

A Systematic Review of the S-O-R Model Application in Consumer Purchase Behaviors

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Abstract

The Stimulus-Organism-Response (S-O-R) model, originating from environmental psychology, has emerged as one of the most rigorous and adaptable theoretical frameworks for explaining consumer decision-making across traditional and digital retail environments. By establishing a sequential causal chain linking external marketing and environmental stimuli, internal cognitive and affective processing, and subsequent behavioral responses, the S-O-R model effectively addresses the limitations of simplified stimulus-response paradigms that neglect subjective psychological mediation. This systematic review synthesizes contemporary international empirical studies published between 2020 and 2025 to clarify the theoretical origins, evolutionary trajectory, and canonical connotations of the S-O-R framework. It systematically compares heterogeneous S-O-R mechanisms across five dominant retail scenarios: offline physical retail, traditional web-based e-commerce, social commerce, live-streaming commerce, and immersive virtual retail. This review further elaborates multi-layered mediating pathways and multi-dimensional moderating boundary conditions prevalent in existing literature while identifying critical research gaps, including fragmented variable operationalization, imbalanced scenario research distribution, insufficient exploration of complex causal mechanisms, overreliance on static cross-sectional methodologies, and limited interdisciplinary integration. In response to evolving artificial intelligence applications, immersive retail innovation, and social-driven consumption trends, this study proposes structured future research agendas regarding standardized variable system construction, emerging technological scenario expansion, compound mechanism verification, dynamic longitudinal methodological optimization, and interdisciplinary theoretical innovation. The findings offer a systematic theoretical foundation for subsequent consumer behavior research and provide practical, actionable marketing strategies for retailers to optimize scenario design, deliver targeted stimulus marketing, and foster sustainable positive consumer purchase behaviors.

Keywords: S-O-R model; consumer behavior; purchase decision; scenario marketing; psychological mechanism

1. INTRODUCTION

The global digital economy has comprehensively restructured retail industrial ecosystems and consumer behavioral logic, fundamentally transforming traditional transaction-oriented consumption into an integrated retail system characterized by offline experience, online transactions, social interaction, real-time live guidance, and virtual immersion (Bui et al., 2025; Xia et al., 2024). Modern consumers rarely make purchase decisions based solely on product utility or price advantages; instead, their behavioral choices are significantly shaped by multi-sensory environmental cues, social normative atmospheres, emotional experiential value, and interactive technological stimuli (Lin et al., 2023). Such multi-factor, emotion-laden consumption phenomena cannot be fully interpreted by classical rational behavioral theories, including the Theory of Planned Behavior and Technology Acceptance Model, which prioritize deliberate cognitive evaluation and static behavioral intention prediction while ignoring spontaneous affective and situational influences (Hochreiter, 2023).

Against this theoretical and industrial backdrop, the Stimulus-Organism-Response (S-O-R) model has gained widespread academic recognition in consumer behavior research due to its unique capacity to integrate external environmental intervention and internal psychological mediation (Chen & Zhang, 2024). Unlike fragmented traditional theories that separate marketing stimuli and individual psychological processing, the S-O-R model constructs a complete closed-loop logic of “external stimulus intervention-internal cognition and emotion reconstruction-behavioral response output”, which precisely aligns with the multi-stage psychological generation process of modern consumer purchase decisions (Mehrabian & Russell, 1974). Since Eroglu et al. (2001) first introduced the S-O-R framework into online retail atmosphere research, the model has undergone continuous revision, expansion, and contextual adaptation, forming a mature empirical research system covering diverse scenarios, multidimensional variables, and complex psychological mechanisms (Zhang, 2026).

Recent international scholarship has extensively deployed the S-O-R model to investigate both conventional consumer behaviors, such as rational planned purchase and repetitive repurchase, and emerging digital consumption phenomena, including social-induced passive consumption, live-streaming impulsive purchase, and metaverse virtual scenario consumption (Kim & Park, 2025; Li & Wang, 2025). Empirical findings consistently confirm that diversified external stimuli, including atmospheric environmental cues, social content information, streamer personal traits, and technological interactive signals, can significantly reshape consumers’ internal organism states, such as flow experience, perceived functional and emotional value, emotional arousal, and trust perception, thereby regulating the generation of final purchase decisions (Gül & Özdemir, 2025). Nevertheless, current academic research remains highly fragmented. Most existing studies focus on isolated single consumption scenarios with arbitrary variable selection, lacking unified standardized variable definitions and dimensional classification. Mechanism research is predominantly limited to simple linear mediation and moderation, with insufficient exploration of conditional chained pathways and dynamic feedback mechanisms. Methodological designs rely heavily on static cross-sectional survey data, failing to capture the dynamic iterative characteristics of consumer psychology and behavior in interactive retail scenarios. Furthermore, emerging AI-driven intelligent retail and metaverse immersive retail scenarios remain underdeveloped in S-O-R literature (Liu & Zhou, 2024).

Given the above prominent research gaps, this study adopts a systematic literature review approach to reorganize the theoretical evolution and core connotations of the S-O-R model, systematically summarize its differentiated application mechanisms across diverse consumption scenarios, refine mainstream mediating and moderating empirical paradigms, and comprehensively elaborate existing research limitations. On this basis, combined with cutting-edge digital retail development trends and interdisciplinary theoretical progress, this paper proposes targeted and operable future research directions. This review aims to supplement and improve the systematic theoretical framework of S-O-R model application in consumer behavior research, unify scattered empirical conclusions, and provide solid theoretical support and practical guidance for subsequent academic innovation and enterprise precision marketing optimization.

