103865>
- Zheng, X., Lee, M. K. O., & Cheung, C. M. K. (2017). Examining e-loyalty towards online shopping platforms: The role of coupon proneness and value consciousness. Internet Research, 27 (3), 709-726. <https://doi.org/10.1108/INTR-01-2016-0002>