

# Critical Humanistic Social Theory

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## Critical Humanistic Social Theory

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# Cross-Border Practice through the Lenses of Transformative Learning and Uses-and-Gratifications: An Empirical Study of Macao Entrepreneurs in the Guangdong–Hong Kong–Macao Greater Bay Area

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**Abstract:** The Guangdong-Hong Kong-Macao Greater Bay Area positions Macao as an intermediary between mainland China and Portuguese speaking countries, and the coordination of formal institutions and social networks reduces cross border costs. Existing research privileges structure over process and lacks an explanation of how entrepreneurs translate external conditions into capabilities and sustained intention. Drawing on semi structured interviews and thematic analysis with ten Macao entrepreneurs who have cross border experience, this study advances two mechanisms. Situated internalization, comprising situational triggering and capability consolidation, explains how practice is reflected upon and sedimented as organizational knowledge. Motivation sustainment, comprising motivation matching and satisfaction assessment, explains how platform satisfaction is converted into sustained cross border operating intention. Together the mechanisms trace a causal chain linking learning and platform use and provide process indicators that are observable, comparable, and testable. The study operationalizes the alignment of policy and social networks into an actionable framework and offers empirical support and design levers for platform governance and for embedding entrepreneurial learning in practice.

**Keywords:** Guangdong-Hong Kong-Macao Greater Bay Area; Macao Entrepreneurs; Transformative Learning; Uses and Gratifications Theory; Cross Border Entrepreneurship

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## 1.Introduction

The Guangdong-Hong Kong-Macao Greater Bay Area positions Macao as a key intermediary between mainland China and Portuguese speaking countries. Institutional arrangements such as CEPA, the Hengqin Cooperation Zone, and the China Portugal business platform combine to create an institutional lever for cross border flows of factors. Within this configuration, Macao entrepreneurs rely on frequent shuttling and cross border network collaboration to link raw material origins in

Portuguese speaking countries with the large capacity markets of the mainland, forming a practice logic of institutional push plus network safeguard. Formal and informal institutions reinforce one another, encompassing hard arrangements in investment and finance as well as soft norms rooted in multicultural kinship and local customs. Together they reduce the transaction costs of opportunity recognition and resource integration and expand the feasible boundary of cross border operations. The materials you provided indicate that Macao entrepreneurs, drawing on One country two systems, the China Portugal platform, and Greater Bay Area policies, develop transnational ventures under the dual assurance of institutions and networks. This pathway has become stable, observable, and reproducible.

However, existing research remains largely at the structural level of institutions, networks, and outcomes and has not revealed how entrepreneurial actors translate external conditions into sustained capability growth and organizational learning. This process calls for Transformative learning to portray the chain of situated participation, reflective integration, capability consolidation, and re contextualization and to identify which institutional and network triggers set these learning events in motion. At the same time, the cross border information ecology lacks a systematic model grounded in uses and gratifications theory that explains why entrepreneurs move among government portals, forums, trade promotion events, and chamber based communities, what types of gratifications they seek in each venue, how these experiences shape trust and decision making, and how they affect local embeddedness and operational sustainability. Filling these two mechanism lines can translate the macro logic of institutional alignment and network embedding into micro level process variables that are observable, comparable, and verifiable, thereby strengthening explanatory power and practical operability.

## 1.2 Research Objectives & Questions

This study advances two research objectives and questions, each directly testable through semi structured interviews. RO1 is to explain, through Transformative learning, how Macao entrepreneurs convert Greater Bay Area institutions and network resources into internal capabilities. RO2 is to explain, through uses and gratifications theory, how entrepreneurs primary motivations for using policy platforms influence their sustained intention to operate across borders. RQ1: how Macao entrepreneurs complete the learning conversion from practice and reflection to capability internalization in real business contexts? RQ2: how entrepreneurs primary motivations on policy platforms influence their sustained cross border operating intention? Methodologically, the study employs semi structured interviews and theoretical sampling, enrolling ten Macao entrepreneurs with cross border experience. We collect evidence on learning events and media use around key institutional and network nodes and conduct cross case comparisons to ensure saturation and robustness of conclusions.

## 2. Literature Review

### 2.1 Institutional and Relational Embedding and the Mechanism of Internal Growth

Existing scholarship has outlined the structural logic of Macao entrepreneurs' cross border practice <sup>[1]</sup>. On the one hand, formal arrangements such as CEPA, the Hengqin Cooperation Zone, and the China Portugal business platform provide hard channels for tariffs, investment, and customs clearance, thereby lowering entry costs for cross border sourcing and market linkage <sup>[2]</sup>. On the other hand, informal institutions and relational networks including multicultural kinship, Portuguese language proficiency, religious communities, and overseas Chinese associations serve as soft guarantees that mitigate uncertainty in execution and competition through reciprocity and trust <sup>[3]</sup>. Combined, these forces form a normalized pattern of institutional push with network safeguard.

However, this framework largely remains at the level of external conditions and business outcomes and offers few process oriented accounts or testable mediating chains that show how entrepreneurial actors convert institutional and network resources into sustained capability growth and organizational learning <sup>[4]</sup>. While the literature notes frequent travel between Portuguese speaking countries and the mainland and the use of associations and government channels to resolve compliance and execution issues, it does not answer how learning occurs, why it occurs, or how it is consolidated as organizational knowledge <sup>[5]</sup>.

From the perspective of Transformative learning, cross border entrepreneurship can be understood as a practice based process of situation, reflection, internalization, and re contextualization <sup>[6]</sup>. Real tasks trigger reflection, which leads to the internalization of a sense of rules and cross cultural negotiation capacity, followed by application and optimization in new

settings, and finally sedimentation into organizational processes and capability structures <sup>[7]</sup>. The Macao case offers fertile ground for this chain. Institutional platforms and facilitation provide entry points for learning situations, while collaboration and friction within networks stimulate reflection and re contextualization. Yet prior studies have not systematized these learning events into operational process indicators, nor have they compared pathway differences across industries and destinations <sup>[8]</sup>.

Addressing this gap requires proposing and testing a micro process model guided by Transformative learning that explains how external institutions and networks are converted into internal capabilities and organizational learning through practice <sup>[9]</sup>. It also calls for cross case comparison to trace stage specific features and variants along the learning chain, thereby bridging the disconnect between structural description and subjective growth. On this basis, the first research question is both theoretically necessary and empirically feasible <sup>[10]</sup>. It elucidates the internal mechanism by which institutions and networks take effect and provides observable and verifiable mediating paths for assessing the sustainability of cross border operations <sup>[11]</sup>.

## 2.2 Information Ecology and the Pattern of Motives, Gratifications, and Consequences

A second salient gap lies in the insufficient dynamical explanation at the level of the information ecology <sup>[12]</sup>. Evidence shows that entrepreneurs move between formal channels such as government portals, forums, trade promotion events, and the China Portugal platform and informal channels such as chambers and associations, hometown and interpersonal networks, and instant messaging groups to accomplish distinct tasks that include opportunity identification, compliance confirmation, partner matching, and rapid problem solving <sup>[13]</sup>. Official platforms are often used to obtain institutional confirmation of what can be done and to secure market entry, whereas associations and local ties are used to learn how to proceed and to mitigate risks <sup>[14]</sup>.

Yet much of the literature describes this only as channel complementarity and lacks mechanism based modeling anchored in uses and gratifications theory <sup>[15]</sup>. It remains unclear what primary motives drive the use of different channels, how corresponding types of gratifications are distinguished, how the motive gratification linkage shapes the evaluation of information quality and the formation of trust, and how these in turn affect local embeddedness and sustained willingness to operate <sup>[16]</sup>. These questions have not been systematically explained or tested.

Modeling is especially necessary in the Macao context. Institutional platforms provide high certainty in rules and matching at the initial stage of cross border activity, but their ability to sustain entrepreneurial intention depends largely on whether platform interactions satisfy core motives such as opportunity visibility, procedural certainty, matching efficiency, and pathway accessibility <sup>[17]</sup>. Informal networks offer flexibility and responsiveness, but the gratifications they deliver tend to emphasize emotional support and quick fixes, which may not reliably build intertemporal trust or compliance certainty <sup>[18]</sup>. While existing texts offer vivid examples of market development through platforms and risk mitigation through association backed guarantees, they have not elevated these into an analytical framework of motive, use, gratification, and consequence, nor have they identified which motives are the key drivers of sustained operating intention across firm life cycles and destination contexts <sup>[19]</sup>.

It is therefore necessary to reconstruct the mechanism of the cross border information ecology through uses and gratifications theory <sup>[20]</sup>. This reconstruction begins with primary usage motives, clarifies the target orientation and gratification types of platform interactions, and links them to outcome variables, especially sustained cross border operating intention <sup>[21]</sup>. Such a model can explain why entrepreneurs continue or withdraw from a given policy platform and can inform actionable improvements in platform governance and service design <sup>[22]</sup>. Consequently, the second research question emerges as a direct and necessary inquiry <sup>[23]</sup>. It narrows the analytical focus to the main chain connecting formal channels, core motives, and behavioral consequences, avoids conflating formal and informal channels, improves model identifiability, and can be tested through semi structured interviews that collect linked evidence on motive statements, usage trajectories, perceived gratifications, and action intentions.

## 3. Methods

### 3.1 Semi-structured interviews

This study addresses two process-oriented research questions that are strongly actor centered. Both require narration

of individual experience, contextual judgment, and the display of reflective mechanisms, which cannot be adequately captured with closed-ended scales. Semi structured interviews keep the inquiry focused while preserving narrative space to trace learning event chains, platform interaction chains, and the details and turning points of motives, gratifications, and consequences. In the Macao context, cross-border practice relies on the coupling of institutional leverage and network safeguards. Such mechanisms are best reconstructed through first-person accounts that reveal how they operate in practice, making semi structured interviews a highly congruent approach.

### 3.2 Sample size and scope

The study combines theoretical sampling with the principle of information power. Given clear research foci and a relatively homogeneous population, and given our plan to obtain full event-chain narratives through high-quality, extended interviews, we judge a total of ten participants to be sufficient to reach saturation and enable pathway comparison within a limited sample. Prior interview research in the Macao setting has covered larger samples of about thirty participants, which informs our sampling frame. Building on that foundation, the present study pivots to fine-grained mechanism tracing and pathway comparison, hence a smaller but deeper sample strategy to achieve thick description (Shown in Table 1).

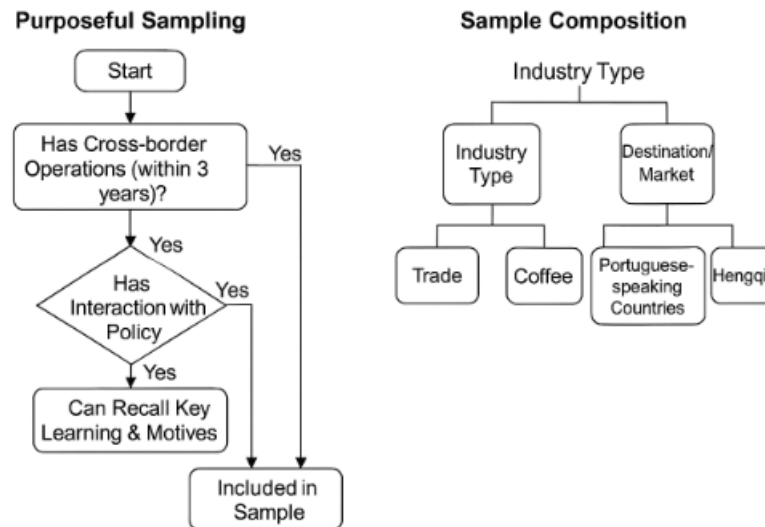
*Table 1. Profile of ten Macao entrepreneurs' positions*

| Age | Industry  | Pseudonym | Gender | Rationale for selection  |
|-----|---|-----------|--------|--|
| 42  | Import–export trade<br>Portuguese agricultural products   | E01       | Male   | In the past three years connected Brazilian coffee beans to mainland roasting plants through the China–Portugal business platform and can recount a learning chain of regulatory confirmation, customs coordination, and quality traceability. |
| 36  | Food and beverage<br>coffee chain                         | E02       | Female | Opened a cross-border outlet in Hengqin and joined trade promotion events. Platform use is driven mainly by market entry and procedural certainty and allows comparison of formal platforms with chamber-based information.                    |
| 49  | Cold-chain logistics<br>and warehousing                   | E03       | Male   | Leveraged CEPA customs facilitation to expand distribution in the Pearl River Delta and is active in industry associations and instant-messaging groups with clear cases of rapid problem solving and process consolidation.                   |
| 33  | Cross-border e-commerce<br>Portuguese cosmetics           | E04       | Female | Uses government portals and trade fairs to obtain certification pathways, then relies on hometown networks for channel rollout. Can clearly narrate changes in motive, gratification, and intention.   |
| 41  | Cultural tourism and<br>convention services               | E05       | Female | Repeatedly participated in Hengqin roadshows and matching sessions. Focuses on matching efficiency and pathway accessibility and can provide traces of platform interaction and trust formation.   |
| 29  | Cultural and creative<br>design co-branding               | E06       | Female | Entered mainland retail chains through association resources and experienced a re-contextualized learning process of style localization, contract compliance, and post-event review.   |
| 45  | Medical device<br>agency                                  | E07       | Male   | Uses both government technical filing platforms and industry forums and can compare credibility rules across information sources and their impact on decisions.  |
| 38  | Education and corporate<br>services                       | E08       | Female | Provides compliance training in the mainland for firms from Portuguese speaking countries. Frequent shuttling has produced internalization of a sense of rules and negotiation capacity and enables cross-case comparison.                     |
| 52  | Environmental<br>materials and engineering                | E09       | Male   | Entered Greater Bay Area projects via green procurement policies of industrial parks. Motives center on opportunity visibility and policy interfacing and can speak to mechanisms that raise sustained operating intention.                    |
| 35  | Digital marketing<br>and cross-border<br>brand operations | E10       | Female | Acquires clients through trade fairs and chambers and uses instant-messaging groups for after-sales and risk control. Can clearly distinguish gratifications of emotional support versus compliance certainty.                                 |

### 3.3 Inclusion criteria and composition

Purposeful sampling targets Macao entrepreneurs with cross-border operating experience and actual interaction with policy platforms. Inclusion criteria are as follows. First, documented cross-border operation or collaboration within the past three years. Second, at least one interaction with a policy platform such as the China–Portugal business platform, trade fairs, or park services. Third, the ability to recall key learning events and platform-use motives. The sample composition emphasizes variation in industry for example trade, coffee, services, destination Portuguese speaking countries or Hengqin, and firm stage entry, expansion, or stabilization to ensure comparability and representativeness (Shown in Figure 1).

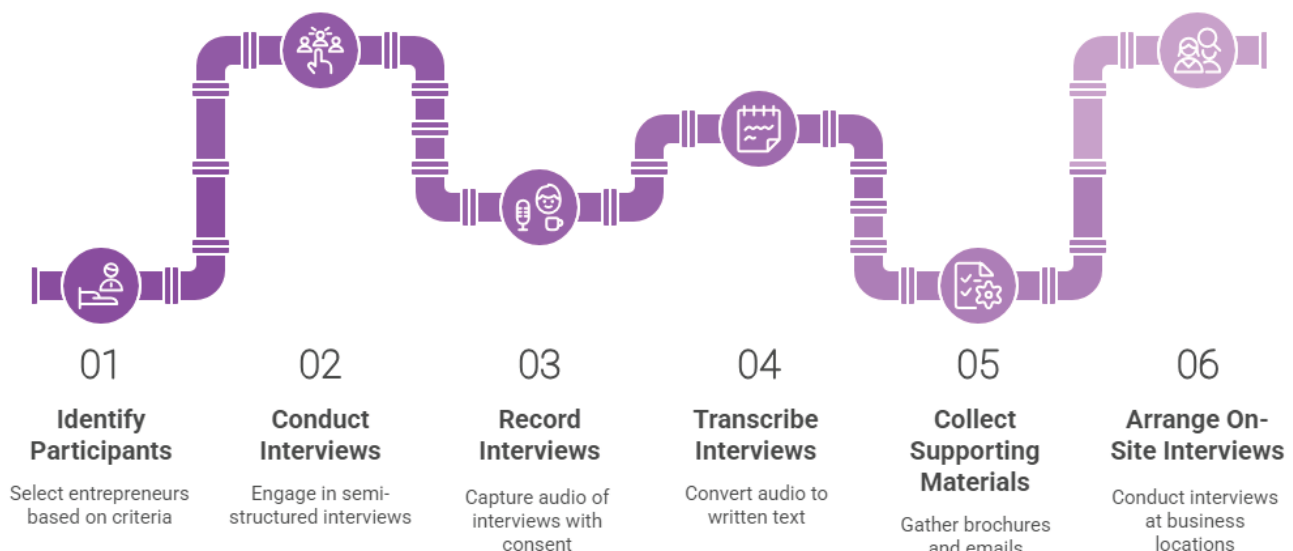
Figure 1. Sample Selection and Composition of Macao Entrepreneurs



### 3.4 Data collection

Data were gathered through semi structured in-depth interviews of sixty to ninety minutes per participant, conducted primarily in Cantonese and Mandarin with Portuguese added when appropriate. Interviews followed two main threads. The first examined practice, reflection, and capability internalization. The second examined platform motives and the transformation of intention. We emphasized source tracing of key events and detailed post-event reviews. With consent, all interviews were audio recorded and transcribed. When available, activity brochures and platform emails were collected as supporting materials. Whenever possible, interviews were arranged on site at business operations or immediately after platform activities to enhance contextual authenticity and fidelity (Shown in Figure 2).

Figure 2. Data Collection Process for Macao Entrepreneurs





### 3.5 Data analysis

We employed thematic analysis, following a layered path from codes to subthemes to themes. First, interview texts were read in full and open initial coding was conducted to identify keywords related to learning behavior, media motives, and policy use. Second, similar or repeated codes were grouped into subthemes and iteratively refined against the theoretical framework. Finally, subthemes were abstracted into core themes to produce explanatory conclusions, summarized in Table 2. Two researchers independently completed the first round of coding and jointly confirmed the thematic structure to ensure analytic rigor and theoretical alignment.

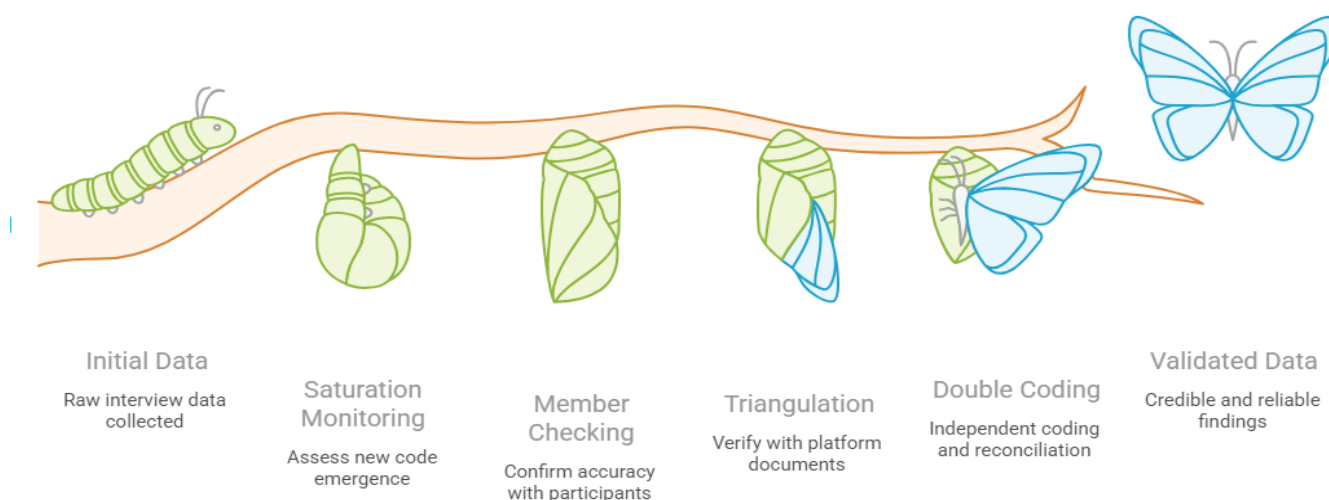
Table 2. Thematic Structure

| Theme                     | Subtheme                 | Codes   |
|---------------------------|--------------------------|---|
| Situating internalization | Situational triggers     | Institutional nodes; Cross cultural friction; Task reframing; Peer benchmarking; Dual domain comparison; Immediate review           |
|                           | Capability consolidation | Rules moved to the front; Negotiation scripts; SOP standardization; Role segmentation; Knowledge transmission; Re contextualization |
| Motivation sustainment    | Motivation matching      | Opportunity visibility; Procedural certainty; Matching efficiency; Risk mitigation; Knowledge updating; Relationship expansion      |
|                           | Satisfaction assessment  | Information verifiability; Cross checking; Cost reduction; Response based trust; Local embeddedness; Sustained intention            |

### 3.5 Trustworthiness and credibility checks

To ensure credibility, we undertook several validation steps. First, saturation monitoring began after the eighth interview to assess the emergence of new codes. Second, member checking was conducted by returning interview summaries to participants for accuracy confirmation. Third, interview content was triangulated with platform documents and policy texts. Fourth, a subset of cases was double coded independently and reconciled to produce a unified codebook. Detailed audit trails and analytic reflections were maintained throughout to ensure transparency and replicability (Shown in Figure 3).

Figure 2. Ensuring Credibility



## 4. Findings and Discussion

### 4.1 Situated internalization

This study advances situated internalization as the focused answer to RQ1. Situated internalization means turning on site problems into capabilities. When entrepreneurs confront bottlenecks in real business such as unclear procedures or ineffective communication, they immediately record causes and remedies and hold short review meetings. They then codify the approach into checklists and workflows that specify sequences, responsible persons, and contingencies. When similar situations recur, they execute by the checklist and fine tune based on results. Over time, these practices move from individual experience to



shared team capability that can be replicated and taught. In real contexts, practice is fixed through reflection and ultimately becomes a stable capability, thereby addressing the first research question. Transformative learning posits that learning is not external transmission but inner growth triggered by the actor's re understanding of tasks and relations in specific situations. The greater the complexity of practice, the more likely it is to trigger reflection and meaning making, which consolidates a sense of rules, negotiation capacity, and process awareness. Facing dual domains and cross cultural collaboration, Macao entrepreneurs use institutional facilitation and network resources as entry points and translate repeated real tasks into reusable knowledge units and action scripts. Situated internalization therefore explains how, in real business settings, entrepreneurs convert practice and reflection into capability internalization and grounds this in two observable subthemes, situational triggers and capability consolidation.

**Situational triggers.** This subtheme describes how learning is initiated as external environments ignite inner reflection and problem framing. First, institutional nodes. Confronted with rigid requirements such as customs rules, admission catalogues, and tax benefit lists, entrepreneurs reframe task boundaries and clarify goals and pathways in terms of what can be done and how to do it, establishing an institution anchored starting point for learning. Second, cross cultural friction. Differences in language, religious prohibitions, and customary etiquette generate tension in communication and execution. Such tension forces actors to recalibrate their understanding of others and of rules in action. Reflection targets not only errors but also the scope conditions of existing knowledge. Third, task reframing. When original plans meet execution or resource constraints, actors decompose goals, reset priorities, and reallocate resources, shifting learning toward strategy redesign. Fourth, peer benchmarking. Through close observation in park activities, association exchanges, and trade fairs, actors convert external benchmarks into reference systems that calibrate their own processes and capability gaps. Fifth, dual domain comparison. Moving between origin countries and mainland markets, entrepreneurs distill transferable rules and adaptable practices through environmental contrasts. Sixth, immediate review. Around discrete nodes such as a negotiation, a customs declaration, or a shelf placement, actors conduct rapid after action reviews, record key cues and failure points, and abstract experience into simplified operational takeaways. Together these six triggers form a conduit from external events to inner reflection and ensure that learning is driven by the scene rather than by post hoc sentiment. From the vantage point of Transformative learning, such task centered reflection is generative because it directly reshapes the actor's understanding of context and meaning, thereby supplying the material and clues for subsequent capability sedimentation. To align mechanism and evidence, we cite an illustrative account:

"On our first shipment of Brazilian beans to the Pearl River Delta we were held at animal and plant inspection. That night I reorganized the customs checklist into three tasks and completed the documents one by one the next day. Since then, whenever a bottleneck appears I note the trigger and the remedy on site, hold a ten minute review back at the office, assign the form and the owner, and the same problem rarely recurs." (Participant E01, male, 42, import and export trade)

**Capability consolidation.** This subtheme explains how reflection sediments into stable and reusable organizational capability. First, rules brought to the front. Entrepreneurs move compliance requirements to the beginning of decisions so that every resource allocation carries an institutional and risk awareness, which reduces trial and error. Second, negotiation scripts. Effective expressions, clarification routines, and concession boundaries formed in multi scene negotiations and multi party communication are standardized as phrases and step prompts, making cross cultural collaboration trainable. Third, SOP standardization. Around the critical moves of critical tasks, steps, required materials, acceptance points, and contingency plans are written into operating guides and iterated after each execution so that processes update with changing environments. Fourth, role segmentation. Tasks are decomposed into duties and authorization boundaries, with front stage interaction supported by back office functions, ensuring that personal experience converts into institutionalized team coordination. Fifth, knowledge transmission. Rules, scripts, and SOPs are embedded in training and manuals and circulated through peer coaching and case reviews so that knowledge does not remain with a few key individuals. Sixth, re contextualization. Consolidated capabilities are tested in new countries, new parks, and new channels through small scale trials to assess transferability and boundary conditions, with new evidence fed back to rules and processes. Transformative learning emphasizes the inner conversion from experience to meaning and then the social placement of knowledge through collective

and institutional embedding. Capability consolidation is the organizational manifestation of this mechanism, turning learning from individual narrative into organizational memory and continuous improvement. To show the mapping from mechanism to evidence, we cite a typical account:

“We move compliance checks before quotation and run a self checklist. If it cannot pass we do not take the order. All negotiations follow standard scripts from needs clarification to concession boundaries. Each step is written into the SOP and reviewed monthly. Newly identified risks and practices go straight into the training manual. New hires can run the process independently within two weeks, and provincial rollouts are faster.” (Participant E07, male, 45, medical device agency)

Placing situational triggers alongside capability consolidation yields a full picture of situated internalization. Real tasks supply stimuli. Actors frame problems and construct meaning within context, with institutional nodes, cross cultural friction, task reframing, peer benchmarking, dual domain comparison, and immediate review continually supplying extractable experiential material. Through rules brought to the front, negotiation scripts, SOP standardization, role segmentation, knowledge transmission, and re contextualization, this experience sediments as structured capability. The process answers not only how learning occurs but why it endures. First, inputs arise from high contextual complexity, which disciplines reflection with real constraints. Second, outputs enter organizational rules and process systems, which enable replication and diffusion. Third, learning cycles gain continual external validation through re contextualization, allowing capabilities to evolve with their environments. Situated internalization thus directly resolves RQ1 by translating the abstract statement from practice and reflection to internalized capability into observable, comparable, and verifiable process units. Within the framework of Transformative learning, it presents a full growth trajectory from situational participation to meaning generation to organizational placement and provides a clear and actionable evidentiary structure for explaining capability formation among Macao entrepreneurs in real business settings. It also yields mediating variables and assessment indicators for evaluating the sustainability of cross border operations, including the depth of rules brought to the front, the coverage of negotiation scripts, the frequency of SOP iteration, the penetration of knowledge transmission, and the robustness of re contextualization loops, all of which can be examined through combined quantitative and qualitative tracking across cases and over time.

## 4.2 Motivation sustainment

This study advances motivation sustainment as the focused response to RQ2. Uses and gratifications theory holds that users enter a media environment with specific motives to seek gratifications, and the degree of gratification subsequently shapes continued choice and stickiness. In the policy platform context, entrepreneurs are not abstract recipients of policy but actors who enter the platform with concrete problems. They do so to see opportunities, confirm procedures, match partners efficiently, reduce risks, update knowledge, and expand relationships. When a platform delivers sustained gratifications on these dimensions, entrepreneurs incorporate it into their routine decision making and execution. What begins as usefulness becomes reliability, and platform interaction is integrated into the same planning cycle as cross border operations, generating stable revisits and long term proclivities. Motivation sustainment directly addresses the second research question because it links the starting point and the end point of platform use into a testable causal sequence that takes specific motives as inputs, satisfaction assessment as process control, and sustained intention as the output. Once the platform consistently delivers on key dimensions such as opportunity visibility and procedural certainty, behavior shifts from a single trial to repeated use and durable commitment. Intention is thereby strengthened and becomes predictable, which clarifies how platform motives shape sustained cross border operating intention. In short, motivation sustainment joins why entrepreneurs use a platform with whether they continue. When gratifications are delivered at the corresponding points, entrepreneurs save time and effort and feel assured, return for the next round, and over time become more reliant and more willing to operate in the Greater Bay Area. When key motives are not satisfied, intention declines and attention shifts to other channels. This clear pathway of motive, matching, gratification, and revisit also identifies concrete targets for platform improvement.

Motivation matching. This subtheme answers why entrepreneurs use platforms and how platform functions align with their goals. Opportunity visibility is an entry motive as entrepreneurs filter vast information for leads that match their categories and regions; fair schedules and project announcements reduce search costs and delineate a clear space of possibility. Procedural certainty is a safety motive; service windows and material checklists move compliance requirements to the

project design stage and prevent costly rework. Matching efficiency is a resource motive; structured roadshows and park based brokerage compress negotiation rounds and rapidly convene viable parties. Risk mitigation is a safeguard motive; credit endorsement by chambers and compliance consulting convert uncertainty into manageable boundary conditions. Knowledge updating is a growth motive; focused training and case repositories supply the latest versions of industry rules and operational templates and keep teams learning. Relationship expansion is a development motive; local associations and instant messaging groups open entry points into local networks and create weak ties that can be mobilized. The six motives can drive entry on their own or in combination, for example opportunity visibility with matching efficiency or procedural certainty with risk mitigation. The crux of uses and gratifications theory is the degree of alignment between goals and supply. When motives are accurately identified and promptly met by platform functions, first use tends to become a positive experience that lays the groundwork for subsequent satisfaction and trust. An illustrative testimony follows: “I first look at opportunity visibility on the platform. Fair schedules and project announcements narrow the direction and save a great deal of trial and error. Before handling procedures I check for procedural certainty and work step by step through the checklist provided at the service window, which avoids detours. Matching efficiency on the day of the roadshow is also crucial. Three rounds of meetings were enough to lock in two suitable partners. A park officer then followed up, which freed my time for solution work. It felt controllable and less labor intensive.” (Participant E05, female, 41, cultural tourism and convention services)

Satisfaction assessment. This subtheme explains how entrepreneurs judge platform usefulness and how that judgment translates into behavioral tendencies. Information verifiability is the first threshold; sources that are explicit and traceable enable an initial trust. Cross checking is a robustness mechanism; entrepreneurs compare announcements, reputational accounts, and samples for consistency and thereby attenuate information noise. Cost reduction is a felt indicator; noticeable declines in processing, communication, and time costs are remembered and incorporated into subsequent planning. Response based trust is a core variable; speed of response and problem resolution rates constitute perceptible dimensions of service quality that shape the immediate experience and the probability of a second entry. Local embeddedness is a structural outcome; the emergence of local collaborations, the normalization of regular travel, and the taking of association roles convert individual use into an organizational change in network position. Sustained intention is a composite outcome; when stable positive feedback is obtained on the five foregoing dimensions, the platform is upgraded from a one time tool to a routine mechanism and revisits and scope expansion follow. Uses and gratifications theory highlights the downstream effects of gratification. Each element of satisfaction assessment both tests and reinforces motivation matching, and together they form a continuous chain from first use to long term use. An illustrative testimony follows: “To judge whether a platform is useful I first check information verifiability, with a source and a contact, and then I do cross checking. Announcements, reputational accounts, and samples must align. Once these pass, processing and communication costs drop markedly. When a bottleneck appears, the officer replies the same day with an alternative path. My response based trust builds step by step. After deals landed I joined a local association, travel became routine, and my sustained intention increased.” (Participant E10, female, 35, digital marketing and cross border brand operations)

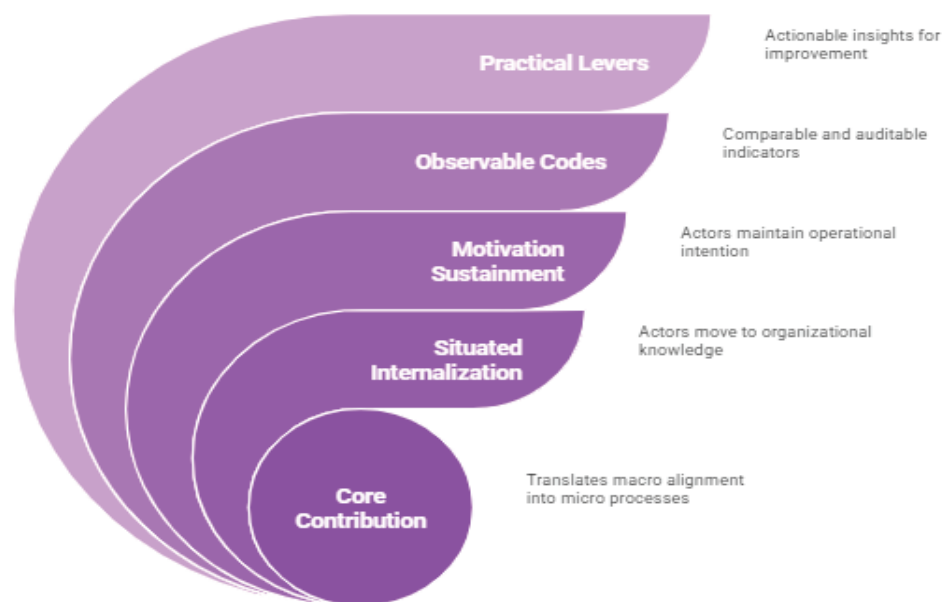
Connecting motivation matching with satisfaction assessment reveals the full passage from motives to intention. Entrepreneurs enter with motives that include opportunity visibility, procedural certainty, matching efficiency, risk mitigation, knowledge updating, and relationship expansion. If the platform delivers high quality and high efficiency support in the corresponding dimensions, the first interaction yields positive gratification. Information verifiability and cross checking convert gratification into cognitive trust that can be evidenced. Cost reduction and response based trust convert gratification into experiential trust that can be felt. Local embeddedness externalizes gratification into observable shifts in network position. The accumulation of these forms of trust and position ultimately appears as elevated sustained intention in the form of platform revisits and increased investment. This mechanism explains how a platform moves from one time assistance to a long term operational fulcrum and why firms at different stages display different levels of sustainment. When motivation matching is off target or satisfaction assessment turns negative, sustained intention declines rapidly and entrepreneurs look to informal networks to compensate. When the platform delivers stable gratifications on key motives, especially procedural

certainty and matching efficiency, sustained intention rises and hardens into habitual choice. As a practical contribution, motivation sustainment offers a uses and gratifications based mechanism that goes beyond static descriptions of channel complementarity and translates into platform side improvement metrics such as precision push rates for opportunity information, executability of material checklists, conversion rates for matching, response timeliness of compliance consulting, update frequency of training content, and collaboration conversion after association linkage. Continuous optimization on these metrics enables a shift from one time satisfaction to sustained engagement and materially increases entrepreneurs' willingness to operate across borders and the depth of their local embeddedness.

## 5. Research Contributions

The core contribution of this study is to translate the macro alignment of institutions and network embeddedness into verifiable micro processes through a qualitative approach. Drawing on semi structured interviews and thematic analysis with ten entrepreneurs, I propose and substantiate two mechanistic concepts. Situated internalization explains how actors, in real business settings, move from practice and reflection to organizational knowledge through situational triggers and capability consolidation. Motivation sustainment explains how actors, on policy platforms, progress from motivation matching and satisfaction assessment to a stable intention to continue operating. Both mechanisms are operationalized into observable codes and linked evidence, yielding process indicators that are comparable and auditable. In doing so, the study connects why an approach works with how it can be improved and provides actionable theoretical explanation and practical levers for entrepreneurial learning and platform governance (Shown in Figure 4).

Figure 4. Research Contributions in Entrepreneurship



## Conclusion

Situated in the Guangdong-Hong Kong-Macao Greater Bay Area, this study advances and substantiates two operational micro mechanisms based on semi structured interviews and thematic analysis with ten Macao entrepreneurs. The first is situated internalization, which emphasizes capability consolidation generated from real operations beginning with situational triggers and immediate reviews and continuing through rules brought to the front, negotiation scripts, and SOPs. It explains how practice is transformed into organizational knowledge. The second is motivation sustainment, which emphasizes that entrepreneurs enter policy platforms with motives such as opportunity visibility and procedural certainty, then evaluate gratifications through information verifiability and cross checking, thereby building response based trust and local embeddedness and ultimately strengthening sustained cross border operating intention. The study concretizes the broader narrative of coordination between policy and social networks into observable processes and helps fill the process oriented gap in existing research.

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No

## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Research on Tea Packaging Design and Cultural Communication Mechanism From a Sustainable Perspective

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**Abstract:** Tea packaging plays a crucial role in cultural heritage and sustainable development, but current practices face challenges such as insufficient material sustainability, difficulties integrating traditional crafts with modern technologies, and a lack of cultural symbolism. This study constructs a theoretical framework centered on a circular material system, process-technology integration, and collaborative innovation between materials, processes, and culture. It also proposes strategies such as collaborative development, the construction of an interdisciplinary collaborative platform, and policy- and industry-driven incentive mechanisms. Validated through case studies, this framework not only enhances the ecological sustainability of tea packaging but also effectively strengthens cultural narratives and consumer identification. The findings provide systematic theoretical support and practical approaches for the design of cultural and creative tea packaging and are valuable references for the integration of green design and cultural innovation.