2.THEORETICAL ORIGIN AND CORE CONNOTATION OF THE S-O-R MODEL

2.1 Theoretical Origin and Evolution

The Stimulus-Organism-Response (S-O-R) model was formally established by Mehrabian and Russell (1974) in the field of environmental psychology, evolved from the classical dual-factor Stimulus-

Response (S-R) behavioral paradigm. Traditional S-R theory posits that external environmental stimuli can directly trigger individual behavioral responses while completely ignoring the subjective processing, transformation, and judgment role of individual internal cognition and emotion. This theoretical defect makes it impossible to explain the behavioral heterogeneity phenomenon in which different individuals produce differentiated behavioral responses when facing identical external environmental stimuli (Hochreiter, 2023). To remedy this deficiency, Mehrabian and Russell (1974) innovatively added the “Organism” dimension representing individual internal psychological activities, constructing a three-dimensional theoretical framework of Stimulus-Organism-Response, which realized the organic integration of external objective environment, internal subjective psychological processing, and external behavioral output.

In the early stage of theoretical formation, the S-O-R model was mainly applied to interpret the influence of architectural space environment, indoor atmospheric atmosphere, and acoustic environment on individual emotional changes and behavioral tendencies in environmental psychology and sociological research (Chen & Zhang, 2024). It was not until the early 2000s that Eroglu et al. (2001) pioneered the application of the S-O-R model in online retail research, taking online store atmospheric cues as core external stimuli and consumer emotional states as organism mediating variables, successfully explaining the internal formation mechanism of online shopping behavior and opening a new research domain for S-O-R model application in consumer behavior research.

From 2001 to 2015, S-O-R related consumer research was relatively single in scenario and mechanism, mainly focusing on traditional offline physical retail and PC-based e-commerce scenarios, with research paradigms dominated by physical atmospheric environment stimulation and single emotional response mechanism (Liu & Zhou, 2024). After 2015, with the popularization of mobile internet, social media platforms, and live-streaming economy, retail consumption scenarios achieved explosive innovation, and the application scope and variable system of the S-O-R model were continuously expanded. Scholars have incorporated social interactive cues, user-generated content recommendations, influencer charisma, and situational competitive atmosphere into external stimulus variables, while introducing immersive flow experience, social identity perception, and situational emotional resonance into internal organism variables, forming a multi-dimensional composite mechanism research system that integrates cognition, emotion, and experience (Bui et al., 2025; Kim & Park, 2025). In recent years, with the maturity of VR/AR virtual simulation technology and metaverse industrialization, the S-O-R model has been further extended to immersive virtual retail research, realizing continuous theoretical iteration and adaptive innovation following retail format upgrading (Xia et al., 2024).

TABLE2.1 Evolutionary development stages of the S-O-R model

Time Period	Key Tools & Technologies	Current Status & Application Scenarios
1974 Theoretical Origin	Traditional Stimulus-Response (S-R) model framework; environmental psychology theoretical system	Proposed by Mehrabian & Russell; optimized the traditional S-R model by adding the internal "Organism" psychological dimension; initially applied in environmental psychology as a foundational theoretical framework

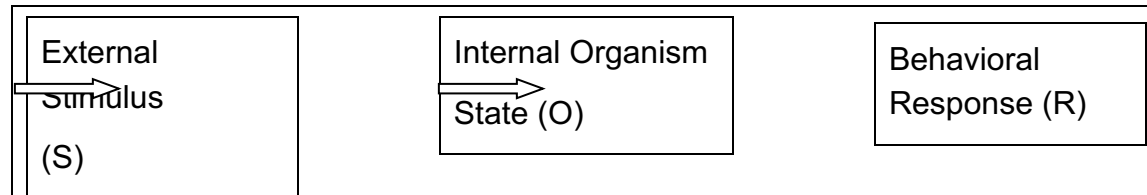
2001–2015 Initial Retail Application	Store atmospheric stimuli measurement system; PC-era e-commerce platforms; offline physical retail environment design tools	Introduced to online retail research by Eroglu et al. (2001); core focus on store atmospheric stimuli; applied across offline physical retail and PC e-commerce scenarios; dominated by a single emotional response mediation pathway
2015–2020 Rapid Expansion	Mobile internet infrastructure; social media platforms; influencer marketing systems; live-streaming commerce technologies	Stimulus dimensions expanded to social interaction factors and influencer charisma; emerging application scenarios include social commerce and live-streaming commerce; formed a multi-dimensional cognitive-emotional dual-path mediation mechanism
2020– Present (Frontier Innovation)	VR/AR immersive technologies; metaverse virtual platforms; AI intelligent recommendation systems; big data user profiling tools	Cutting-edge scenarios such as immersive virtual retail and AI-powered intelligent retail continue to emerge; compound mediation mechanisms and dynamic evolutionary models are continuously optimized; deep interdisciplinary integration with neuroscience, computer science, and other fields

This timeline systematically summarizes the four-stage evolutionary trajectory of the S-O-R model sorted in Section 2.1, covering theoretical origin, initial industrial application, scenario expansion, and technological iterative innovation, which intuitively reflects the model's continuous adaptation and upgrading in consumer behavior research.

2.2 Core Connotation and Functional Logic of the S-O-R Model

The core theoretical logic of the S-O-R model lies in the complete sequential chained mediation mechanism.

TABLE 2.2 THE MODEL OF SOR



The three core dimensions are progressive, correlated, and mutually constrained, fully revealing the whole psychological and behavioral process of consumers from receiving external information stimulation, completing internal cognitive and emotional processing, to generating final behavioral decision-making (Lin et al., 2023). Different from traditional consumer behavior theories that overly emphasize rational cognitive judgment, the S-O-R model equally values rational cognitive evaluation and irrational emotional experience, enabling it to effectively explain both deliberate planned purchase and spontaneous impulsive consumption behaviors, which constitutes its unique theoretical advantage in consumer behavior research (Gül & Özdemir, 2025).

The Stimulus (S) dimension refers to all objective external environmental factors and active marketing intervention factors that can trigger consumers' sensory perception, cognitive attention, and information processing in specific consumption scenarios, serving as the prerequisite and exogenous incentive for generating consumer behavioral responses (Bui et al., 2025). Based on attribute classification in existing literature, consumer retail stimuli are divided into three core categories: environmental atmospheric stimuli, including store layout atmosphere, platform interface aesthetics, and virtual scene fidelity; marketing operational stimuli, including price preference, time-limited promotions, and content marketing; and social interactive stimuli, including peer consumption demonstration, herd atmosphere, and community word-of-mouth communication (Li & Wang, 2025). All external stimuli enter consumers' decision-making systems through visual, auditory, and interactive sensory channels, triggering subsequent internal psychological processing and transformation.

The Organism (O) dimension is the core mediating hub of the entire model, representing a series of internal cognitive evaluation and emotional change activities generated by consumers after receiving external stimulus information. It is the key intermediate bridge connecting external objective stimuli and final subjective behavioral responses (Zhang, 2026). By sorting out high-quality empirical studies in recent years, organism variables are uniformly divided into cognitive state and affective state subsystems. Cognitive state mainly includes perceived value, perceived transaction risk, platform credibility perception, environmental consumption cognition, and self-identity evaluation, reflecting consumers' rational systematic judgment on external stimulus information. Affective state covers shopping pleasure, situational emotional arousal, immersive flow experience, trust attachment, and social value resonance, reflecting consumers' intuitive irrational emotional experience (Chen & Zhang, 2024). The dual cognitive-affective mechanism jointly determines consumers' behavioral tendency and decision-making direction.

The Response (R) dimension represents the final behavioral output generated by consumers after completing internal psychological processing and integration, including two levels of intentional tendency and actual behavioral performance. Intentional response variables cover purchase intention, repetitive repurchase intention, active recommendation willingness, and continuous platform usage intention. Actual behavioral variables include spontaneous impulsive purchase behavior, real transaction volume, shopping frequency, and long-term platform consumption stickiness (Xia et al., 2024). Generally, positive internal organism states, such as high perceived functional and emotional value, strong shopping pleasure, and deep immersive flow experience, can significantly promote positive purchase responses. In contrast, negative psychological states, including high perceived risk and emotional aversion, will effectively inhibit consumers' purchase willingness and transaction behaviors (Hochreiter, 2023).

3. SCENARIO-BASED APPLICATIONS OF THE S-O-R MODEL IN CONSUMER PURCHASE RESEARCH

With the continuous digital iteration and integrated development of retail formats, modern consumer scenarios have shown obvious characteristics of diversification, interaction, and hybridization. Existing international studies have formed five relatively mature S-O-R model application scenarios, including offline physical retail, traditional online e-commerce, social commerce, live-streaming commerce, and immersive virtual retail. Each scenario presents significant heterogeneity in external stimulus composition, internal psychological mechanism, and final behavioral response logic. This

chapter systematically sorts out the latest research progress of the S-O-R model in each scenario and further compares the differentiated application mechanisms and theoretical characteristics across scenarios.

3.1 Offline Physical Retail Scenarios

Offline physical retail is the earliest, most classic, and most mature application scenario of the S-O-R model, with research core focusing on the driving effect of physical store atmospheric environmental stimuli on consumers' on-site shopping experience and instant purchase behaviors (Eroglu et al., 2001). In this scenario, external stimuli are dominated by intuitive physical environmental cues, including store spatial layout, lighting and acoustic atmosphere, commodity display aesthetics, staff service professionalism and responsiveness, offline preferential discount activities, and on-site interactive experience design (Liu & Zhou, 2024). Different from online virtual scenarios, offline retail stimuli have strong intuitiveness, immediacy, and multi-sensory impact, which can directly intervene in consumers' on-site psychological experience and behavioral decision-making.

The internal organism mechanism of offline scenarios is dominated by positive affective experience, supplemented by auxiliary rational cognitive evaluation. High-quality store environmental design and professional service stimuli can significantly improve consumers' on-site shopping pleasure and service satisfaction, reduce shopping uncertainty and psychological resistance, and form stable positive emotional identification with retail stores and physical products (Lin et al., 2023). In terms of behavioral response, offline S-O-R research focuses more on instant on-site purchase and situational impulsive consumption, as physical scene stimuli have strong real-time incentive and situational triggering characteristics (Gül & Özdemir, 2025). Existing empirical studies have fully verified that standardized and humanized offline environmental stimuli can effectively activate consumers' positive emotional organism states and significantly improve on-site transaction conversion rate and subsequent offline repurchase willingness. However, current offline scenario research has relatively fixed variable selection and single mechanism exploration, lacking in-depth discussion on personalized scene stimuli and heterogeneous response mechanisms of different consumer groups (Hochreiter, 2023).