**Keywords:** Sustainable Design; Tea Packaging; Cultural Heritage; Craft-Technology Integration; Collaborative Innovation; Cultural and Creative Packaging

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As an important part of Chinese civilization, tea culture carries rich historical memories and social values. Tea is not only a daily consumer product, but also a cultural symbol. Its packaging design not only protects the product function, but also undertakes the mission of cultural transmission and brand expression. With the rapid development of the cultural and creative industry, tea packaging design has gradually surpassed traditional functionality and began to emphasize cultural connotation, storytelling and consumer experience <sup>[1]</sup>. Driven by the concept of sustainable development and green design, designers are increasingly concerned about how to achieve an organic combination of material sustainability, process innovation and cultural heritage in packaging. Current practice still faces many challenges. Packaging materials have limitations in terms of ecological sustainability, traditional crafts are difficult to efficiently integrate with modern production technology, and cultural symbols and stories have not been effectively conveyed in modern packaging design. This not only limits the innovative potential of tea packaging, but also affects the continuation and dissemination of traditional culture. Based on this, this study takes cultural and creative tea packaging as the research object, aiming to explore the theoretical and practical path of combining sustainable design with cultural heritage, and provide systematic theoretical guidance and practical reference for cultural and creative packaging design.

## 1. Research Background

Tea packaging not only carries the function of product protection, but also carries the important mission of cultural communication and brand expression<sup>[2]</sup>. With the rise of the industry, tea packaging design has gradually transformed from simple functionality to cultural expression, storytelling and consumer experience<sup>[3]</sup>. The current practice still has the following significant problems:

- (1) Insufficient material sustainability: Traditional packaging materials are mostly plastics, paper and other materials that consume a lot of resources or are difficult to recycle, which makes it difficult to meet the requirements of green design and circular economy.
- (2) Insufficient integration of crafts and technologies: Traditional crafts such as bamboo weaving and wood are difficult to combine efficiently with modern production methods, resulting in limited design innovation.
- (3) Lack of cultural heritage: The visual language and storytelling of tea packaging are insufficient, and traditional cultural symbols have not been effectively expressed and continued in modern packaging. This affects the cultural value of the product and weakens consumers' cultural identity. At the academic research level, tea packaging involves multidisciplinary cross-disciplinary fields such as design, materials, cultural studies and sustainable development. Systematically studying the sustainable development mechanism and cultural communication path of cultural and creative tea packaging will help enhance the theoretical depth and practical guidance value of packaging design.

## 2. Analysis of Sustainability and Cultural Challenges in Creative Tea Packaging

### 2.1 Material Constraints and Environmental Impact

The choice of materials for tea packaging directly affects its environmental sustainability and design innovation. Although the paper, plastic, and composite materials commonly used in the current market have good processability and cost advantages, they consume a lot of resources and have a high environmental load during production and recycling, which is not in line with the concept of circular economy and green design<sup>[4]</sup>. Although green and recyclable materials (such as recycled paper and biodegradable biomaterials) are gradually gaining attention<sup>[5]</sup>, they have limitations in durability, printing effects, and cost control, making it difficult for designers to strike a balance between sustainability and aesthetic innovation. At the same time, the imperfections of the material supply chain and regional differences also limit the widespread application of sustainable materials, creating a dual pressure of material constraints and ecological environmental impacts.

### 2.2 Innovation in Craft and Technological Application Barriers

Traditional crafts such as bamboo weaving, wood carving, and handmade paper art have unique advantages in cultural expression and visual aesthetics, but they are difficult to apply efficiently in modern production systems. The difficulty in combining crafts with digital design and mechanized production has limited design innovation and made large-scale production difficult to achieve<sup>[6]</sup>. In addition, there are challenges in the inheritance of traditional craft skills, and the new generation of designers has limited mastery of manual skills, which further affects their innovation capabilities. Technical application barriers are also reflected in the mismatch between modern design software, digital production tools, and traditional process flows, which increases the cost of innovative design and restricts the deep integration of materials, processes, and technologies.

### 2.3 Gaps in Cultural Transmission and Innovation Ecosystem

Tea packaging suffers from a significant deficiency in its ability to convey and express the cultural value of tea. Many packaging efforts lack a systematic distillation of traditional cultural symbols, stories, and visual language, weakening its cultural connotations. Ineffective collaboration between design, materials, and craftsmanship, the market, and policy has led to a disconnected innovation ecosystem. The inadequate integration of cultural symbols with modern design language not only weakens consumers' sense of cultural identity but also restricts the cultural communication function of packaging design within the cultural and creative industries. Furthermore, a lack of interdisciplinary collaborative platforms and policy incentives hinders the simultaneous advancement of sustainable design and cultural heritage.

## 3. Theoretical Framework for Sustainability and Cultural Transmission

### 3.1 Circular Materials and Principles of Sustainable Design



Circular materials and sustainable design principles are the core foundation of cultural and creative tea packaging innovation. In terms of material selection, emphasis is placed on the use of renewable, degradable or highly recyclable materials to reduce environmental load and comply with the concept of circular economy. Circular materials not only reduce resource waste in the production, use and recycling stages, but also support functional innovation and visual expression of packaging<sup>[7]</sup>. Sustainable design principles include life cycle design, optimal use of materials, low-energy processing and recyclable design, providing systematic guidance for packaging design. By combining circular materials with design principles, tea packaging can not only meet environmental responsibility requirements, but also provide ample space for cultural expression and creative design, achieving the coordinated development of green design and cultural innovation.

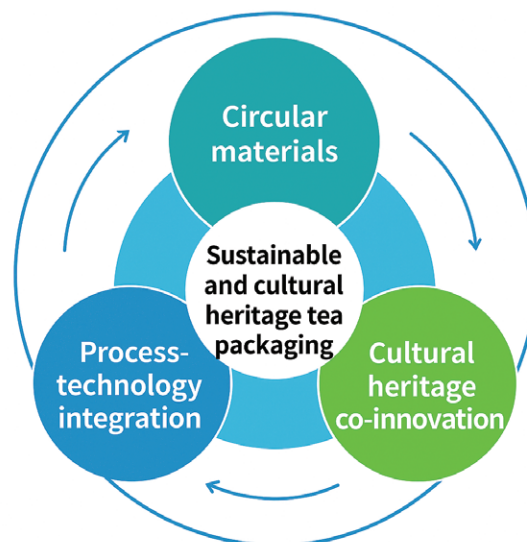
### 3.2 Craft–Technology Integration Theory

The fusion of craft and technology is a crucial mechanism for achieving innovative design. Traditional crafts such as bamboo weaving, wood carving, and handmade paper art possess unique cultural and aesthetic value, while modern digital design and mechanized production offer efficient manufacturing and diverse means of expression. The theory of craft-technology fusion emphasizes the organic integration of traditional skills with modern production technologies. Through the coordinated application of digital design tools, process optimization, and process innovation methods, it aims to improve design efficiency, reduce costs, and expand creative possibilities. This theory provides a systematic approach to tea packaging design, enabling traditional cultural elements to be efficiently reproduced and innovatively expressed through modern technology while maintaining the integrity of cultural heritage.

### 3.3 Cultural Transmission and Collaborative Innovation Mechanism

The cultural heritage and collaborative innovation mechanism aims to solve the problem of weakening cultural value in cultural and creative tea packaging. By establishing a multi-party collaborative system, including designers, craftsmen, material suppliers, enterprises and policy institutions, an interdisciplinary and cross-field innovation network is formed to achieve the systematic extraction and re-creation of cultural elements. Under this mechanism, packaging design not only focuses on environmental sustainability and process innovation, but also emphasizes the integration of cultural narrative, visual language and consumer experience. The collaborative innovation mechanism drives design creativity through cultural heritage, while using policy incentives and industrial support to form a sustainable, innovative and culturally profound packaging design ecology, providing a framework support for the theoretical research and practice of cultural and creative tea packaging<sup>[8]</sup>.

Figure 3-1 Framework Construction



In summary, the framework takes the principles of recycled materials and sustainable design as the green foundation, establishes the environmental responsibility of packaging in material selection and the entire life cycle, and provides a sustainable premise for innovation. On this basis, the framework uses the process-technology fusion theory to combine traditional cultural skills with modern production technology to effectively solve the problem of efficient reproduction and innovative

expression of cultural elements in modern design, as shown in Figure 3-1. Finally, cultural heritage and collaborative innovation mechanisms serve as top-level safeguards, building a cross-disciplinary collaborative network to ensure the cultural depth and narrative value of packaging design and avoid the superficial application of cultural symbols. These three elements are closely linked and organically integrated, forming a complete design ecosystem from environmentally friendly materials and technological implementation to the transmission of cultural value. This provides solid theoretical support and practical guidance for promoting tea packaging design that combines sustainability, technological innovation, and cultural heritage.

## **4. Collaboration Strategies and Innovation Mechanisms in Tea Packaging**

### **4.1 Material–Craft–Culture Collaborative Development Strategies**

The collaborative development of materials, craftsmanship, and culture is a core strategy for integrating sustainability and cultural value in cultural and creative tea packaging. In design practice, sustainable material selection, process innovation, and cultural elements should be integrated through multi-faceted collaboration. For example, during the packaging design phase, designers can optimize process solutions based on material characteristics while incorporating traditional cultural symbols, stories, and visual language into the design, achieving a unified package across function, aesthetics, and cultural expression. This collaborative development strategy emphasizes systematic design process management, balancing environmental protection, innovation, and cultural transmission to realize the multidimensional value of packaging design.

### **4.2 Interdisciplinary Collaboration and Innovation Models**

Tea packaging design involves multiple disciplines such as design, materials, technology, cultural studies, and marketing, so interdisciplinary collaboration is crucial. The interdisciplinary innovation model achieves the sharing and integration of knowledge, technology, and cultural resources by establishing a collaborative platform for designers, craftsmen, material suppliers, business managers, and cultural researchers. In this model, innovation comes not only from breakthroughs in a single discipline, but also from in-depth collaboration across different fields, enabling the design solution to be comprehensively optimized in terms of sustainability, technology, and cultural communication. Interdisciplinary collaboration also helps promote the integration of design concepts and market demand, and enhances the commercial and cultural value of cultural and creative tea packaging<sup>[9]</sup>.

### **4.3 Policy- and Industry-Driven Incentive Mechanisms**

Policy and industry incentive mechanisms are important guarantees for promoting the sustainable development and cultural innovation of tea packaging. The government can encourage enterprises to adopt sustainable materials and innovative processes through policy measures such as tax exemptions, green design certification, and innovation funds, while supporting the development of cultural and creative industries. Each link in the industrial chain can also promote innovative practices through standard setting, collaborative platform construction, and technology sharing. Policy and industry-driven incentive mechanisms can effectively mobilize the enthusiasm of designers, enterprises, and craftsmen, forming an ecosystem where materials, processes, cultural innovation, and industrial development promote each other, and provide institutional support for the sustainable design and cultural heritage of cultural and creative tea packaging<sup>[10]</sup>.

## **5. Case Study and Practical Validation**

### **5.1 Analysis of Creative Tea Packaging Design Practice**

Figure 5-1 demonstrates a series of culturally creative packaging designs developed by integrating weaving techniques, sustainable materials, process innovation, and cultural elements. This work draws inspiration from traditional Chinese culture's profound understanding of harmonious coexistence with nature, while also responding to modern society's pursuit of sustainable lifestyles. Using black tea as a medium, the design not only carries the rich heritage of tea culture but also emphasizes the close connection between humans and nature. In terms of materials and craftsmanship, a green and minimalist approach is employed, combining contemporary tea stems with traditional bamboo weaving techniques to achieve both sustainable packaging and technological innovation. In terms of visual design, the combination of illustrations of ancient friends drinking tea together and contemporary handwritten tea stems creates a cohesive and storytelling visual language, organically blending cultural heritage with creative expression.

Figure 5-1 Busy Searching for Tea “Cultural and Creative Tea Packaging Design



## 5.2 Validation of Material and Craft Innovation for Sustainability

The research focuses on the contribution of material and process innovation to packaging sustainability. For example, the use of recycled paper, biodegradable biomaterials, or optimized process flows can significantly reduce resource consumption and environmental impact. Furthermore, by integrating modern technologies with traditional craftsmanship, the design achieves efficient production and optimized functionality. These practical applications demonstrate that material selection and process innovation can effectively enhance the ecological sustainability of tea packaging, providing designers with a practical path to achieve green design goals.

In the case study “Busy Searching for Tea,” material and process innovation significantly enhanced the sustainability of tea packaging. The project employed a green reduction approach, combining contemporary tea stems with traditional bamboo weaving techniques to achieve efficient and eco-friendly packaging materials. Reusing tea stems as a byproduct not only reduces resource waste but also embodies the concept of a circular economy. The use of bamboo weaving preserves traditional aesthetics while reducing reliance on consumable materials. Furthermore, the integration of process optimization with modern production technologies improves packaging efficiency while ensuring material performance and visual quality. Practice demonstrates that material and process innovation not only enhances environmental sustainability but also provides a practical green design path for tea packaging.

## 5.3 Practical Effects of Cultural Transmission Mechanisms and Visual Narratives

In addition to sustainability, cultural transmission and visual narrative are also important dimensions of cultural and creative packaging design practice. By incorporating traditional cultural symbols, story elements and visual language into packaging design, consumers can feel the cultural identity and emotional value of the story during use. Cultural transmission and visual narrative are effectively reflected in the design of “Busy Looking for Tea”. The design combines illustrations of ancient friends drinking tea with contemporary handwritten tea stems to form a continuous visual language and story narrative, making the packaging not only aesthetically pleasing but also conveying the core concept of tea culture<sup>[11]</sup>. Consumers can feel the cultural connotation of harmonious coexistence between man and nature during use, and at the same time understand the concept of modern sustainable living. The practical results show that the systematic cultural transmission mechanism not only enhances the cultural depth of the packaging, but also enhances brand identity and market appeal, providing practical verification for the hypothesis of cultural collaborative innovation in the theoretical framework.

## 6. Conclusion

This study addresses the issues of materials, craftsmanship, and cultural transmission in cultural and creative tea packaging from a sustainable perspective, constructing a systematic theoretical framework and proposing collaborative strategies and innovation mechanisms. The study found that cultural and creative tea packaging faces three major challenges in achieving

green design and cultural heritage: insufficient material sustainability, difficulties integrating traditional craftsmanship with modern technology, and a lack of cultural symbolism and storytelling. To address these issues, this paper proposes principles of recycled materials and sustainable design, a theory of craft-technology integration, and a mechanism for cultural heritage and collaborative innovation, providing theoretical support for tea packaging design.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Study on the Innovative Model of Art Management in the Large-Scale Live-Action Historical Dance Drama “The Song of Everlasting Sorrow”

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**Abstract:** Taking the large-scale live-action historical dance drama The Song of Everlasting Sorrow as the research object, this paper focuses on its innovative model of art management. In the context of cultural and tourism integration, combined with the development needs of live-action performances, it systematically analyzes the project's core resource composition, innovative model, and industry implications through literature research, field research, and case study methods. The study reveals that The Song of Everlasting Sorrow has constructed a “four-in-one” innovative art management system covering “resource integration, creation management, operation management, and communication management”: it realizes resource integration innovation through the three-dimensional collaboration of “text, live scene, and technology”; promotes creation management innovation guided by both “art and market”; optimizes operation management through a full-chain closed loop from “ticket purchase, performance viewing to park departure”; and strengthens communication management via a three-dimensional path of “IP, traffic, and word-of-mouth”. This model not only provides a theoretical framework for the “transformation of cultural resources into performance products” in the field of live-action performances but also offers a replicable practical paradigm for the coordinated development of art and commerce in similar projects. It holds significant implications for promoting the return of the live-action performance industry to its cultural core and achieving high-quality development.

**Keywords:** Historical Dance Drama; The Song of Everlasting Sorrow; Art Management; Innovative Model

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## 1.Introduction

In recent years, against the background of the deepening strategy of cultural and tourism integration, live-action performances, with their unique advantages of “live scene + cultural content”, have become an important carrier for the innovative development of the cultural and tourism industry. However, most current live-action performance projects still face problems such as intensified homogeneous competition, imbalance between artistic value and commercial value, and rigid management models, making it urgent to explore breakthrough paths in terms of art management. The large-scale live-action historical dance drama The Song of Everlasting Sorrow, based on Bai Juyi's poem of the same name and relying on the live scenes of the Huaqing Palace Scenic Area, has maintained high reputation and box office since its launch, becoming



a benchmark project in China's live-action performance field. The logic behind its art management innovation is of great research value.

Existing studies mostly focus on single dimensions such as the artistic expression, technical application, or market operation of live-action performances, and the research on "art management" as a systematic project is still insufficient, especially lacking in in-depth analysis of the coordination mechanism among "historical and cultural IP, live venue resources, and modern management models". Based on this, this paper takes *The Song of Everlasting Sorrow* as a case and conducts research from three levels: "basic resources, innovative model, and industry implications", aiming to explore the core logic of the innovation of its art management model, fill the gap in the theoretical research on art management of live-action performances, and provide practical references for the sustainable development of similar projects.

The research idea of this paper follows the path of "problem-oriented, case deconstruction, model extraction, and value sublimation". It uses the literature research method to sort out relevant theories of live-action performances and art management; obtains first-hand information on venue operation and performance execution through field research on the Huaqing Palace Scenic Area and the performance site of *The Song of Everlasting Sorrow*; analyzes the implementation details of the management model by combining in-depth interviews with the project operator and creative team; and finally summarizes the core characteristics and industry value of its innovative model using the case study method.

## **2.Literature Review**

Existing studies on *The Song of Everlasting Sorrow* focus on three dimensions: artistic creation practice, stage technology innovation, and cultural-tourism integration and industrial operation, forming a multi-disciplinary research pattern. The research focus has gradually shifted from the analysis of artistic ontology in the early stage to the exploration of management models and industrial value.

### **2.1 Artistic Creation Practice**

Scholars' research on the artistic creation of *The Song of Everlasting Sorrow* initially focused on the ontological techniques of music (chorus, conducting) and dance (group dance, narration), and later gradually paid attention to the coordination logic of the two in "historical narration" and "emotional expression", providing theoretical support for "creation standardization" in art management.

#### **2.1.1 Music Creation and Conducting Practice**

The music creation (especially chorus and conducting) of *The Song of Everlasting Sorrow* is regarded as a classic case of modern Chinese choral art. Relevant studies focus on analyzing the supporting role of its techniques in artistic expression. Wu Lan (2025) constructed a research framework from the perspective of conducting, proposing that choral interpretation needs to achieve the unity of "pitch accuracy, technical completion, and emotional expressiveness" through three paths: "regulating rhythm with basic conducting techniques, optimizing presentation with vocal techniques, and deepening emotions with artistic treatment". Wang Yifan (2021) further pointed out that the chorus conducting of *The Song of Everlasting Sorrow* must balance the "coordination between the band and the choir", and the handling of upbeats and downbeats must be deeply linked to the "fluctuations of artistic emotions", with specific conducting practices closely integrated with the ups and downs of artistic emotions to achieve the unity of artistry and scientificity.

In addition, Lin Huaqiong (2018) started from "tragic expression" and pointed out that techniques such as "dissonant intervals" and "thematic motif penetration" in the music play a role in shaping the tragic image of Emperor Xuanzong of Tang by analyzing the melody and harmonic texture, providing an evaluation standard for "the review of the matching degree between music creation and historical narration" in art management. Bai Yuqian explored the singing and conducting techniques of *The Song of Everlasting Sorrow*, emphasizing that the diverse forms such as "duet, round singing, and mixed chorus" in the work have high requirements for the professional quality of conductors, and clarifying the necessity of "conductor's desk work" (such as technique decomposition and analysis of key and difficult points) in art management.

#### **2.1.2 Dance Design and Space-Time Construction**

As the core expression carrier of the dance drama, the "space-time construction" of dance has become the focus of research, and relevant results provide references for "dance choreography" and "stage scheduling" in art management. Jin Dezhaohao

(2023) took group dance as the research object, proposing that the space-time construction of group dance depends on the coordination of “body language, dance composition, stage scheduling, and music rhythm”, and pointed out that *The Song of Everlasting Sorrow* avoids the “inserted dance nature” through the complex scheduling of group dance.

Hou Wenjing (2017) analyzed the three characteristics of Wan Su’s creation in *The Song of Everlasting Sorrow* from the perspective of the choreographer’s aesthetic characteristics: “expression of subjective discourse, experimental practice, and humanistic feelings”, and pointed out that dance design must balance “individual emotional expression” and “historical theme transmission”, emphasizing the innovation of “material organization and technical mobilization”. This research provides theoretical support for “controlling the innovation boundary of dance creation” in art management. Wu Leilei (2017) started from the “beauty of Chinese tragedy” and pointed out that dance shows the spirit of resistance through the protagonist’s breakthrough of the unreasonable concepts of Confucianism and Taoism, clarifying the connection between dance movements and the “core of cultural tragedy”.

## 2.2 Stage Technology Innovation

As the core support for the audience’s immersive experience, the combination of technical application and artistic effect of stage design is the focus of research, and relevant results directly serve the “standardization of stage technology” and “effect optimization” in art management. Xun Lijie (2019) pointed out through graphic analysis that the stage innovation of *The Song of Everlasting Sorrow* is reflected in three aspects: “multi-dimensional stage design, application of high-tech special effects, and large-scale color changes”, and proposed that stage design makes up for the “lack of delicate movements of dancers” by “stimulating vision and rendering emotions”, realizing the core goal of “conveying emotions and meanings”.

From the perspective of indirectly related research, although Yue Yin (2013) did not directly focus on stage technology, she proposed that *The Song of Everlasting Sorrow* improves the “aesthetic experience space” through “modern technological means”, indirectly confirming the core role of stage technology in “optimizing the audience experience”; combined with the general trend of cultural-tourism performances, it can be inferred that the stage management of *The Song of Everlasting Sorrow* has formed a set of standardized processes, and Xun Lijie’s research provides specific indicators (such as visual impact and emotional rendering power) for “effect evaluation” in this process.

## 2.3 Cultural-Tourism Integration and Industrial Operation

As a model of cultural-tourism integration, the cultural IP building and industrial operation of *The Song of Everlasting Sorrow* are also hot topics among scholars. Relevant results reveal the innovation points of “resource integration” and “market operation” in art management.

### 2.3.1 Joint Construction of Cultural IP and Tourism Brand

Zhao Linlong (2009) was one of the earliest to pay attention to the “tourism brand value” of *The Song of Everlasting Sorrow*, proposing that the tourism brand of a famous historical and cultural city should take “cultural support and packaging” as the core, and pointed out that *The Song of Everlasting Sorrow* has become a “exquisite business card” of Shaanxi tourism through the reproduction of historical scenarios—this research provides early theoretical support for project positioning in art management. Tian Ye (2019) further pointed out that *The Song of Everlasting Sorrow* has promoted the “standardization construction of tourism performances” through the polishing of classic cultural IP, and its IP value is not only reflected in “attracting tourists” but also in providing a “standardized model” for the industry. This research provides a direction for “long-term IP operation” (from a single performance to industry standards) in art management.

### 2.3.2 Industrial Operation Model and Resource Integration

Ren Yi (2017) took the local music industry in Shaanxi as the background, listed *The Song of Everlasting Sorrow* and Tang-Style Music and Dance as typical cases of “music industrial operation”, proposed that music culture must balance “artistry and commodity”, and pointed out that *The Song of Everlasting Sorrow* has realized the “industrial transformation of local music resources” through “market-oriented operation”. Yue Yin (2013) started from the perspective of “resource integration”, proposing that *The Song of Everlasting Sorrow* takes “capital and market as the leader” to integrate the “cultural and tourism resources” of Xi’an, promote the “extension of cultural resources to industrialization”, and at the same time maintain the “balanced logic of resource integration” (market and culture, tradition and modernity) in art management through the

combination of modern technology and traditional art, providing a paradigm for “resource allocation” of similar projects.

### **3. Core Resources and Basic Context of the Historical Dance Drama *The Song of Everlasting Sorrow***

#### **3.1 Value Analysis of the Project's Core Resources**

##### **3.1.1 Historical Text Resources**

The large-scale historical dance drama *The Song of Everlasting Sorrow* is based on Bai Juyi's poem of the same name and revolves around the love story between Emperor Xuanzong of Tang (Li Longji) and Yang Guifei. The script highly restores the plot of the poem *The Song of Everlasting Sorrow* and interweaves historical cultures such as Tang Dynasty court culture and etiquette culture. With the poem as the narrative framework, the ten scenes (e.g., “A Fair Maiden Grows Up in the Yang Family” and “Whispers in the Dead of Night”) directly take verses as titles, completely reproducing the emotional context of the protagonists from meeting, falling in love to separation in life and death.

The core images in the poem are given concrete expressions in the dance drama: “The Melody of Rainbow-Feathered Coat”, as a dual symbol of love and the prosperity of the Tang Dynasty, is transformed into an immersive visual spectacle in the dance drama through the elegant postures of the group dance, the neon phantom projected by lights, and the fairy music scene reflected on the surface of Jiulong Lake, turning the poetic sentiment of “slow songs and gentle dances accompanied by silk and bamboo” into a tangible experience. The oath “In heaven, we wish to be birds flying side by side; on earth, to be branches intertwined” is elevated to an emotional symbol of body language through the poses of the duet dance and aerial lifting techniques, which not only retains the romantic metaphor of the poem but also endows it with the dynamic tension of modern dance.

While respecting the emotional core of the poem, the dance drama has made stage-oriented adaptations to the narrative: the poem ends with the tragedy of “this sorrow lasts forever without end”, while the dance drama, in the tenth scene “Reunion in Heaven and Earth”, endows the love between Li and Yang with a romantic ending beyond life and death through the starry sky transformation projected on the Lishan Mountain and the ascension of the duet dance. Although this adaptation deviates from the original meaning of the poem, it continues the emotional intensity of the “everlasting sorrow” theme and transforms the lyricism of the poem into the visual impact of the theater through the interweaving of virtual and real stage technologies.

##### **3.1.2 Live Venue Resources**

As the live-action carrier of *The Song of Everlasting Sorrow*, the Huaqing Palace Scenic Area has realized the transformation from “static scenic resources” to a “dynamic functional stage” through systematic artistic transformation and functional reconstruction. In terms of spatial form, the pools, palaces, and mountain landscapes of Huaqing Palace respectively serve as “narrative carriers”, “emotional anchors”, and “atmosphere renderers”, jointly supporting the restoration of the immersive historical scene.

For example:

Transformation of Jiulong Lake: Through the integrated transformation of underwater lights, fog equipment, and mechanical devices, Jiulong Lake has been transformed from a simple water landscape into a “dynamic stage” carrying the core plot;

Activation of palace buildings: Palace buildings such as Feishuang Hall and Changsheng Palace have realized the immersive restoration of historical scenes through external contour lighting, internal projection mapping, and spatial acoustic design;

Atmosphere rendering of Lishan Mountain: Lishan Mountain has been upgraded from a natural background to a “giant background screen” of the dance drama through the application of light matrices and laser projection technology, focusing on atmosphere rendering and spatial extension.

From the value dimension, this transformation of the live venue has dual significance: on the one hand, it breaks through the limitation of the “limited space” of traditional theaters, and through “real historical space + artistic transformation”, it promotes the audience to shift from “observational appreciation” to “immersive experience”; on the other hand, through the integration with *The Song of Everlasting Sorrow*, Huaqing Palace has transformed static historical buildings and natural landscapes into “experiential and perceptible” cultural products, extending the tourist stay time and enhancing the brand recognition of the scenic area.



## 3.2 Industry Drivers and Internal Demands for Art Management Innovation

### 3.2.1 External Industry Drivers

As a typical carrier of “cultural content + tourism space”, live-action performances have formed a systematic synergy of external driving forces for breaking through the traditional theater model and pursuing innovative development.

First, the continuous deepening of the national-level “cultural and tourism integration” policy provides institutional guarantees and direction guidance for the innovation of live-action performances: on the one hand, the policy provides approval convenience and financial support for high-quality live-action performance projects (such as cultural industry special fund subsidies in some regions); on the other hand, it constructs an industry orientation of “cultural value first”, requiring performance projects to be embedded in the tourism industry chain to realize the coordination of “cultural experience and tourism consumption”. Against this background, live-action performances, which break through the “closed space” of traditional theaters and rely on the live scenes of scenic areas to create “local cultural experiences”, have become an inevitable choice to respond to policies and obtain industry resources.

Second, the update of consumer demand provides a direct driving force for the innovation of live-action performances. With the increase in residents’ per capita disposable income and the change in consumption concepts, cultural and tourism consumption has transformed from “sightseeing-type” to “experience-type”, and consumers’ demand for “in-depth cultural experience” has increased significantly. The “fixed venue” and “observational experience” of traditional theater performances can no longer meet consumers’ demand for “personalized and immersive” experiences. The combination of “live scene + cultural plot” in live-action performances accurately meets consumer demand: first, the “locality” of the live venue endows the performance with irreproducible cultural uniqueness (such as the uniqueness of the Tang Dynasty court ruins in Huaqing Palace); second, the immersive viewing model promotes consumers to shift from “passive viewing” to “active participation”.

### 3.2.2 Internal Development Demands

The innovation of the art management model of *The Song of Everlasting Sorrow* is not a passive adaptation to external industry trends, but an active strategic choice based on the project’s own development goals. Its core internal motivation focuses on breaking through the industry’s homogeneous competition barriers and realizing the unification of “artistic value and commercial value”.

When *The Song of Everlasting Sorrow* was established, China’s live-action performance projects were in a period of rapid growth around 2010, but the industry generally had problems such as “content homogeneity” and “model singularity”: content creation mostly focused on themes such as “historical love stories” and “folk legends”, and the expression form was limited to a simple combination of “singing and dancing + lighting”, lacking cultural depth and artistic innovation. In this environment, if *The Song of Everlasting Sorrow* adopted the traditional management model, it would not only face the risk of theme overlap (its theme of Tang Dynasty imperial love is likely to be homogeneous with the historical love theme of projects such as *The Romance of the Song City*) but also fall into the dilemma of insufficient profit stability.

To this end, *The Song of Everlasting Sorrow* has built a differentiated advantage through systematic innovation in art management: in terms of resource integration, it takes the three-dimensional collaboration of “text, live scene, and technology” as the core, and deeply integrates the “literariness” of Bai Juyi’s poem with the “historical spatiality” of Huaqing Palace to form an irreproducible cultural expression (such as transforming the poetic image of “a pear blossom in spring rain” into a live-action dance); in terms of operation management, it constructs a full-chain closed loop of “performance + cultural tourism” and strengthens the coordinated linkage with the Huaqing Palace Scenic Area, eventually forming a differentiated competition barrier with cultural uniqueness as the core and operational coordination as the support.

From the perspective of the motivation to realize the unification of artistic value and commercial value, *The Song of Everlasting Sorrow* has both “cultural attributes” and “commercial attributes”, and needs to balance the relationship between the two through art management innovation to avoid the dilemma of “emphasizing commerce over art” or “emphasizing art over commerce”. In response to this demand, *The Song of Everlasting Sorrow* has constructed a “dual-oriented” balance mechanism at the art management level: in the creation management stage, it establishes a coordination mechanism of “artistic professionalism + market adaptability” to ensure the accuracy of cultural expression and the adaptability of market demand;

in the operation management stage, it realizes commercial value through a “diversified profit model” (such as hierarchical ticketing and derivative consumption), and at the same time strengthens artistic value through “symbolic shaping of cultural IP” (such as extracting core cultural symbols such as Yang Guifei’s costumes). This innovation not only ensures the artistic quality of the project (e.g., winning the “China Lotus Award for Dance”) but also realizes the stable growth of commercial profits (from the beginning of 2023 to October 2024, there were 1,486 performances, receiving 3.95 million audiences), ultimately achieving a positive unification of “artistic value and commercial value”.

## **4. Analysis of the Innovative Model of Art Management in the Historical Dance Drama The Song of Everlasting Sorrow**

### **4.1 Innovation in the Integration of Core Resources**

#### **4.1.1 Artistic Translation of Historical Texts**

It constructs an adaptation framework from poetic narration (e.g., “a pear blossom in spring rain”) to dance drama language (dance, stage design, music), realizing the organic integration of historical images and stage presentation.

The embodiment of formal beauty:

- ① The musical form reflects the natural beauty of balance, harmony, contrast, and unity. The sections within each movement are mostly composed of musical phrases of the same scale, creating a symmetrical structural model, which enables the work to achieve balance and unity in the overall musical form.
- ② The diversity of melodies. The melody line is sometimes gentle and sometimes ups and downs. The flexible combination of various rhythms makes the melody lines of each movement dense and sparse, long and short in order, and the pauses and connections of the musical language are controlled more flexibly and reasonably.
- ③ The endless changes of timbre. Throughout the tonal layout of the work, modulation is one of the important technical means to develop the music. The ten movements of the work are different in musical form, and the combination and distribution of the two texture forms (homophony and polyphony) enrich the musical forms with different characteristics, providing more possibilities for the change of timbre and a broad imagination space for the aesthetic subject.

#### **4.1.2 Immersive Development of Live Venues**

The immersive development of live venues is the core of *The Song of Everlasting Sorrow* to break through the space limitation of traditional theaters and realize “scene as narration”. Through the three strategies of “spatial function reconstruction”, “moving line narrative design”, and “digital technology support”, it breaks the physical boundary between the stage and the audience, transforming Huaqing Palace into a “three-dimensional narrative space” that flows with the plot.

From the dimension of spatial function reconstruction: the project team has carried out the transformation of “embedding performance functions” on the scenic space centered on Jiulong Lake, Changsheng Palace, and Lishan Mountain of Huaqing Palace, transforming static landscapes into “functional performance stages” with narrative capabilities. This transformation follows the “minimum intervention principle”—it does not damage the ontological style of the historical buildings and natural landscapes of the scenic area, but endows the landscapes with “performance carrying capacity” through non-destructive facility implantation (such as hidden stage machinery, movable performance platforms, and underwater light bases).

In terms of moving line narrative design: *The Song of Everlasting Sorrow* deeply integrates the audience’s viewing moving line with the plot promotion path, constructing an experience logic of “spatial movement is plot development”. Different from the traditional theater model where the audience has a fixed viewing position, the project designs a “linear + node-type” viewing moving line based on the layout of Huaqing Palace (“front palace and back garden, adjacent to mountains and water”): the audience starts from the square in front of Changsheng Palace (starting node), moves to the bank of Jiulong Lake (court life scene), the corridor of Feishuang Hall (the scene of the Mawei Slope Incident), and the foot of Lishan Mountain (the scene of reunion in fairyland) in turn with the plot, and finally returns to the starting square (climax of the ending).

From the perspective of digital technology support: through digital technology, it realizes “lighting programming control”, “landscape element linkage”, and “real-time plot response”, enabling the live landscapes such as palaces at night to dynamically respond to the plot, constructing the effect of “landscape as plot extension”. Taking the palace landscape as an example, the contour lights of buildings such as Changsheng Palace and Feishuang Hall adopt a “zonal programmable control

system”, which can adjust the color, brightness, and flicker frequency according to the plot. For example, in the “Qixi Oath” section, warm yellow lights are used as the main tone, and the lights at the corners of the eaves are lit in sequence, simulating the prosperous atmosphere of the “court night banquet”.

## 4.2 Innovation in the Management of Creative Teams

### 4.2.1 Collaboration of Cross-Disciplinary Creative Teams

The collaborative cooperation of cross-disciplinary creative teams is the organizational guarantee for *The Song of Everlasting Sorrow* to balance “artistic professionalism” and “market adaptability”. Its core lies in breaking the limitation of “single leadership by choreographers” in traditional artistic creation, constructing a four-dimensional collaborative mechanism of “choreographer, cultural-tourism planner, technical team, and historical consultant”, and forming a creative ecology of “performing their own duties, mutual checks and balances, and collaborative creation” by clarifying the responsibility boundaries of each subject and establishing a regular communication mechanism.

From the perspective of team role positioning and responsibility division, each subject undertakes differentiated and complementary functions in the creative process, jointly forming the “four-dimensional support” of creation management:

- ① Choreography team (art core): As the core leader of creation, it is responsible for constructing the artistic expression system of the dance drama, including core links such as dance vocabulary design, narrative structure arrangement, and emotional atmosphere creation.
- ② Cultural-tourism planning team (market orientation): Its core responsibilities include: putting forward content adjustment suggestions through tourist portrait analysis (such as age structure, cultural preferences, and viewing duration needs); optimizing the performance duration and schedule based on the data of the scenic area’s passenger flow peak, to avoid the situation where tourists miss subsequent itineraries due to overly long performances.
- ③ Technical team (implementation support): Its core responsibilities include: conducting technical evaluation on the artistic concepts proposed by the choreography team; optimizing the technical plan according to the characteristics of the live venue; synchronously promoting the installation and commissioning of technical equipment during the creation process to avoid the disconnection between later technical implementation and artistic creativity.
- ④ Historical consultant team (cultural check): Composed of Tang Dynasty history researchers and cultural relic protection experts, it is responsible for ensuring the historical authenticity of the creation. Its core responsibilities include: reviewing the historical elements in the dance drama (such as costumes, etiquette, and architectural details); providing historical background interpretation to help the creative team accurately grasp the impact of the “An Lushan Rebellion” on the imperial love, and avoiding historical logic deviations in the plot.

### 4.2.2 Dynamic Content Iteration Management

Dynamic content iteration management is the key for *The Song of Everlasting Sorrow* to realize “continuous innovation” based on the “classic IP”. Its core logic is to take “data feedback” as the core, construct a management mechanism of “audience research, data analysis, content optimization, and effect verification”, and realize the long-term balance between classics and innovation by regularly adjusting dance segments, technical presentation, and plot details to adapt to the audience’s aesthetic needs and market changes.

From the dimension of data collection and analysis: *The Song of Everlasting Sorrow* has built a “multi-dimensional data collection system” to provide a scientific basis for content iteration: first, collecting data on core indicators such as “dance segment preference”, “plot comprehension”, and “technical experience satisfaction” through “post-viewing questionnaires”; second, conducting “in-depth interviews” with core groups such as cultural lovers and repeat viewers to explore their in-depth needs for the emotional expression of the plot and the presentation of historical details; third, using big data tools for “online review crawling”, collecting reviews on platforms such as Weibo, Xiaohongshu, and Dianping, extracting keywords such as “shocking lighting” and “tedious plot”, and analyzing the potential preferences of the audience.