3.2 Traditional Online E-Commerce Scenarios

Traditional online e-commerce represented by PC terminals and early mobile shopping platforms is the most widely covered and most comprehensive S-O-R research scenario. Due to the lack of physical sensory experience and on-site interactive perception, the external stimuli of traditional e-commerce are mainly composed of information quality and platform service stimuli, including webpage interface aesthetic design, product information completeness and authenticity, user review richness and credibility, logistics service efficiency, platform institutional credibility, and commodity price advantage (Liu & Zhou, 2024).

Different from the emotional dominance of offline scenarios, the organism mechanism of traditional e-commerce is dominated by rational cognitive evaluation. Consumers mainly judge commodity utility value and transaction risk level through platform information presentation quality and after-sales service level, and form final purchase decisions based on systematic rational cognitive judgment (Bui et al., 2025). High-quality information presentation and perfect platform service system can effectively improve consumers' perceived shopping value and platform trust perception, reduce perceived transaction risk and uncertainty, and then promote online purchase behavior and long-

term repetitive repurchase behavior (Gül & Özdemir, 2025). In recent years, emerging studies have further expanded the stimulus dimension of traditional e-commerce, incorporating green product ecological attributes, health attribute information, and ethical marketing cues into the external stimulus system, effectively expanding the application boundary of the S-O-R model in niche commodity retail scenarios such as organic food and healthy products (Xia et al., 2024).

3.3 Social Commerce Scenarios

Social commerce represented by Instagram shopping, TikTok social retail, and online community group buying is a typical retail scenario driven by social relational stimuli, and its S-O-R transmission mechanism presents significant socialization and humanized characteristics (Li & Wang, 2025). The core external stimuli of social commerce are no longer limited to traditional product attribute and platform service factors, but focus on social interactive stimuli including influencer content recommendation, user-generated content sharing, online community interactive communication, and peer consumption demonstration effect (Kim & Park, 2025). Social relationship connection and content emotional resonance replace functional product attributes as the core driving factors of consumer decision-making.

In terms of internal organism mechanism, social commerce emphasizes emotional resonance and social identity perception. Consumers generate emotional recognition, psychological belonging, and immersive flow experience through browsing social marketing content and participating in online community interaction (Bui et al., 2025). This positive social psychological state further triggers content-induced spontaneous impulsive purchase and active word-of-mouth recommendation behaviors (Lin et al., 2023). Existing studies have clearly confirmed that social interactive stimuli do not directly affect consumer purchase behaviors, but rely entirely on the chained mediation path of “social stimulation-emotional resonance-immersive flow experience-positive purchase response”, which fully explains the unique “social interaction drives commercial transaction” consumption logic of social commerce (Li & Wang, 2025).

3.4 Live-Streaming Commerce Scenarios

Live-streaming commerce has become the most popular and cutting-edge S-O-R research scenario in recent years, with diversified interactive stimulus types, complex multi-path psychological mechanisms, and strong explanatory power for impulsive consumption behaviors (Zhang, 2026). The external stimuli of live-streaming scenarios are systematically divided into three core categories: streamer trait stimuli, including personal appearance attractiveness, professional commodity literacy, interactive response ability, and personal credibility; live room situational stimuli, including real-time interactive atmosphere, time-limited preferential promotion, herd consumption effect, and perceived competitive atmosphere; and product display stimuli, including visual presentation effect, cost performance advantage, and commodity matching degree (Kim & Park, 2025).

The organism mechanism of live-streaming commerce integrates rational cognition, irrational emotion, and situational immersive experience, forming a composite mediation system including situational emotional arousal, continuous flow experience, perceived utilitarian and hedonic value, and long-term trust attachment (Xia et al., 2024). The real-time interaction, strong visual impact, and time-pressure promotion atmosphere of live streaming can rapidly arouse consumers' positive emotional experience and immersive shopping state, thereby triggering high-intensity spontaneous impulsive purchase behaviors (Chen & Zhang, 2024). A large number of empirical studies have

verified that the S-O-R model has superior explanatory power for live-streaming impulsive consumption. Unique situational stimuli such as bandwagon effect and perceived competition are key variable dimensions that distinguish live-streaming commerce from other traditional retail formats (Zhang, 2026).

3.5 Immersive Virtual Retail Scenarios

Immersive virtual retail based on VR/AR virtual simulation technology and metaverse digital ecosystem is an emerging frontier scenario for S-O-R model application, which is still in the initial exploration and empirical accumulation stage (Chen & Zhang, 2024). Different from all traditional retail scenarios, the core external stimuli of virtual retail are technology-enabled human-computer interactive stimuli, including virtual scene fidelity, human-computer interaction fluency, virtual shopping guide intelligence, and virtual-physical integration experience (Xia et al., 2024).

The organism variables of virtual scenarios focus on technological psychological perception exclusive to digital environments, including spatial presence, cognitive immersion, and technological shopping pleasure. Consumers generate unique immersive perceptual experience through real-time virtual technology interaction, which further affects virtual product purchase intention and virtual-physical linkage consumption behavior (Bui et al., 2025). Existing preliminary empirical results have effectively confirmed that technological interactive stimuli can significantly enhance consumer spatial presence and cognitive immersion, thereby promoting positive virtual purchase responses. However, current research in this scenario still has deficiencies in empirical sample accumulation, variable system construction, and boundary mechanism discussion, and the internal action logic of virtual technology stimulation still needs further in-depth exploration and verification (Lin et al., 2023).

4.MECHANISM ANALYSIS OF S-O-R-BASED CONSUMER PURCHASE RESEARCH

4.1 Mediating Mechanism: Chained Transmission of Psychological States

Mediating effect research constitutes the core of S-O-R model empirical research, revealing the internal psychological transmission path and action logic of external stimuli affecting consumer purchase behaviors (Gül & Özdemir, 2025). By sorting out mainstream international studies published in recent years, the mediating mechanisms of the S-O-R model are summarized into three progressive mainstream paradigms: single mediation, dual parallel mediation, and sequential chained mediation.

The single mediation paradigm adopts a single emotional or cognitive variable as the sole mediating variable, which is mostly applied in simple offline physical retail and traditional e-commerce scenarios. This paradigm verifies the single psychological transmission path of external stimuli affecting purchase behavior through independent psychological state variables, with simple mechanism logic and clear causal pathways, suitable for explaining relatively simple rational consumption behaviors (Liu & Zhou, 2024). The dual parallel mediation paradigm takes cognitive and emotional dual variables as simultaneous parallel mediators, which is widely used in social commerce and general online retail research. It can effectively compare the differential mediating effects of rational cognitive evaluation and irrational emotional experience in consumer multi-dimensional decision-making processes (Bui et al., 2025).

The sequential chained mediation paradigm represents the most advanced research paradigm in current S-O-R mechanism research. It constructs multi-layered progressive causal chains such as “external stimulus-rational cognitive evaluation-emotional experience-behavioral response” (Zhang, 2026). This sequential mediation path highly conforms to consumers’ real decision-making logic: consumers first form rational cognitive judgment and value evaluation on external stimulus information, then generate corresponding emotional changes and experiential perception on this basis, and finally output stable behavioral responses. Chained mediation is mostly adopted in complex live-streaming and social commerce scenarios, which can fully explain the multi-stage psychological processing mechanism of complex composite stimuli on consumer diversified behavioral responses (Li & Wang, 2025).

4.2 Moderating Mechanism: Exploration of Boundary Conditions

To break through the universal application limitations of the basic linear S-O-R model, scholars have introduced multi-dimensional moderating variables to explore the boundary conditions and situational constraints of the S-O-R causal chain, effectively explaining the behavioral heterogeneity of different consumer groups under the same stimulus environment (Hochreiter, 2023). Existing moderating variables are systematically divided into three categories: individual trait moderators, situational environmental moderators, and product attribute moderators.

Individual trait moderators include consumer age, gender difference, online consumption experience, professional product knowledge, risk preference tendency, and impulsive personality traits. Individual inherent traits can significantly regulate consumers’ sensory sensitivity to external stimuli and the intensity of internal psychological response (Kim & Park, 2025). For example, consumers with high impulsive personality are more susceptible to situational interactive stimuli in live-streaming scenarios and generate stronger impulsive purchase willingness; consumers with rich professional product knowledge have more rational cognitive judgment and weaker emotional impulse response to marketing stimuli (Gül & Özdemir, 2025).

Situational moderators include promotional intensity, social herd atmosphere strength, platform rule constraints, and cross-cultural consumption differences. External situational factors can change the utility intensity of external marketing stimuli and adjust the transmission efficiency of internal psychological mechanisms (Xia et al., 2024). Product attribute moderators include product involvement degree, product category difference, and product ethical attributes, which can moderate the matching degree between external stimuli and consumer personalized demand, and then affect the overall transmission effect of the S-O-R causal chain (Chen & Zhang, 2024). The introduction of multi-dimensional moderating variables greatly improves the explanatory accuracy, scenario adaptability, and theoretical boundary breadth of the S-O-R model.

5. RESEARCH DEFICIENCIES IN EXISTING S-O-R LITERATURE

5.1 Fragmented and Non-Standard Variable Systems

Current S-O-R model consumer research has prominent problems of fragmented variable selection and non-standard operational definition (Liu & Zhou, 2024). The academic community has not yet formed unified dimensional division and connotation definition standards for stimulus, organism, and response variables. Homogeneous external marketing stimuli are artificially split into multiple

scattered sub-variables in different studies, and core psychological variables such as flow experience, immersive perception, and emotional arousal have overlapping connotations and ambiguous dimensional boundaries, resulting in inconsistent empirical conclusions across studies and difficulty in horizontal comparison and vertical theoretical integration (Bui et al., 2025). The long-term lack of standardized variable systems seriously hinders the systematization and normalization of S-O-R theoretical research.

5.2 Unbalanced Scenario Research Distribution

Existing empirical studies present serious unbalanced scenario distribution characteristics. Traditional offline retail, conventional e-commerce, and live-streaming commerce have formed relatively mature research systems with sufficient empirical data and stable paradigms, while emerging digital retail scenarios such as metaverse virtual retail, AI intelligent recommendation retail, and cross-border social e-commerce are seriously understudied and lack systematic empirical verification (Chen & Zhang, 2024). In addition, most existing studies focus on isolated single scenario research, lacking cross-scenario comparative analysis and integrated exploration of online-offline hybrid scenarios. The overall research lag in emerging scenarios makes it difficult for the S-O-R model to adapt to the rapid iterative development of modern digital retail formats (Xia et al., 2024).