From the perspective of the implementation path of content optimization: the *The Song of Everlasting Sorrow* project has established an iteration mechanism of “daily fine-tuning and annual major revision” to ensure the accuracy and systematicness of optimization:

“Daily fine-tuning (monthly)”: Based on monthly audience research and box office data, conduct small-scale adjustments such as “detail optimization” and “experience improvement” on the dance drama;

“Annual major revision (from November to March of the next year, the off-tourism season)”: Carry out systematic upgrades such as “dance segment reconstruction”, “technical update”, and “plot improvement”.

From the perspective of the effect verification mechanism: after each content optimization, *The Song of Everlasting Sorrow* verifies the effect through “data tracking” and “audience return visits”, forming an iteration closed loop. For example, after adding the “court etiquette demonstration” dance segment, track the box office data (such as attendance rate and audience stay time) and research feedback in the following month. If the data shows that “the attendance rate has increased by 15%” and “the audience preference rate has reached 80%”, the dance segment will be retained; if the feedback is not good, analyze the reasons (such as overly long dance duration and unattractive movements) and adjust it in the next iteration. This closed loop of “optimization-verification-re-optimization” ensures that the content is developed around “audience needs” and “market trends”, which not only avoids the loss of the core value of IP caused by blind innovation but also prevents aesthetic fatigue caused by sticking to classics, ultimately realizing a positive cycle of “classic IP + continuous innovation”.

### 4.3 Innovation in the Management of Operation Teams

#### 4.3.1 Construction of a Diversified Profit Model

The diversified profit model of *The Song of Everlasting Sorrow* is not a simple combination of “tickets + derivatives”, but a three-level profit matrix of “ticket income, derivative development, and scenic area consumption”. Through the coordinated linkage between each level, it transforms a single performance project into a “cultural-tourism consumption entrance”, realizing the systematic improvement of commercial added value.

From the perspective of hierarchical operation of ticket income: the project designs a hierarchical ticket system based on “matching differentiated services with differentiated needs”, taking into account both the coverage of the mass market and the development of high-end potential:

Basic tickets: Focus on the core viewing needs, provide standard viewing areas and basic services, and adapt to the consumption capacity of the mass groups such as family tourists and young backpackers;

VIP tickets: Strengthen the immersive experience, set up a “premium viewing area” in the center of the stage, and provide value-added services such as exclusive guided tours (explanation of the historical background of the plot), customized drinks, and performance commemorative albums, targeting high-end tourists and cultural lovers.

This hierarchical system not only improves the overall premium capacity of ticket income but also enhances the consumption satisfaction of different customer groups through differentiated services.

In terms of derivative product development: the project transforms the cultural elements of the dance drama into consumable physical products, with three core categories:

Cultural souvenirs: Such as replica Yang Guifei hairpins and silk scarves with Tang Dynasty court patterns, which attract collection-oriented consumers relying on the cultural attributes of IP;

Scene experience products: Such as the “Yang Guifei costume experience package” (including costume rental, makeup styling, and live-action photography), where tourists can take “time-travel” photos in designated scenes of Huaqing Palace (such as in front of Changsheng Palace), extending the viewing experience into participatory consumption;

Daily practical products: Such as integrating cultural symbols into daily necessities such as stationery and tea sets, reducing the consumption threshold and increasing the purchase frequency.

#### 4.3.2 Refined Viewing Service Management

The core of refined viewing service is to construct an integrated service system of “online-offline coordination and combination of hardware and software” around the audience’s full-process experience touchpoints from “ticket purchase to park departure”. Through the standardization and personalized optimization of each service link, the “viewing experience” is extended to a “full-cycle service experience”, ultimately improving the audience’s satisfaction and repurchase intention.

In the online service link: Focus on “convenience and personalization”, covering the whole process from ticket booking to viewing preparation.

**Ticket booking:** Relying on the official mini-program and third-party platforms such as Ctrip and Meituan, realize “multi-channel ticket purchase + intelligent seat selection”. The audience can view the viewing angles of different areas through a 3D live-action map and select seats according to their needs; the system will also push “customized ticket products” and other personalized recommendations based on the audience’s historical consumption data (such as having purchased VIP tickets).

**Viewing preparation:** The online platform pushes a “viewing guide” to the audience 3 days in advance, including traffic routes (schedule of scenic area shuttle buses, location of parking lots), viewing notices (best arrival time, prohibited items), and historical background popularization (introduction to the poem *The Song of Everlasting Sorrow*, tips on Tang Dynasty court culture); for foreign tourists, it additionally provides a “hotel-scenic area” shuttle bus reservation service to solve the problem of traffic connection.

**In the on-site service link:** Improve the audience experience through the dual paths of “moving line optimization and scenario-based service”:

**Moving line planning:** Combine the spatial layout of Huaqing Palace and the distribution of performance venues to design a “one-way circular viewing moving line”. Guide the audience to enter, view, and exit in an orderly manner through Tang Dynasty-style lanterns to avoid congestion; set up “service pavilions” at key nodes such as entrances, restrooms, and derivative stores, equipped with staff to provide real-time guidance.

**Scenario-based service:** During the performance, each viewing area is equipped with a “regional service specialist” to promptly handle the audience’s immediate needs such as requesting help.

### **4.3.3 Risk Prevention and Control for Live Performances**

Live performances are affected by many factors such as the natural environment, venue conditions, and personnel flow, so the risk prevention and control is significantly more difficult than that of traditional theater performances. The *Song of Everlasting Sorrow* ensures the safety and stability of the performance by constructing a full-process risk management mechanism of “early warning, scheduling, and emergency replacement” and formulating systematic prevention and control plans for the three core risk points of weather, venue, and personnel.

**In terms of weather risk prevention and control:** The project establishes a “multi-dimensional early warning + hierarchical response” mechanism to deal with weather risks.

**Multi-dimensional early warning:** Realize “real-time data connection” with the meteorological department to obtain accurate weather forecasts of the Huaqing Palace Scenic Area 48 hours in advance (including rainfall probability, wind force, temperature, etc.); at the same time, set up multiple meteorological monitoring points in the scenic area to collect on-site data in real time, and push weather warnings and viewing suggestions (such as reminding to bring rain gear in case of heavy rain and sun protection in case of high temperature) to the audience 24 hours in advance through online platforms and text messages.

**Hierarchical response:** Implement three-level measures according to the weather conditions:

**Level 1 response (light rain, gentle wind):** Activate rain protection guarantees, and simultaneously adjust the performance details of open-air scenes (such as shortening the duration of lake dance);

**Level 2 response (moderate rain, strong wind):** Activate partial scene adjustment, transfer the open-air performance to semi-enclosed areas such as the corridor of Feishuang Hall, and ensure the scene atmosphere through lighting and stage design adjustments;

**Level 3 response (heavy rain, extreme high temperature, typhoon):** Activate the performance adjustment plan, provide services such as rescheduling the performance (to the next day or recent sessions) and full refund, and promptly inform the audience through online platforms and on-site announcements to avoid disputes.

**Venue risk prevention and control** focuses on “regular inspection and dynamic monitoring”.

**Regular inspection:** Establish a three-level inspection mechanism of “daily, weekly, and monthly”:

**Daily inspection:** Before each performance, conduct a comprehensive inspection of the stage machinery, audience seats, and passages, focusing on checking the operation of the stage lifting equipment, the stability of the audience seats, and the smoothness of the passages;



Weekly inspection: The technical team and safety experts conduct a special inspection, and conduct in-depth testing of high-risk areas such as the underwater stage and aerial wire equipment;

Monthly inspection: Conduct a comprehensive safety assessment jointly with the scenic area management department and the fire department to check fire hazards and electrical safety issues.

Dynamic monitoring: Install high-definition surveillance cameras, vibration sensors, load sensors, and other equipment in the performance venue to monitor the operation data of the stage machinery (such as lifting speed, load capacity) and the passenger flow density of the audience seats in real time, ensuring the timely detection of risks.

Personnel risk prevention and control covers both actors and the audience, constructing a dual system of “health management and safety guarantee”:

For actors: Establish a “health monitoring + safety training” mechanism: conduct temperature detection and health inquiries for actors before each performance; organize regular safety training (including stage action safety and emergency handling); equip actors with protective equipment such as aerial safety ropes and underwater non-slip shoes, and arrange special personnel to monitor safety during the performance.

For the audience: Establish a “passenger flow control + safety guidance” mechanism: arrange staff to guide at key nodes such as entry, viewing, and exit to prevent crowding and stampede; regularly broadcast safety reminders through the radio system during the performance (such as prohibiting climbing over railings and taking good care of children).

## **4.4 Innovation in the Management of Communication Models**

### **4.4.1 Symbolic Shaping of Cultural IP**

The symbolic shaping of cultural IP is the core link for *The Song of Everlasting Sorrow* to realize “visualization of cultural core, materialization of communication content, and transformation of derivative value”. Its essence is to extract core symbols with “uniqueness, memory points, and extensibility” from the historical texts, artistic expressions, and live-action carriers of the dance drama, and form an IP image system that is recognizable, communicable, and monetizable through systematic design, laying a foundation for subsequent communication promotion and derivative development.

In terms of symbol shaping, *The Song of Everlasting Sorrow* follows the three principles of “historical authenticity, artistic expressiveness, and communication adaptability”, and completes the screening and extraction of core symbols from three dimensions:

Visual symbols: Focus on elements in the dance drama that have strong visual impact and carry historical and cultural connotations;

Emotional symbols: Build concrete carriers of abstract emotions around the “everlasting sorrow” love theme;

Cultural symbols: Extract representative cultural elements from the Tang Dynasty history and culture to strengthen the cultural depth of IP.

### **4.4.2 Precision Traffic Operation on New Media**

Precision traffic operation on new media is the key means for *The Song of Everlasting Sorrow* to realize “low-cost customer acquisition and high-precision reach”. Its core logic is to develop targeted communication strategies based on the attribute differences of different new media platforms and the characteristics of target audiences, maximizing the communication effect.

Short video platforms (TikTok, Kwai): Focus on “traffic explosion” with visually impactful content. The users of TikTok and Kwai are mainly young people, who prefer “short, fast, visually strong, and highly interactive” content. Therefore, the core content of *The Song of Everlasting Sorrow* on these two platforms is “visual presentation + scenario-based experience”, quickly capturing users’ attention through 15-60 second short videos. The main content types include:

“Plot highlight clips”: Selecting the most visually shocking segments of the dance drama (such as the red laser special effects in the “Mawei Slope Incident” and the mountain projection and flying performance in the “Reunion in Fairyland”);

“Behind-the-scenes highlights”: Filming behind-the-scenes content such as actor makeup (such as the 3-hour process of wearing Yang Guifei’s headdress) and technical equipment debugging (such as the lifting test of the underwater stage) to meet users’ “curiosity”.

Social media (Xiaohongshu): Focus on “value output + user resonance” with graphic and medium-length video (1-3 minutes) content to build user trust by delivering more abundant information. Therefore, the content of The Song of Everlasting Sorrow on Xiaohongshu is mainly “practical guides”, including:

“Viewing guides” (such as comparison of viewing angles in different ticket price areas, best arrival time, and dressing suggestions);

“In-depth cultural interpretation” (such as the historical prototype of the Tang Dynasty costumes in the dance drama and the adaptation logic of the “Mawei Slope Incident” plot);

“Experience sharing” (such as “new discoveries from re-watching The Song of Everlasting Sorrow” and “experience of watching The Song of Everlasting Sorrow with parents”).

#### **4.4.3 Scenario-Based Word-of-Mouth Activation**

Scenario-based word-of-mouth activation is the core path for The Song of Everlasting Sorrow to realize “low-cost and high-credibility communication”. Its essence is to create “memorable points worth sharing” through “multi-sensory immersive experience”, triggering the audience’s spontaneous communication behavior, which not only reduces marketing costs but also improves the credibility and effectiveness of communication.

From the perspective of the word-of-mouth trigger mechanism: The Song of Everlasting Sorrow creates motivation for the audience to actively share through “multi-sensory immersive experience + emotional resonance + social currency design”:

First, the multi-sensory immersive experience provides diverse memory points of “vision, hearing, and touch” for word-of-mouth communication;

Second, emotional resonance injects an “emotional core” into word-of-mouth communication, enhancing the appeal of the shared content;

Third, social currency design provides “show-worthy sharing materials” for the audience, reducing the sharing threshold.

## **5. Industry Implications of the Innovative Art Management Model of The Song of Everlasting Sorrow**

### **5.1 Return to the Cultural Core**

From the perspective of the path to explore the cultural core: The Song of Everlasting Sorrow takes the “balance between historical authenticity and artistic expressiveness” as the core exploration path, avoiding the problem of “entertainment overriding the essence of culture”. In the early stage of creation, the project team, together with Tang Dynasty history researchers and cultural relic protection experts, systematically sorted out the historical background (such as the Tang Dynasty court system and the impact of the An Lushan Rebellion) and cultural elements (such as costumes, etiquette, and music and dance) in the poem The Song of Everlasting Sorrow, forming a “cultural element list” to ensure that core cultural symbols such as Yang Guifei’s Hezi skirt and court hand-crossing etiquette conform to historical regulations; at the same time, through artistic translation, abstract historical culture is transformed into perceivable stage language, realizing the organic unity of historical connotation and artistic presentation.

In terms of cultural content expression: The Song of Everlasting Sorrow follows the logic of “taking emotional resonance as the core and technology as the auxiliary”, abandoning the tendency of “emphasizing form over content”. The project does not over-rely on technologies such as holographic projection and laser special effects, but uses technology as a tool to convey cultural emotions: for example, in the “Mawei Slope Incident” section, the red laser beams do not simply pursue visual impact, but cooperate with the actors’ desperate dances and low-pitched sound effects to strengthen the emotional atmosphere of “love tragedy”. This logic of “technology serving content” breaks the cognition of “technological determinism” and clarifies that technology should be an “amplifier of cultural expression” rather than a “core selling point”.

From the perspective of the long-term transmission of cultural value: To realize the long-term transmission of cultural value, The Song of Everlasting Sorrow adopts the dual paths of “dynamic content iteration and cultural popularization extension” to keep the cultural core continuously reaching the audience. On the one hand, it optimizes the cultural and artistic content every year during the winter off-season based on audience feedback and new research results; on the other hand, it launches a series of content titled “The History Behind The Song of Everlasting Sorrow”(such as the evolution of Tang Dynasty costumes and

the historical status of Huaqing Palace) on online platforms such as WeChat Official Account and TikTok, transforming the performance project into a "cultural popularization carrier". This "performance + popularization" model breaks the limitation of "one-time performance", upgrades the project to a "cultural communication platform", and enhances the cultural value of the project and the distance with the audience through continuous cultural output.

## 5.2 Strengthen the Collaborative Thinking

Most current live-action performance projects are still in the stage of "single performance project" operation, with insufficient coordination with the scenic area where they are located and the surrounding cultural-tourism resources, leading to the situation of "consumption ends when the performance ends", which makes it difficult to maximize the value. The Song of Everlasting Sorrow constructs a "cultural-tourism integration ecosystem" through the full-chain coordination of "performance, scenic area, and cultural-tourism consumption". Its experience implies that the industry needs to strengthen "collaborative thinking", break resource barriers, and realize the unification of artistic value, commercial value, and cultural value.

From the perspective of the coordination between performance and scenic area: The Song of Everlasting Sorrow realizes the two-way value enhancement of "performance empowering the scenic area and the scenic area feeding back the performance": On the one hand, the performance injects "dynamic cultural experience" into Huaqing Palace, changing its single attribute of "static historical site" and promoting the scenic area to transform from a daytime sightseeing type to a day-night linkage experience type;

On the other hand, Huaqing Palace provides a "live-action carrier" and "passenger flow foundation" for the performance, and its historical and cultural atmosphere provides natural support for the cultural expression of the performance, while the daytime passenger flow of the scenic area also brings stable potential audiences to the performance.

From the perspective of the coordination between performance and cultural-tourism consumption: Design a "consumption scenario chain" around the viewing process, transforming the performance experience into continuous consumption demand, and forming a closed loop of "viewing-consumption-repurchase":

Before viewing: Guide tourists to arrive in advance through "performance + scenic area package tickets" to consume catering, cultural and creative products, etc. in the scenic area;

After viewing: Guide tourists to extend their stay time with "performance + accommodation packages" and "performance + research activities", spawning subsequent consumption.

From the perspective of the coordination between artistic value and commercial value: The Song of Everlasting Sorrow balances artistic value and commercial value through "dual-oriented creation management", avoiding the dilemma of polarization:

In the creation stage, establish a coordination mechanism of "choreographer (art core) + cultural-tourism planner (market orientation)"—the choreography team ensures the artistic quality such as the accuracy of the dance drama's cultural expression and the innovation of dance vocabulary, while the cultural-tourism planning team puts forward market adaptation suggestions based on tourist portraits (age structure, cultural preferences);

In the operation stage, rely on the "data feedback-content update" mechanism to continuously optimize the adaptability between artistic expression and market demand.

## 6. Conclusion

Through the systematic research on the innovative model of art management in the large-scale historical dance drama The Song of Everlasting Sorrow, this paper reveals the core logic of the project to realize the coordination of artistic value and commercial value under the background of cultural and tourism integration. The research shows that the success of The Song of Everlasting Sorrow is not a single-dimensional innovation, but a systematic art management innovation with "resource integration as the foundation, creation management as the core, operation management as the support, and communication management as the driving force": it activates core resources through the three-dimensional collaboration of "text, live scene, and technology"; ensures the quality of creation and market adaptability with the dual orientation of "art and market"; improves operational efficiency through the full-chain closed loop of "ticket purchase, performance viewing, and park departure"; and expands the communication influence through the three-dimensional path of "IP, traffic, and word-of-mouth",



ultimately forming a recyclable and sustainable art management ecology.

Its innovative logic of “taking culture as the core and collaboration as the means” provides important implications for solving the problems of homogenization and emphasizing form over content in the current live-action performance industry, and promotes the industry to transform towards the high-quality development direction of “cultural empowerment + management innovation”.

This research still has certain limitations, such as focusing on a single case and not conducting a comparative analysis of the management models of different types of live-action performance projects. In the future, the research sample can be further expanded to explore the differences in art management of live-action performance projects with different cultural backgrounds and scales. At the same time, combined with the trend of digital transformation, the research can explore the reconstruction effect of new technologies (such as AI and metaverse) on the art management model of live-action performances.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# From Slogans to Indicators: How Malaysian Chinese Evaluate Chinese-Style Modernization

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**Abstract:** We conducted semi-structured interviews with 18 Malaysian Chinese (aged 19–62) in Malaysia between June and September 2025. Using reflexive thematic analysis, we show how respondents translate visible material cues in logistics, digital services and manufacturing into judgments about institutional delivery, equity, green industrial upgrading, and predictability in trade, education and mobility. Media multilingualism fosters cross-checking and experience-based calibration. Rather than reproducing official categories, participants assemble pragmatic, context-dependent evaluations that hinge on the alignment between outputs and trust. We contribute an audience-side indicator logic for Chinese-style modernization and specify channels through which diaspora publics render national development narratives credible and actionable.

**Keywords:** Malaysian Chinese; Chinese-style Modernization; Thematic Analysis

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## 1.Introduction

“Chinese-style modernization” has moved to the center of contemporary debates on development and global governance. Official texts define it as a path marked by five features: a very large population base, a focus on common prosperity, coordination between material progress and cultural-ethical advancement, harmony between humanity and nature, and a commitment to peaceful development (CPC, 2022).

International scholarship engages with this agenda from different angles. Many studies assess performance outcomes in growth, poverty reduction, and technology, and then link these outcomes to institutional capacity and social goals such as equity and ecological balance (Luo & Ding, 2024; Hu et al., 2024). Others focus on the discourse of modernization itself and ask how audiences interpret key terms and benchmarks (Yang, 2023). A recurring theme is the risk of conceptual slippage when “modernization” is equated with “Westernization” or when categories developed for other cases are applied without adaptation (Keping, 2010). This diversity of approaches reflects distinct analytical traditions and different expectations of China’s role in world affairs.

Regional literatures add important nuance. In Europe, public policy documents frame China simultaneously as a partner, an economic competitor, and a systemic rival (Wanek, 2024; Chang, 2025). This triad structures scholarly and policy debate

and shapes how observers weigh opportunities in climate cooperation and trade against concerns in security and standards (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2019). In Latin America, the conversation often adopts a pragmatic lens. Analyses emphasize concrete outcomes in infrastructure, trade, industrial upgrading, and social policy learning, while also noting selective misreadings due to inherited interpretive frames and limited local expertise on China (Sun, 2025). In Africa, research based on first-hand commercial, media, and educational channels suggests that perceptions emerge from everyday interactions as much as from elite commentary. These studies point to strong economic linkages and to practical challenges in services, regulation, and social inclusion that shape the evaluation of China's development path (Bodomo, 2010; Lin et al., 2016; Jin, 2023).

Southeast Asia deserves specific attention within this comparative map. The region hosts long-standing Chinese diaspora communities whose daily lives connect China's development narrative with local political economies. Malaysia is a strategic case because of its large and diverse ethnic Chinese population, its close economic ties with China, and its multilingual media ecology (Yow, 2016). These conditions can intensify both resonance and friction in cross-border narratives. They also make it possible to observe how ideas about modernization circulate across languages and social networks, and how they are tested against personal experience in education, trade, technology, and mobility.

This study examines how Malaysian Chinese perceive and evaluate Chinese-style modernization. We treat perceptions as situated and negotiated rather than as simple reflections of elite discourse. We consider both cognitive judgments about policy performance and normative judgments about fairness, participation, and international posture. We also attend to the channels that allocate salience to different dimensions of the five-feature framework, including news media, social media, interpersonal networks, schools, business ties, and travel (CPC, 2022). Comparative evidence suggests that audiences often value concrete indicators and policy outcomes over abstract regime typologies, and that they can affirm socioeconomic results while remaining cautious about political form or geopolitical risk (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2019; Sun, 2025; Bodomo, 2010).

Methodologically, we employ semi-structured, in-depth interviews with eighteen Malaysian Chinese, aged 19–62, and analyze the material using thematic analysis. Thematic analysis is well suited to identify patterned meanings across a small corpus while preserving contextual nuance. It offers a transparent process for coding, theme development, and reflexive interpretation, and it is established in qualitative research across disciplines (Braun & Clarke, 2006; Braun & Clarke, 2019). This design allows us to map how respondents describe, compare, and judge the five defining features of Chinese-style modernization and to trace the trade-offs they perceive between growth, equity, governance, environment, and international orientation (CPC, 2022).

Substantively, our analysis engages three strands of the international conversation. First, we speak to the performance-focused strand by documenting how respondents connect observed changes in China's economy and technology to perceived opportunity structures in Malaysia. Second, we address the equity and welfare strand by examining how respondents interpret "common prosperity" and social mobility and how they compare experiences across regions and sectors. Third, we engage the ecological and global-governance strand by assessing how respondents weigh green transition, interdependence, and the claim of peaceful development against narratives of strategic rivalry (Sun, 2025). We also consider how multi-language media environments shape these judgments and how lived interactions with Chinese firms, products, and institutions recalibrate initial views, as shown in African cases where everyday commerce and service encounters leave a strong imprint on perceptions (Bodomo, 2010; Lin et al., 2016; Jin, 2023).

The contribution of this study is threefold. First, it provides primary qualitative evidence from a Southeast Asian diaspora community, complementing bodies of work that focus on Europe, Latin America, or Africa. Second, it clarifies the conceptual boundaries that often blur debates, especially the difference between modernization as a plural, context-dependent process and modernization as a single institutional template. Third, it specifies the communication channels through which ideas about Chinese-style modernization travel in a multilingual society, and it identifies where those channels converge or conflict. In doing so, the study speaks to the wider question of how national development narratives become credible, legitimate, and actionable across borders. It also offers an empirical baseline for future mixed-method research on diaspora cognition and

cross-border knowledge flows in Southeast Asia.

## 2.Methods

We adopted a qualitative design based on semi-structured, in-depth interviews and thematic analysis. This design is appropriate for exploring patterned meanings while preserving participants' context and nuance (Braun & Clarke, 2006; Braun & Clarke, 2019). Purposive and snowball sampling are common and suitable when the population is specific and not readily enumerated (Malterud et al., 2016).

### 2.1 Participants and sampling

We recruited 18 Malaysian Chinese adults aged 19–62. Inclusion criteria were: (a) self-identified Malaysian Chinese; (b) residence in Malaysia for the past three years; (c) awareness of the term “Chinese-style modernization” through any channel; (d) ability to provide informed consent; and (e) availability for a 60–90-minute interview. Exclusion criteria were: (a) inability to participate in an interview in Mandarin, English, or Malay; and (b) acute cognitive or psychiatric impairment that would preclude informed consent or participation. Recruitment began with key informants in education, SMEs, and technology sectors and proceeded via snowball referrals until thematic saturation was reached, defined as no new codes relevant to study aims in two consecutive interviews (Guest et al., 2020; Hennink et al., 2017).

### 2.2 Data collection

Interviews were conducted in Malaysia between June and September 2025. We used a semi-structured guide organized into four modules: (1) overall understandings of Chinese-style modernization; (2) value judgements and comparative standards; (3) information sources, media use, and trust; and (4) links to personal life and work. The guide was piloted with two eligible individuals; minor wording changes improved clarity. Interviews were held face-to-face or via secure videoconferencing according to participant preference and feasibility; each session lasted 60–90 minutes and was audio-recorded with consent. Transcripts were produced verbatim in the original language, then meaning-translated into English with key-term back-translation; transcripts were checked against recordings for accuracy. Personally identifying information was removed during transcription. Field notes documented context, nonverbal cues, and reflexive observations for analysis (Tong et al., 2007).

### 2.3 Data analysis technique

We applied thematic analysis in six phases: familiarization, coding, generating candidate themes, reviewing themes, defining and naming themes, and producing the report (Braun & Clarke, 2006; Braun & Clarke, 2019). Two researchers independently coded an initial subset of transcripts to develop a shared codebook, discussed discrepancies, and reached consensus on code definitions. We used this negotiated approach to enhance transparency and dependability while respecting the reflexive stance of thematic analysis (O'Connor & Joffe, 2020; Braun & Clarke, 2019). The remaining transcripts were coded by one analyst with periodic peer debriefings to interrogate assumptions and refine theme boundaries. We iteratively examined theme coherence and distinctiveness and constructed a theme map to represent relationships among themes.

### 2.4 Ethics

All participants received an information sheet describing the study purpose, procedures, risks, and rights, including the right to withdraw at any time without consequence. Written informed consent was obtained before data collection. Procedures followed the Declaration of Helsinki and relevant local institutional norms for social research (World Medical Association, 2013). Data were stored on encrypted drives with access restricted to the research team.

## 3.Findings

### 3.1 Demographic characteristics

The study included 18 Malaysian Chinese participants aged 19–62 years ( $M = 36.9$ ,  $SD = 12.7$ ). Gender was evenly distributed (male: 9; female: 9). Educational attainment was high: most held a bachelor's degree ( $n = 11$ ), followed by master's ( $n = 4$ ), diploma ( $n = 2$ ), and high school ( $n = 1$ ). Occupational roles were diverse, with SME owners forming the largest group ( $n = 4$ ); educators, tech employees, university students, and freelancers each accounted for 16.7% ( $n = 3$  per group), and one participant worked in an NGO and one in the civil service (both 5.6%). Residence was reported at a coarse geographic level for anonymity: Klang Valley (38.9%), Penang (22.2%), Johor (16.7%), and single cases in Kedah, Perak,

Sabah/Sarawak, and Malacca (each 5.6%). Interviews were conducted in Mandarin (55.6%), English (38.9%), and Malay (5.6%). Most interviews were face to face (55.6%); the remainder were conducted via video (44.4%). Sessions lasted on average 72.4 minutes (SD = 8.2; range = 60–90).

Table 1: Social demography of participants ( $n = 18$ )

| Variables          |                    | Value, n (%) or Mean (SD; range) |
|--------------------|--------------------|----------------------------------|
| Gender             | Male               | 9 (50.0%)                        |
|                    | Female             | 9 (50.0%)                        |
| Age                | Years              | 36.9 (SD = 12.7; range = 19–62)  |
| Education          | High school        | 1 (5.6%)                         |
|                    | Diploma            | 2 (11.1%)                        |
|                    | Bachelor's         | 11 (61.1%)                       |
|                    | Master's           | 4 (22.2%)                        |
| Region             | Klang Valley       | 7 (38.9%)                        |
|                    | Penang             | 4 (22.2%)                        |
|                    | Johor              | 3 (16.7%)                        |
|                    | Kedah              | 1 (5.6%)                         |
|                    | Perak              | 1 (5.6%)                         |
|                    | Sabah/Sarawak      | 1 (5.6%)                         |
|                    | Malacca            | 1 (5.6%)                         |
|                    |                    |                                  |
| Interview language | Mandarin           | 10 (55.6%)                       |
|                    | English            | 7 (38.9%)                        |
|                    | Malay              | 1 (5.6%)                         |
| Interview mode     | Face-to-face       | 10 (55.6%)                       |
|                    | Video              | 8 (44.4%)                        |
| Occupation         | University student | 3 (16.7%)                        |
|                    | Tech employee      | 3 (16.7%)                        |
|                    | Educator           | 3 (16.7%)                        |
|                    | SME owner          | 4 (22.2%)                        |
|                    | Freelancer         | 3 (16.7%)                        |
|                    | NGO worker         | 1 (5.6%)                         |
|                    | Civil servant      | 1 (5.6%)                         |
| Interview duration | Minutes            | 72.4 (SD = 8.2; range = 60–90)   |

Note. Percentages may not total 100% due to rounding. SD = standard deviation. Region is reported at a coarse geographic level for anonymity.

### 3.2 Thematic findings

Analysis of 18 semi-structured interviews with Malaysian Chinese produced six interrelated themes that trace how Chinese-style modernization is perceived, assessed, and translated into everyday decisions. Themes are presented in order of salience across the corpus. Illustrative excerpts are rendered in plain text and tagged with anonymized identifiers (P01–P18).

#### Theme 1: Economic performance and the imagination of opportunity

Participants associated Chinese-style modernization with resilient growth, extensive infrastructure, industrial upgrading, and fast cycles of technological change. They treated these features as tangible and as gateways to new opportunities. Education, supply-chain participation, and market access were the most frequently mentioned domains. Respondents grounded their expectations in observable evidence, such as rail networks, factory automation, logistics reliability, and product quality. They then projected these observations onto plans for skills development and collaboration.

I walked the floor at a supplier fair and saw short lead times and clean tooling; if my plant can sync to that rhythm, I can



accept tighter delivery windows (P10)

Release cycles are fast and data driven; our training should add product operations and analytics so new hires can contribute early. (P03)

A visit to an automated line clarified what polytechnic curricula should cover, from preventive maintenance to safety standards. (P04)

E-commerce prices and delivery are predictable, so a small online shop now feels feasible. (P02)

Urban transit and intercity rail make the growth story concrete; people visualize capacity, not only read about it. (P12)

Logistics from the peninsula is still costly; if we align to a regional warehouse network, shipping to Borneo can be faster. (P14)

#### Theme 2: Common Prosperity and Social Equity

Participants regarded common prosperity as a manifestation of social equity. Social equity was associated with opportunities for social mobility, reductions in poverty, and the expansion of public services.

Only when individuals can, through their own efforts, earn income and achieve upward mobility can fairness be said to exist. (P02)

Malaysia exhibits a relatively large wealth gap; affluent families may be less affected, whereas low-income households require public services to meet basic subsistence needs. (P11)

Serving low-income groups generates durable benefits, including higher employment, greater subjective well-being among recipients, and improvements in human capital; however, such service provision presupposes national economic development. (P07)

Coordinated development of urban and rural areas is also an important component of common prosperity:

Cities are Malaysia's cities, and rural areas are Malaysia's rural areas; it is not acceptable to prioritize cities while neglecting the countryside. (P01)

Urban areas are changing rapidly, but our rural areas remain largely unchanged. (P13)

#### Theme 3: Coordinated Development of Material and Spiritual Civilization

Participants argued that modernization should align material advancement with cultural and spiritual development. They emphasized that prosperity at the material level must be matched by cultural growth. Most participants noted that culture involves both subjective fulfillment and the enhancement of civic qualities and human capital, including a sense of social responsibility, civility, and social trust. The following excerpts support these views:

Infrastructure is important, but culture is decisive; a campus acquires a sense of modernity when students respect public space. (P04)

Cultural anchors can alleviate anxiety, whereas new technologies function only as tools. (P12)

Malaysia is ethnically diverse, and its culture should likewise be pluralistic. (P03)

Participants also identified social contradictions:

When culture is developed as an industry, results are difficult and slow to achieve; consequently, most people prefer quick profits rather than invest in developing and transmitting their own culture. (P08)

Malaysia is indeed rich in cultural resources, yet for political and historical reasons some cultural traditions are gradually disappearing. (P03).

#### Theme 4: Green transition and a technology-oriented pathway

Participants perceived China's ability to integrate environmental protection with economic growth as a defining feature of its modernization. They pointed to renewable energy, the digital economy, and high-tech industrial upgrades as primary windows for observing this shift. Respondents noted a decisive transition from a model of "growth at any cost" to a state-led, technology-driven green development strategy. This deliberate path was viewed not as a limitation on growth, but as a new engine for a more sustainable and globally competitive economy.

Ten years ago, we bought German solar panels; now, we sell Chinese ones to the world. That supply chain reversal says everything about their new development path. (P06)

The old image was cheap toys from a smoky factory. The new one is an electric car, full of tech, rolling off a robotic assembly line. That's a different kind of strength. (P02)

In Shenzhen, you scan a QR code to rent a bike and pay for groceries. The digital convenience is obvious, but it's also subtly promoting a greener, more efficient lifestyle. (P11)

This green shift didn't happen by accident. You see the government's hand setting clear targets for industries like solar and EVs; it's a planned transition, not just market luck. (P07)

They are proving that 'green' isn't just a cost or a sacrifice; it's the next massive economic opportunity. They are betting their future on it. (P14)

Theme 5: Peaceful development and perceptions of regional order

Many participants read the commitment to peaceful development as a stabilizing signal. What mattered was not grand geopolitics but whether the promise translated into predictable trade, education, and mobility. When they believed regional order would hold, they were more willing to plan investments, apply for programs, or sign multi-year contracts.

Offices plan when they expect stability; peaceful development reduces background anxiety. (P11)

Hiring decisions follow supply-chain confidence; if we expect steady parts, we commit. (P03)

Headlines are one thing, and my ledger is another. When the news shows warships, tour bookings get cancelled. For us, peace means steady foot traffic, not long discussions about patrols. (P05)

We are considering expanding a processing plant, but only if predictability holds—no sudden politically driven inspections, no overnight capital-control shifts; peaceful development must equal a stable business environment, or cash stays in the bank. (P18)

Joint degrees survive politics when they deliver value to both sides; graduating cohorts build trust. (P16)

While scholarships and high-tech campuses are appealing, parents also seek assurance that students will be welcomed and kept safe, rather than entangled in diplomatic tensions. Clear and friendly signals between governments can facilitate decision-making. (P01)

Theme 6: Media ecologies, knowledge sources, and cognitive divergence

Participants, as multilingual consumers of diverse media, inhabit a complex information environment that fosters divergent cognitions and uneven trust in narratives about China. They report a sharp contrast between Chinese-language media, which typically frame developments in terms of cooperation and shared opportunity, and English-language media, which often emphasize systemic comparison and strategic competition. To navigate this polarized landscape, respondents described a process of cross-channel verification and placed a high premium on personal experience, using firsthand observations to calibrate and challenge abstract media portrayals.

Watch the news on a Chinese channel, and a project is about building bridges. Switch to an English Channel, and the same project is about building influence. It's like they're reporting on two different worlds. (P08)

My rule is to read the reports from both Beijing and New York, strip out the adjectives, and see what facts are left. You have to be your own editor. (P05)

The headlines warn you about a surveillance state, but then you visit Shanghai and just feel... safe and incredibly efficient. That personal experience is the ultimate tie-breaker for me. (P11)

In our family WhatsApp group, one uncle shares articles from a Chinese news portal, another shares from the BBC. The arguments are endless because their information sources are from different planets. (P16)

Trust is the real casualty. You learn to be skeptical of everything—the enthusiastic praise and the dire warnings. Your own judgment becomes your only guide. (P01)

## 4. Discussion

Our analysis suggests that Malaysian Chinese participants treat “Chinese-style modernization” less as a distant geopolitical slogan and more as a practical evaluative frame for everyday planning. Reasoning proceeds from concrete observations in transport, logistics, and digital services to broader judgments about growth, equity, governance, ecology, and regional order. This micro-to-macro logic addresses our research questions by showing how observed performances, institutional delivery,

and interpersonal trust jointly shape evaluations. It aligns with performance-oriented strands in the literature while adding a grounded Southeast Asian perspective on how audiences translate practices into expectations and choices (Luo & Ding, 2024; Hu et al., 2024). It also complements regional work that documents pragmatic appraisals in Latin America and perception formation through quotidian interaction in Africa (Sun, 2025; Bodomo, 2010; Lin et al., 2016; Jin, 2023).

First, the theme on economic performance indicates that technological upgrading and infrastructure are read as actionable opportunity structures. Participants connected factory automation, delivery reliability, and rail connectivity with plans for skills acquisition and supply-chain participation (for example, “short lead times make tighter delivery windows feasible,” P10). They privileged visible outcomes over abstract regime typologies, which is consistent with comparative evidence on how audiences weigh growth and capability signals in cross-national evaluation (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2019). This refines performance-focused debate by specifying the cognitive pathway through which material indicators become vocational and entrepreneurial intentions. It also identifies concrete frictions, such as logistics costs and uneven East–West Malaysia integration, which condition how external models are localized.

Second, interpretations of “common prosperity” were anchored in social mobility, poverty reduction, and the breadth of public services. Fairness was seen as contingent on opportunities for upward movement through one’s own effort, supported by targeted welfare and balanced urban–rural provision. This resonates with the official five-feature framework and equity-oriented international discussion while refracting through local concerns about wealth gaps and service coverage (CPC, 2022). The theme advances debate by showing that equity is judged not only by redistributive intent but also by perceived institutional capacity to deliver mobility at scale.