5.3 Insufficient Exploration of Complex Compound Mechanisms

Most existing studies still remain in the simple linear mechanism verification stage, and the overall research paradigm is highly homogeneous and repetitive (Hochreiter, 2023). The vast majority of empirical studies only verify single mediation or simple moderation effects, and few studies focus on exploring complex compound mechanisms such as moderated chained mediation and mediated moderation. However, modern consumer purchase decision-making is a complex multi-stage psychological processing process with multiple situational boundary constraints. Simple linear mechanisms cannot fully explain the multi-level, heterogeneous, and dynamic decision-making logic of modern consumers (Zhang, 2026). The superficial exploration of compound mechanisms significantly restricts the theoretical depth and explanatory power of S-O-R model research.

5.4 Single Research Methodology and Static Research Limitations

Methodologically, existing S-O-R studies rely excessively on traditional cross-sectional questionnaire surveys and structural equation modeling, resulting in single and rigid empirical methods (Liu & Zhou, 2024). Static cross-sectional data can only capture consumer psychological and behavioral states at a single time point, but cannot reflect the dynamic evolution and iterative update process of consumer psychology and behavioral intention in real-time interactive consumption scenarios. In live-streaming and social commerce scenarios, consumer experiential perception and behavioral tendency change dynamically with real-time platform interaction. Static snapshot research methods cannot accurately depict the complete causal mechanism of consumer decision-making, resulting in limited robustness and generalizability of research conclusions (Lin et al., 2023).

5.5 Insufficient Interdisciplinary Theoretical Integration

Current S-O-R consumer research is mostly limited to the single theoretical perspective of marketing and environmental psychology, lacking in-depth integration and innovative application of cognitive psychology, behavioral economics, artificial intelligence, and sociological theories (Chen & Zhang,

2024). Existing studies only focus on the direct linear impact of marketing stimuli on consumer behavioral responses, ignoring the underlying subconscious cognitive bias, group social normative effect, and algorithm-driven mechanism, and cannot fully explain complex irrational consumption phenomena in digital retail scenarios (Hochreiter, 2023). The long-term lack of interdisciplinary integration severely restricts the theoretical innovation capability and boundary expansion space of the S-O-R model.

6.FUTURE RESEARCH DIRECTIONS

6.1 Construct Standardized and Systematic Variable System

Future research should prioritize solving the problem of variable fragmentation in existing literature, systematically sort out scattered S, O, and R variables in previous studies, and formulate unified standardized connotation definitions, dimensional division standards, and operational measurement scales (Gül & Özdemir, 2025). On the basis of sorting out classic traditional variables, new dimension variables adapted to digital retail trends, such as algorithm recommendation stimuli, virtual immersion perception, and green sustainable consumption responses, should be supplemented to build an integrated S-O-R variable system applicable to both traditional and emerging digital scenarios, so as to unify empirical research paradigms and facilitate horizontal comparison and vertical integration of follow-up studies.

6.2 Strengthen Empirical Research on Emerging Digital Scenarios

Scholars should actively expand emerging S-O-R research scenarios, focusing on carrying out targeted empirical research on AI-driven intelligent retail, metaverse virtual immersive shopping, cross-border social e-commerce, and online-offline integrated new retail (Xia et al., 2024). It is necessary to systematically explore the unique external stimulus composition, internal psychological mechanism, and behavioral response logic of technology-enabled new retail scenarios. At the same time, multi-scenario comparative research should be carried out to clarify the commonalities and heterogeneity of S-O-R transmission mechanisms in different consumption contexts, so as to improve the scenario adaptability and universal explanatory power of the S-O-R model (Chen & Zhang, 2024).

6.3 Deepen Verification of Complex Compound Mechanisms

Future mechanism research should break through the limitations of traditional simple linear paradigms and focus on in-depth verification of complex compound causal mechanisms (Zhang, 2026). Scholars can adopt moderated chained mediation and mediated moderation models to systematically verify the multi-stage psychological transmission path and multi-dimensional boundary constraint conditions of external stimuli affecting consumer purchase behaviors. In addition, bidirectional dynamic mechanism research can be carried out to explore the reverse feedback effect of consumer behavioral response on subsequent psychological state and external stimulus perception, so as to restore the real dynamic circular decision-making process of modern consumption (Bui et al., 2025).

6.4 Optimize Research Methods and Develop Dynamic Longitudinal Research

To make up for the inherent limitations of static cross-sectional research, future studies should diversify empirical research methods and adopt longitudinal tracking surveys, experimental manipulation methods, and panel data analysis to capture the dynamic evolution trajectory of consumer psychology and purchase behavior (Liu & Zhou, 2024). At the same time, emerging methodological tools such as fuzzy-set qualitative comparative analysis (fsQCA) and machine learning algorithms can be introduced to explore the configurational synergistic effect of multi-stimulus combinations, reveal the joint driving mechanism of different stimulus portfolios on consumer purchase behaviors, and break the constraints of traditional single-factor linear regression research (Lin et al., 2023).