Third, coordination between material and spiritual civilization emerged as a normative expectation that modernization should cultivate civic qualities, cultural pluralism, and social trust alongside material gains. Participants endorsed culture as both subjective fulfillment and a public good, while acknowledging tensions when culture is treated primarily as an industry (for example, “fast money crowds out heritage,” P08). These views counter the slippage that equates modernization with a single civilizational template and support a plural, context-dependent understanding emphasized in discourse-analytic scholarship (Yang, 2023; Keping, 2010).

Fourth, the green transition was interpreted as a technology-driven pathway that couples ecological targets with industrial strategy. Respondents identified renewable energy, electric vehicles, and the digital economy as the main windows into this shift, and they described state coordination as decisive. Rather than a constraint, environmental policy appeared as a new engine of competitiveness. This adds audience-level detail to ecological and global-governance debates by showing how green industrial policy becomes credible when embodied in products, supply chains, and everyday digital conveniences (Sun, 2025).

Fifth, “peaceful development” functioned in participants’ reasoning as a proxy for predictability in trade, education, and mobility. Peace was assessed not in abstract strategic terms but in the stability of bookings, contracts, and hiring plans (for example, “stable visas and flights shape semester planning,” P03). The result echoes the European policy triad that frames China as partner, competitor, and systemic rival, while clarifying how small actors translate these categories into risk tolerance and timing decisions (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2019; Wanek, 2024; Chang, 2025). For this audience, credible assurances of order enable longer-horizon choices, whereas signals of confrontation depress everyday transactions.

Sixth, a multilingual media ecology generated divergent readings and a reported trust deficit. Participants contrasted cooperation-oriented narratives in Chinese-language outlets with competition-oriented narratives in English-language media and responded by cross-checking sources and privileging personal experience (for example, “I verify through the platforms I use,” P12). This mirrors African cases in which direct encounters recalibrate media-driven priors (Bodomo, 2010; Lin et al., 2016; Jin, 2023). The theme specifies the channels through which ideas about modernization travel in Malaysia’s information environment and identifies experiential validation as a key mechanism of belief updating.

Taken together, the themes support three conceptual claims. First, within our sample, “Chinese-style modernization”

operates as an embedded referential system applied to personal developmental horizons. Second, audience judgments are pragmatically assembled from material cues, institutional delivery, and interpersonal trust rather than from allegiance to a single ideological frame. Third, credibility and legitimacy emerge where policy claims are repeatedly corroborated by lived interactions and consistent signals across media. These claims distinguish modernization as a plural process rather than a fixed institutional template and locate diaspora communities as epistemic brokers who translate external models into local calculus (CPC, 2022; Yang, 2023; Keping, 2010).

## 5. Limitations and future recommendations

Our purposive, urban-leaning sample, which has relatively high educational attainment and greater exposure to China-related sectors and media, likely over-represents informationally advantaged respondents; therefore, the findings aim for analytic transferability rather than statistical generalization. Requiring awareness of “Chinese-style modernization” as an inclusion criterion may have selected politically attentive individuals. The cross-sectional design cannot capture time-varying influences (e.g., visa/customs procedures, logistics cadence, price shocks, salient media events). Mode and language may have shaped disclosure; despite translation checks, minor translation drift is possible. As a reflexive thematic analysis, theme boundaries are interpretive and alternative readings remain plausible. We did not triangulate interview claims with administrative or behavioral indicators (e.g., visa or customs statistics, logistics KPIs, transaction logs) or systematic multilingual media content analysis, which would sharpen measurement.

Future work should broaden coverage across Malaysian regions and major ethnic groups (Malay and Indian Malaysians), add rural/low-connectivity settings, and incorporate longitudinal designs (panel re-contacts around policy or market events). To strengthen measurement and causal inference, combine interviews with administrative and transaction data, platform or supply-chain analytics, and survey/conjoint experiments on message framing. In educational contexts, co-develop practice-oriented modules with industry and civic partners and evaluate them with pre-registered designs that track skills, ethical reasoning, service, and partnership outcomes.

## Conclusion

This study shows how Malaysian Chinese evaluate Chinese-style modernization through routine judgments of performance, equity, culture, ecology, and regional order. Credibility is inferred from visible outputs in logistics, technology, and services, and from the alignment of material cues with institutional delivery and interpersonal trust within a multilingual media ecology. Peaceful development is interpreted as a signal of policy predictability, the green transition as an industrial strategy aligned with ecological targets, and common prosperity through mobility prospects and the reach of public services. The evidence supports modernization as a plural and context-dependent process, with diaspora actors brokering national narratives into local opportunities. Policy and communication should emphasize verifiable standards, reliable service metrics, and safety assurances. Future research should use longitudinal and behavioral data to test durability and scope.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Analysis of the “Bull” Image in Picasso’s Guernica

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**Abstract:** The bull motif is a recurring visual element in Picasso’s works. Centered on the bull imagery in his iconic piece Guernica, this study analyzes the symbolic significance of the bull and its deep psychological resonance with Picasso through the lens of art psychology, drawing parallels with two contemporaneous works: Franco’s Dreams and Lies and The Bullfighter and the Great Bull. The study reveals that the bull serves as a crucial vehicle for projecting Picasso’s inner self-image. The violence and indifference embodied by the bull in Guernica stem from the artist’s conscious expression of trauma from the Spanish Civil War, while also incorporating unconscious manifestations of negative psychological factors rooted in childhood patriarchal pressures. The study further reveals that in Franco’s Dreams and Lies, the bull as an embodiment of justice represents Picasso’s earnest desire to end the civil war. In The Bullfighter and the Great Bullfight, the wounded, rebellious bull symbolically reenacts Picasso’s emotional struggle with his wife Olga and his yearning to break free from constraints.

**Keywords:** Bull; Picasso; Guernica; Art Psychology

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As the founder of Cubism, Pablo Picasso’s bold exploration of form, color, and space transformed humanity’s understanding of art and aesthetic standards. Guernica (Fig. 1) stands not only as a quintessential example of the artist’s Cubist style but also as one of the 20th century’s most symbolic anti-war works. Analyzing the bull imagery in Guernica through the lens of art psychology deepens our understanding of the piece and illuminates the cultural significance of this motif within Western and Spanish societies. Simultaneously, examining this image offers insight into the creative psychology underlying the artist’s work.

## 1. Background Research on Guernica and Western Bull Culture

### 1.1 The Background of Guernica’s Creation

Guernica was created in 1937. The outbreak of the Spanish Civil War in 1936 plunged Spanish society into extreme division, subjecting countless citizens to unspeakable suffering. Though Picasso himself enjoyed considerable social and political standing at the time, he could not escape the psychological and emotional toll of the war. On April 26, 1937, the Luftwaffe of Nazi Germany, supporting fascist forces in the Spanish Civil War, bombed the town of Guernica in the Basque region. This bombing resulted in the deaths of numerous innocent civilians and caused severe destruction to the city. This iconic act of violence profoundly affected Picasso, sparking an intense creative urge and laying the groundwork for his later creation of Guernica. That same year, Picasso received a commission from the Spanish Republican government to create a work for the Paris International Exposition, aiming to reveal the devastating consequences of the Spanish Civil War. This commission provided the impetus for Picasso to create Guernica. He ultimately chose to transform the historical tragedy of Guernica



into art, exposing the cruelty of war and expressing his sympathy and anger toward the suffering of innocent people. In fact, even before the Spanish Civil War erupted, Picasso had demonstrated profound concern for social injustice and war. After the conflict began, he unequivocally sided with the Republican cause and vehemently opposed the violent oppression of the fascist regime.<sup>[1]</sup> These convictions served as the driving force behind his creation of this work. During the 1930s, Picasso's personal life was also marked by turmoil, as he navigated between his wife and his mistress. In 1935, Picasso formally divorced his second wife, Olga Khokhlova, and began a new relationship with the younger artist Marie-Thérèse Walter.<sup>[2]</sup> Picasso's perception of war's brutality resonated profoundly with the emotional conflicts and losses he experienced in his personal life. These private sentiments also influenced his artistic creation, making *Guernica* not only an indictment of politics, war, and violence, but also a profound emotional catharsis for the artist himself.

*Figure 1: Pablo Picasso, Guernica, 1937, 350 cm × 780 cm,  
Collection of the Reina Sofía Museum, Madrid*



## 1.2 The Image of the Bull in Greek Mythology and Spanish Culture

The bull was a motif particularly favored by Picasso himself, appearing in numerous works—a preference rooted in the cultural environment in which the artist lived. In Greek mythology, the bull holds profound symbolic significance, embodying strength, ferocity, and courage while being intrinsically linked to numerous deities and heroes in mythological narratives—such as the tales of Europa and Zeus, or Minos and the Cretan Bull. Ancient Greeks frequently sacrificed black bulls to the gods, particularly to Poseidon, the god of the sea, seeking divine protection and blessings. In earthquake-prone regions like Ionia and Thessaly, bullfighting contests were also held to honor the sea god.<sup>[3]</sup> Picasso created a series of paintings depicting bulls and the Minotaur in the 1930s, this is Picasso's other self within the image.<sup>[4]</sup> This demonstrates his profound understanding of Greek mythology, particularly the bull imagery within Greek culture. Furthermore, as a Spanish painter, Picasso was influenced from childhood by Spain's bullfighting culture. Bullfighting is a highly symbolic activity within Spanish traditional culture. As an ancient form of entertainment, it is not only a sporting event but also a social ritual. Bullfighting performances were the most important weekend entertainment in Picasso's hometown of Málaga. Picasso's father was a devoted bullfighting enthusiast who took Picasso to watch bullfights almost every weekend.<sup>[5]</sup> From childhood, Picasso developed an interest in bullfighting—not only culturally but also emotionally and artistically. Many of his works feature figures and scenes inspired by bullfighting themes. Notably, his 1930s works, such as the *Bullfighters Series* and *Portrait of a Bullfighter*, vividly reinterpret imagery from bullfighting culture.

## 2. Image Analysis of the Bull in Guernica

*Guernica* is a monumental mural with a strong sense of horizontal expansion. The composition forms a visual continuum from left to right, with each segment resonating and interacting with the whole. The painting lacks clear vertical or front-to-back hierarchy; all figures are arranged in a fragmented, deconstructed state. In *Guernica*, the bull figure (Fig. 3) occupies the upper left corner, positioned near the edge of the composition. Its head protrudes prominently, dominating nearly the

entire left side of the canvas. Employing Cubist deconstruction, the bull's face is distorted, its gaze fixed forward. The horns and ears are depicted as sharp and pointed, while the tail bears no resemblance to a real bull's tail, instead resembling that of a horse. Its body exhibits a constrained posture, with limbs and neck depicted in extreme distortion, defying natural proportions. Directly beneath the bull's head sits the figure of a woman cradling her dead child. This mother figure serves as a common post-war symbol of victimhood, particularly representing mothers who lost children in conflict. Her face is positioned immediately below the bull's head, the two forms in close proximity. The woman screams toward the heavens, her face contorted in extreme agony. In stark contrast, the bull's expression appears blank and numb. The mother's heart-wrenching emotional outcry stands in sharp relief against the bull's impassive countenance. At the center of the composition, adjacent to the bull, stands the horse. The contrast between bull and horse is striking, particularly in their physical expression and symbolism. The bull appears more grounded, while the horse seems turbulent and frenzied within the composition—its eyes wide, mouth open as if screaming. These animals carry distinct symbolic meanings in Western art and culture: the bull often symbolizes wildness and courage.<sup>[6]</sup> The horse, meanwhile, represents heroism, war, and speed.<sup>[7]</sup> In *Guernica*, however, the bull and horse diverge from their conventional symbolism. According to Picasso's own description, the horse symbolizes humanity suffering the horrors of war, while the bull is identified as a force of cruelty and darkness.<sup>[8]</sup> This explains the contrast between the bull and the woman mentioned earlier. As the only two animal figures in the painting, they convey strikingly different symbolic meanings, which inevitably piques the author's interest. What significance does the bull hold in the artist's psyche? Does it carry a special meaning for him?

Figure 2 *Guernica* (Detail 1)



Figure 3 *Guernica* (Detail 2)



### 3. The Image of the “Bull” in *Guernica* from an Art Psychology Perspective

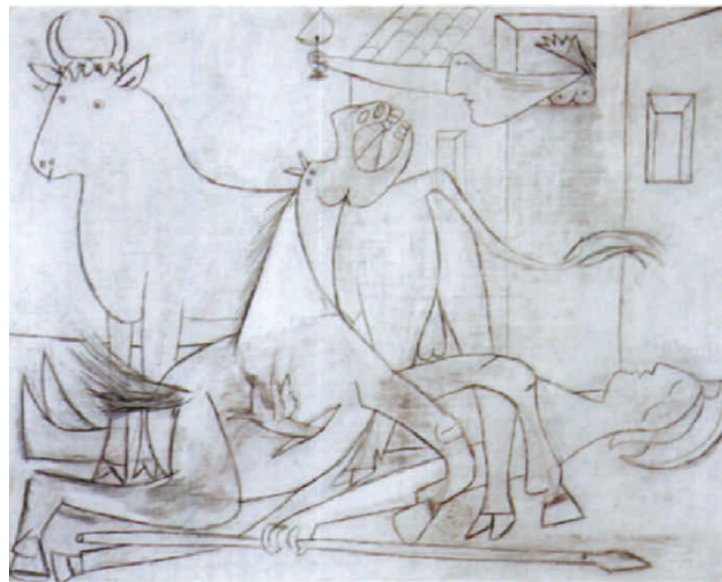
#### 3.1 The Relationship Between the “Bull” Image in *Guernica* and the Artist's Psychology

*Guernica*, like Picasso's other works, carries a distinct autobiographical quality—a universal characteristic throughout his entire oeuvre.<sup>[4]</sup> Thus, the bull imagery in this piece can first be understood as a projection of the artist's personal emotions onto its form. The bull unquestionably symbolizes masculine power, representing Picasso's latent virility and paternal complex. Picasso's relationship with his father, also a painter, was complex—a blend of mentor and father figure.<sup>[9]</sup> This paternal oppression likely became a source of inner conflict and fear for Picasso. Additionally, Picasso exhibited a strong desire for control. Whether with his first official girlfriend Fernande or his later second wife Teresa, Picasso displayed an intense need for dominance.<sup>[10]</sup> This behavior also served as a form of overcompensation for the lack of autonomy he experienced during his childhood. From a psychoanalytic perspective, the bull's violence and darkness symbolized Picasso's subconscious rebellion against paternal authority. Simultaneously, it reflected the artist's own psychological

projection of coercive, controlling, and violent impulses onto the bull's image (a view reinforced by Roland Penrose's commentary on Picasso, cited below). Furthermore, the bull's negative connotations may also relate to the trauma inflicted on Picasso personally by Western warfare. Picasso was an individual profoundly sensitive to war, inevitably becoming emotionally invested in its consequences.<sup>[11]</sup> The Spanish Civil War constituted not only a personal trauma for Picasso but also a collective wound for the Spanish nation. The bull, originally a symbol of courage and strength in Spanish society, transformed in the artist's mind into an emblem of violence and darkness under the war's influence. Of course, Picasso did not purely unconsciously imbue the bull with negativity in his work; he consciously engaged in this process during creation, ultimately choosing to present the bull's image in a negative light. During the creation of this work, the bull also held positive connotations in Picasso's mind. For instance, in Picasso's May 1, 1937, compositional study for *Guernica* (Fig. 4), the bull is depicted as an innocent and benevolent figure, crowned with a wreath and appearing free and carefree.

*Figure 4: Pablo Picasso, Guernica (Composition Study), May 1, 1937, 53.7 cm × 64.7 cm*

*Collection of the Reina Sofía Museum, Madrid*



### 3.2 Analysis of the Contrasting Portrayals of the “Bull” and “Horse” in *Guernica*

In *Guernica*, the bull and horse, though both depicted as animals, exhibit starkly different visual representations. The horse is rendered in extreme agony, while the bull appears cold and cruel. This contrast in portrayal likely stems from the artist's childhood memories. In Spanish bullfighting culture, bulls and horses are often placed in the bullring to fight freely. The defenseless horse is inevitably no match for the powerful bull, and the noble steed frequently faces a painful death at the hands of the bull.<sup>[12]</sup> Picasso witnessed this tragedy firsthand during his childhood, subconsciously associating the bull with violence and cruelty, while viewing the horse as the victim. Furthermore, the symbolic differences between bulls and horses can be traced to socio-historical and cultural contexts. In Spanish culture, the bull often symbolizes strength, courage, and masculinity. Thus, in *Guernica*, the bull represents male violence and power. In Picasso's May 11, 1937, compositional study for *Guernica* (Fig. 5), the bull figure was practiced separately. In this study, Picasso depicted the bull as a human-headed bull, with the facial features clearly identifying it as a male head. Although this image was ultimately not adopted in the final work, it sufficiently demonstrates the artist's recognition of the bull as a male symbol. The horse, as a vulnerable animal, is often seen as a more feminine symbol. The horse's fragility and agony in the painting reflect women's victimhood in war. In Picasso's May 8, 1937, compositional study for *Guernica* (Fig. 6), the image of a painfully contorted horse is juxtaposed with that of a mother clutching her dead child and wailing to the heavens. Evidently, the artist was conducting preparatory sketches based on shared emotional expressions. In his subsequent compositional study the following day (Fig. 7), the mother holding her child extends her right hand into the horse's abdomen, further intertwining their forms. This demonstrates Picasso's identification of the horse as a victim of war and an embodiment of the female figure. Rudolf Arnheim, in his analysis of Picasso's compositional studies, similarly observed: “In the artist's initial depictions of women, the most intimate connection



in conception and composition lies in the fusion of the mother's image with that of the horse".<sup>[13]</sup>

Figure 5: Pablo Picasso, *Guernica* (Composition Study), May 11, 1937, 23.9 cm × 45.5 cm,  
Collection of the Reina Sofía Museum, Madrid



Figure 6: Pablo Picasso, *Guernica* (Composition Study), May 8, 1937, 24 cm × 45.5 cm  
Collection of the Reina Sofía Museum, Madrid



Figure 7: Pablo Picasso, *Guernica* (Composition Study), May 9, 1937, 24 cm × 45.5 cm,  
Collection of the Reina Sofía Museum, Madrid



#### 4. Comparison of the “Bull” Motif Across Picasso’s Works from the Same Period

In the same year *Guernica* was completed, Picasso also created a series of politically charged etchings featuring bull motifs titled *Franco’s Dreams and Lies* (Fig. 8). This work depicts a series of tragic events while expressing support for the Spanish Republic, employing a colossal, grotesque figure to represent Franco.<sup>[14]</sup> Some scholars have dubbed this grotesque figure the “Franco monster with a horse’s body and coral-like head”.<sup>[4]</sup> The artist’s profound loathing for the dictator is evident throughout this series. Here, the bull is portrayed as a positive symbol, while the monster is depicted being disemboweled by the bull. Regarding the monster’s depiction, Picasso’s friend Roland Penrose offered an insightful commentary:

The repulsive image he created for Franco stemmed from a deeply personal monster lurking within him. Shortly after completing this series, I asked him to sign a set of prints I had purchased. As he signed my name, starting with the lowercase p, I was startled to notice that the shape of the capital letter P in his own signature was nearly identical to the head of the creature he loathed most—the coral worm. The power he imbued in this image was unconsciously drawn from such a deeply secret source, revealing the profound entanglement he felt. The desire to allude to himself through the capital letter of his own name could not be more compelling. Just as he had previously often used idealized self-portraits as the basis for his heroic Harlequin figures, here, conversely, the unconscious source for the image of the most detested person was equally personal.<sup>[11]</sup> The coral-like head in Picasso's series possesses a hidden personal origin. Thus, the author posits that on an individual psychological level, the bull representing justice in this series likely mirrors the bull in *Guernica*—both being unconscious projections of the artist's inner self within his work. The former embodies his positive psyche, while the latter reflects his negative psyche. The author further contends that such hidden, idealized images within the artist's own psyche are more readily projected unconsciously into works and abstract forms rich in abstract qualities.

*Figure 8: Pablo Picasso, Franco's Dreams and Lies, 1937,  
31.4 cm × 42 cm, Private Collection*



The Female Bullfighter and the Great Bull (Fig. 9) is an etching on the theme of bullfighting completed by Picasso in 1934. This work also possesses a strong sense of abstraction and expressiveness. The bull, enraged by a lance piercing its neck, is depicted with meticulous attention to its head. Its ferocious expression conveys both agony and fury. The female bullfighter has fallen from the bull's back, her limbs contorted. Some scholars suggest: "The exposed chest of the female bullfighter identifies her as Picasso's then-lover Marie-Thérèse, who has fallen from the bull's back; while the horse-like figure on the right, swollen like a flail threshing grain, represents Picasso's confused and despairing wife Olga."<sup>[5]</sup> The author disagrees with this interpretation. While Picasso did frequently depict his wives, lovers, and children, his portrayals of beloved women were predominantly positive and triumphant.<sup>[15]</sup> The title itself suggests the work celebrates the bull, positioning the female bullfighter as the defeated party. Picasso would not have depicted his lover Teresa as the fallen bullfighter. The female bullfighter in the painting likely represents Olga, with whom Picasso was on the verge of divorce. The bull, meanwhile, symbolizes the artist himself. In the biography written by Picasso's grandson Olivier Widmaier Picasso, we find this passage: In the summer of 1934, Picasso, Olga, and Paul embarked once more on the long journey to Spain. Marie-Thérèse followed behind. She still obediently followed Picasso's arrangements, yet a unique resonance developed between them, drawing them closer than ever before. Picasso even introduced his young mistress to his sister, Lola. By autumn, their shattered home was filled with Olga's rage over Picasso's absence, compounded by a prolonged silence.



Picasso remained devoted to painting and sculpture. Intriguingly, one motif grew increasingly frequent in these works: a girl resembling Marie-Thérèse guiding a wounded Minotaur. The Minotaur represented Picasso's subconscious self-portrait, and these creative experiments formed the prelude to his renowned Minotaur series.<sup>[16]</sup>

*Figure 9: Picasso, The Female Fighter and the Great Bull, 1934,  
81 cm × 60 cm, Collection of the Picasso Museum*



The passage above indicates that Teresa's portrayal in Picasso's other paintings and sculptures from the same year as *The Bullfighter and the Great Bull* was consistently positive. Picasso depicted Teresa as the benevolent maiden guiding the Minotaur (the bull-headed monster), while the wounded Minotaur symbolized the artist himself. Interestingly, the wounded Minotaur aligns with the injured bull in "The Ménage à Trois." Therefore, the author posits that the bull in "The Ménage à Trois" mirrors the bull in *Guernica*—both representing Picasso's inner self projected onto the bull motif. The female bullfighter in the painting embodies his wife, Olga. Holding a lance, she seeks to "tame" Picasso, embodied as the bull, in an attempt to salvage their crumbling relationship. Yet the bull, in agony, struggles fiercely and shakes the matador off his body—vividly reenacting Picasso's personal emotional turmoil and his desperate desire to break free from his wife. The bull's triumph in this struggle signifies Picasso's inner, idealized desire.

## Conclusion

This paper analyzes three abstract works featuring bull imagery created by Picasso in the 1930s from an art psychology perspective. It explains the relationship between the bull imagery in the paintings and the artist's psychological state, revealing his emotional experiences and psychological characteristics. In all three works, Picasso unconsciously projected his own emotions or inner desires onto the bull imagery, making the bull figures vivid reflections of his psychological state at the time. In *Guernica*, the violent bull imagery first emerged from Picasso's conscious decision to negatively transform the bull motif. During the actual creation process, he infused the bull with masculine traits while simultaneously projecting unconscious psychological factors—shaped by childhood patriarchal pressures and the Spanish Civil War—onto the figure. In two other works from the same period featuring bull imagery, the bull in *Franco's Dreams and Lies* reflects Picasso's intense desire for a swift end to the Spanish Civil War on a socio-political level. Meanwhile, the bull and female matador figures in *The Great Bullfight* express the artist's emotional turmoil with his first wife, Olga, on a personal level. I believe it is precisely because the artist consciously or unconsciously infused his own emotions into the pictorial imagery that the numerous figures in *Guernica* possess such profoundly moving artistic power. This allows viewers to perceive the cruelty of war through the abstract forms within the painting, endowing the work with timeless artistic appeal. Naturally, the multiplicity of meanings inherent in abstract art and abstract imagery provides ample scope for the analysis of this work from an art psychology perspective in this essay.



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# The Inheritance and Innovation of the “Calligraphy and Painting Share the Same Origin” Theory: Taking Guo Xi’s Lofty Ambitions in Forest and Spring as an Example

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**Abstract:** The theory that “calligraphy and painting share the same origin” first emerged from Zhang Yanyuan’s Tang Dynasty concept of “calligraphy and painting sharing the same essence”. This idea was later reaffirmed by Guo Xi in his Northern Song Dynasty masterpiece *Lofty Ambitions in Forest and Spring*, which emphasizes that throughout Chinese painting’s evolution, its core essence—pursuing the “figural representation of objects”—has remained unchanged. The act of nature’s forms concurrently gave birth to another great art form: the origins of calligraphy. As a foundational text of Northern Song landscape painting theory, *Lofty Ambitions* begins with an Original Preface that explores the relationship between calligraphy and painting. It not only inherits the «shared origin» tradition but also enriches it through four new dimensions: «shared ontological origin,» «shared formal source,» «shared spiritual source,» and «shared inner mind source».

**Keywords:** *Lofty Ambitions in Forest and Spring*; Calligraphy and Painting Share the Same Origin; Guo Xi

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## 1.Introduction

*Lofty Ambitions in Forest and Spring* is a summary of Northern Song painter Guo Xi’s experiences in landscape aesthetics and landscape painting creation, embodying extremely high aesthetic value. The opening Original Preface serves as Guo Xi’s “exposition of his ideas,” exploring the origin of painting and emphasizing that calligraphy and painting share similarities or close connections in aspects such as materials used, expressive techniques, formative conditions, and aesthetic concepts. In the Tang Dynasty, painter Zhang Yanyuan, in Volume “On the Origin and Development of Painting” of *Records of Famous Paintings of All Dynasties*, comprehensively expounded the theory of “calligraphy and painting sharing the same origin” from a theoretical perspective for the first time, and concluded that “calligraphy and painting were of the same essence and undivided” in terms of the significance of their origins. Guo Xi inherited and developed this theory, breaking down “calligraphy and painting sharing the same origin” into four aspects: “calligraphy and painting sharing the same ontological origin,” “calligraphy and painting sharing the same formal source,” “calligraphy and painting sharing the same spiritual source,” and “calligraphy and painting sharing the same inner mind source.” By conducting an in-depth analysis of the “calligraphy and painting sharing the same origin” theory in the Original Preface, and combining it with the specific practice of “integrating calligraphic techniques into painting” by later calligraphers and painters, this study further explores and interprets the aesthetic thoughts that Guo Xi did not elaborate on, appreciates the beauty of painting from the perspective of calligraphy,

and seeks the essence of painting.

## 2. Calligraphy and painting share the same “origin”

Calligraphy and painting share the “same origin” in that during clan society, each tribe had its own totem. Cultures such as the Dawenkou, Wucheng, and Banpo cultures have preserved hundreds of ancient clan emblems. The images on these emblems all originated from the observations of ancient ancestors on nature—they understood every grass, tree, flower, and “expression” around them from a purely natural perspective. Whenever they gained insights, they recorded these matters or expressed them through symbols. The Northern Song Dynasty Taoist classic *Seven Apocrypha of the Clouds* records: “The Emperor (Huangdi, the Yellow Emperor) arrived at the Spring of Cuiwei, where a yellow dragon came carrying a map. The map had all colors fully presented, with a white base, orchid leaves, and crimson text. The Emperor ordered his attendants to copy it and show it to the world, calling it the ‘Hetu and River Map and Luo Document.’”<sup>[1]</sup> The Hetu and Luoshu here represent one interpretation of the “shared origin of calligraphy and painting.” In the understanding of ancient ancestors, calligraphy and painting were in a chaotic state of being undivided, integrated, and mutually complementary—they were both calligraphy and painting, with no obvious distinction between them. People used their bodies, physical objects, images, and symbols to convey information and communicate. The functions and significance of calligraphy and painting in clan society all arose from the needs of life and evolved based on the observation of nature. In the Original Preface, Guo Xi mentioned the historical basis for the “shared origin” of calligraphy and painting. He quoted *The Book of Appended Remarks*, Part 1: “Looking up to observe the patterns of heaven, looking down to examine the principles of earth—thus understanding the reasons for the obscure and the evident” and *The Book of Appended Remarks*, Part 2: “In ancient times, when Fuxi ruled the world, he looked up to observe the images in heaven, looked down to examine the laws of earth, studied the patterns of birds and beasts and the suitability of the land, took examples from his own body and from distant things. Thus, he created the Eight Trigrams.”<sup>[2]</sup> These quotations illustrate that the earliest writing and images originated from humans’ “taking examples from nearby and distant things”—i.e., imitating human affairs and the forms of objects from near and far. Here, “looking up and down to observe” and “taking examples from near and far” are both ways of observing things and capturing their forms. The objects of “observation” and “imitation” all come from heaven, earth, and all creatures, serving as an inevitable channel connecting the subject’s emotions, thoughts with heaven, earth, and all things. This view inherits the ideas of the Tang Dynasty painter Zhang Yanyuan. In *Records of Famous Paintings of All Dynasties*, Zhang expounded on the origin and transformation of calligraphy and painting from the perspective of painting. In Volume 1, *On the Origin and Development of Painting*, he stated:

“Fuxi obtained from the Rong River, and thus classics and images began to emerge; Xuanyuan obtained from the Wen River and Luo River, and Shihuang and Cangjie shaped them. The Kui constellation has bright horns, governing literature and writing from below; Cangjie had four eyes, looking up to observe the celestial phenomena. He followed the traces of tortoise shells and thus determined the forms of written characters. Nature could not hide its secrets, so grain rained from heaven; spirits and monsters could not conceal their shapes, so ghosts cried at night. At that time, calligraphy and painting were of the same essence and undivided; their symbolic forms were just initiated and still simple. Since there was no way to convey ideas, calligraphy emerged; since there was no way to show forms, painting emerged. These were the intentions of heaven, earth, and sages. According to the category of philology, there are six styles of writing: first, ancient script; second, unusual script; third, seal script; fourth, auxiliary script; fifth, Miao seal script; sixth, bird script. The bird-head-like patterns on the top of banners and tallies belong to the category of painting. (In the late Han Dynasty, Zhen Feng, the Minister of Works, collated the scripts, identifying six types: Ancient script, i.e., the script found in the walls of Confucius’ mansion; Unusual script, i.e., variants of ancient script; Seal script, i.e., small seal script; Auxiliary script, i.e., Qin Dynasty official script; Miao seal script, used for carving seals; Bird script, i.e., the insect-and-bird-shaped patterns on banners and tallies.) Yan Guanglu said: ‘There are three purposes of diagrams: first, diagramming principles (e.g., the Eight Trigrams); second, diagramming knowledge; third, diagramming forms. Additionally, in the Zhou Dynasty, the royal court taught the six scripts to noble youths, and the third one—pictographs—embodies the essence of painting. Therefore, we know that calligraphy and painting have different names but share the same essence.’”<sup>[3]</sup>

Zhang Yanyuan's exposition holds that although calligraphy and painting have different names, their essence is interconnected. Their initial creation and subsequent development could not do without "looking up and down to observe" and "taking examples from near and far." Yan Yanzhi once said that writing and painting are connected by following the principle of "pictography"—this principle determined the original state of calligraphy and painting being "of the same essence and undivided" in their early stages. Therefore, Guo Xi's discussion on the "shared origin" of calligraphy and painting is reasonable and well-founded.

### 3.Calligraphy and Painting Share the Same "Form-Based" Origin

Calligraphy and painting share the same "form-based" origin, meaning they follow common rules in terms of expressive forms, particularly in the use of brush and ink. Both embody the beauty of abstraction, the beauty of brush and ink, and the beauty of rhythm. The brushwork in calligraphy serves as a "language of form-building," while the brushwork in painting inherently carries a strong calligraphic charm. The lines and ink nuances in traditional Chinese painting reveal the abstract beauty of calligraphy everywhere, exuding its unique aesthetic value.

This viewpoint was put into practice by freehand calligraphers of the Song Dynasty. For instance, Han Zhuo, a renowned portrait artist during the Xuanhe era, clearly stated: "Calligraphy and painting bear different names but follow the same principles."<sup>[4]</sup> Wang Shizhen wrote, "Mr. Shishi painted bamboo using calligraphic techniques, while Daoist Huang Tingjian created calligraphy using bamboo-painting methods."<sup>[5]</sup> The fruitful practices of these two artists provided the most compelling evidence for the theory of "calligraphy and painting sharing a common origin." Zhao Mengfu of the Yuan Dynasty also mentioned the connection between calligraphy and painting in terms of brush and ink in his poems: "Rocks should be painted like the flying-white calligraphy, trees like the ancient seal script; painting bamboo must align with the 'eight methods' of calligraphy. If one can master this, they will know that calligraphy and painting are inherently the same."

<sup>[6]</sup> By comparing rocks and trees in paintings to the "ancient seal" script and "flying-white" calligraphy, he confirmed that calligraphy and painting have an inherent connection in their respective developmental processes. Trees and *Elegant Rocks*, now in the collection of the National Palace Museum in Taipei, is a work from Zhao Mengfu's middle age and a fine representation of the "calligraphy and painting sharing the same 'form-based' origin" theory. The first thing that catches the eye is the running-script inscription at the top right of the painting: "Painted for Yang Anfu on the 26th day of the seventh lunar month in the third year of the Dade era (1299). Zi'ang (Zhao Mengfu's courtesy name)." On the left side, there are colophons by Chen Lin and Ke Jiusi. Chen Lin wrote: "I set sail from the bank of Floating Jade; mountain birds sing through mist beyond tall trees. On Bilan Hall, I recall the nobleman—white stones and clustered bamboos wetted by autumn rain. Chen Lin." Ke Jiusi wrote: "Clouds over Bilang Lake; mist-shrouded vines on evening hills of Tiaoxi. A path through sparse woods and elegant rocks; dancing in the Crystal Palace. Inscribed by Ke Jiusi of Danqiu." The characters of their inscriptions are smaller than Zhao Mengfu's, and this attention to the size of the script resembles the arrangement of primary and secondary relationships among forms in painting. From the verses in the colophons, we know the painting depicts sparse trees and elegant rocks along a lakeshore on an evening after an early autumn rain. The simplicity of the images in the painting highlights the independent beauty of the brush and ink itself—subtle, calm, and imbued with a strong calligraphic touch, with no unnecessary strokes. On the flat slope, three withered trees are painted using elegant "seal" and "ancient seal" brush techniques; their lines twist and interweave, with clear brush paths. The third withered tree in the background has "deer-horn" branches reaching high, and the direction of the branches draws the viewer's gaze to the inscription at the top right (Figure 1). Between the cracks of the rocks, three clusters of bamboo leaves stand gracefully; their shapes—leaning forward or backward—adopt the "left-falling stroke" and "right-falling stroke" techniques of regular script. Compared to the trees and rocks painted with light ink and dry brush, the bamboo leaves have a softer yet more upright texture. The rocks in the painting have their outlines drawn with "flying-white" brushwork, with a continuous flow of brush momentum. Overall, the painting conveys a sense of sparse tranquility after an autumn rain, and the integration of calligraphic brushwork amplifies this feeling—exactly confirming the connection between calligraphy and painting in terms of brush and ink. Regarding Guo Xi's view on calligraphy and painting sharing the same "form-based" origin, Zhu Hegeng, a later scholar, also made important remarks in *Insights from Practicing Calligraphy*:

“Since ancient times, most who excel at calligraphy are skilled in painting, and most who excel at painting are proficient in calligraphy—calligraphy and painting take different paths but lead to the same destination. Painting rocks is like ‘flying-white’ calligraphy; painting trees like ‘ancient seal’ script; painting bamboo stems like “seal” script, branches like cursive script, leaves like regular script, and joints like official script. The trees painted by Guo Xi and Tang Di, the bamboo by Wen Tong, and the grapes by Wen Riyuan all originate from cursive script techniques—these are examples of calligraphy-painting connection. As for calligraphy styles, there are metaphors such as ‘swan’s head,’ ‘tiger’s claw,’ ‘inverted leek,’ ‘wavy curve,’ ‘dragon and phoenix,’ ‘unicorn and turtle,’ ‘fish and insect,’ ‘cloud and bird,’ ‘dog and rabbit,’ ‘tadpole’. There are also descriptions like ‘stroke like a cone scraping sand,’ ‘ink like a seal pressing clay,’ ‘folded hairpin,’ ‘water stain on wall,’ ‘rock falling from a high peak,’ ‘withered vine of a hundred years,’ ‘startled snake entering grass,’ ‘dragon leaping and tiger pouncing,’ ‘playing in the sea and roaming the sky,’ ‘beauty and immortal,’ ‘sunset fading and moon rising.’ These are all examples of the connection between calligraphy and painting. Reading Han Yu’s Preface to Sending Monk Gaoxian and Li Yangbing’s Letter to Minister Li, one will have even greater faith in the principle that calligraphy and painting are connected.”<sup>[7]</sup>

This passage explains that since ancient times, those skilled in calligraphy are mostly good at painting, and those skilled in painting are also mostly proficient in calligraphy. Although calligraphy and painting differ in form, they are essentially connected. If one does not rigidly adhere to the superficial forms of calligraphy and painting but explores their evolution, they will find that calligraphy and painting influence each other, leading to changes and mutual promotion.

*Figure1: Partial View of Sparse Woods and Elegant Rocks by Zhao Mengfu*



#### 4.Calligraphy and Painting Share the Same “Spirit-Based” Origin

Calligraphy and painting share the same “spirit-based” origin, meaning that calligraphy and painting not only share a common origin in terms of brush-and-ink forms, but their deeper connection lies in the fact that neither has ever ceased pursuing artistic conception. The creation of artistic conception serves not only as the basis for calligraphers’ ingenuity but also as the source of inspiration for painters’ creations. The formal beauty of calligraphic colophons can balance the composition of a painting, fill empty spaces, and enhance its momentum. The textual content they carry endows the painting with a clearer semantic expression, evokes aesthetic appeal in a literary sense, generates artistic interest, and highlights the scholarly artistic conception. Fang Xun of the Qing Dynasty stated: “Some paintings may not require colophons, but Jin Nong’s paintings cannot be without inscriptions. His new verses and witty remarks possess exquisite literary grace; his running script and official script all conform to ancient styles.” This passage refers to Jin Nong, the leader of the “Eight Eccentrics of Yangzhou,” whose calligraphic colophons were unique and innovative, adding great artistic charm to his paintings. Influenced by the prevailing trends in the calligraphy circle of his time, Jin Nong absorbed new calligraphic form elements from the Song Dynasty’s Buddhist scripture calligraphy and folk woodblock carvings, adapting them for his own use. Consequently, his calligraphic colophons mostly adopted the scripture-writing style regular script or a hybrid style of



official and regular script (Figure 2). The complete rendering of each dot and stroke, along with the relatively gentle rhythm of brush movement, brought new changes to calligraphic colophons. Using such calligraphic styles in paintings obviously added a “scholarly elegance” to the composition. Jin Nong’s calligraphic colophons became a hallmark of his paintings and exerted a profound influence. If Jin Nong’s paintings still left room for the further development of calligraphic colophons, then in Zhu Da’s works, the aesthetic appeal of calligraphic colophons and paintings has been fully integrated, and the boundary between calligraphy and painting has blurred here. Thus, his works allow viewers to better perceive the beauty of artistic conception pursued by both “calligraphy” and “painting.” Zhu Da painted with a style that revealed his true nature; while capturing the artistic interest of the composition, he also demonstrated his active and perceptive way of thinking. In his works, the definitions of all concepts became less important—only indulging in “the pursuit of calligraphy and painting” was his true goal. The expression of artistic conception in both Jin Nong’s and Zhu Da’s paintings was inseparable from the integration of calligraphy, serving as typical examples of the “spirit-based shared origin of calligraphy and painting.”

Qi Baishi, a renowned modern calligrapher and painter, also used calligraphy to highlight the artistic conception of his paintings. In 1941, Qi Baishi created the scroll *Eagle*; on the upper left, he inscribed in running-regular script: “To Chairman Mao Zedong. The tenth lunar month of the Gengyin year. Qi Huang” (Figure 3). A single-line signature was added along the left edge of the painting. With the assistance of this calligraphic colophon, the painting achieved a clear contrast between emptiness and solidity, as well as a compact and rich sense of layering, highlighting a grand artistic conception. The calligraphic inscription on another work, *Eagle and Rock*, differs entirely from that on *Eagle*. Through the content of the calligraphic colophon, Qi Baishi incorporated the auspicious meanings of folk sayings into his painting, narrowing the distance between “freehand painting” and the general public. For instance, he painted two magpies on the branches of a plum tree, titling the work *Joy on the Eyebrows*. Using metaphors and symbols to subtly convey a joyful and auspicious atmosphere, he allowed viewers to feel the authenticity of art in daily life. Qi Baishi’s paintings drew inspiration from calligraphy: his brushwork was vigorous, neat, and unrestrained, embodying the “metal and stone charm” pursued by stele-school calligraphy. He handled the contrasting relationships in his paintings—such as emptiness and solidity, opening and closing, expansion and restraint—with great intensity. Here, the expressive power of “calligraphy” was elevated to a new height, enabling his works to not only highlight a grand artistic conception but also exhibit vivid and natural vitality.

From “calligraphic intent” to “painterly intent,” the innovation of calligraphy and painting lies not only in technical aspects but more importantly in elevating artistic creation to a spiritual practice of perceiving the laws of nature and cultivating one’s mind.

Figure2: *Album of Flower Paintings by Jin Nong and Eagle by Qi Baishi*





## 5. Calligraphy and Painting Share the Same “Heart-Based” Origin

The notion that calligraphy and painting share the same “Heart-Based” Origin means both arts attach great importance to the state of the creative subject—a concept encapsulated by the principle “Learning from nature externally, and drawing inspiration from one’s heart internally”. Artworks are no longer mere combinations of black and white ink, but dynamic recreations of life. Guo Xi elaborated on the connotation of heart origin using landscape painting as an example in his work *The Lofty Message of Forests and Streams*:

“A well-established view in the world holds that landscapes in paintings can be ‘walked through,’ ‘looked at,’ ‘traveled in,’ or ‘lived in.’ Any painting that achieves this reaches the realm of exquisite work. However, landscapes that are ‘walkable’ or ‘viewable’ are not as valuable as those that are ‘travelable’ or ‘livable.’ Why? Observe the mountains and rivers in the real world: across hundreds of miles, places that are truly suitable for traveling or living make up no more than three or four out of ten. Yet we must depict scenes that are ‘livable’ and ‘travelable’ in paintings. The reason why virtuous scholars yearn for forests and springs is precisely because of these wonderful qualities. Therefore, painters should create with this intention, and connoisseurs should appreciate paintings with this understanding—that is how the original essence of landscape painting is preserved.”<sup>[8]</sup>

By comparing four types of landscape paintings, Guo Xi expounded his ideal of landscape art: landscapes that are “livable” and “travelable.” Since places suitable for living and traveling are rare in real natural landscapes, yet virtuous scholars seek exactly such places in nature, landscape paintings—as representations of ideal scenery—should strive to create a realm of “livability” and “travelability,” transforming black and white ink into an ideal paradise in reality. He advocated “immersing oneself in mountains and rivers to capture them”—experiencing and contemplating landscapes as part of one’s lived world, and transforming objective natural objects into carriers of subjective emotions and thoughts. Shi Tao, a renowned painter of the early Qing Dynasty, put forward the concept of “the Primal Brush” in *The Aphorisms of Painter Bitter Melon Monk*, which also beautifully explains the meaning of “heart origin”. He stated:

“Painting is governed by the mind. If a painter fails to deeply comprehend the principles behind the graceful complexity of mountains, rivers, figures, the inherent nature of birds, beasts, grass, and trees, and the structural rules of ponds, pavilions, and towers—if they cannot fully capture their subtleties—they will never grasp the fundamental principles of ‘the One Brush’... ‘The Primal Brush’ encompasses everything beyond the chaos of primal creation. Even hundreds of millions of brushstrokes begin and end with this principle; it all depends on how the painter wields it. If one can embody ‘the One Brush’ in even the smallest details, with clear intention and transparent brushwork...”<sup>[9]</sup>

This passage explains that painting creation is governed by the subjective mind. Painters must also deeply observe objective nature—“learning from nature externally, and drawing inspiration from one’s mind internally”—and convey the essence of all things in heaven and earth through brush and ink. However, for the brush and ink used by painters to successfully achieve this, they must “deeply comprehend the underlying principles.” Only in this way can they transcend the surface of objects, embrace “the vastness of the eight extremes, the changes of the nine regions, the majesty of the Five Great Mountains, and the breadth of the Four Seas”<sup>[10]</sup>, and profoundly interpret the vitality of life and the spirit of heaven and earth. In this process, calligraphy is integrated into painting, and the two arts merge as one. Calligraphy—an art form more inclined to abstraction—injects life into painting, allowing both to converge into a realm that harmonizes with the universe’s great transformation. Beyond Shi Tao, many other theorists have also made relevant remarks to confirm this idea. For instance, Yun Xiang said: “What makes Zhonggui (Wu Zhen of the Yuan Dynasty) unparalleled is that a single brushstroke of his contains ten thousand strokes.”<sup>[11]</sup> Yun Shouping stated: “There is no such thing as a painting without ‘the Primal Brush.’ Even a long scroll or a large album depicting a thousand peaks and ten thousand valleys can be called ‘no painting at all’ if it lacks this essence.”<sup>[12]</sup> These remarks illustrate that “the Primal Brush” gives rise to all things in a painting. Only when brush and ink converge into a “single stroke” that connects with “the Primal Brush” can a painter depict “a thousand peaks and ten thousand valleys” and evoke a cosmic spirit that encompasses all things.

## Conclusion

The concept of “the common origin of calligraphy and painting” has endured for millennia. Regardless of dynastic changes and transitions, its theoretical value remains deeply rooted in the hearts of creators. With the accumulation of history, the integration of these two art forms has become increasingly close.

By sorting out and researching the four aspects mentioned in the Original Preface of Guo Xi's *Lofty Ambitions in Forests and Streams* — namely “calligraphy and painting sharing the same origin of genesis”, “calligraphy and painting sharing the same origin of form”, “calligraphy and painting sharing the same origin of spirit”, and “calligraphy and painting sharing the same origin of mind” — this study first reveals the evolutionary process of the gradual infiltration and expansion between calligraphy and painting. It then explores the unique aesthetic orientation of Chinese calligraphy and painting and the spiritual pursuit of painters embodied within this process. Finally, it cites the philosophical viewpoints from Shi Tao's Chapter on the Single Brushstroke to explain the cosmic spirit contained in the «common origin» of calligraphy and painting, demonstrating the artistic divergence between Chinese painting and Western painting from different perspectives. To sum up, the theory of “the common origin of calligraphy and painting” proposed by Guo Xi is not only a discovery and summary of the achievements of previous generations, but also expands the connotation of “common origin” from different angles. The inscriptions on Chinese paintings are derived from poetry, and the brushwork and ink application draw more from calligraphy. Calligraphers and painters of all dynasties “used the fluttering of brush and ink to express the free spirit in their hearts”. Therefore, Chinese painting does not emphasize the depiction of specific objects; instead, it tends to use abstract brush and ink to convey the painter's personality, mood, and the artistic conception of the work. Although “calligraphy” and “painting” are different art forms, they share the same essence and source of artistic charm.

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# Costume Semiotics and Cultural Construction in East Asian Historical War Films: A Comparative Analysis of Roaring Currents, Red Cliff, and Ran

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**Abstract:** This study explores the semiotic dimensions of costume in East Asian historical war films, focusing on the Korean film *Roaring Currents* (2014), the Chinese film *Red Cliff* (2008), and the Japanese film *Ran* (1985). By integrating Barthes' "signifier–signified" model with Peirce's triadic semiotic framework of iconicity, indexicality, and symbolicity, the research examines how costumes function as visual signs that mediate identity, power, and cultural values.

The analysis demonstrates that in *Roaring Currents*, costumes highlight the tension between practicality and heroism, reinforcing narratives of national resistance and collective sacrifice. In *Red Cliff*, costume design balances historical accuracy and artistic stylization, visually articulating political power structures and cultural identities among the Three Kingdoms. In *Ran*, the symbolic use of armor and color coding conveys themes of fatalism, clan disintegration, and philosophical reflection, transforming costumes into theatrical metaphors.

Comparative findings reveal that costume semiotics operates across three key dimensions: (1) identity construction through differentiation of rank, class, and gender; (2) representation of power via materiality, ornamentation, and hierarchical design; and (3) cultural signification through color systems, symbolic motifs, and ideological codes. While each national cinema emphasizes distinct thematic priorities—heroic resistance in Korea, political-military order in China, and fatalistic aesthetics in Japan—all three employ costume as a multilayered semiotic system that transcends mere historical reproduction.

This research contributes theoretically by positioning film costume as a core subject of cultural studies rather than a subsidiary of visual art, expanding semiotic analysis into the interdisciplinary field of costume studies. Practically, it underscores the role of costume in shaping national identity, collective memory, and cultural discourse, demonstrating its value as a medium of aesthetic expression and soft power.

**Keywords:** Film Costume; Semiotics; Historical War Films; Identity; Power; Cultural Symbolism; East Asia

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## 1.Introduction

In the genre of historical war films, costume has long functioned not merely as a tool for reproducing historical reality but as a complex visual language that embodies cultural symbolism, political attitudes, and national sentiments. The color, structure, texture, hierarchy, and combination of costumes construct characters' social status, factional affiliation, and values, while simultaneously delivering visual signals to the audience such as "who holds power" and "who is the other." Furthermore,

costume design in war films reinforces the historical atmosphere and spatial perception, moving beyond surface-level reproduction to foster emotional identification and the projection of values among viewers.

In East Asian countries, historical war films often bear a dual mission as both “national epics” and “cultural narratives.” For example, Korea’s *Roaring Currents* (2014), China’s *Red Cliff* (2008), and Japan’s *Ran* (1985) are representative war epics that not only reconstruct the horrors and tragic grandeur of war through monumental scenes but also articulate aesthetic imaginations of power, identity, order, and national spirit through the semiotic system of costume imagery. In this way, film costumes transcend historical accuracy and become deeply inscribed with cultural codes, aesthetic traditions, and national narrative logics, forming an essential stratum of visual language. Therefore, examining the semiotic mechanisms and cultural construction of costumes in these three films from the perspectives of semiotics and visual culture holds significant academic and practical value.

The title of this study is “Costume Semiotics and Cultural Construction in East Asian Historical War Films: Focusing on Korea’s *Roaring Currents*, China’s *Red Cliff*, and Japan’s *Ran*.” It focuses on three representative East Asian war films, analyzing the visual semiotic systems and cultural implications embedded in costume expressions and comparing them across cultures. These films serve as key visual texts of national and ethnic histories, illustrating typical modes of constructing war imagery within dominant cultural memory. At the same time, they combine high levels of historical verisimilitude with distinct semiotic differences, making them highly suitable cases for comparative study.

The purpose of this study is to explore how costumes, as a visual language, contribute to the construction of character identity, the formation of national identity, and the development of narrative progression. Particular attention is paid to how costumes embody a balance between “authenticity” and “visuality,” as well as between “historical reproduction” and “artistic staging.” Based on this perspective, the study poses the following three research questions:

How do costumes encode characters’ status and power relations through color, material, structure, and hierarchy?

In distinguishing factions and transmitting cultural values, what similarities and differences emerge among the three films’ costumes?

Within the tension between “historical verification” and “artistic stylization,” how do costumes perform narrative and symbolic functions?

In Korean scholarship, research on war representation and film costumes has been carried out from diverse angles. Kim (2012) argued, through a genre analysis of war films, that war imagery reflects not merely the battlefield but also social structures and ideologies. Lee and Kang (2016) examined late-1930s Korean films and revealed how women’s costumes were shaped within specific historical contexts. Ryu and Noh (2013) established a classification framework that divided film costume studies into textual analysis, contextual analysis, and dress-related fields, while pointing out the lack of research on education and production systems. Shin and Kim (2014), after reviewing studies from 1996 to 2013, found that qualitative approaches centered largely on Korean and American films, with a predominant focus on symbolic meanings of characters. Other case studies include Lee et al. (2002), who analyzed *Gone with the Wind* and identified close connections between costume design and character personality, and Kim (2014), who applied fantasy literature theory to categorize the modes of fantasy expressed through costumes in *Alice in Wonderland*. Overall, previous Korean research has laid the groundwork for understanding the relationship between costume, character, narrative, and social context, but systematic studies of war/historical films, cross-cultural comparisons, and digital methodologies remain underdeveloped.

In China, scholarship has mainly focused on historical and classical films. Jin (2024) analyzed *Red Cliff*, highlighting the role of costume design in shaping character imagery, while Ni (2009) examined costume techniques and the interplay of history and literature. Zhou (2016) analyzed female costume art in Ye Yanyan’s classic films, emphasizing the influence of designers’ personal styles on cinematic aesthetics. Tian (2024) extended research into early Chinese films, exploring the formation of costume forms and concepts. Xie (2015) argued that costumes function not as mere decoration but as a medium of visual communication that engages audience reception and cultural transmission.

Japanese scholarship has tended to focus on the interactions between film, society, and literature. Tang (2018) studied Akira Kurosawa’s Shakespeare adaptations, pointing out the visual symbolism of costume in cross-cultural reinterpretation. Harada

et al. (2001) analyzed films from the 1960s to the 1980s, identifying costumes as a representation of social transformation. In summary, both Chinese and Japanese scholarship recognizes the critical role of costume in character construction, narrative development, and cultural representation. Chinese studies emphasize artistic and aesthetic values, while Japanese studies focus more on social contexts and cross-cultural adaptation. However, across East Asia as a whole, comparative studies between nations and the application of digital restoration methodologies remain insufficient—an area for further research development.

Although prior research has addressed the political, narrative, and cultural dimensions of costume, most studies are confined to a single nation or individual text. Cross-cultural comparative research that takes costume as a central medium remains scarce. Moreover, issues such as the interaction between costume and cinematography, or the mechanisms through which costume conveys national sentiment, have not yet been systematically analyzed. To address these gaps, this study constructs a triadic analytical framework of “visuality–narrative–culture.”

Methodologically, this study adopts four approaches.

First, a literature review, which systematically synthesizes Korean, Chinese, Japanese, and Western scholarship to establish a theoretical foundation, particularly integrating cross-disciplinary insights from film studies, semiotics, and costume studies.

Second, film costume analysis, which treats cinematic images as texts to examine how costumes function in character construction, scene atmosphere, and narrative progression, as well as their interaction with narrative structures.

Third, semiotic analysis, which applies Barthes’ signifier–signified model and Peirce’s triadic sign classification to explore how costumes operate as visual mediators within meaning-making systems.

Fourth, a cross-cultural comparison, which juxtaposes the three films within the East Asian cultural context to reveal the cultural logics, historical thought, and visual discourses embedded in costume representation.

Through these methods, the study seeks to explore the intersection between film visual culture and costume semiotics and to propose a new paradigm of cross-cultural analysis that demonstrates both interpretive depth and practical applicability.

## **2.Theoretical Foundations**

### **2.1 Semiotic Theory and Film Costume Studies**

Semiotics provides a fundamental methodological foundation for the study of film costume (Barthes, 1977; Peirce, 1998; Gunggi & Lee, 2015). This research simultaneously adopts Barthes’ (1977) model of the signifier–signified structure and Peirce’s (1998) triadic division of iconicity–indexicality–symbolicity. The former clarifies how costumes function as mechanisms of meaning production between signifier and signified, while the latter subdivides the concrete pathways through which costumes are manifested on the visual level. By combining the two, the semiotic analysis of costumes enables the identification of meaning-construction logic at a macro level and the interpretation of specific visual expressions at a micro level.

In historical war films, costume functions as the “skin of an era.” At the level of signifier, it appears through colors (black, red, white), materials (metal, leather, textiles), and forms (armor, robes, cloaks). At the level of signified, it embodies social hierarchy, power relations, and ethnic characteristics as the “surface of discourse.” Through the selection and combination of such visual elements, costumes complete the visible encoding of identity and power, organizing the perceptual and emotional pathways of the audience (Honeycutt, 2021).

The diverse theoretical trends of semiotics offer multilayered interpretations for costume studies. Iconicity reproduces the forms of historical dress, providing the basis of “historical authenticity” as perceived by audiences. Indexicality reveals the brutality of the war environment and the bodily experiences of characters through traces such as battle damage, bloodstains, smoke, and water marks. Symbolicity is realized through color systems, heraldic motifs, and decorative styles, linking deeper cultural oppositions such as loyalty and betrayal, order and collapse, honor and disgrace.

### **2.2 Genre Characteristics of Historical War Films**

Historical war films take major historical events as the axis of narrative, possessing both factual record and artistic fabrication. From a genre perspective, war films are not merely narrative types but mechanisms for producing cultural discourse and collective memory. In other words, they organize fragmentary historical events into “visualized national epics”



and construct cultural identity for audiences through heroic character portrayals and scenes of collective confrontation (Joo, 2012).

Within this framework, costume functions to mediate the tension between “authenticity” and “stylization.” On one hand, historically verified and functional attire, such as armor designs adapted to tactical needs, guarantees the authenticity and sense of historical time. On the other hand, directors, art directors, and costume designers externalize power relations and ethical themes into visual orders through color systems and stylized forms of dress.

Specifically, in the case films analyzed in this study:

*Red Cliff* adopts a dual strategy of “authenticity–aestheticization,” simultaneously implementing grand narrative and character differentiation.

*Roaring Currents* contrasts the “concise and pragmatic” battle attire of the Joseon navy with the “ornate and complex” armor of Japanese warriors, reinforcing the binary opposition of “resilience vs. coercion.” It also highlights the specific functional requirements of costume in naval combat and conveys the bodily experiences of the characters.

*Ran* establishes a theatricalized visual system through color-coding of clans and factions, rendering visible its thematic drivers of “collapse of order” and “fatalism” through the “surface signs” of costume.

Thus, costume in historical war films plays dual roles in genre construction: as a device of “narrative differentiation” (identification of status, faction, class) and as a mechanism of “aesthetic organization” (integration of color, material, style). It functions as a mediating apparatus along the spectrum of “historical authenticity–artistic style.”

## 2.3 Semiotic Meanings of Costume

From a multidimensional perspective, costumes in historical war films are not mere visual elements of form but semiotic systems with complex cultural implications (Vojković, 2020).

First, at the functional level, costumes serve as instruments of combat and protection, responding to geographic environments and tactical requirements. For example, in naval warfare, lightness and mobility are emphasized, while in land battles, weight and defensiveness are prioritized. This indicates that costume symbolizes not only practical functionality but also adaptation to environment and strategic implications.

Second, at the status level, costume functions as a visible apparatus of social differentiation and hierarchical order. Through differences in color, form, and ornamentation, it distinguishes generals from soldiers, rulers from advisors, and allies from enemies. This operates as more than cognitive identification; it serves as a visual system that externalizes power structures and organizational order.

Third, at the cultural level, costume embodies ethnicity, gender culture, and ritual, serving as a mediator of historical memory and collective imagination. This is not only the reproduction of traditional culture in contemporary visual media but also a visualization of social ethics and cultural values through representations of gender roles and supporting characters. Furthermore, the semiotic encoding of costume expands into philosophical and aesthetic metaphors, reflecting deeper themes such as regime change and the transience of human fate (Annala, 2014).

In summary, costume in historical war films is not simply a device of representation but a critical channel for understanding narrative mechanisms, power discourses, and cultural identities.

## 3. Semiotic Analysis of Costumes in the Korean Historical War Film *Roaring Currents*

### 3.1 Historical Context and Formal System

#### 3.1.1 Armor and Costume System of the Joseon Navy

The 2014 film *Roaring Currents* reconstructs the attire of the Joseon navy during the Battle of Myeongnyang in the Imjin War. The basic armor was made of iron plates reinforced with thick leather, ensuring lightness and water resistance suitable for naval combat. Soldiers typically wore dark blue or black robes under leather armor and simple leather helmets, emphasizing mobility and practicality (Figure 1).

By contrast, Japanese warriors wore lacquered iron armor adorned with intricate patterns on shoulder plates and helmets. These decorations conveyed not only the dignity of the samurai but also signified social rank and clan affiliation (Figure 2). The differences between the costumes of the Joseon navy and the Japanese samurai extend beyond military technology,



reflecting divergent cultural orientations: Joseon emphasized pragmatism and restraint, while Japan highlighted decorum and aesthetics.

*Figure 1. Costume style of the Joseon navy*

Source: <https://blog.naver.com/sunnsky99/220081218480>



*Figure 2. Lacquered iron armor of Japanese warriors*

Source: <https://blog.naver.com/mimininikaka/220081921453>



### 3.1.2 Materials and Forms of Commanders' and Soldiers' Costumes

Admiral Yi Sun-sin's attire sharply contrasts with that of his soldiers. He is depicted wearing a deep red or brown robe overlaid with iron armor, with additional protection on the shoulders and chest, symbolizing both command authority and a spirit of sacrifice. Soldiers, by contrast, wore modest robes and leather armor with almost no decoration, expressing collective uniformity. This differentiation visually reinforces the hierarchical order within the army, while simultaneously semiotically encoding Yi Sun-sin as a national hero whose costume serves as a visual metaphor for leadership and patriotic spirit.

### 3.1.3 Costume Colors and the Semiotic Meaning of the Naval Narrative

In *Roaring Currents*, color functions as a crucial narrative device. Joseon naval costumes, dominated by blue and black, harmonize with the sea while symbolizing composure and resilience. These colors also reduce the enemy's visibility and create a solemn atmosphere. By contrast, Japanese costumes employ vivid hues of red, gold, and black to emphasize power and authority, exerting psychological pressure.

From a semiotic perspective, dark tones are encoded as symbols of "sacrifice and national solidarity," while bright colors signify "power and ceremonial authority." This chromatic contrast generates visual tension between enmity and cultural difference.

A comparison of semiotic meanings between Joseon and Japanese naval costumes in *Roaring Currents* is presented in Table 1.

*Table 1. Semiotic Comparison of Joseon and Japanese Naval Costumes in Roaring Currents*

| Category          | Joseon Navy (Roaring Currents)   | Japanese Navy (Roaring Currents)                   | Semiotic Meaning   |
|-------------------|--|--|--|
| Armor type        | Light armor of iron plates + thick leather, functional and pragmatic         | Heavy lacquered iron armor, ornate and decorative  | Function vs. dignity: light armor → "pragmatism/adaptation"; heavy armor → "power/oppression"        |
| Costume weight    | Lightweight, emphasizing mobility and efficiency                             | Heavyweight, emphasizing dignity and rituality     | Tactical sign: light → "agility"; heavy → "stability/domination"                                     |
| Costume colors    | Dark blue/black, low saturation, blending with the sea                       | Red/gold/black, high saturation, ornate emphasis   | Color contrast: dark → "sobriety/sacrifice/national solidarity"; bright → "power/honor/ceremony"     |
| Headgear          | Simple leather caps, pragmatic   | Decorative helmets with family crests              | Power sign: simplicity → "survival/pragmatism"; elaboration → "authority/samurai spirit"             |
| Commander costume | Yi Sun-sin: deep red/brown robe + iron armor, with protective reinforcements | Samurai commanders: elaborate armor, bright colors | Hierarchical sign: Yi → "sacrifice/leadership/national hero"; samurai → "clan honor/aesthetic power" |
| Strategic values  | Emphasis on lightness, waterproofing, mobility; restraint and functionality  | Emphasis on dignity, aesthetics, clan symbolism    | Cultural semiotics: Joseon → "resilience/restraint"; Japan → "aestheticized power/decorum"           |

### 3.2 Costume Semiotics of Identity and Power

In *Roaring Currents*, identity and power relations are highly encoded through costume. Admiral Yi's armor is thick and majestic, with chest plates reinforced by iron studs and collars and sleeves decorated with fur or leather, symbolizing both protection and command authority. Sub-commanders' armor was more refined than that of common soldiers but still modest, using leather and iron plates, reflecting simplicity. This gradation visually materialized the hierarchy of "general–subcommander–soldier." Soldiers wore dark robes topped with lightweight leather armor, almost devoid of decoration, emphasizing discipline, uniformity, and interchangeability.

Collectively, the Joseon military contrasted starkly with the Japanese warriors. Japanese armor was lavishly constructed with multiple layers of iron and lacquered leather, adorned with clan crests on helmets and protective gear. These crests represented not only social status but also the aesthetics of bushido and personal honor. In cinematic depictions, when Japanese warriors appeared en masse under sunlight, the gleam of their armor created an overwhelming visual effect, strongly contrasting with the Joseon soldiers' plain and dark attire. This visual opposition foregrounded the clash of two cultural values: "personal honor" versus "collective sacrifice."

Special characters also gained symbolic meaning through costume. Spies typically wore gray or brown garments, hinting at ambiguous identities. Traitors were shown in more ornate attire than common soldiers, symbolizing the pursuit of power and personal desire. By contrast, civilians who voluntarily joined the fight appeared in worn and ragged clothing, expressing tragic determination and helplessness. These costumes of marginal characters visually intensified the contrast between individual fate and collective struggle, reinforcing narrative tension.

### 3.3 Battlefield Context and Narrative Function

The naval battle scenes in *Roaring Currents* present an extreme environment of waves, gunpowder, and smoke. Within this context, the Joseon soldiers' lightweight robes and leather armor symbolize not only practicality, waterproofing, and mobility but also a national character of resilience and pragmatism. Though visually modest, these costumes established a visual order of "collective uniformity," enabling audiences to perceive the intensity of national mobilization.

The film particularly highlights the narrative function of damaged armor and bloodstains. Bloodstains symbolize sacrifice and devotion, while cracked armor reveals the brutality of war and the vulnerability of warriors. Such details not only enhance realism but also function as significant semiotic devices, intensifying emotional resonance. Through damaged and stained armor, the audience directly perceives the cost of war and the fragility of life, sharing in the tragic experience.

The ultimate theme of the film is national resistance and the spirit of sacrifice. Admiral Yi's majestic armor symbolizes the national hero, resonating with the soldiers' uniform and plain attire to convey the historical miracle of "triumph of the weak over the strong." In the climax, costume transcends its role as combat equipment and is sublimated into a visual sign that embodies national spirit, amplifying both the tragedy of war and the dignity of the nation.

## 4. Semiotic Analysis of Costumes in the Chinese Historical War Film *Red Cliff*

### 4.1 Historical Context and Formal System

#### 4.1.1 Reproduction of Armor and Military Attire in the Three Kingdoms Period

The 2008 film *Red Cliff* depicts the Battle of Red Cliffs, pursuing both "historical authenticity" and "aesthetic recreation" in its costume design. The production team consulted historical texts such as *Records of the Three Kingdoms* and *Book of the Later Han*, as well as archaeological evidence including Han dynasty stone carvings, pottery figurines, and bronze motifs, to reconstruct the basic attire of generals and soldiers. Costumes typically consisted of long robes (jiao ling you ren chang yi) belted at the waist, with armor composed of iron plates reinforced with leather to ensure both sturdiness and practicality.

Yet the film does not confine itself to archaeological reproduction; artistic stylization was also employed according to narrative needs. The armor of Cao Cao's army appears heavier, with emphasized decorations on shoulders and chest, generating a sense of intimidation, while the troops of Wu are dressed in lighter robes and armor to highlight agility in naval combat. Thus, costume functions not only as historical reproduction but also as a visual semiotic device for distinguishing factions and reinforcing narrative tension.

#### 4.1.2 Differentiation between Generals' and Soldiers' Costumes

Costume design in *Red Cliff* also underscores social hierarchy and symbolic power. Generals' attire is highly stylized. Cao Cao wears a black, heavy, and solemn robe over armor adorned with metal studs, paired with a tall crown to signify authority and majesty (Figure 3). By contrast, Zhou Yu dons a light blue-and-white robe with lighter armor, expressing elegance and balance between civil and martial qualities (Figure 4).

*Figure 3. Costume of Cao Cao*

Source: <https://zhuanlan.zhihu.com/p/371715380>





Ordinary soldiers' costumes emphasize uniformity and practicality. Troops under Cao Cao wear dark-colored robes with leather armor or simple iron plating, signifying discipline and mass collectivity. Soldiers of Wu are dressed in lighter-colored robes and lighter armor, reinforcing agility required for naval battles. Such differentiation not only allows audiences to recognize characters and ranks quickly but also visually represents the hierarchical structure and organizational order of the Three Kingdoms' armies.

Figure 4. Costume of Zhou Yu

Source: [https://k.sina.com.cn/article\\_6482181285\\_1825e3ca500100epgp.html](https://k.sina.com.cn/article_6482181285_1825e3ca500100epgp.html)



#### 4.1.3 Costume Colors and Factional Symbolism

In *Red Cliff*, color functions as the most immediate costume sign. Cao Cao's forces are dominated by black, gray, and dark brown, forming a heavy and unyielding momentum of "iron torrents." By contrast, Zhou Yu and Sun Quan's armies wear blue, cyan, and white, corresponding with the water environment of the Yangtze region, symbolizing agility, wisdom, and legitimacy. Liu Bei's army, though less prominent in the film, is characterized by earth-toned robes made of coarse hemp, highlighting their identity as a "righteous army of benevolence" with humble, civilian qualities.

Through such factionalized color contrasts, the director establishes distinct cultural images and political stances of Wei, Wu, and Shu. Black is assigned to signify power and ambition, cyan to strategy and intelligence, and earth tones to simplicity and righteousness. Thus, costume colors function not only as visual elements but also as signs that visualize narrative values and ideological positions.

Table 2. Hierarchical, Chromatic, and Semiotic Meanings of Costumes in *Red Cliff*

| Category         | Cao Cao's Faction (Wei)                                       | Zhou Yu/Sun Quan's Faction (Wu)                   | Liu Bei's Faction (Shu)               | Semiotic Meaning   |
|------------------|---|---|---------------------------------------|--|
| Generals' attire | Black robe + heavy armor + tall crown, emphasized metal studs | Blue/white robe + light armor, elegant simplicity | Earth-toned hemp robe, plain armor    | Wei → power & ambition; Wu → legitimacy & balance; Shu → benevolence & populism            |
| Soldiers' attire | Dark robes + leather/iron armor, uniform, minimal decoration  | Light robes + light armor, emphasizing mobility   | Coarse hemp robes, simple equipment   | Wei → discipline & pressure; Wu → agility & mobility; Shu → humility & closeness to people |
| Color system     | Black/gray/dark brown (low brightness, heaviness)             | Blue/cyan/white (medium saturation, freshness)    | Earth/natural tones (neutral, rustic) | Wei → authority & ambition; Wu → wisdom & naval identity; Shu → righteousness & simplicity |

#### 4.2 Costume Semiotics of Identity and Power

In *Red Cliff*, identity and power are encoded through costume differentiation. As commander of the northern army, Cao Cao appears in black robes and heavy metallic armor, often adorned with feathers or metallic ornaments on the helmet, producing a solemn and oppressive image. This emphasizes his hegemonic position and identity as a conqueror. Zhou Yu, in contrast,

appears in a blue-and-white robe with light armor, exuding refined lines and elegant hues, symbolizing a balance of literary grace and martial strength. The contrast between “heaviness vs. lightness” and “dark vs. bright” visually distinguishes their political positions and military temperaments, deepening the narrative conflict.

Costumes of military groups also reinforce hierarchy and order. Elite units in Cao Cao’s army wear full suits of iron armor with standardized weapons, symbolizing concentration of resources and strict discipline. Regular soldiers wear simpler robes with leather or partial armor, representing simplicity and “interchangeability” within the collective. Wu’s soldiers wear lighter robes with light armor, emphasizing agility suitable for naval warfare. Although Shu’s soldiers appear less frequently, their earth-toned hemp attire underlines the populist and benevolent character of Liu Bei’s army. Through such hierarchical layering and contrasts, the film visually structures the differences of rank and cultural identity among the Three Kingdoms’ armies.

Particularly notable is the depiction of women’s costumes. Xiao Qiao appears in white and pale pink attire made of light silk, complemented by delicate head ornaments, symbolizing beauty and peace. By contrast, palace maids and other supporting female characters are shown in darker, simpler costumes, indicating subordination and auxiliary roles. While women’s costumes are not central to the narrative, their colors and textures nonetheless function as gendered signs, recalling the symbolic order of “purity vs. subjugation” within the war narrative. Thus, the costume system of the film expresses not only military hierarchy but also gender culture through the shaping of female characters.

### 4.3 Battlefield Context and Costume Imagery

The Battle of Red Cliffs combines both naval and land combat, and the costume design reflects both functionality and symbolism. The heavy iron armor of Cao Cao’s troops generates visual oppression in large-scale scenes, emphasizing their mountainous dominance. In contrast, Wu’s forces wear lighter robes and armor, highlighting mobility and tactical agility suitable for naval operations. These differences align with historical context while simultaneously generating visual tension that allows audiences to intuitively perceive the tactical and cultural contrasts of the “northern vs. southern” confrontation.

The film also assigns narrative functions to details of bloodstains and damaged costumes. Cracks in armor and blood on robes enhance realism while functioning as symbolic signs. Bloodstains symbolize dedication and sacrifice, while damaged armor signifies the brutality of war and the fragility of life. In scenes filled with fire and blood, viewers simultaneously experience pathos and shock, transforming individual deaths into collective historical memory.

Furthermore, costume colors are employed to construct a symbolic system of “alliances and oppositions.” The black, dark gray, and brown of Cao Cao’s army symbolize power and ambition; the cyan of Wu’s army symbolizes wisdom and agility; and the earth tones of Shu symbolize simplicity and benevolence. In particular, during the fire attack scene, the juxtaposition of blue robes and red flames visually overwhelms the black-clad forces, a vivid metaphor that concretizes the theme of “the weak overcoming the strong.” Thus, costume functions not merely as battle gear but also as a semiotic device that embodies cultural and political positions.

## 5. Semiotic Analysis of Costumes in the Japanese Historical War Film *Ran*

### 5.1 Historical Context and Formal System

#### 5.1.1 Basic Forms of Sengoku Armor

The 1985 film *Ran* is set in Japan’s Sengoku period, dramatizing feudal power struggles and the disintegration of clans in a grand war epic. The armor featured in the film references the typical *tōsei gusoku* style of the late Sengoku period. However, the film emphasizes Kurosawa’s theatrical aesthetic rather than strict historical accuracy. Armor for generals is exaggerated in shoulder and chest proportions, heightening dignity and intimidation, while soldiers’ armor is simplified, highlighting numerical scale and collective imagery. Thus, costume does not serve as mere historical reproduction but instead visualizes the tensions of feudal order and power struggles through exaggeration and simplification of form.

#### 5.1.2 Color System and Symbolism

Costume in *Ran* employs color contrast to make character traits and factional divisions immediately legible. The three sons of the Ichimonji clan are each associated with a distinctive color: red, yellow, and blue (Figure 5). Red symbolizes destruction and violence; yellow denotes ambition and betrayal; blue represents coldness, isolation, and fatalism. These chromatic

assignments visually embody the internal fragmentation of the clan and directly convey the film's central conflicts of familial collapse and the struggle for power.



Figure 5. Costumes of the three sons of the Ichimonji clan

Source: <https://www.themoviedb.org/movie/11645/images/backdrops>

### 5.1.3 Costumes and Theatricalized Aesthetics

The costumes in *Ran* reflect Kurosawa Akira's distinctive dramatic style, functioning similarly to stage devices. Grand armor and vivid colors transform battlefield chaos into painterly spectacle, while soldiers' costumes are arranged as color fields that structure cinematic composition. This aesthetic treatment borrows from Japanese traditional theater, especially Noh and Kabuki, whose symbolic forms of expression reinforce the film's solemn atmosphere and tragic tension.