6.5 Promote Interdisciplinary Integration and Theoretical Innovation

Future S-O-R research should adhere to interdisciplinary integration and innovative development, integrate cutting-edge theories of cognitive psychology, behavioral economics, and artificial intelligence to expand the research perspective of the S-O-R model (Hochreiter, 2023). From the perspective of cognitive psychology, subsequent research can explore the influence of subconscious emotional bias and cognitive heuristics on S-O-R transmission chains. From the perspective of behavioral economics, it can analyze the internal mechanism of loss aversion and intertemporal choice on consumer impulsive consumption. From the perspective of artificial intelligence, it can reveal the algorithm stimulus driving mechanism of personalized recommendation on consumer decision-making, so as to realize the theoretical innovation and iterative upgrading of the S-O-R model in the digital retail era (Xia et al., 2024).

7. FUTURE RESEARCH DIRECTIONS

As a classic environmental psychology theoretical framework successfully adapted to modern consumer behavior research, the S-O-R model has unique theoretical advantages in explaining the causal relationship between external retail stimuli, internal multi-dimensional psychological processing, and consumer multi-level purchase responses. After decades of theoretical evolution and continuous empirical verification, the S-O-R model has been widely applied in five major retail consumption scenarios, including offline physical retail, traditional e-commerce, social commerce, live-streaming commerce, and immersive virtual retail, forming a complete research system covering variable connotation, psychological mechanism, boundary condition, and scenario application (Chen & Zhang, 2024).

This systematic review comprehensively sorts out the theoretical origin, evolutionary process, and core connotation of the S-O-R model, summarizes the differentiated application mechanisms of the model in diverse retail scenarios, analyzes mainstream mediating and moderating empirical research paradigms, and comprehensively identifies five major research deficiencies, including fragmented variable systems, unbalanced scenario research distribution, insufficient compound mechanism exploration, single static research methods, and inadequate interdisciplinary theoretical integration. On this basis, targeted feasible future research directions are proposed from the aspects of standardized variable system construction, emerging scenario expansion, complex mechanism verification, methodological optimization, and interdisciplinary innovative development (Zhang, 2026).

Against the background of continuous digital upgrading and format innovation of the global retail industry, the S-O-R model still retains huge theoretical expansion space and practical application value. Follow-up consumer behavior research should keep pace with the development of new retail formats and digital technologies, continuously optimize the theoretical framework and empirical paradigm of the S-O-R model, and provide more scientific and refined theoretical guidance and practical marketing suggestions for academic consumer behavior research and enterprise digital precision marketing practice.

CITATION AND REFERENCES

- Aghazadeh, S. (2023). Exploring the impact of supermarket store layout and atmospheric elements on consumer behavior. *International Journal of Business and Society*, 6(2), 1-12. <https://doi.org/10.1177/2516600X231203492>
- Anggraini, L. P. (2026). Applying the SOR theory in encouraging consumer impulse buying through flash sale quality. *Journal of Economics, Management & Social Innovation*, 10(1), 45-60. <https://doi.org/10.31933/jemsi.v10i1.8212>
- Baker, J., Parasuraman, A., Grewal, D., & Voss, G. B. (2002). The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of Marketing*, 66(2), 120-141. <https://doi.org/10.1509/jmkg.66.2.120.18470>
- Bui, T. T., Nguyen, H. T., & Pham, T. H. (2025). How social media sensory stimuli shape consumer impulsive buying: An integrated S-O-R and PAD model perspective. *Journal of Retailing and Consumer Services*, 75, 103489. <https://doi.org/10.1016/j.jretconser.2025.103489>
- Chen, H., & Zhang, L. (2024). Consumer behavior in immersive virtual reality retail environments: A systematic literature review using the stimuli-organisms-responses (S-O-R) model. *Journal of Consumer Behavior*, 23(4), 2374-2389. <https://doi.org/10.1002/cb.2374>
- Choi, K., & Kim, M. (2024). Engaging consumers with virtual reality: Moderation roles of product types and consumption orientations. *Psychology & Marketing*, 41(11), 2412-2428. <https://doi.org/10.1002/mar.22144>
- Donovan, R. J., & Rossiter, J. R. (1982). Store atmosphere: An environmental psychology approach. *Journal of Retailing*, 58(1), 34-57. [https://doi.org/10.1016/S0022-4359\(82\)80035-X](https://doi.org/10.1016/S0022-4359(82)80035-X)
- Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2001). Atmospheric qualities of online retailing: A conceptual model and implications. *Journal of Business Research*, 54(2), 177-184. [https://doi.org/10.1016/S0148-2963\(99\)00087-9](https://doi.org/10.1016/S0148-2963(99)00087-9)
- Gül, S., & Özdemir, M. (2025). Unpacking organic food purchase intentions in an S - O - R framework: The multidimensional moderating roles of consumer knowledge and trust. *Psychology & Marketing*, 42(12), 2173-2187. <https://doi.org/10.1002/mar.21876>