Table 3. Semiotic Meanings in the Costume System of *Ran*

| Category              | Expressive Features   | Visual Effect  | Semiotic Meaning   |
|-----------------------|---|--|--|
| Armor forms           | Referencing tōsei gusoku; generals' armor exaggerated, soldiers' simplified | Generals → dignity and authority;<br>Soldiers → collective mass effect | Historicity transformed into theatricality, reinforcing power struggles                        |
| Color system          | Three sons: red, yellow, blue;<br>intergenerational chromatic split         | Intense color contrast, visual conflict                                | Red = violence; Yellow = ambition; Blue = fatalism → clan fragmentation and struggle for power |
| Theatrical aesthetics | Costumes create large-scale color fields; borrowing from Noh and Kabuki     | Battlefields turned into painterly, ritualized compositions            | Costumes function as signs of emotion and power, deepening tragic atmosphere                   |

## 5.2 Costume Semiotics of Identity and Power

The most striking function of costume in *Ran* is to highlight differences of identity and hierarchy. The sons' differently colored armor not only reflects their individual characters but also visualizes the fraternal struggle for power. Their father Hidetora's colorless, muted armor symbolizes decline and emptiness, functioning as a central tragic image.

The contrast between generals' and soldiers' attire also reinforces unequal structures within feudal society. Generals' armor is ornate, embellished with metal and decorations to signify authority, while soldiers wear simple iron or textile armor, highlighting uniformity and lack of ornamentation. This opposition visually intensifies the structural inequalities inherent in the feudal order.

Female characters also acquire symbolic significance through costume. Lady Kaede wears dark attire, symbolizing intrigue and ambition for power, while Lady Sué appears in bright garments, representing purity and sacrifice. Their contrast not only



foregrounds gender differences but also visually expresses the opposition between power and innocence, amplifying the tragic tension of the narrative.

### 5.3 Costume Imagery in the Battlefield Context

On the battlefield, costumes serve as both practical gear and symbols of death and destruction. Armor consumed by flames and blood-soaked robes concretize the themes of sacrifice and tragedy. Damaged armor embodies the brutality of war, while blood signifies devotion and the extinguishing of life.

In large-scale battle sequences, the chromatic organization of soldiers' armor creates collective visual structures of opposition. The clash of red and blue armies operates not only as a representation of military conflict but also as a metaphor for intra-clan power struggles. Kurosawa uses blocks of color to transform the battlefield into theatrical compositions, rendering order within chaos while simultaneously foreshadowing collapse.

Furthermore, Hidetora's wandering across the battlefield in muted armor symbolizes the futility of power and life. Armor crumbling amid flames functions as a fatalistic visual metaphor, translating the tragic determinism of Shakespeare's *King Lear* into the Japanese cultural notion of *mujō* (impermanence). Thus, costume transcends its role as equipment, ascending into a philosophical visual sign.

## 6. Conclusion

### 6.1 Summary of Research Findings

#### 6.1.1 Semiotic Features of Costumes in *Roaring Currents* (Korea)

*Roaring Currents* emphasized both "consolidation of national spirit" and "priority of practical functionality" in constructing costume semiotics. Overall, costumes were simple and dominated by dark tones, highlighting mobility and durability within naval combat environments. Admiral Yi Sun-sin's costume, featuring heavy armor and dark hues, symbolized "sacrifice and resilience" while externalizing "leadership and authority." In contrast, the soldiers' uniform attire expressed "collectivity" and "replaceability," visually realizing the dual semiotic configuration of "individual hero" and "collective army."

#### 6.1.2 Semiotic Features of Costumes in *Red Cliff* (China)

The costume system of *Red Cliff* demonstrates a dual strategy of "historical authenticity" and "artistic stylization." While the production team referenced archaeological sources and historical texts to reproduce period dress, the director emphasized color and material contrasts to intensify factional opposition. The black and heavy armor of Wei symbolized power and oppression; the blue-and-white attire of Wu symbolized agility, wisdom, and legitimacy; and the earth tones of Shu represented populism and benevolence. Thus, costumes functioned not only as tools of historical reproduction but also as visual mediators of political order and cultural identity.

#### 6.1.3 Semiotic Features of Costumes in *Ran* (Japan)

*Ran* revealed the collapse of clan order and fatalistic tragedy through the aesthetic logic of "theatricalization and symbolization." The red, yellow, and blue armor of the three sons respectively symbolized destruction, betrayal, and isolation, while Hidetora's muted armor signified decline and emptiness. Costumes thus transcended mere reproduction to acquire philosophical meaning, functioning as "fatalistic metaphors" that permeated the entire film.

#### 6.1.4 Comparative Findings of East Asian Historical War Films

*Table 4. Comparative Semiotic Features of Costumes in Three East Asian Historical War Films*

| Category | Roaring Currents (Korea)  | Red Cliff (China)  | Ran (Japan)   | Comprehensive Meaning   |
|----------|---|--|---|---|
| Identity | Emphasis on contrast between generals and soldiers; Yi Sun-sin's costume symbolizes "national hero" | Clear differentiation of generals and soldiers; contrast between Cao Cao and Zhou Yu | Distinction between father and sons; women's costumes bear cultural/emotional meaning | Costumes externalize social class and identity                |
| Power    | Contrast between plain/practical Joseon attire and ornate Japanese armor → national resistance      | Color/material contrasts highlight power differences among Wei, Wu, Shu              | Exaggerated generals' armor vs. simplified soldiers' attire → unequal power           | Costumes directly signify political/military power structures |

| Category      | Roaring Currents (Korea)                    | Red Cliff (China)  | Ran (Japan)   | Comprehensive Meaning   |
|---------------|---|--|---|---|
| Culture       | Embodiment of national spirit and sacrifice | Balance of historical authenticity and artistic stylization, emphasizing collective memory | Theatricalization/symbolization → fatalistic philosophy and tragic aesthetics | Costumes function as semiotic systems of cultural values and ideology                         |
| Overall Focus | National resistance and heroism             | Political power and military order   | Fatalism and philosophical reflection   | All three construct multilayered systems of "identity–power–culture," with differing emphases |

In summary, all three films constructed costume systems centered on “identity, power, and culture,” though with distinct emphases. *Roaring Currents* foregrounded national resistance and heroism, *Red Cliff* highlighted political power and military order, and *Ran* accentuated fatalism and philosophical reflection. Thus, in East Asian historical war films, costume functions not merely as a device of reproduction but as a semiotic system of cultural values and ideology.

## 6.2 Theoretical Value and Practical Implications

This study situates film costumes within a semiotic framework, emphasizing that they are not merely “visual reproductions” but also “cultural signs.” Through the triadic structure of “iconicity–indexicality–symbolicity,” costumes reveal multilayered meanings in terms of material and color, individual and collective, reality and metaphor, thereby expanding the horizon of semiotic research.

Theoretically, this research repositions film costume as a central domain of cultural studies rather than a subsidiary of visual arts. Analysis of costume enables clarification of how historical authenticity is semiotically constructed in cinema, how power and identity are externalized into visual systems, and how traditional culture is reproduced in modern film. This deepens interdisciplinary scholarship across history, film studies, and costume studies, while offering new interpretive pathways for semiotics.

Practically, film costumes play a critical role in shaping national images and collective memory. *Roaring Currents* conveys the national spirit of “triumph of the weak over the strong,” *Red Cliff* communicates the political wisdom of alliances and power, and *Ran* expresses fatalistic philosophy. These cases illustrate that costumes serve as mediators of cultural transmission and instruments of soft power, extending beyond mere aesthetic elements.

Accordingly, the semiotic study of film costume enriches the theoretical spectrum of visual aesthetics while providing new academic and practical value for understanding cultural identity and international exchange.

## 6.3 Limitations and Prospects

This study analyzed three representative films—*Roaring Currents*, *Red Cliff*, and *Ran*—to identify semiotic features of costumes in East Asian historical war cinema. However, the limited sample constrains generalization across the genre, and the universality of the findings is thereby restricted. In addition, the methodology primarily relied on semiotic text analysis, lacking empirical data such as audience reception studies or interviews with directors and costume designers. Consequently, some interpretations may not entirely escape subjectivity.

Future research can be expanded in three directions. First, by broadening the scope of analysis to include more East Asian and Western historical war films, a more global perspective can be achieved. Second, by diversifying methodologies—incorporating audience surveys, archival research, and oral histories—the empirical grounding of findings can be strengthened. Third, by exploring technological applications such as 3D, VR, and AI modeling for the restoration and digital semiotic analysis of costumes, new methodological and technical avenues can be introduced to the study of film costume.

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# A Study on the Contemporary Path to Sustainable Development from the Philosophical Perspective of Song Dynasty Furniture Design

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**Abstract:** Furniture transcends mere utility, serving as a vital medium that embodies cultural spirit and design philosophy. In the context of global sustainable development, the furniture industry is confronted with pressing issues, including rapid resource consumption, shortened product lifecycles, and a prevailing trend towards ephemeral aesthetics. Song Dynasty furniture, characterized by its minimalist aesthetic of ‘Qi yi Zai Dao’ (vessels bearing the Dao), its material philosophy of ‘Dao Fa Ziran’ (the Dao follows Nature), and its human-centric functionality derived from ‘Ge Wu Zhi Zhi’ (the investigation of things to extend knowledge), embodies a design philosophy that is highly congruent with contemporary sustainability concepts. This paper, taking the design philosophy of Song Dynasty furniture as its point of departure, employs historical comparison and critical analysis to contrast the deviations of contemporary furniture design in terms of material ethics, structural value, and aesthetic orientation. Based on this analysis, it proposes pathways for future development. The study concludes that the Song Dynasty’s design philosophy not only offers a cultural foundation and methodological support for the sustainable development of contemporary furniture but also provides inspiration for the application of modular design, the circular economy, and interdisciplinary thinking. It is hoped that this research will serve as a reference for the green transformation of the furniture industry and contribute to the refinement of future sustainable design theory.

**Keywords:** Song Dynasty Furniture; Design Philosophy; Sustainable Development; Modular Design; Circular Economy

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## 1.Introduction

As an integral component of interior design, furniture not only fulfills the role of meeting daily functional needs but also plays a crucial part in aesthetic construction and cultural inheritance. In recent years, with the increasing prominence of global sustainable development issues, the furniture industry has been facing challenges such as rapid resource depletion, a growing environmental burden, and shortened product lifecycles. How to achieve resource conservation and environmental friendliness while satisfying the demands of modern life has become a central issue in the transformation and upgrading of design. Against this backdrop, traditional design philosophies are being re-examined by both academia and industry, with Song Dynasty furniture serving as a particularly distinguished example. The design of Song Dynasty furniture, centered on

simplicity, naturalness, and human-centric principles, embodies an aesthetic pursuit of ‘Qi yi Zai Dao’ (vessels bearing the Dao), a material philosophy of ‘Dao Fa Ziran’ (the Dao follows Nature), and a functional philosophy of ‘Ge Wu Zhi Zhi’ (the investigation of things to extend knowledge). These principles not only reflect profound cultural wisdom but are also highly congruent with the emphasis on restrained consumption, green materials, and human-centeredness advocated by contemporary sustainable design. Consequently, Song Dynasty furniture is not merely a historical and cultural heritage; it may also serve as a vital reference for rethinking the path to sustainable design today.

Proceeding from this understanding, this paper takes the design philosophy of Song Dynasty furniture as its point of departure. It outlines its core tenets and conducts a critical analysis in conjunction with modern furniture practices, revealing the deviations of contemporary design in terms of material ethics, structural value, and aesthetic orientation. Concurrently, it explores the inspiration and application pathways that Song Dynasty design philosophy offers for the sustainable development of modern furniture. The aim is to provide a cultural foundation and theoretical support for the green transformation of the furniture industry, as well as to offer a reference for the construction of a theoretical framework for future sustainable design.

## **2.The Philosophical Connotations of Song Dynasty Furniture Design**

The Song Dynasty represents a zenith in the development of traditional Chinese culture. During this period, the prevailing social ethos championed rationality and the pursuit of simplicity, which in turn gave rise to a unique philosophical vision in furniture design. Consequently, Song Dynasty furniture was not merely an object for daily life but rather the material manifestation of philosophical thought. With the confluence of Confucian, Buddhist, and Daoist cultures and the ascendancy of the literati and scholar-official class, furniture evolved from being purely functional items into a medium for conveying cultural meaning and aesthetic ideals. The core of Song Dynasty design philosophy is centrally embodied in three aspects: the minimalist aesthetic of ‘Qi yi Zai Dao’ (vessels bearing the Dao), the material philosophy of ‘Dao Fa Ziran’ (the Dao follows Nature), and the human-centric functionality derived from ‘Ge Wu Zhi Zhi’ (the investigation of things to extend knowledge).

### **2.1 The Minimalist Aesthetic of Qi yi Zai Dao (Vessels Bearing the Dao)**

Song Dynasty society, which esteemed literati ideals and the Confucian Doctrine of the Mean, directly shaped the aesthetic orientation of its furniture design<sup>[1]</sup>. The aesthetic philosophy of Song furniture emphasized Qi yi Zai Dao, positing that an object is not merely a physical vessel but a tangible expression of the Dao—a medium through which social ethics, cultural spirit, and philosophical pursuits are borne and manifested<sup>[2]</sup>. This stands in stark contrast to the intricate carvings of Ming and Qing dynasty furniture; Song furniture placed greater emphasis on the harmony of overall proportions, the simplicity and fluidity of its lines, and the unadorned naturalness of its forms. This “simplicity” was not one of scarcity but rather a harmonious beauty born of rational restraint, embodying the aesthetic principle that “less is more.” In historical texts, such as the *Yingzao Fashi* (State Building Standards), the emphasis was on ensuring that the scale and proportions of furniture were suited to its function, rather than on excessive ornamentation<sup>[3]</sup>. As can be seen in Song Dynasty paintings, furniture such as the side tables and writing desks used by Southern Song literati were predominantly characterized by clean lines and gracefully understated forms. For instance, the table upon which the figures in the painting *Listening to the Qin* lean is simple in form yet profound in its artistic conception.

This minimalist aesthetic was not merely a constraint on visual form but a manifestation of Qi yi Zai Dao: objects were endowed with moral and spiritual significance, where simplicity signified self-discipline and restraint reflected self-cultivation. Furniture was no longer just a daily utility but a vehicle for the literati’s self-cultivation and their investigation of things to attain the Dao. Through its perfectly balanced beauty, reflecting the Doctrine of the Mean, it guided the user to apprehend the philosophy embedded within the object. For this very reason, Song Dynasty furniture often transcends time and space to retain its artistic value, embodying a “timeless beauty” and providing a significant point of reference for the anti-consumerism ethos in contemporary sustainable design.

### **2.2 The Material Philosophy of Dao Fa Ziran (the Dao follows Nature)**

The furniture of the Song Dynasty embodied the philosophy of Dao Fa Ziran in its selection of materials and craftsmanship. The furniture was primarily crafted from local woods, such as elm, fir, and nanmu, with an emphasis on using materials according to their inherent properties and honoring the natural grain and texture of the wood. In the design and crafting



process, artisans sought to work in harmony with the material's nature, rather than resorting to excessive carving or forcibly altering the wood's inherent characteristics. The mortise-and-tenon joinery of Song furniture is a quintessential manifestation of this principle. Through ingenious structural design, it allowed the wood to achieve its maximum potential within its own framework, minimizing reliance on external fasteners like nails or glue and thereby preserving the material's integrity and natural resilience. In its surface treatment, Song furniture often featured a clear lacquer or a light finish that preserved the wood's natural texture. It was repeatedly polished to accentuate the wood's inherent warmth to the touch and its delicate grain. This aesthetic principle of *yi su wei mei* (finding beauty in simplicity) not only showcased the natural qualities of the material but also avoided the resource waste and environmental burden associated with excessive ornamentation<sup>[4]</sup>.

This respect for the authentic nature of the material is, in essence, a tangible manifestation of the Daoist concept of *Tian Ren He Yi* (the unity of humanity and nature) at the level of the object. It not only embodies a reverence for and restraint in the use of natural resources but, through the medium of furniture, also constructs a profound relationship of harmonious coexistence between humanity and nature. Through the simplicity and naturalness of their furniture, the literati and refined scholars of the Song Dynasty cultivated an ambiance of serene and elegant artistic conception (*yijing*) within their homes, allowing the furniture to become a medium that connected indoor and outdoor spaces and conveyed the flow of nature<sup>[5]</sup>. This integrated consideration of material ethics, resource conservation, and aesthetic conception undoubtedly provides an early and profoundly wise cultural paradigm, as well as deep philosophical inspiration, for the principles advocated by modern sustainable design, such as "the use of green materials," "reducing environmental impact," and "respecting the material lifecycle."

### **2.3 The Human-Centric Functionality of Ge Wu Zhi Zhi (the investigation of things to extend knowledge)**

Song Dynasty Neo-Confucianism emphasized *Ge Wu Zhi Zhi*, the principle of attaining rational knowledge through the investigation of things, and this philosophy profoundly influenced furniture design. In its form and scale, Song Dynasty furniture gave full consideration to the daily lives and practical needs of its users, with a focus on both functionality and comfort<sup>[6]</sup>. For instance, furniture such as chairs, tables, and daybeds were crafted in their height, proportions, and angles to conform naturally to the human body, allowing the user to achieve a sense of balance and ease in both body and mind. This human-centric design was not only an embodiment of "practicality" but, more profoundly, a reflection of "appropriateness" (*he yi*) in a philosophical sense. Song furniture did not merely pursue luxury; rather, through rational functional arrangements and appropriate forms, it became a medium for a dialogue between the person and their space, and between the person and the self. This human-centered view of functionality directly resonates with the "human-centered" principle emphasized by contemporary sustainable design.

## **3.A Critical Analysis of Contemporary Sustainable Design from the Perspective of Song Dynasty Philosophy**

In the context of the design philosophy of Song Dynasty furniture, furniture is not merely an object for satisfying the needs of daily life but is, more significantly, a vital medium that embodies cultural ideals and reflects the harmonious relationship between humanity and nature. However, under the impetus of industrialization and consumerism, contemporary furniture design has gradually shown a tendency to diverge from this philosophical spirit. By drawing a comparison with the Song Dynasty's "minimalist aesthetic," "philosophy of natural materials," and "human-centric functionality," one can more clearly identify the predicaments and issues confronting contemporary furniture design on its path to sustainable development. These are primarily manifested as the degradation of material ethics, a shift in structural value, and the alienation of aesthetic orientation.

### **3.1 The Degradation of Material Ethics: From a Reverence for Nature and Materials to Excessive Consumption**

In its selection of materials, Song Dynasty furniture adhered to the principle of *yin cai shi yong* (using materials according to their inherent properties), placing great value on the natural texture and performance of the wood<sup>[7]</sup>. For example, Song furniture was often crafted in harmony with the wood's grain, avoiding excessive ornamentation and thereby embodying the

philosophy of Dao Fa Ziran (the Dao follows Nature). This can be seen in the meigui yi (rose chair, a type of side chair with a low back) depicted in the Southern Song painting *Bogu Tu* (Illustrations of Antiquities) (Fig. 1, left), and the writing table with an inset marble top and the speckled bamboo chair portrayed in the painting *Shiba Xueshi Tu* (The Eighteen Scholars) (Fig. 1, right).

In the contemporary era, however, furniture production relies more heavily on industrialized processing and globalized supply chains, with solid wood often being replaced by synthetic materials such as composite panels, plywood, plastics, and metals. Taking certain “flat-pack furniture” brands as an example, their products are predominantly made from particleboard with artificial veneers. The production process involves the extensive use of formaldehyde-based adhesives, which not only accelerates resource consumption but also poses health risks. Although this trend has lowered costs and increased production efficiency, it has led to the wasteful use of resources and an exacerbated ecological burden. More seriously, driven by consumerism, furniture is often designed as a low-durability, disposable good, resulting in a significantly shortened lifespan. This shift from a “reverence for nature” to “excessive consumption” indicates that contemporary furniture design has deviated from the principles of sustainable development in its material ethics.

*Figure 1 Southern Song Dynasty “Bogu Tu”, “Eighteen Bachelor Diagram”*



### 3.2 The Shift in Structural Value: From Centennial Durability to Rapid Iteration

Song Dynasty furniture, by virtue of its precision mortise-and-tenon joinery, already possessed a strong foundation for durability<sup>[8]</sup>. By the Ming and Qing dynasties, the forms of mortise-and-tenon joints had undergone systematic development, with their types expanding to over a hundred, their structures becoming more rigorous, and their mechanical properties more balanced<sup>[9]</sup>. A classic example of Ming-style furniture, such as the hongmu (rosewood) round-back armchair, can last for centuries under suitable preservation conditions, fulfilling the function of furniture as a material carrier of generational inheritance. The supreme wisdom of traditional mortise-and-tenon joinery lies in its nature as a flexible connection that adapts to the “life” of the wood. As wood naturally expands and contracts with changes in environmental temperature and humidity, the ingenious interlocking of mortise and tenon reserves minute space for such deformations. This allows the various components of the furniture to work in synergy while remaining interlocked, thereby avoiding the cracking caused by stress concentration. This stands in stark contrast to the “rigid” connections commonly used in modern furniture, such as screws and adhesives, which often work against the nature of the wood and accelerate structural deterioration. This evolution in craftsmanship not only reflects a profound understanding of materials and structure within the traditional craft system but also embodies a humanistic philosophy of creation under the concept of Ge Wu Zhi Zhi (the investigation of things to extend knowledge)—a philosophy that seeks to maximize the utility of objects and create them to be passed down through generations.

Contemporary furniture production, however, has shifted to a model of rapid iteration and mass manufacturing. It commonly employs screws, adhesives, and flat-pack modular designs, with the aim of reducing manufacturing costs and shortening time-to-market. While such structures facilitate transportation and on-site assembly, they are significantly inferior to traditional mortise-and-tenon joinery in terms of structural durability. It is noteworthy that some global furniture enterprises have begun to experiment with providing standardized connectors and replaceable parts, guiding users to extend the product lifecycle through partial repairs, which reflects an initial response from the industry to sustainability issues. Nevertheless, in the absence of a well-established, systemic repair service framework, rapid product iteration still tends to lead to frequent replacement and resource consumption, exacerbating the environmental burden. Therefore, the shift in structural value from “centennial durability” to “short-term usability” is, in essence, not merely a change in technical approach but a rupture in the philosophy of creation. It reflects a widespread neglect in contemporary design of enduring value, natural laws, and the philosophy of Tian Ren He Yi (the unity of humanity and nature) in its pursuit of efficiency. Consequently, this has inevitably intensified immense resource waste and severe environmental pressure.

### 3.3 The Alienation of Aesthetic Orientation: From Timeless Classics to Ephemeral Fashion

The aesthetic of Song Dynasty furniture emphasized *Qi yi Zai Dao* (vessels bearing the Dao), pursuing a timeless beauty that was restrained, simple, and thought-provoking. For example, the writing desks of Song literati possessed unadorned forms, relying not on complex decoration but on proportion, line, and material to exhibit an enduring elegance. This aesthetic vision ensures that the furniture retains its artistic value even centuries later. However, the aesthetic of contemporary furniture design is largely driven by consumerism, tending to cater to trends and market hotspots, thereby forming a “fast fashion” model. The appearance of furniture often changes rapidly with prevailing trends, trapping products in a cycle of being “fashionably perishable.” For instance, while the Swedish company IKEA is known for its “affordable design,” its furniture frequently changes with trends, and a large number of its products are discarded after just a few years due to being stylistically outdated or lacking in durability. In contrast, the contemporary aesthetic orientation places more emphasis on trends and instant gratification, lacking the “timeless classic” quality of Song furniture, which leads to premature disposal. The root of this alienation in aesthetic orientation lies in a shift in the philosophy of creation: from revering the principle of *Dao Fa Ziran* (the Dao follows Nature), which advocates conforming to the inherent nature of materials, to a logic of *ren ding sheng cai* (human will conquers materials), which emphasizes the dominance of human intention. This transition not only diminishes the enduring value of furniture as a cultural symbol but, more importantly, it reflects a disregard for and alienation from natural materials. When aesthetics are no longer rooted in respect for and understanding of the intrinsic properties of materials, but are instead reduced to a superficial style that can be rapidly replicated and iterated, the inevitable logical conclusion is an accelerated “production-disposal” cycle within a consumerist society. This model not only contradicts the core tenets of sustainable development but also constitutes a severe misappropriation and dissipation of the Earth’s finite resources.

## 4. Inspiration from Song Dynasty Design Philosophy for Modern Sustainable Furniture

After comparing the design philosophy of Song Dynasty furniture with the predicaments of contemporary sustainable furniture design, it becomes evident that traditional wisdom possesses not only historical value but can also provide theoretical resources and practical pathways for the contemporary green transition. The philosophical connotations of Song Dynasty furniture in aesthetics, materials, and functionality offer inspiration for the sustainable development of modern furniture design in three key areas: the inheritance of cultural value, the integration of modularity and the circular economy, and the expansion of interdisciplinary design thinking.

### 4.1 The Inheritance of the Cultural Value of Design Philosophy

The minimalist aesthetic of Song Dynasty furniture embodies the design wisdom of *yi jian yu fan* (governing complexity with simplicity). For example, the principles of proportional scale and functional suitability proposed in the *Yingzao Fashi* (State Building Standards) emphasize the beauty of “moderation.” Its restrained, controlled, and durable aesthetic orientation provides a valuable point of reference for contemporary furniture to counter “fast fashion.” If modern furniture design can absorb the spirit of the Song Dynasty’s *Qi yi Zai Dao* (vessels bearing the Dao) and integrate aesthetics with culture, it can break through the logic of short-term consumption and reshape the enduring significance of furniture as a cultural symbol.

This inheritance of cultural value not only elevates the spiritual substance of products but also helps to advance the furniture industry beyond mere function and market competition towards a higher plane of cultural and social responsibility.

Contemporary brands are already attempting to rediscover the value of a “durable aesthetic.” For example, the Swedish company IKEA has launched its “Buy Back & Resell” program, emphasizing the reuse of furniture. Similarly, local Chinese brands such as Shiwu Zhaoling (Lost & Found), which create new furniture from reclaimed wood, also embody the philosophy of ‘governing complexity with simplicity’. These practices demonstrate that translating the spirit of the Song Dynasty’s Qi yi Zai Dao into contemporary expression can not only enhance the cultural substance of a product but also help to curb waste.

#### 4.2 Modular Design and the Circular Economy

The structural characteristics of Song Dynasty furniture inspire the possibilities of contemporary modular design. The flexibility and repairability embodied by mortise-and-tenon joinery are crucial prerequisites for the “disassemblable, replaceable, and recyclable” principles pursued by modern sustainable design. If contemporary furniture can draw upon the Song Dynasty’s concepts of yin cai shi yong (using materials according to their inherent properties) and structural durability, and combine them with modern craftsmanship to achieve modular production, it can not only extend the lifespan of furniture but also reduce its disposal rate, thereby promoting the establishment of a circular economy. Modern modular furniture design already reflects this line of thinking. For instance, the Aeron Chair by the American brand Herman Miller allows for the individual replacement of its components, thereby extending its overall lifespan. Similarly, the Stacked modular shelving system by the Danish brand Muuto can be freely combined and disassembled to adapt to different spatial needs. These design approaches echo the flexibility of Song Dynasty mortise-and-tenon joinery, reflecting the potential for achieving a circular economy under modern manufacturing conditions. By integrating traditional wisdom with contemporary manufacturing, the furniture industry can truly realize a sustainable path of “partial replacement for holistic longevity.”

*Figure 2 Aeron Chair*



*Figure 3 Stacked Module Cabinet*





### 4.3 The Application of Interdisciplinary Design Thinking

The philosophy of Ge Wu Zhi Zhi (the investigation of things to extend knowledge), as embodied in Song Dynasty furniture, emphasizes the achievement of a harmonious relationship between humans and objects through practice and rational understanding. This provides inspiration for interdisciplinary integration in contemporary sustainable design. The design of modern furniture cannot be confined to aesthetics and function; it must also integrate knowledge from fields such as ecology, materials science, ergonomics, and even sociology to construct a systemic approach to design thinking. Through interdisciplinary and collaborative innovation, the human-centric spirit found in Song Dynasty philosophy can be transformed into a new research paradigm, enabling furniture to truly achieve the dual goals of being “human-centered” and “nature-centered.” Some designers in China are integrating ecology with design by introducing renewable materials like bamboo and rattan into modern furniture and combining them with weaving techniques to explore new forms of sustainable expression. These cases exemplify the fusion of Song Dynasty philosophy with modern scientific methods: they not only focus on materials and ecology but also place a high value on human-object interaction and social responsibility.

*Figure 4 Wicker Chair*



## Conclusion

This paper, proceeding from the design philosophy of Song Dynasty furniture, has explored its value and significance in the context of contemporary sustainable furniture development. The minimalist aesthetic, philosophy of natural materials, and human-centric functionality embodied in Song Dynasty furniture reveal a harmonious relationship between humanity and nature, and between humans and objects. However, contemporary furniture, driven by the logic of consumerism and industrialization, commonly suffers from the problems of material waste, structural fragility, and ephemeral aesthetics, progressively diverging from the core objectives of sustainable development. In response to this, the philosophy of Song Dynasty furniture offers three key lessons for the contemporary era: first, to counter the logic of fast consumption with an aesthetic concept that is both minimalist and timeless; second, to inspire modern modular design and the circular economy through the wisdom of mortise-and-tenon joinery; and third, to promote interdisciplinary approaches with the philosophy of Ge Wu Zhi Zhi (the investigation of things to extend knowledge), thereby strengthening humanistic care and ecological responsibility in design. From this, it is evident that Song Dynasty furniture is not only a crystallization of historical culture but also an intellectual resource capable of responding to the predicaments of our time. Its reinterpretation holds profound significance for the green transformation of the furniture industry and for the construction of a sustainable design theory with distinct Eastern characteristics.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# The Impact of Mate Selection Methods on Marital Satisfaction —An Investigation Based on CFPS 2010-2020 Data

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**Abstract:** This study utilizes data from the China Family Panel Studies collected between 2010 and 2020 to investigate how mate selection methods influence marital satisfaction. The analysis employs ordered logit models, fixed-effects models, and propensity score matching techniques. Key findings reveal that individuals who met their partners through self-initiated channels such as school or workplace report higher marital satisfaction than those who relied on introductions by others. The effect of mate selection methods proves particularly significant for specific demographic groups including parents, highly educated individuals, high-income earners, urban residents with non-agricultural household registration, and male respondents. Further examination yields two important insights. First, marital satisfaction tends to be lower when couples meet through family introductions compared to friend introductions. Second, online-initiated relationships demonstrate lower satisfaction levels than offline self-initiated relationships. These results suggest practical implications. Educational institutions, employers, and government agencies should implement programs to expand young adults' social networks. Couples who met through introductions should consciously nurture emotional connections in their daily lives. Matchmakers would benefit from placing greater emphasis on emotional compatibility when facilitating potential matches.

**Keywords:** Mate Selection Methods; Marital Satisfaction; Emotional Bonding; CFPS

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## 1.Introduction

Currently, China's youth are witnessing an evolving trend in mate selection methods: a decline in arranged introductions and a rise in self-initiated encounters. Among those who meet through introductions, matches facilitated by relatives are becoming less common, while those arranged by classmates, colleagues, and friends are growing in prevalence. However, despite the increasing prevalence of singlehood and delayed marriage among young people, arranged introductions remain a significant approach to finding partners, with parents and other relatives continuing to play crucial roles in the matchmaking process<sup>[1]</sup>. Family gatherings during holidays often transform into venues for marriage pressure, sparking frequent discussions on social media platforms and websites. A substantial proportion of parents still regularly attend matchmaking events on behalf of their children. Meanwhile, novel mate selection methods continue to emerge, such as online dating platforms and television matchmaking shows<sup>[2]</sup>.

During the transition from singlehood to marriage, young people's mate selection patterns undergo significant changes due to limited social circles: self-initiated encounters decrease while arranged introductions increase<sup>[3]</sup>. These different approaches to

finding partners directly impact marital matching outcomes<sup>[4]</sup>. However, existing research on mate selection methods remains limited, leaving us uncertain whether such variations affect marital satisfaction. Should arranged introductions indeed lead to lower marital satisfaction, our support for young people's partner selection should extend beyond facilitating external matchmaking arrangements. Instead, we must develop innovative approaches to help expand their social networks and improve interaction methods to better connect with potential partners. This study therefore aims to investigate the impact of mate selection methods on marital satisfaction and examine how these relationships may vary across different demographic groups.

## 2. Literature Review

### 2.1 Research on Mate Selection Methods

Regarding the classification of mate selection methods, existing studies have proposed various typologies. Some researchers categorize them into three types: "parent-arranged marriages," "introduction-based meetings," and "self-initiated encounters."<sup>[5]</sup> Others adopt a binary classification of "introduction-based" versus "self-initiated" approaches<sup>[6]</sup>. In recent years, new media-facilitated mate selection methods have emerged, including television matchmaking shows and internet-based dating platforms. However, it's crucial to recognize that these new media platforms primarily serve as communication tools, while the fundamental participants in the matchmaking process—prospective partners, matchmakers, and potential spouses—remain unchanged. Consequently, the essential distinctions between different mate selection methods persist despite technological advancements.

Research has identified multiple factors influencing mate selection methods, including educational attainment, urban-rural background, age, income level, gender, and online dating experience. Educational level emerges as the most significant determinant: urban youth with bachelor's or associate degrees demonstrate higher rates of self-initiated partner selection compared to their counterparts with postgraduate degrees, while those with high school education or below show no significant difference from postgraduates in mate selection patterns.

The second key factor is urban-rural background. Current urban residents exhibit greater reliance on arranged introductions compared to those from rural areas, though no significant differences exist between residents of different urban locations. Income level exerts a relatively modest yet statistically significant influence, with higher-income individuals showing lower probabilities of choosing arranged introductions. Notably, research on rural populations remains limited. Studies indicate that as rural residents age, their likelihood of self-initiated partner selection decreases, while both online dating experience and extended education increase this tendency<sup>[7]</sup>. Among migrant populations, gender, age, and education level prove more influential than income or duration of migration, with younger, better-educated male migrants demonstrating stronger preferences for self-initiated partner selection<sup>[8]</sup>. These demographic factors—including education, occupation, urban-rural background, income, generation, and gender—also significantly affect marital satisfaction. When examining how mate selection methods influence other outcomes, researchers must account for these interrelated variables to avoid confounding effects.

### 2.2 The Impact of Mate Selection Methods on Marital Satisfaction

Current research on the relationship between mate selection methods and marital satisfaction remains limited, with existing studies primarily focusing on traditional matchmaking and emerging dating approaches. However, scholars have increasingly examined how mate selection methods influence marital matching patterns, as well as the subsequent effects of these matching patterns on marital satisfaction.

One pathway shows that compared to self-initiated acquaintance, friend-introduced matches show no significant differences in marital matching outcomes, while relative-introduced matches increase hypergamy where women marry partners with matching household registration, education level and occupational type, as well as homogamy with matching household registration and paternal education. Women in hypergamous marriages are less prone to depression and more likely to achieve higher life satisfaction, which also affects their marital satisfaction<sup>[9]</sup>. Therefore, relative-introduced matches may improve women's marital satisfaction by increasing educational hypergamy. However, this pathway cannot explain the impact of mate selection methods on men's marital satisfaction.

Another pathway is: self-initiated marriages typically develop emotions through daily life, while introduced marriages are more based on both parties' socioeconomic resources. The motivation for self-initiated marriages emphasizes interpersonal emotional factors, whereas that for non-self-initiated marriages focuses on material economic and familial social factors. For both men and women, interpersonal emotional factors in marital motivation can positively predict ten marriage satisfaction-related indicators including spousal personality compatibility, communication and economic arrangements, while material economic or familial social factors in marital motivation negatively predict these indicators<sup>[10]</sup>. Thus, mate selection methods can influence marital satisfaction through marital motivation.

### 3.Theoretical Analysis and Research Hypotheses

This study categorizes mate selection methods into two distinct types: "self-initiated acquaintance" and "non-self-initiated acquaintance". The "non-self-initiated acquaintance" classification encompasses partnerships formed through introductions by friends, parents or other relatives, as well as those established via marriage-oriented platforms and activities including television matchmaking programs, online dating platforms, and large-scale offline matchmaking events. Conversely, "self-initiated acquaintance" refers to relationships developed through organic interactions in settings such as educational institutions and workplaces, or through non-marriage-oriented online platforms and activities where the primary purpose is not partner matching.

Arranged marriages typically undergo rigorous matching processes, where matchmakers primarily apply the "matching social status" criterion for selection<sup>[11]</sup>. However, such social parity does not necessarily guarantee marital happiness or satisfaction<sup>[12][13]</sup>. The arranged approach places considerable emphasis on first impressions, particularly physical appearance. Due to the "primacy effect," individuals who are less articulate or possess less favorable physical attributes may be overlooked during initial encounters, despite their other outstanding qualities, consequently losing potential relationship opportunities. This introduction-based method often neglects emotional compatibility between partners, resulting in marital foundations that may lack stability<sup>[14]</sup>. In contrast, relationships developed through self-initiated acquaintance are predominantly rooted in mutual attraction rather than external marital pressures. Partners who meet through self-initiated channels typically cultivate their relationships through academic or social activities, where interactions occur more naturally with minimal utilitarian motives. The extended period of mutual exposure allows for deeper understanding and greater acceptance of each other's external imperfections. Consequently, families established through self-initiated acquaintance tend to demonstrate higher life satisfaction compared to those formed through arranged introductions, which correspondingly enhances their overall marital satisfaction.

Based on the preceding analysis, this study proposes its first research hypothesis.

Hypothesis 1: Compared with non-self-initiated acquaintance, self-initiated acquaintance leads to higher marital satisfaction.

Compared to offline self-initiated acquaintance, online-initiated partnerships typically exhibit fewer shared living spaces, overlapping social networks, similar life experiences, and mutual interaction histories, all of which hinder emotional bonding. Furthermore, internet platforms abound with carefully curated profile pictures, retouched personal photos, and selectively positive life portrayals. These idealized representations significantly alter individuals' perceptions of potential partners and marriage, while reshaping their reference points for marital expectations. In contrast, those who meet partners through offline channels develop their understanding through direct social interactions, gaining more authentic perceptions of their counterparts. Their cognitions of potential partners and marital expectations typically derive from local marriage market conditions, their partner's authentic characteristics, and the marital statuses of close acquaintances. For couples meeting online, the polished partner images prevalent on social platforms like WeChat Moments and Weibo may inflate marital expectations<sup>[15]</sup>. When reality fails to meet these heightened expectations, marital satisfaction consequently declines<sup>[16]</sup>.

Based on the above analysis, this study proposes its second research hypothesis.

Hypothesis 2: Compared with offline self-initiated acquaintance, online self-initiated acquaintance results in lower marital satisfaction.

The identity of matchmakers significantly influences marital matching outcomes, which subsequently affects marital satisfaction. Colleagues and classmates represent close-knit groups within specific social spheres who maintain frequent

communication and strong connections with match-seekers. Their shared life experiences, emotional perspectives, and value systems enable them to better understand the expectations and requirements that match-seekers have for potential partners. Consequently, the candidates they introduce are more likely to develop emotional bonds with match-seekers.

In modern society, however, increasing social distance has emerged between individuals and their relatives. Relatives' matchmaking perspectives often substantially diverge from those of match-seekers themselves. As a result, the characteristics of candidates introduced by relatives frequently mismatch with match-seekers' preferences, making emotional connection more difficult to establish.

Based on the foregoing analysis, this study proposes its third research hypothesis.

Hypothesis 3: Compared with friend-arranged introductions, relative-arranged introductions exert greater negative effects on marital satisfaction.

## 4. Empirical Analysis

### 4.1 Data, Variables, and Model Specification

#### 4.1.1 Data Sample

The data for this study were drawn from the China Family Panel Studies (CFPS) project spanning 2010 to 2020. As a comprehensive longitudinal survey, CFPS systematically collects tri-dimensional data at community, household, and individual levels, capturing the current status and evolving trends of China's economic conditions, social development, demographic characteristics, and public health. The survey's nationally representative sample covers households and their members across 25 provincial-level administrative regions, including provinces, autonomous regions, and municipalities directly under the central government, ensuring both substantial sample size and robust representativeness.

This study focuses on examining the impact of mate selection methods on marital satisfaction, and therefore selects currently married individuals as the research population. The final analytical sample comprises 12,883 valid observations.

#### 4.1.2 Variable Specification

**Independent variable:** The independent variable in this study is mate selection method. According to the 2020 CFPS questionnaire, "any acquaintance made through marriage-oriented organizations or activities should be categorized as matchmaker-arranged," which includes partner selection via dating apps or participation in large-scale offline matchmaking events. This research operationally defines "self-initiated acquaintance" as meeting partners through schools, workplaces, residential communities, other physical locations, or internet platforms, coded as 1. Conversely, "non-self-initiated acquaintance" includes introductions by relatives, friends, or professional matchmakers, coded as 0. The variable was constructed by integrating mate selection method data from the CFPS database spanning 2010 to 2020.

**Dependent Variable:** Marital satisfaction serves as the dependent variable in this study. The CFPS questionnaire measures this construct through the item: "Overall, how satisfied are you with your current marriage/cohabitation relationship?" As a crucial indicator for assessing marital quality and personal wellbeing within marital relationships, the variable adopts a five-point Likert scale: 1 = "Very dissatisfied", 2 = "Dissatisfied", 3 = "Neutral", 4 = "Satisfied", 5 = "Very satisfied".

**Control Variables:** In marital satisfaction research, the selection of control variables follows a principled approach. For studies examining independent variables with weak correlations to spousal interactions—such as internet usage patterns or media consumption—researchers typically control for individual and household characteristics<sup>[17][18]</sup>. Conversely, when investigating independent variables strongly associated with dyadic interactions—including spousal religious differences or gender role divisions—the analytical model generally incorporates individual characteristics, household attributes, and partner-specific factors as controls<sup>[19][20]</sup>.

Since mate selection methods form the contextual background of premarital interactions, this study controls for variables across three dimensions: individual characteristics (including gender, health status, age, educational attainment, and current household registration type), household characteristics (comprising the logarithm of per capita household income and the total number of children), and spousal characteristics (covering spouse's educational level and age). Detailed definitions for all control variables incorporated in the analysis are provided in Table 1.



Table 1 Variable Definitions

|  | Definition and assignment  | Minimum | Maximum |
|--|--|---------|---------|
| Dependent variable                       |  |         |         |
| Marital satisfaction                     | 1=Very dissatisfied,<br>5=Very satisfied   | 1       | 5       |
| Independent variable                     |  |         |         |
| Mate selection method                    | 0=Non-self-initiated acquaintance,<br>1=Self-initiated acquaintance  | 0       | 1       |
| Control variables                        |  |         |         |
| Gender                                   | 0=Female, 1=Male   | 0       | 1       |
| Age                                      | 2020 minus the respondent's birth year   | 18      | 88      |
| Logarithm of household income per capita | Logarithm of household income per capita   | 4.200   | 14.514  |
| Total number of children                 | Actual number of children raised by the individual   | 0       | 9       |
| Education Level                          | 1=Illiterate/semi-literate, 2=Primary school, 3=Junior high school, 4=Senior high school/secondary specialized school/technical school/vocational high school, 5=Junior college, 6=Undergraduate, 7=Master's degree, 8=Doctoral degree | 1       | 8       |
| Health status                            | 1=Very healthy, 2=Quite healthy, 3=Relatively healthy, 4=Fair, 5=Unhealthy   | 1       | 5       |
| Current household registration           | 0=Non-agricultural household registration,<br>1=Agricultural household registration  | 0       | 1       |
| Spouse's education level                 | 1=Illiterate/semi-literate, 2=Primary school, 3=Junior high school, 4=Senior high school/secondary specialized school/technical school/vocational high school, 5=Junior college, 6=Undergraduate, 7=Master's degree, 8=Doctoral degree | 1       | 8       |
| Spouse's age                             | 2020 minus the spouse's birth year   | 20      | 87      |

Table 1 presents the descriptive statistics of all variables, displaying means and standard deviations for the full sample as well as subsamples stratified by mate selection method (self-initiated vs. arranged). The marital satisfaction levels show minimal divergence between groups, with both cohorts reporting relatively high satisfaction (mean  $\approx 4.49$  on 5-point scale).

Regarding the control variables, the overall sample had an average age of approximately 50.5 years, with males accounting for about 49.5% of the total sample, and the average education level was 2.63. In the subsamples, individuals who met their partners through self-initiated acquaintance were younger, had more children, and exhibited better health status, higher educational attainment, and greater per capita household income compared to other groups.

Table 2 Descriptive Statistics of Variables

| Variable              | Total sample(obs=12 864) |                    | Self-initiated acquaintance(obs=2 961) |                    | Non-self-initiated acquaintance(obs=9 903) |                    |
|-----------------------|--------------------------|--------------------|--|--------------------|--|--------------------|
|                       | Mean                     | Standard deviation | Mean                                   | Standard deviation | Mean                                       | Standard deviation |
| Dependent variable    |                          |                    |  |                    |  |                    |
| Marital satisfaction  | 4.491                    | 0.854              | 4.491                                  | 0.837              | 4.49                                       | 0.859              |
| Independent variable  |                          |                    |  |                    |  |                    |
| Mate selection method | 0.230                    | 0.421              | 1                                      | 0                  | 0  | 0                  |
| Control variables     |                          |                    |  |                    |  |                    |

| Variable                                    | Total sample(obs=12 864) |                    | Self-initiated acquaint-<br>tance(obs=2 961) |                    | Non-self-initiated acquaint-<br>tance(obs=9 903) |                    |
|---|--------------------------|--------------------|--|--------------------|--|--------------------|
|   | Mean                     | Standard deviation | Mean   | Standard deviation | Mean   | Standard deviation |
| Education Level                             | 2.630                    | 1.274              | 3.091  | 1.357              | 2.492  | 1.215              |
| Gender                                      | 0.497                    | 0.500              | 0.52   | 0.500              | 0.490  | 0.500              |
| Health status                               | 2.989                    | 1.224              | 3.10   | 1.140              | 2.956  | 1.246              |
| Age   | 50.546                   | 12.902             | 44.601                                       | 12.572             | 52.324   | 12.460             |
| Current household registration              | 0.176                    | 0.381              | 0.230  | 0.421              | 0.160  | 0.367              |
| Logarithm of household income<br>per capita | 9.705                    | 0.926              | 9.926  | 0.903              | 9.639  | 0.923              |
| Total number of children                    | 1.585                    | 0.900              | 1.640  | 0.843              | 1.569  | 0.916              |
| Spouse's education level                    | 2.591                    | 1.281              | 3.069  | 1.397              | 2.448  | 1.209              |
| Spouse's age                                | 50.551                   | 12.932             | 44.480                                       | 12.537             | 52.366   | 12.488             |

### 4.1.3 Model Specification

In the CFPS questionnaire, marital satisfaction is measured as an ordinal variable (ranging from 1 to 5, corresponding to “very dissatisfied,” “dissatisfied,” “neutral,” “satisfied,” and “very satisfied”), making the ordered logit model appropriate for analysis. The ordinary least squares (OLS) model was not adopted because ordinal variables fail to meet the homoscedasticity requirement of OLS regression, and using OLS would lead to biased coefficient estimates. Drawing on existing research, which indicates that individual marital satisfaction is influenced by provincial-level factors, this study incorporates province fixed effects in the model<sup>[21][22]</sup>. The ordered logit model is specified as follows:

$$\log \frac{P(Y \leq y)}{1 - P(Y \leq y)} = \theta_j - \alpha_{xi} \quad (1)$$

In the equation,  $x_i$  represents the independent variable of mate selection method,  $P$  denotes the conditional probability of mate selection method  $x_i$ , and  $\alpha_{xi}$  signifies the regression coefficient of the  $i$ th dependent variable on the independent variable  $x_i$  under the condition that the mate selection method takes the value  $x_i$ .

The preceding analysis demonstrates that both mate selection methods and marital satisfaction are subject to modernization effects. Variables including age, urban-rural background, educational attainment, gender, and age at first marriage influence both mate selection patterns and marital satisfaction outcomes. Moreover, individuals adopting different mate selection approaches exhibit systematic differences across generational cohorts, income levels, urban-rural backgrounds, and health status. Under these conditions, conventional Logit models cannot disentangle whether observed variations in marital satisfaction stem from mate selection methods or these underlying sample selection biases. The propensity score matching method addresses this by constructing comparison groups with minimized observable differences from the treatment group, enabling more accurate estimation of treatment effects to isolate the impact of mate selection methods on marital satisfaction. The implementation involves three key steps: First, we employ a Logit model to estimate each individual's probability of self-initiated mate selection during first marriage, converting these probabilities into propensity scores. Second, using nearest-neighbor matching without replacement based on these scores, we reconstruct balanced treatment and control groups. Finally, we estimate treatment effects using these matched samples and conduct ordered logit regression analyses on the matched dataset.

### 4.2 Ordered Logit Model Analysis of Mate Selection Methods' Impact on Marital Satisfaction

Table 3 presents the estimation results examining the impact of mate selection methods on marital satisfaction. Model 1 displays the ordered logit regression outcomes incorporating control variables for individual and household characteristics, along with province fixed effects.

Table 3 Ordered Logit Model Analysis of the Impact of Mate Selection Methods on Marital Satisfaction

|  | Model 1           |
|--|-------------------|
| Mate selection method                    | 0.145*** (0.048)  |
| Education Level                          | -0.132*** (0.020) |
| Gender                                   | 0.794*** (0.046)  |
| Health status                            | 0.255*** (0.017)  |
| Age                                      | 0.011* (0.006)    |
| Current household registration           | -0.026 (0.058)    |
| Logarithm of household income per capita | 0.036 (0.024)     |
| Total number of children                 | 0.045* (0.024)    |
| Spouse's education level                 | 0.052*** (0.020)  |
| Spouse's age                             | 0.005 (0.006)     |
| N  | 12 864            |
| Province fixed effects                   | Yes               |
| PseudoR <sup>2</sup>                     | 0.04              |

Note: \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01; The values in parentheses represent standard errors.

Model 1 results suggest that self-initiated mate selection enhances marital satisfaction. Regarding control variables, higher educational attainment appears to reduce marital satisfaction—a phenomenon potentially attributable to traditional gender role norms in a “male breadwinner” societal context, where more educated individuals may experience greater conflicts over domestic labor allocation, thereby diminishing marital quality<sup>[23]</sup>. The analysis further reveals that males report higher marital satisfaction than females, better health status positively correlates with marital satisfaction, satisfaction levels increase with age, and greater offspring numbers exert positive effects. Additionally, higher spousal education levels contribute to improved marital satisfaction for the focal respondents.

### 4.3 Heterogeneous Effects of Mate Selection Methods Across Demographic Groups

The influence of mate selection methods on marital satisfaction may vary across different demographic groups characterized by education levels, income brackets, household registration status, parental status, and gender. This study conducts heterogeneity analysis along these five key dimensions. The results from ordered logit regressions incorporating control variables and province fixed effects are presented in Table 4.

Table 4 Differences in the Impact of Mate Selection Methods on Marital Satisfaction Across Population Groups

| Variable              | Grouped regression by educational level |                      |
|-----------------------|---|----------------------|
|                       | Low-education level                     | High-education level |
| Mate selection method | 0.112* ( 0.058 )                        | 0.270*** ( 0.090 )   |
| N                     | 10 148                                  | 2 716                |
| Pseudo R <sup>2</sup> | 0.037                                   | 0.056                |
| Variable              | Grouped regression by income level      |                      |
|                       | Low-income groups                       | High-income groups   |
| Mate selection method | 0.120 ( 0.078 )                         | 0.157** ( 0.062 )    |
| N                     | 4 489                                   | 8 375                |

|                       |   |   |
|-----------------------|---|---|
| Pseudo R <sup>2</sup> | 0.055   | 0.037                                   |
| Variable              | Grouped regression by household registration type |   |
|                       | Agricultural household registration               | Non-agricultural household registration |
| Mate selection method | 0.110** ( 0.054 )                                 | 0.268** ( 0.105 )                       |
| N                     | 10 598  | 2 266                                   |
| Pseudo R <sup>2</sup> | 0.040   | 0.053                                   |
| Variable              | Regression based on whether there are children    |   |
|                       | None  | Yes                                     |
| Mate selection method | -0.040 ( 0.214 )                                  | 0.148*** ( 0.050 )                      |
| N                     | 1 114   | 11 750                                  |
| Pseudo R <sup>2</sup> | 0.057   | 0.040                                   |
| Variable              | Grouped regression by gender                      |   |
|                       | Female  | Male                                    |
| Mate selection method | 0.125* ( 0.064 )                                  | 0.193*** ( 0.074 )                      |
| N                     | 6 471   | 6 393                                   |
| Pseudo R <sup>2</sup> | 0.031   | 0.021                                   |

Note: ① In 2020, China's personal income tax exemption threshold was set at 3,500 yuan per month. Accordingly, this study defines individuals with annual incomes  $\leq 42,000$  yuan as the low-income group, and those exceeding this threshold as the high-income group. ② \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ , The values in parentheses represent standard errors.

For individuals in non-self-initiated marriages, incompatibility in spousal dispositions may be more prevalent, necessitating greater interpersonal coordination. Inadequate coordination in such cases tends to reduce marital satisfaction. These effects become particularly pronounced when couples accumulate more shared marital experiences over time. The positive effect of self-initiated mate selection on marital satisfaction proves more substantial among highly educated individuals, high-income earners, and urban residents with non-agricultural household registration, compared to their less-educated, lower-income, and rural counterparts. As education levels and incomes rise within urban contexts, individuals develop more diverse needs and differentiated spousal expectations—requirements that non-self-initiated partners often struggle to fulfill, resulting in more pronounced marital dissatisfaction. This effect is particularly amplified among parents relative to childless couples. Parental responsibilities necessitate increased spousal interaction regarding childrearing, which magnifies the negative consequences of dispositional incompatibility in non-self-initiated marriages. Furthermore, self-initiated selection demonstrates stronger effects on marital satisfaction for men than women. This gender differential arises because relative-arranged marriages disproportionately promote female hypergamy (upward marital mobility in household registration, education, and occupational status)—a pattern empirically shown to enhance women's marital satisfaction. Consequently, the beneficial impact of self-initiated selection appears less statistically significant and substantively smaller for female respondents.

## 4.4 Further Analysis

### 4.4.1 Comparison Between Online and Offline Self-Initiated Mate Selection Methods

The widespread adoption of internet technologies and the proliferation of social media platforms have significantly increased online social networking. Popular applications like WeChat, Douyin, and Kuaishou now facilitate new friendships and even romantic connections through features such as WeChat's "Shake" and QQ's "People Nearby." This study specifically examines how partner selection through general social platforms (not explicitly designed for dating) differs from other self-initiated acquaintance methods in influencing marital satisfaction outcomes.

This study constructs a new independent variable by coding online self-initiated partner selection as 1 and all other self-

initiated methods as 0, while retaining the original dependent variable, control variables, and province fixed effects for ordered logit regression analysis. As shown in Table 5 (Model 5), online self-initiated acquaintance demonstrates significantly lower marital satisfaction compared to offline self-initiated methods. This finding validates Hypothesis 3 through two mechanisms: first, the limited shared physical contexts for emotional bonding in online-formed relationships; second, the inflated marital expectations created by online dating platforms that often remain unfulfilled in reality.

*Table 5 Heterogeneous Effects of Mate Selection Methodson Marital Satisfaction Across Demographic Groups*

|  | <b>Model 6</b>                |
|--|-------------------------------|
| Online self-initiated acquaintance       | -0.496 <sup>**</sup> (0.240)  |
| Education level                          | -0.123 <sup>***</sup> (0.043) |
| Gender                                   | 0.881 <sup>***</sup> (0.097)  |
| Health status                            | 0.327 <sup>***</sup> (0.038)  |
| Age                                      | 0.025 <sup>*</sup> (0.013)    |
| Current household registration           | 0.070(0.116)                  |
| Logarithm of household income per capita | -0.073(0.055)                 |
| Total number of children                 | 0.041(0.055)                  |
| Spouse's education level                 | 0.106 <sup>**</sup> (0.041)   |
| Spouse's age                             | -0.009(0.013)                 |
| Province fixed effects                   | Yes                           |
| N  | 2 961                         |
| Pseudo R <sup>2</sup>                    | 0.054                         |

Note: \*p<0.1、\*\*p<0.05、\*\*\*p<0.01, The values in parentheses represent standard errors.

#### 4.4.2 Impact of Different Arranged Introduction Channels on Marital Satisfaction

This study extracts three subsamples of individuals who met partners through friend introductions, relative introductions, or professional matchmaking services, then merges each subsample with the self-initiated acquaintance subsample separately. Using mate selection method as the independent variable while retaining the dependent variable, all control variables, and province fixed effects, we perform three ordered logit regressions, with results presented in Table 6.

Models 7 and 8 demonstrate that compared to self-initiated acquaintance, both friend-introduced and relative-introduced matches reduce marital satisfaction, with relative-introduced matches showing a more substantial negative effect. The regression results indicate that relative introductions lead to greater marital satisfaction decline than friend introductions. In contemporary society characterized by frequent population mobility and the separation of kinship, geographic, and occupational ties, relatives are more prone to misunderstandings about match-seekers' partner preferences and expectations compared to friends. Moreover, limited daily interactions make it more difficult for relatives to accurately communicate match-seekers' personal qualities to potential partners, creating greater obstacles for emotional bonding in relative-arranged matches. These findings validate Hypothesis 4.

*Table 6 The Impact of Different Arranged Introduction Methods on Marital Satisfaction*

|                                       | <b>Model 7</b>               | <b>Model 8</b>                | <b>Model 9</b>                |
|---------------------------------------|------------------------------|-------------------------------|-------------------------------|
| Met through a friend's introduction   | -0.141 <sup>**</sup> (0.071) |                               |                               |
| Met through a relative's introduction |                              | -0.158 <sup>**</sup> (0.065)  |                               |
| Met through a matchmaking agency      |                              |                               | -0.108(0.117)                 |
| Education level                       | -0.083 <sup>**</sup> (0.035) | -0.123 <sup>***</sup> (0.032) | -0.113 <sup>***</sup> (0.039) |
| Gender                                | 0.828 <sup>***</sup> (0.077) | 0.856 <sup>***</sup> (0.073)  | 0.859 <sup>***</sup> (0.089)  |
| Health status                         | 0.292 <sup>***</sup> (0.030) | 0.287 <sup>***</sup> (0.027)  | 0.298 <sup>***</sup> (0.034)  |
| Age                                   | 0.029 <sup>***</sup> (0.010) | 0.010(0.010)                  | 0.016(0.012)                  |



|  | Model 7                     | Model 8                      | Model 9                     |
|--|-----------------------------|------------------------------|-----------------------------|
| Current household registration           | -0.053(0.092)               | 0.094(0.092)                 | 0.115(0.111)                |
| Logarithm of household income per capita | -0.019(0.044)               | -0.061(0.040)                | -0.042(0.049)               |
| Total number of children                 | 0.060(0.044)                | 0.058(0.039)                 | 0.037(0.048)                |
| Spouse's education level                 | 0.080 <sup>**</sup> (0.033) | 0.081 <sup>***</sup> (0.031) | 0.080 <sup>**</sup> (0.038) |
| Spouse's age                             | -0.012(0.010)               | 0.007(0.010)                 | -0.000(0.012)               |
| Province fixed effects                   | Yes                         | Yes                          | Yes                         |
| N  | 4 430                       | 5 164                        | 3 451                       |
| Pseudo R <sup>2</sup>                    | 0.047                       | 0.047                        | 0.046                       |

Note: \* $p < 0.1$ 、\*\* $p < 0.05$ 、\*\*\* $p < 0.01$ ，The values in parentheses represent standard errors.

## 4.5 Robustness Tests

To verify the robustness of the regression results presented in Table 3, this study implements three validation approaches: propensity score matching, alternative variable specifications, and modified model formulations.

### 4.5.1 Re-examination Using Propensity Score Matching

To address potential estimation bias caused by sample self-selection, this section re-estimates the effect of mate selection methods on marital satisfaction using an ordered logit model with propensity score matching. The PSM approach requires careful selection of covariates that influence treatment assignment while excluding post-treatment variables<sup>[24]</sup>. As established in previous sections, birth year, urban-rural background, education level, gender, and age at first marriage significantly determine mate selection patterns. Accordingly, we specify mate selection method as the treatment variable, with birth year, household registration at age twelve, educational attainment, gender, and first marriage age as covariates. The analysis proceeds by first estimating propensity scores through an ordered logit model predicting the probability of self-initiated partner selection, then implementing three-to-one nearest neighbor matching without replacement to construct balanced treatment and control groups based on these propensity scores.

Table 7 presents the balance test results obtained through nearest-neighbor matching. The findings indicate that after matching, none of the covariates significantly predict mate selection methods, confirming the sample meets randomized experiment requirements. All t-tests for characteristic variables between the matched treatment and control groups become statistically insignificant, demonstrating successful balance achievement through propensity score matching. This confirms the elimination of systematic differences between groups in critical variables that could influence mate selection patterns—including birth year, household registration at age twelve, educational attainment, gender, and age at first marriage. The matching procedure effectively reduced observable differences between self-initiated and non-self-initiated subsamples.

Table 7 Balance Test

| Variable                                | Inspection methods | Before matching | After matching |
|---|--------------------|-----------------|----------------|
| Birth year                              | T-test             | 26.48***        | -0.71          |
| Household registration status at age 12 | T-test             | 11.82***        | 1.29           |
| Education level                         | T-test             | 22.81***        | 0.41           |
| Gender                                  | T-test             | 2.33**          | -0.34          |
| Age at first marriage                   | T-test             | 0.32            | -1.19          |

Note: ① The reported values in the t-tests represent t-statistics. ; ② \* $p < 0.1$ 、\*\* $p < 0.05$ 、\*\*\* $p < 0.01$ ，The values in parentheses represent standard errors.

Table 8 reports the treatment effects estimated through nearest-neighbor matching, including the Average Treatment Effect

on the Treated (ATT), the Average Treatment Effect on the Untreated (ATU), and the Average Treatment Effect (ATE). The ATT quantifies how much self-initiated mate selection enhances marital satisfaction for those who actually used this method, while the ATU measures the potential effect for those who did not. The ATE represents the population-level impact of mate selection methods on marital satisfaction. The propensity score matching results reveal an ATE of 0.012 after controlling for observable differences, indicating that self-initiated acquaintance increases marital satisfaction by 1.2 percentage points—a finding consistent with the Table 3 conclusions.

*Table 8 Results of Propensity Score Matching Analysis*

| Statistic | Nearest neighbor matching |
|-----------|---------------------------|
| ATT       | 0.022                     |
| ATU       | 0.009                     |
| ATE       | 0.012                     |

The ordered logit regression performed on the matched samples, as presented in Table 9, continues to show statistically significant effects of mate selection methods on marital satisfaction. These results robustly confirm that self-initiated acquaintance consistently enhances marital satisfaction.

*Table 9 Ordered Logit Model Analysis of Mate Selection  
Effects on Marital Satisfaction Using Post-Matching Sample*

|  | Model 10         |
|--|------------------|
| Mate selection method                    | 0.165***(0.054)  |
| Education level                          | -0.144***(0.026) |
| Gender                                   | 0.762***(0.058)  |
| Health status                            | 0.279***(0.021)  |
| Age                                      | 0.015*(0.008)    |
| Current household registration           | 0.034(0.072)     |
| Logarithm of household income per capita | -0.001(0.031)    |
| Total number of children                 | 0.019(0.031)     |
| Spouse's education level                 | 0.055**(0.025)   |
| Spouse's age                             | 0.003(0.008)     |
| N  | 8 125            |
| Province fixed effects                   | Yes              |

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ , The values in parentheses represent standard errors.

#### 4.5.2 Alterations to variable specifications and modifications to model formulations

This study modifies the variable specification by creating a binary “marital satisfaction” indicator, where responses of “very dissatisfied,” “dissatisfied,” or “neutral” in the original scale are coded as 0, while “satisfied” and “very satisfied” responses are coded as 1. As shown in Table 10, mate selection methods significantly improve marital satisfaction at the 1% level under this alternative measurement. Furthermore, the analysis employs model specification changes by substituting the ordered logit model with both ordered probit and OLS models. Table 10 demonstrates that regardless of model specification, mate selection methods maintain statistically significant effects on marital satisfaction at the 1% significance level.

Therefore, this study concludes that the regression results presented in Table 3 demonstrate robust stability, providing further empirical validation for the conclusion that self-initiated mate selection methods significantly enhance marital satisfaction.

Table 10 Alternative Model Specifications and Variable Coding Approaches

| Variable                              | Whether satisfied with marriage | Change model settings: Ordered Probit | Change model settings: OLS |
|---------------------------------------|---------------------------------|---------------------------------------|----------------------------|
| Satisfaction with marriage            | 0.230*** (0.068)                |                                       |                            |
| Change model settings: Ordered Probit |                                 | 0.085** (0.028)                       |                            |
| Change model settings: OLS            |                                 |                                       | 0.054*** (0.019)           |
| R <sup>2</sup> /Pseudo R <sup>2</sup> | 0.060                           | 0.039                                 | 0.065                      |

Note: \*p<0.1、\*\*p<0.05、\*\*\*p<0.01, The values in parentheses represent standard errors.

## 5. Conclusions and Policy Implications

In China, self-initiated mate selection methods have become increasingly prevalent. This raises two critical research questions: Does a relationship exist between mate selection approaches and marital satisfaction? If so, what is the nature of this relationship? Utilizing China Family Panel Studies data from 2010 to 2020 and employing propensity score matching with ordered logit models, this investigation examines both the impact of mate selection methods on marital satisfaction and its underlying mechanisms across demographic subgroups. Four key findings emerge: First, self-initiated acquaintance significantly enhances marital satisfaction. Second, online-initiated self-acquaintance demonstrates lower satisfaction outcomes compared to offline self-initiated methods. Third, relative-introduced matches exhibit more detrimental effects on satisfaction than friend-introduced arrangements. Fourth, the influence of mate selection methods proves particularly pronounced among younger, highly educated, high-income, urban, parenting, and male populations.

As a crucial determinant of marital formation among youth, this study's findings offer valuable insights for educational institutions, employers, and policymakers to facilitate optimal partner selection. First, schools, companies, and government agencies should prioritize expanding young adults' social networks and fostering organic interpersonal connections—such as encouraging participation in campus organizations and workplace interest groups—rather than relying exclusively on matchmaking events or marital intermediaries. Second, couples introduced through third parties should consciously cultivate emotional bonds by creating more natural interaction opportunities. Third, matchmakers must emphasize compatibility in personality traits, value systems, and daily habits—key factors influencing emotional connection development—when facilitating potential unions.

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# Research on Fresh Produce Inventory Management at D Supermarket

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**Abstract:** Fresh produce is an essential daily consumer item characterized by high demand, perishability, and a short shelf life. As living standards improve, consumer demand for healthy, safe, and fresh produce continues to grow. Supermarkets, as a key sales channel for fresh produce, see their operational efficiency directly impacted by inventory management levels. Therefore, adopting scientific and effective inventory control strategies is crucial for enhancing supermarket inventory management. This paper examines the current inventory status at Supermarket D, analyzes the primary issues in its fresh produce inventory management, and proposes targeted solutions based on these findings. The aim is to provide valuable insights for related research.

**Keywords:** Fresh Produce; Inventory Management

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## 1.Introduction

Fresh produce is characterized by its perishability, strong seasonality, short shelf life, and high unpredictability. In today's society, people increasingly prioritize quality of life and place greater emphasis on the quality and safety of fresh food. Data indicates that consumers exhibit high purchase frequency for fresh food, further confirming their stringent demands for product quality. As shown in Figure 1-1, Chinese consumers purchase fresh products approximately 3 times per week on average—higher than the global average of 2.5 times. This frequency is particularly pronounced for fruits and vegetables, with weekly purchases reaching 4.8 times. Sales of fruits and vegetables account for the largest share of total sales at around 55%, followed by meat/poultry/protein products (17%) and seafood (16%)<sup>[1]</sup>. Both purchase frequency and sales volume indicate shifting consumer habits, with heightened expectations for fresh produce quality. As purchasing power increases, fresh supermarkets have become the primary retail channel for fresh goods, especially in developed cities like Beijing, Shanghai, Guangzhou, and Shenzhen. Consumers now prioritize not only affordability but also product quality and shopping experience. To meet this growing demand, governments at all levels have promoted the “farm-to-supermarket” strategy, leading to an increasing market share for fresh supermarkets. International experience shows that in Europe, the United States, and developed Asian countries, supermarkets account for the majority of fresh produce sales, reaching 93% and 70% respectively<sup>[1]</sup>. However, fresh products are prone to spoilage and have short shelf lives, making inventory management challenges persistent. Issues such as arbitrary purchasing and inaccurate demand forecasting lead to expired goods and unsold inventory. To enhance sales efficiency and reduce losses, fresh produce supermarkets must strengthen inventory management



and optimize strategies to meet consumers' high expectations for freshness and quality.

## 2. Literature Review

### 2.1 Inventory Classification Management

Inventory classification management involves categorizing different products based on distinct characteristics to enable targeted management. The resulting classifications allow for tailored management approaches suited to varying operational scenarios, thereby improving the rationality of supermarket inventory structures and enhancing operational efficiency and management standards. The ABC classification method has been widely adopted across industries for inventory categorization. However, since this approach typically relies on a single factor as the classification criterion, the resulting categories, while meaningful for inventory management, may not necessarily be the most efficient. Consequently, multi-criteria classification methods have garnered significant attention in both academic circles and practical applications in recent years.

Balaji proposed a multi-criteria ABC classification method for the automotive rubber parts manufacturing industry. Based on multiple criteria including demand, unit price, annual consumption value, unit weight, and component shape, they employed the Analytic Hierarchy Process (AHP) to enhance the traditional ABC method for classifying rubber components. This approach addressed issues of improper material allocation and inefficient inventory handling processes<sup>[2]</sup>. Yang proposed a novel integrated MILP model to simultaneously optimize multiple inventory classification and control decisions, enabling profit maximization under non-stationary demand.<sup>[3]</sup> Ishizaka introduced the DEASort method based on traditional ABC classification, integrating the weighting capabilities of AHP to address multi-criteria classification problems. Case studies demonstrated that the improved classification method achieved significant cost savings compared to the ABC classification approach.<sup>[4]</sup> Maganha proposed a multi-criteria classification method based on the combination of the Fuzzy Analytic Hierarchy Process (FAHP) and the Analytic Binary Comparison (ABC) technique. By applying selected criteria, they categorized 345 parts into three classes, enabling the implementation of differentiated inventory management strategies to enhance the efficiency and scientific rigor of inventory management<sup>[5]</sup>.

The ABC classification method is currently the most widely applied categorization approach in China, frequently employed across various sectors. Ma Yuwen utilized the ABC classification method to categorize and manage pharmaceuticals in hospital drug warehouses, establishing specific procurement limits and cycles for each category. This approach enhances the scientific rigor of inventory management, improves drug turnover rates, and reduces capital tied up in inventory<sup>[6]</sup>. Chen applied the ABC classification method to manage high-value consumables in operating rooms. They proposed distinct inventory management strategies for three categories of supplies and implemented these strategies in practice. This resulted in a significant increase in inventory turnover rates for consumables and an improvement in shortage incidents<sup>[7]</sup>. As enterprises place increasingly stringent demands on inventory management, the traditional and readily applicable ABC classification method no longer meets their management needs. Scholars and practitioners have therefore refined conventional classification approaches based on the unique characteristics of individual businesses. Existing domestic literature contains limited research on inventory classification management for fresh produce enterprises. Some studies employ the Analytic Hierarchy Process (AHP) to enhance traditional ABC classification. For instance, Qi Yongfang (2013) introduced AHP to refine ABC classification by incorporating multiple criteria beyond capital occupation—including warehouse facilities, stockout impacts, seasonality, and procurement difficulty—thereby optimizing inventory for SC Company and achieving more scientific and reliable inventory management<sup>[8]</sup>. Xu similarly introduced the Analytic Hierarchy Process (AHP) to enhance the ABC classification method. First, the ABC classification method was used to categorize fresh products into three major groups. Subsequently, the AHP method was applied to further analyze the key Category A products requiring intensive management, thereby generating more targeted management recommendations<sup>[9]</sup>.

### 2.2 Inventory Control Optimization

Numerous factors influence inventory control, and perishable goods require consideration of even more aspects. Scholars have conducted research on various influencing factors accordingly.

In the early stages of research, many scholars assumed that demand for perishable products was deterministic, positing demand as either constant or as a function of influencing factors such as time, price, and freshness. For instance, Yu and others assumed demand was related to price and inventory levels, studying inventory models under carbon cap constraints<sup>[10]</sup>. Banerjee hypothesize that demand depends on freshness and price, and investigate optimal ordering decisions under discount promotions<sup>[11]</sup>. However, product demand often exhibits significant uncertainty. When addressing uncertain demand, scholars typically consider scenarios where demand follows a specific distribution or where the demand distribution is unknown. For instance, Abdel-Aal and others assume market demand follows a normal distribution. Based on the CVaR criterion, they established a multi-product newsboy model under three risk aversion levels and employed algorithms for solution. Ultimately, this yields two decision outcomes: the market to serve and the product order quantity<sup>[12]</sup>.

Han Shuguang assumed that demand is related to transportation time and freshness, analyzing the order cycle and order quantity that maximize profit<sup>[13]</sup>. In studies considering quantity discounts, Zhang introduced quantity discount contracts to coordinate supply chains for time-delayed perishable goods, enabling the entire supply chain system to achieve an optimal state under centralized decision-making<sup>[14]</sup>. In studies considering spoilage rates, Wei investigated inventory problems under a two-parameter Weibull distribution for spoilage rates. Aiming to minimize the retailer's average total cost, they established a retailer inventory model and employed genetic algorithms to plan and solve inventory and screening strategies<sup>[15]</sup>. In studies addressing simultaneous ordering of multiple products, Chen developed a multi-product Marquis demand boy model with capacity constraints under stochastic demand, integrating the theoretical foundation of the multi-product Marquis demand model. This approach yielded optimal ordering strategies for multiple products<sup>[16-17]</sup>.

### 3.Current Status of Fresh Produce Inventory Management at D Supermarket

#### 3.1 Current Inventory Status

D Supermarket offers an extensive variety of fresh produce, displayed in distinct sections by category. Shelves feature a wide selection of items with clear, easy-to-read pricing, enabling customers to quickly and conveniently choose their desired products. The supermarket's fresh food offerings are primarily divided into four major categories: vegetables, fruits, meats, and seafood. The specific classification structure is shown in Table 2-1 below.

*Tbale 2-1 D Supermarket Fresh Produce Categories*

| Name          | Classification   | Subcategory  |
|---------------|------------------|--|
| Fresh Produce | Vegetables       | Tomatoes, broccoli, cauliflower, bell peppers, lettuce, round eggplant, dried ginger, potatoes, parsley, baby bok choy, romaine lettuce, long beans, spinach, cucumbers, green peppers, yellow cabbage, zucchini |
|               | Fruit            | Cherries, Red Fuji apples, plums, passion fruit, blueberries, cantaloupe, dragon fruit, avocados, mangoes, green dates, lemons, nectarines, watermelon, peaches  |
|               | Meat and Poultry | Chilled Free-Range Chicken, Fresh Beef Short Ribs, Fresh Lamb, Fresh Beef, Pork Trotters, Beef Steak, Beef Shank, Pork Loin, Frozen Chicken Wings, Frozen Shrimp, Chilled Chicken Drumsticks                     |
|               | Seafood          | Burbot, Fresh Seafood Shrimp, Hairy Crab, Fresh Sea Bass   |

D Supermarket primarily operates fresh goods including meat, seafood, fruits, and vegetables. By the end of 2024, the total inventory of fresh food slightly increased, rising 3% compared to the same period last year. With processing centers directly supplying standardized products, inventory of meat and poultry has significantly decreased, accepting only select varieties for processing and repackaging sales. Among the four categories, fruit holds the largest share exceeding 30%, showing an upward trend over the past year. Seafood and vegetable reserves have also steadily increased. However, despite rising inventory levels, sales have not grown significantly, instead increasing operational pressure on the store. The specific

inventory composition is detailed in Table 2-2.