- Hochreiter, M. (2023). The Stimulus-Organism-Response (S-O-R) paradigm: Cross-domain comparison of consumer behavior and organizational research. *Journal of Environmental Psychology*, 89, 102067. <https://doi.org/10.1016/j.jenvp.2023.102067>
- Imanuddin, K. A., & Handayani, P. W. (2025). User continuance intention to use social commerce livestreaming shopping based on stimulus-organism-response theory. *Cogent Business & Management*, 12(1), 2479178. <https://doi.org/10.1080/23311975.2025.2479178>
- Jafar, S., Alzahrani, S., & Oyelere, A. (2024). Metaverse in human behavior: Telepresence and flow experience shaping shopping behavior. *SAGE Open*, 14(4), 1-12. <https://doi.org/10.1177/21582440241261256>
- Kim, J., & Park, S. (2025). Identifying key streamer characteristics affecting customers' impulsive purchase behaviors: SOR model approach. *Cogent Business & Management*, 12(1), 2527917. <https://doi.org/10.1080/23311975.2025.2527917>
- Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research*, 13(2), 205-223. <https://doi.org/10.1287/isre.13.2.205.48>
- Lazaris, C., Vrechopoulos, A., & Sarantopoulos, P. (2022). Additive omnichannel atmospheric cues: Mediating effects on purchase intention. *Journal of Retailing and Consumer Services*, 64, 102789. <https://doi.org/10.1016/j.jretconser.2022.102789>
- Li, Y., & Wang, X. (2025). Applying the S-O-R model to explore impulsive buying behavior driven by influencers on social commerce websites. *PeerJ Computer Science*, 11, e3113. <https://doi.org/10.7717/peerj-cs.3113>
- Lin, S., Wang, Y., & Liu, H. (2023). Atmospheric stimuli and consumer sustained shopping intention: A meta-analysis of S-O-R studies in e-commerce. *Electronic Commerce Research*, 23(3), 1045-1072. <https://doi.org/10.1007/s10660-022-09678-4>
- Liu, X., & Zhou, Y. (2024). Prediction of online purchase behavior: An application of the S-O-R model. *Ingenuis*, 16(2), 8250-8257. <https://doi.org/10.46480/ing.2024.16.2.8250>
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. MIT Press. ISBN 9780262130905
- Ming, J., Bilal, M., & Fan, M. (2021). How social presence influences impulse buying via S-O-R theory. *International Journal of Web Information Systems*, 17(3), 300-320. <https://doi.org/10.1108/IJWIS-03-2021-0039>
- Prada, J., Mendez, A., & Rodriguez, L. (2022). Recommend or not: Generational differences under SOR paradigm. *Sustainability*, 14(23), 16104. <https://doi.org/10.3390/su142316104>
- Song, L., Yao, S., Liu, L., & Tso, G. (2025). Investigating binge-watching and paid subscription based on SOR theory. *Journal of Consumer Behaviour*, 24(2), 389-402. <https://doi.org/10.1002/cb.2402>

- Spence, C., Puccinelli, N. M., Grewal, D., & Roggeveen, A. L. (2014). Store atmospherics: A multisensory perspective. *Psychology & Marketing*, 31(7), 472-488. <https://doi.org/10.1002/mar.20709>
- Tarawneh, M., Horani, S., & Yoo, J. (2025). Shopping in the metaverse: Decoding consumer intentions. *Communication Quarterly*, 73(4), 412-430. <https://doi.org/10.1080/10572317.2025.2594293>
- Widiastuti, L. P., Ningrum, N. K., & Maharani, B. D. (2024). Live streaming commerce and purchase intention under SOR framework. *International Journal of Economic and Educational Research*, 5(4), 6157. <https://doi.org/10.37385/ijedr.v5i4.6157>
- Wongkitrungrueng, A., & Assarut, N. (2020). The role of live streaming in building consumer trust and engagement with social commerce sellers. *Journal of Business Research*, 117, 543-556. <https://doi.org/10.1016/j.jbusres.2018.08.032>
- Xia, Y., Zhang, Q., & Li, J. (2024). Immersive technology stimuli and consumer retail decision-making: Extending the S-O-R model to metaverse commerce. *Journal of Interactive Marketing*, 64, 189-203. <https://doi.org/10.1016/j.intmar.2024.03.004>
- Zhang, H. (2026). “Countdown to buy” : The impact of perceived competition and bandwagon effect on impulsive behavior in live streaming commerce. *Journal of Organizational and End User Computing*, 38(1), 70107. <https://doi.org/10.4018/JOEUC.370107>
- Friedrich, T., Schumann, J., & Wunderlich, N. (2019). Website stickiness in retail: An S-O-R perspective. *Journal of Retailing and Consumer Services*, 49, 112-121. <https://doi.org/10.1016/j.jretconser.2019.03.011>
- Harrigan, M., Feddema, K., Wang, S., & Diot, E. (2021). Trust, peer communication and online purchase intention. *Journal of Consumer Behaviour*, 20(5), 1297-1312. <https://doi.org/10.1002/cb.1936>
- Horani, S., Tarawneh, M., & Alzoubi, H. (2024). Assessing metaverse retail adoption using UTAUT2 and S-O-R extensions. *International Journal of Retail & Distribution Management*, 52(10), 1124-1142. <https://doi.org/10.1108/IJRDM-02-2024-0087>
- Jiang, S., & Zhao, H. (2025). Lost in the stream: Triggers of impulsive buying on live shopping platforms. *International Journal of Business and Society*, 26, 57-72. <https://doi.org/10.1177/09732586251363710>
- Li, X., Li, Y., & Cai, J. (2021). Attachment and user stickiness on live streaming platforms. *Journal of Retailing and Consumer Services*, 60, 102478. <https://doi.org/10.1016/j.jretconser.2021.102478>
- Yuan, C., & Chen, L. (2020). Social media content stimuli and customer loyalty via S-O-R. *Electronic Markets*, 30(4), 623-638. <https://doi.org/10.1007/s12525-019-00395-8>
- Zhou, M., Huang, J., & Wu, K. (2021). Consumer intention to adopt live e-commerce shopping. *Technology in Society*, 67, 101767. <https://doi.org/10.1016/j.techsoc.2021.101767>