*Table 2-2 2024 Inventory Composition Statement*

| Inventory Items | 2022/4/30     |            |            | 2022/8/31     |            |            | 2022/12/31    |            |            |
|-----------------|---------------|------------|------------|---------------|------------|------------|---------------|------------|------------|
|                 | Quantity (kg) | Amount (W) | Percentage | Quantity (kg) | Amount (W) | Percentage | Quantity (kg) | Amount (W) | Percentage |
| Fruit           | 12065         | 360        | 30.48%     | 11461         | 346        | 30.01%     | 13201         | 375        | 31.38%     |
| Vegetables      | 6905          | 231        | 19.56%     | 7139          | 242        | 20.99%     | 7476          | 258        | 21.59%     |
| Meat poultry    | 6430          | 253        | 21.42%     | 5871          | 225        | 19.51%     | 4587          | 195        | 16.32%     |
| Seafood         | 5470          | 337        | 28.54%     | 6860          | 340        | 29.49%     | 7060          | 367        | 30.71%     |
| Total           | 30870         | 1181       | 100%       | 31385         | 1153       | 100%       | 32324         | 1195       | 100%       |

### 3.2 Current Status of Losses

Losses at Supermarket D typically refer to packaging damage during distribution and handling, spoilage of fresh produce during transportation, and products nearing their expiration dates within the supermarket.

Field research and data collection reveal that packaging damage during transportation accounts for only a small fraction of losses. The primary causes stem from products expiring, deteriorating, or rotting. When supermarket fresh produce managers relay purchase order information to procurement departments, they often rely on personal experience and subjective judgment, potentially leading to over-ordering. This results in declining product quality, wasted shelf space, and increased losses. Furthermore, the inability to accurately predict consumer demand leads to large quantities of fresh produce being stockpiled. Given their typically short shelf lives, these products often cannot be sold before expiring, resulting in significant losses. Ultimately, D Supermarket's fresh produce losses stem from improper inventory management, causing product dehydration, quality degradation, and quantity reduction. This forces the supermarket to sell items at discounted prices or even remove them from shelves for disposal. Unsold fresh produce not stored in warehouses holds no residual value and can be termed "waste volume." This waste volume equals the ordering quantity minus the inventory quantity, where the ordering quantity is the sum of market demand and residual inventory. Thus, the waste rate for a given fresh product = waste volume / ordering quantity.

Analysis of the organized data from the fresh produce inventory management system reveals that the inventory loss rate for certain fresh products at Supermarket D exceeds the stipulated 5% threshold. The industry standard average loss rate for fruits and vegetables ranges from 2% to 3%<sup>[30]</sup>, and Supermarket D's rate surpasses this, indicating room for improvement in its fresh produce management. While loss in fresh products cannot be entirely avoided, losses can be minimized through optimized management practices.

### 3.3 Current Status of Ordering Strategies

D Supermarket faces numerous management issues in its fresh produce sales. First, the extensive variety of fresh products lacks clear and scientific categorization, leading to irregular and highly subjective ordering practices. Second, for fast-moving consumer goods like vegetables and fruits, ordering considers only historical sales volumes without accounting for fluctuations and randomness in customer demand, resulting in inflexible ordering plans. Additionally, D Supermarket faces severe inventory backlog issues, significantly diminishing the freshness of its products. This negatively impacts both brand image and customer shopping experience. Based on field research and data provided by the supermarket regarding procurement, sales, and inventory, demand information for 50 fresh produce items was compiled.

## 4. Inventory Management Issues

### 4.1 Excessive inventory costs

D Supermarket is currently in a phase of rapid expansion. Although it employs traditional inventory management practices, it has adopted a strategy of increasing safety stock levels to prevent stockouts. However, this approach has resulted in excessive inventory levels at both store warehouses and distribution centers, leading to unsold goods and increased inventory costs. Given the short shelf life of D Supermarket's fresh produce, which is prone to spoilage, timely sales are essential. Excessive inventory accumulation causes fresh products to lose freshness or even rot, necessitating discounted sales or outright losses. This further inflates inventory costs and erodes profits. Analysis reveals the following root causes.

#### **4.1.1 Severe inventory backlog**

D Supermarket currently does not employ different ordering models tailored to the characteristics of various fresh produce items, frequently resulting in product inventory backlogs. The primary cause of D Supermarket's excessive fresh produce inventory is over-ordering, which frequently creates mismatches and imbalances between supply and demand for fresh items. Unlike general merchandise, fresh produce differs significantly in that its freshness and value are not static—they gradually decline over time. Consequently, when selecting fresh products, consumers consider not only the selling price but also the item's freshness. Based on the analysis of data from on-site surveys and inventory records provided by Supermarket D, demand information for 50 fresh produce items was compiled. It was discovered that at the end of the sales period, a substantial surplus of fresh produce remained, with inventory levels consistently exceeding demand. This inventory buildup necessitates Supermarket D to reduce losses through price promotions. Fresh produce exceeding its shelf life or expiration date must be forcibly removed from shelves, resulting in additional unnecessary costs for the supermarket.

#### **4.1.2 Management of fresh produce is lax, lacking distinction between primary and secondary items**

Inventory management for fresh produce requires meticulous handling tailored to its specific characteristics. However, D Supermarket's approach to fresh produce management appears overly simplistic and lacks prioritization. Particularly concerning high-value fresh items, the supermarket fails to allocate sufficient attention and emphasis. Furthermore, D Supermarket disproportionately allocates inventory costs toward storing lower-value fresh products, while demonstrating insufficient awareness of the need for differentiated management based on varying levels of perishability.

### **4.2 Excessive loss**

Based on the analysis of current loss rates, it was found that the loss rate for a significant portion of fresh produce exceeds the supermarket's stipulated 5% tolerance, resulting in excessively high loss costs and increased inventory expenses. Fresh produce is characterized by diverse varieties, strong seasonality, and susceptibility to spoilage. To maintain freshness, supermarkets must equip specialized refrigeration and preservation facilities for product storage while also hiring professional inventory management technicians for meticulous stock control. However, D Supermarket currently suffers from a severe shortage of specialized equipment and relies on limited inventory management methods. Inventory management for all categories of fresh produce sold in the supermarket is based solely on individual staff experience, presenting significant drawbacks. Management approaches are not differentiated by product category, resulting in a large volume of fresh produce being unsuitable for the existing inventory management methods. This leads to spoilage, where issues such as rotting, discoloration, and off-odors in fresh produce cannot be effectively addressed. Fresh produce lacks guarantees of "safety" and "environmental sustainability." Vast quantities of spoiled and discarded fresh goods result in substantial direct economic losses, leading to severe inventory cost overruns.

### **4.3 Unreasonable ordering strategy**

Currently, D Supermarket has not established distinct ordering models tailored to the characteristics of different fresh produce items. This hinders effective classification and management of fresh products. The irrational and unscientific categorization of fresh goods significantly impacts the supermarket's ordering decisions. During procurement, D Supermarket fails to consider the variety and shelf life of fresh produce. Most products are ordered either daily or every other day, frequently resulting in excessive orders or spoilage near the expiration date. Over 85% of D Supermarket's fresh produce losses stem from expired items being removed from shelves, highlighting a lack of scientific ordering strategies. Analysis reveals the following root causes:

#### **4.3.1 Lack of detailed categorization for fresh produce**

D Supermarket's current fresh produce ordering decisions lack sufficient understanding of product characteristics, fail to incorporate dynamic market responsiveness, and lack support from a more scientific procurement decision-making system. They do not employ professional techniques to perform standardized ABC classification based on metrics such as inventory quantity and value for fresh products. For high-value, short-shelf-life fresh items, failure to sell them promptly results in significant losses for the supermarket. Analysis of D Supermarket's current fresh produce inventory management reveals weak awareness of product classification. The supermarket fails to implement precise categorization for fresh items and lacks scientific selection and decision-making for ordering methods and quantities of high-value, short-shelf-life products.

#### **4.3.2 Employee decision-making is largely subjective**

D Supermarket is unable to accurately predict and assess consumer demand and inventory fluctuations for fresh produce. When determining fresh produce order quantities, staff primarily rely on past ordering experience, combining it with the item's sales volume during the same period and recent sales figures. However, this approach lacks a scientific, clear methodology. Relying on manual experience increases the risk of inaccurate order quantity forecasts. This can lead to over-ordering, causing inventory buildup, or under-ordering, resulting in product shortages that fail to meet market demand, thereby damaging the supermarket's operating profits. Since D Supermarket primarily relies on operational staff experience to compile ordering data for fresh produce, and given the difficulty of conducting timely inventory counts due to the wide variety of items, certain categories of fresh produce are frequently over-ordered or under-ordered. This results in excessively high spoilage costs or stockout costs, significantly reducing operating profits.

#### **4.3.3 Inadequate inventory management systems and ineffective implementation and oversight**

Employees at Supermarket D lack understanding of the characteristics of fresh produce, making it difficult for them to adhere to established standards in operations and management. Furthermore, the supermarket lacks a comprehensive inventory management system, leaving employees without clear guidelines or standards to follow. Fresh produce is neither properly categorized nor subject to regular stock counts, and inadequate inventory methods lead to over-ordering or under-ordering of the diverse range of fresh items. Additionally, management approaches for both new and experienced staff are inconsistent. There is no systematic training program for new employees, and the absence of an effective oversight mechanism makes it difficult to promptly monitor and correct employee errors. This hinders continuous improvement and impedes efforts to enhance the supermarket's operational efficiency.

### **5.Inventory Management Recommendations**

#### **5.1 Implement a differentiated ordering strategy**

To optimize inventory management for fresh produce, a differentiated ordering strategy should first be developed based on product characteristics. For instance, fresh products have short shelf lives and strong time-sensitivity, necessitating precise management according to their sales cycles, demand fluctuations, and storage conditions. Employing the ABC classification method allows products to be categorized into tiers based on factors like sales volume, demand volatility, and shelf life, enabling more targeted inventory control. For high-value, short-shelf-life fresh goods, adopt a strategy of frequent, small-batch procurement while continuously monitoring inventory levels to prevent product spoilage from excessive stockpiling. Conversely, for low-value fresh goods with extended shelf lives, inventory levels can be appropriately increased while maintaining strict control over inventory turnover. This ensures meticulous inventory management and prevents waste. Through this differentiated approach, unnecessary inventory pressure is reduced, products reach the market at optimal times, and overall operational efficiency is enhanced.

#### **5.2 Optimize inventory management processes to enhance precision management**

First, establish a scientific inventory management system with differentiated standards for various product types. For high-value, short-shelf-life fresh goods, implement stricter freshness preservation and sales monitoring mechanisms to ensure product quality and prevent waste. Concurrently, low-value products with extended shelf lives can follow standard storage and rotation cycles to minimize inventory space utilization. Implementing an intelligent inventory management system, leveraging data analytics and market trend forecasting, enables more precise automated ordering. This reduces uncertainty from manual decision-making and prevents inventory buildup caused by market demand fluctuations or inaccurate sales



projections. For perishable goods, supermarkets should increase investments in refrigeration and freezing equipment while conducting regular operational checks to ensure temperature control remains consistent, thereby maximizing the quality and freshness of fresh produce. Furthermore, integrating real-time inventory data enables more effective optimization of restocking schedules, ensuring each category of fresh products enters the market at the optimal time for timely sales.

### 5.3 Enhance employee training and supervision mechanisms

Provide systematic training for employees, particularly regarding the characteristics of fresh produce and inventory management procedures. Training content should cover knowledge in inventory monitoring, ordering decisions, product categorization, and loss control to ensure staff can accurately assess the management requirements of different products. Establish a rigorous oversight mechanism to guarantee the implementation of inventory management protocols. Conduct regular internal inspections and physical counts to minimize human error and management oversights. Assign dedicated personnel to inspect and document each inventory transaction to ensure data accuracy.

### 5.4 Implement dynamic loss warning and control

Monitor fresh produce losses in real time through data analysis, establishing a loss alert system to promptly identify products nearing expiration or at risk of spoilage, enabling proactive measures. Conduct categorized analysis of fresh produce losses, implementing separate management and review for high-loss items to pinpoint root causes and implement improvements. Introduce automated restocking systems and more efficient logistics management to ensure products reach stores at optimal times for timely sales, reducing inventory backlog.

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# Structural Dimensions and Current Status Assessment of College Students' Innovation and Entrepreneurship Capabilities Based on Grounded Theory

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**Abstract:** Against the backdrop of the digital and intelligent revolution reshaping innovation and entrepreneurship paradigms, cultivating college students' innovation and entrepreneurship capabilities and competencies is crucial for higher education institutions to align with the development of the digital and intelligent economy. Clarifying the structural dimensions and current status of these capabilities is a prerequisite for advancing this cultivation effort. This study employs grounded theory to conduct three-level coding of interview data from 22 participants, forming a four-main-category structural framework for innovation and entrepreneurship capabilities and competencies. A questionnaire survey analyzes the current status of these capabilities and competencies among university students, identifying shortcomings and deficiencies. This provides theoretical support for enhancing students' innovation and entrepreneurship capabilities and competencies and for developing cultivation programs in higher education institutions.

**Keywords:** Digital and Intelligent Background; College Students' Innovation and Entrepreneurship Capabilities; Grounded Theory; Structural Dimensions; Status Assessment

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## 1.Introduction

The digital intelligence wave, centered on generative AI, human-machine collaborative systems, and intelligent algorithms, is reshaping industrial ecosystems and innovation-entrepreneurship logic at an unprecedented pace. This shift propels innovation and entrepreneurship from resource-driven to “data-driven” models<sup>[1]</sup>. Digital intelligence technologies not only lower entrepreneurial barriers but also impose higher demands on the competency frameworks of innovation and entrepreneurship talent. The 2025 State Council document “Opinions on Deepening the Implementation of the ‘AI+’ Initiative” emphasizes empowering talent development through artificial intelligence, highlighting that talent cultivation in the digital-intelligence era must prioritize innovation. As the primary battleground for talent cultivation, universities urgently need to clarify the core components of college students' innovation and entrepreneurship capabilities and competencies in the digital intelligence context. This will resolve the disconnect between traditional training models and digital intelligence demands—a practical necessity for supporting digital intelligence economic development and an inevitable direction for university innovation and entrepreneurship education reform.

Current research on college students' innovation and entrepreneurship capabilities and competencies primarily focuses on

talent cultivation models, teaching reforms, development pathways, ideological and political empowerment, influencing factors, and evaluation systems. However, few scholars have systematically explored and organized the specific innovation and entrepreneurship capabilities and competencies college students should possess. There is a lack of discussion on these capabilities and competencies within the context of digital intelligence, failing to integrate digital intelligence technologies with innovation and entrepreneurship capabilities<sup>[3][4]</sup>. Furthermore, existing research on students' innovation and entrepreneurship capabilities predominantly relies on empirical surveys or theoretical frameworks, lacking a methodology that combines "qualitative research for dimensional deconstruction with empirical research for status assessment." Based on this, This study adopts a grounded theory approach combined with questionnaire surveys to construct core dimensions of college students' innovation and entrepreneurship capabilities and competencies within the digital intelligence context. It identifies current shortcomings to provide theoretical guidance for enhancing these capabilities and competencies, while also offering practical references for universities to develop "digital intelligence-based innovation and entrepreneurship training programs."

## 2. Research Design

Building upon existing research on the structure, frameworks, and measurement scales of college students' innovation and entrepreneurship capabilities and competencies, this study addresses gaps in current dual-innovation research within the digital-intelligence context. It employs grounded theory to conduct an exploratory analysis of the structural framework for these capabilities and competencies, identifying its constituent dimensions.<sup>[5]</sup> Grounded theory is a qualitative analysis method based on raw data. It identifies core concepts and dimensions by organizing, analyzing, and synthesizing extensive raw data. Therefore, this study designed the following steps to collect raw data and constructed a structural framework for college students' innovation and entrepreneurship capabilities and competencies in the digital intelligence context through open coding, axial coding, and selective coding<sup>[6][7]</sup>.

### 2.1 Selection of Research Subjects

To comprehensively and systematically examine the structural dimensions of college students' innovation and entrepreneurship capabilities and literacy in the digital intelligence context, this study selected participants based on practical needs and real-world perspectives. this study selected 5 university faculty members, 13 college students who participated in innovation and entrepreneurship training programs or competitions, and 4 industry managers from different sectors. They comprehensively explored the innovation and entrepreneurship capabilities and competencies that college students should possess from multiple perspectives, including educational expertise, personal learning and practical experiences, and real-world corporate demands. This approach enhances the scientific rigor, comprehensiveness, and practicality of the research findings.<sup>[8]</sup>

### 2.2 Designing the Interview Outline

The interview outline was preliminarily designed through reviewing relevant literature and discussions with experts, scholars, and instructors engaged in university student innovation and entrepreneurship education.<sup>[9]</sup> To ensure the scientific validity of the interview outline, a pre-survey was conducted with five participants meeting the formal research criteria prior to the main interviews. Based on participants' responses during the interviews, post-interview feedback, and potential misunderstandings of questions, the outline was adjusted and revised to produce the final version.

### 2.3 Data Collection and Analysis

This study employed a combination of in-person interviews and online video conferences, with each interview lasting approximately 30–60 minutes. Twenty randomly selected transcripts totaling over 100,000 words were analyzed through independent coding. The coded results underwent iterative comparison and refinement, ultimately yielding 25 initial codes (see Table 1). Through analyzing and categorizing the initial concepts derived from open coding, the study ultimately distilled 11 categories. During the selective coding phase, it was determined that innovation and entrepreneurship capabilities, knowledge reserves, personal traits, and social participation constitute the core elements of college students' innovation and entrepreneurship capabilities and literacy within the digital intelligence context. Consequently, these four primary categories were subsumed under the core category of college students' innovation and entrepreneurship capabilities and literacy. In

this study, two randomly reserved interview datasets were used to test theoretical saturation. These datasets underwent organization, open coding, and axial coding. No new concepts, attributes, or relationships were identified, indicating that the study's conclusions passed the theoretical saturation test<sup>[10]</sup>.

Table 1: Concepts and Categories Formed Through Coding

| Raw Data   | Initial Coding                              | Sub-category  | Main Category                  |
|--|---|---|--------------------------------|
| There are also many innovation and entrepreneurship competitions, and the school encourages us to actively participate in them. I participate every year.  | Participating in innovation Competitions    | Innovative Thinking and Abilities                       | Double Innovation Capabilities |
| The school regularly hosts innovation and entrepreneurship lectures and training courses, inviting successful professionals from the industry to share their experiences, sparking my desire to innovate.                                      | Proactively Cultivating Innovative Thinking |   |                                |
| Collaborating with external companies makes project initiation easier, allowing me to offer constructive feedback to these businesses.   | Market Insight                              | Opportunity Identification and Development Capabilities |                                |
| Anticipate potential risks during entrepreneurial competitions and formulate countermeasures.  | Problem-Solving Skills                      |   |                                |
| In terms of communication, the school has established an online learning platform and innovation and entrepreneurship forums, facilitating exchanges with peers from different disciplines and faculty members to share ideas and experiences. | Digital Platform Communication              | Communication Skills                                    |                                |
| Additionally, there are opportunities for face-to-face exchanges with industry leaders and experts.  | Industry Expert Exchange                    |   |                                |
| By exchanging ideas and sharing insights with classmates, teachers, and experts, we gain valuable experience from peers while accessing additional resources and opportunities.  | Classroom Instructor Interaction            |   |                                |
| The school organizes academic lectures featuring corporate experts and university professors who share cutting-edge technologies and trends in mechanical engineering.   | Academic Lecture Learning                   | Learning and Adaptation Ability                         |                                |
| You must possess certain competencies before you can discern what is applicable and what is not.   | Digital Tool Application                    |   |                                |
| Mechanical engineering curricula are constantly evolving, incorporating new courses like smart manufacturing and industrial internet alongside traditional subjects.   | Cutting-Edge Technology Learning            |   |                                |
| Instructors incorporate industry case studies into their teaching to guide students in analyzing how emerging technologies impact professional development.  | Industry Trend Tracking                     | Professional Fundamentals Knowledge                     | Knowledge Knowledge Base       |
| Traditional design relied solely on designers. Now, our courses utilize AI to save time and costs while seamlessly integrating desired styles.   | Industry Theoretical Knowledge              |   |                                |
| The school has established cooperative relationships with machinery manufacturing enterprises, providing us with internship opportunities to understand the needs of the local machinery manufacturing industry through practical experience.  | Corporate Practical Experience              |   |                                |
| Integrating digital technology with the local machinery manufacturing industry into teaching, introducing case studies of smart manufacturing applications within the regional industrial sector.  | Digital Technology Theoretical Knowledge    | Digital Technology Knowledge                            |                                |
| Encouraging the use of drone aerial photography and GIS analysis to understand farmland mechanisms, designing agricultural landscapes that blend functionality with aesthetic appeal.  | Digital Technology Application Knowledge    |   |                                |



| Raw Data   | Initial Coding                    | Sub-category                     | Main Category     |
|--|-----------------------------------|----------------------------------|-------------------|
| Entrepreneurship often involves numerous setbacks and challenges, so I proactively adjust my mindset to confront these obstacles.  | Self-Regulation                   | Psychological Resilience         | Personal Traits   |
| Even when facing setbacks, I remain willing to actively seek assistance and acquire necessary resources, maintaining passion and confidence in entrepreneurship.   | Optimistic Mindset                |                                  |                   |
| You can't rely solely on this; you must also exercise discernment. Many experts point out that it can make mistakes—machine deception, meaning it may provide partial information that is incorrect or untrue.   | Critical Thinking                 | Critical Thinking                |                   |
| You don't know what to look at or which to choose, suffering from a bit of choice paralysis, unsure how to decide—all of which are significant problems.   | Information Analysis              |                                  |                   |
| Actively participate in innovation and entrepreneurship projects and corporate internships to gain relevant experience.  | Self-improvement                  | Autonomy                         |                   |
| Proactively seek collaborations with external enterprises and institutions to expand possibilities for innovation and entrepreneurship projects.   | Goal-Oriented                     |                                  |                   |
| Collaborate with government departments. We are currently emphasizing public-private partnerships, as governments possess abundant resources that enterprises need to leverage and convert into tangible benefits.   | Resource Integration and Sharing  | Collaborative Innovation Mindset |                   |
| We collaborate with these enterprises as a technical support provider. When certain companies encounter challenges they cannot resolve, we establish dedicated projects to address them, thereby gaining insights into the latest industry developments and changes. | Collaborative Innovation Practice |                                  | Social Engagement |
| The entrepreneurial incubation space provided by the university is allocated based on principles of openness and transparency.   | Upholding Social Equity           | Social Responsibility Awareness  |                   |
| In line with the national call for common prosperity, we provide targeted assistance to counties and cities in Zhejiang Province designated as common prosperity zones.  | Addressing Social Issues          |                                  |                   |

Based on grounded theory, we have constructed the structural dimensions of college students' innovation and entrepreneurship capabilities and competencies in the context of digital intelligence. Through open coding and axial coding, we have formed initial concepts, categories, and main categories, leading to the preliminary construction of an initial item pool comprising 4 dimensions and 22 items. To ensure content validity, five doctoral candidates in education and two education experts evaluated the items, identifying overlaps and ambiguities in some items. Consequently, three items were removed.

Additionally, a pre-survey was conducted by randomly inviting 20 university students to test-fill the questionnaire, collecting feedback on content, structure, item clarity, and completion time. Based on the feedback, the questionnaire was further revised and refined, ultimately forming the "Survey Questionnaire on College Students' Innovation and Entrepreneurship Competencies and Literacy in the Digital Intelligence Context." A total of 417 questionnaires were distributed via an online survey platform, yielding 378 valid responses. Exploratory factor analysis was conducted, resulting in a measurement scale comprising four dimensions and 18 items for assessing college students' innovation and entrepreneurship competencies and literacy in the digital intelligence context. Finally, confirmatory factor analysis demonstrated that the revised model exhibited good fit, indicating that the constructed scale possesses a sound structure and can serve as an official measurement tool for evaluating college students' innovation and entrepreneurship capabilities and literacy in the digital and intelligent context.<sup>[11]</sup>

*Table 2: Scale for Measuring Innovation and Entrepreneurship Competencies and Literacy in Local Industry-Specific Universities*

| Dimension                                  | No. | Item Content  |
|--|-----|---|
| Innovation and Entrepreneurship Competency | A1  | The innovation and entrepreneurship lectures and courses provided by the school have given me a clearer understanding of entrepreneurship.      |
|  | A2  | School courses (e.g., smart manufacturing, industrial internet) have equipped me with skills to identify market needs.                          |
|  | A3  | I excel at using digital tools to explore innovative solutions to real-world problems.  |
|  | A4  | I can identify innovation opportunities within industries during corporate internships.   |
|  | A5  | The university's online platform has enhanced my ability to collaborate and communicate with faculty and students across different disciplines. |
| Knowledge Base                             | B1  | I can apply digital technologies such as AI to design tasks within my major to enhance efficiency and creative expression.                      |
|  | B2  | Possess fundamental abilities to integrate digital technologies (e.g., image analysis) with specific scenarios.                                 |
|  | B3  | The university's "specialized foundational courses" have strengthened my cross-disciplinary integration skills.                                 |
|  | B4  | Industry case studies taught me to integrate local knowledge into innovative practices.   |
|  | B5  | Through collaborative projects with enterprises, I gained deeper insights into applying specialized knowledge in real-world work scenarios.     |
| Personal Traits                            | D1  | When facing entrepreneurial challenges, I proactively adjust my mindset and seek solutions.   |
|  | D2  | I critically utilize tools (such as AI design and data analysis) to avoid reliance on inaccurate information.                                   |
|  | D3  | My experience in innovation and entrepreneurship has taught me to quickly filter out effective content amid information overload.               |
|  | D4  | Participating in project-based initiatives has strengthened my resilience under pressure and enhanced my leadership capabilities.               |
| Social Engagement                          | E1  | I have participated in projects addressing social issues, such as community recycling initiatives and agricultural product assistance programs. |
|  | E2  | I believe innovation and entrepreneurship should prioritize social benefits (such as common prosperity and public welfare projects).            |
|  | E3  | The school's government-enterprise collaboration projects have made me realize the importance of resource integration.                          |
|  | E4  | The university encourages the application of digital technologies to local industries to promote sustainable development.                       |

### 3. Empirical Research

This study developed a grounded theory framework for university students' innovation and entrepreneurship capabilities and literacy in the digital intelligence context, encompassing innovation and entrepreneurship competencies, knowledge reserves, personal traits, and social engagement. To validate the model's reliability and validity and understand the current state of students' innovation and entrepreneurship capabilities and literacy, an empirical study was conducted to test the model.

#### 3.1 Data Collection

Data collection employed a questionnaire survey targeting university students. Two-stage questionnaires were distributed via

the Credamo platform from July 31 to August 18, 2025. Invalid responses—including duplicates and those with abnormal completion times—were excluded. The first phase yielded 400 responses, while the second phase collected 379 responses. After matching data across phases, 346 valid questionnaires were obtained, achieving an 86.5% response rate. Data analysis tools including SPSS and Amos were employed to analyze the collected data.

Data analysis revealed that respondents were predominantly from Guangdong, Zhejiang, and Henan provinces. Male and female college students accounted for 43.4% and 56.6% respectively. Junior students constituted the largest cohort at 29.2%. Among academic disciplines, engineering and management dominated at 22.8% and 18.8% respectively. The vast majority of students (93.6%) had participated in innovation and entrepreneurship projects.

### 3.2 Reliability Testing

This study employed Cronbach's Alpha coefficient to measure the internal reliability of the questionnaire. A higher Cronbach's Alpha coefficient indicates stronger internal consistency. The internal consistency of the questionnaire was assessed by evaluating the reliability of each section separately, with specific results presented in Table 3. As shown in Table 3, the Cronbach's Alpha coefficients for all subscales exceeded 0.7, indicating that the questionnaire possesses high internal consistency and is suitable as a research tool for this study.

*Table 3 Reliability Test Results for the Scale*

| Variable                                   | Number of Items | Cronbach's $\alpha$ |
|--|-----------------|---------------------|
| Innovation and Entrepreneurship Competence | 5               | 0.713               |
| Knowledge Base                             | 5               | 0.854               |
| Personal Traits                            | 4               | 0.846               |
| Social Engagement                          | 4               | 0.795               |
| Overall Scale                              | 18              | 0.819               |

### 3.3 Exploratory Factor Analysis

The Kaiser-Meyer-Olkin test results indicate that the KMO value for the scale data is 0.723. Furthermore, Bartlett's sphericity test confirms suitability for factor analysis.

*Table 4 Validity Test Results for the Scale*

| KMO Value                  |    | 0.723    |
|----------------------------|----|----------|
| Approximate Chi-Square     |    | 559.733  |
| Bartlett's Sphericity Test | df | 210      |
|                            | P  | 0.000*** |

Note: \*\*\*, \*\*, \* denote significance levels of 1%, 5%, and 10%, respectively

Subsequently, factor analysis was conducted on the scale. Results showed that all eigenvalues exceeded 1, and the cumulative variance explained after rotation reached 63.263%, surpassing the 60% threshold. This indicates that the extracted factors account for the majority of variance within the scale. Furthermore, each item's factor loading exceeded 0.5, signifying significant contributions to their respective factors without overlapping loadings across multiple factors. Notably, the observed variables were appropriately assigned to dimensions based on theoretical assumptions. In summary, the selected scale demonstrated sound construct validity, accurately measuring the underlying constructs under investigation. Discrimination validity and convergent validity tests were also conducted. Results indicated high conceptual validity across all four dimensions of the scale, as detailed in Table 5.

Table 5 Factor Analysis of Variables

| Dimension                                  | Item  | Factor Loadings | AVE   | CR    |
|--|-------|-----------------|-------|-------|
| Innovation and Entrepreneurship Capability | A1    | 0.654           | 0.681 | 0.756 |
|  | A2    | 0.764           |       |       |
|  | A3    | 0.696           |       |       |
|  | A4    | 0.774           |       |       |
|  | A5    | 0.882           |       |       |
| Characteristic Root                        | 4.846 |                 |       |       |
| Knowledge Reserve                          | B1    | 0.848           | 0.828 | 0.537 |
|  | B2    | 0.854           |       |       |
|  | B3    | 0.716           |       |       |
|  | B4    | 0.801           |       |       |
|  | B5    | 0.752           |       |       |
| Characteristic Root                        | 2.612 |                 |       |       |
| Personal Traits                            | C1    | 0.832           | 0.770 | 0.641 |
|  | C2    | 0.776           |       |       |
|  | C3    | 0.698           |       |       |
|  | C4    | 0.779           |       |       |
| Characteristic Root                        | 1.907 |                 |       |       |
| Social Engagement                          | D1    | 0.768           | 0.731 | 0.621 |
|  | D2    | 0.779           |       |       |
|  | D3    | 0.857           |       |       |
|  | D4    | 0.788           |       |       |
| Characteristic Root                        | 2.099 |                 |       |       |
| Cumulative Contribution Ratio              |       | 63.263%         |       |       |

### 3.4 Confirmatory Factor Analysis

This study also conducted confirmatory factor analysis. The data indicate that the model fits well, with results shown in Table 6.

Table 6 Results of Confirmatory Factor Analysis

| Common Indicators | P     | Chi-Square | Degrees of Freedom | Ratio | GFI   | RMSEA | CFI   | TLI   |
|-------------------|-------|------------|--------------------|-------|-------|-------|-------|-------|
| Criteria          | >0.05 |            | <3                 |       | >0.9  | <0.10 | >0.9  | >0.9  |
| Value             | 0     |            | 2.518              |       | 0.858 | 0.024 | 0.948 | 0.958 |

### 3.5 Current Situation Analysis

Based on 346 valid questionnaires and scores across all dimensions of the scale (see Table 7), an analysis of the current state of college students' innovation and entrepreneurship capabilities and literacy in the digital intelligence context reveals:

Overall performance is at a moderately high level, but significant imbalances exist both between dimensions and among indicators within dimensions. Specific findings are as follows:

The overall average score for innovation and entrepreneurship capabilities and literacy in the digital intelligence context is 3.42, indicating that students possess a certain foundation in digital innovation and entrepreneurship. Further analysis of sample characteristics reveals that 93.6% of respondents have experience in innovation and entrepreneurship projects, providing a practical foundation for the development of their capabilities and literacy. However, the distribution of scores across dimensions (Innovation and Entrepreneurship Capabilities 3.68 > Knowledge Base 3.52 > Personal Traits 3.29 > Social Engagement 3.20) reveals significant disparities. The gap between the highest and lowest dimensions is 0.48 points, reflecting pronounced unevenness in the development of students' innovation and entrepreneurship capabilities and literacy. Targeted improvements are needed in the weaker dimensions.

*Table 7: Scores for Each Dimension of College Students' Innovation and Entrepreneurship Capabilities and Competencies*

| Dimension                                    | Indicator   | Score | Average Score |
|--|---|-------|---------------|
| Innovation and Entrepreneurship Capabilities | Innovative Thinking and Capabilities                  | 3.52  | 3.68          |
|  | Opportunity Identification and Development Capability | 3.27  |               |
|  | Communication Skills                                  | 3.97  |               |
|  | Learning and Adaptability                             | 3.95  |               |
| Knowledge Base                               | Professional Foundational Knowledge                   | 3.83  | 3.52          |
|  | Digital Technology Knowledge                          | 3.21  |               |
| Personal Traits                              | Psychological Resilience                              | 3.37  | 3.29          |
|  | Critical Thinking                                     | 3.25  |               |
|  | Autonomy  | 3.26  |               |
| Social Engagement                            | Collaborative and Co-creative Mindset                 | 3.34  | 3.20          |
|  | Social Responsibility Awareness                       | 3.05  |               |
| Overall Average Score                        |   | 3.42  |               |

(1) Innovation and Entrepreneurship Capabilities: Strong in Communication, Collaboration, and Learning Adaptability; Weak in Identifying Digital and Intelligent Opportunities

The average score for innovation and entrepreneurship capability was 3.68, ranking highest among the four dimensions and representing the core strength in students' digital innovation literacy. However, significant variations existed among sub-indicators: communication skills (3.97) and learning/adaptability (3.95) scored notably higher. Survey findings indicate that 82.3% of students reported being able to efficiently exchange ideas with faculty and peers from different disciplines via the university's online platforms. Additionally, 79.5% demonstrated the ability to rapidly learn digital innovation and entrepreneurship tools and apply them to project practice. This capability is closely linked to the fact that 93.6% of students have participated in innovation and entrepreneurship projects. Increased practical experience has effectively enhanced their communication, collaboration, and rapid learning abilities.

However, the ability to identify and develop opportunities scored the lowest (3.27). Only 32.1% of students indicated they could accurately pinpoint market pain points through industry big data and digital intelligence platforms, while 67.9% still relied on "traditional market research + experiential judgment" to identify entrepreneurial opportunities, struggling to transform digital intelligence tools into effective means for opportunity recognition. For instance, in feedback regarding "discovering digital innovation opportunities through corporate internships," only 28.6% of students could propose targeted solutions like "intelligent equipment optimization" or "digital process improvements" based on corporate production data. Most students remained at the "observation and documentation" stage, demonstrating insufficient capability to convert digital



opportunities into actionable insights.

#### (2) Knowledge Base: Solid Professional Foundations, but Insufficient Integration of Digital-Intelligent Technologies with Specialized Knowledge

The average score for knowledge reserves was 3.52, indicating an intermediate level. This dimension revealed a divergence where “strong professional knowledge contrasts with weak digital and intelligent technology skills”: scores for fundamental professional knowledge were relatively high (3.83). 81.7% of students reported proficient mastery of core knowledge in their major and the ability to integrate professional knowledge into innovation practice through industry case studies, reflecting the long-term accumulation of specialized education in higher education institutions. However, digital technology knowledge scored the lowest (3.21), with significant disciplinary disparities. Engineering majors scored significantly higher (3.45) than management majors (3.02), yet both groups face a disconnect between digital/intelligent technologies and professional knowledge: only 38.5% of students can proficiently apply AI technologies to professional design tasks; while 45.2% possess only a “limited understanding” of the fundamental principles of digital and intelligent technologies like industrial internet and smart algorithms. This prevents them from transforming such technologies into supportive tools for professional innovation, indicating insufficient knowledge integration.

#### (3) Personal Traits: Strong Psychological Resilience, but Weak Critical Thinking and Autonomy in Digital Intelligence

The average score for personal traits was 3.29, indicating a below-average level and representing a potential weakness in students’ innovation and entrepreneurship literacy. Psychological resilience scored relatively high (3.37). When facing setbacks in digital and intelligent entrepreneurship, 58.3% of students reported being able to proactively adjust their mindset and seek help from mentors or industry experts. This reflects the integration of “setback education” in university innovation and entrepreneurship programs and the accumulation of practical experience among students.

However, scores for critical thinking (3.25) and autonomy (3.26) were notably low. Regarding digital tool usage, only 35.7% of students reported proactively verifying the authenticity of AI-generated entrepreneurial information; while 42.8% exhibited “overreliance on AI tools,” such as directly adopting AI-generated business plan frameworks without adapting them to specific professional contexts, revealing weak digital-intelligence critical thinking. Furthermore, only 39.1% can “actively track digital-intelligence technology iterations and apply them to innovation and entrepreneurship projects,” with insufficient autonomy hindering their ability to adapt to the rapid changes demanded by digital-intelligence entrepreneurship.

#### (4) Social Engagement: Emerging awareness of collaborative creation, but weak sense of social responsibility and sustainability

The average score for the social participation dimension was 3.20, the lowest among the four dimensions, indicating students’ insufficient ability to extend the value of digital and intelligent innovation and entrepreneurship. The awareness of collaborative creation scored slightly higher at 3.34. 34.7% of students indicated they had obtained digital and intelligent entrepreneurship resources through school-government-enterprise collaboration projects, demonstrating a preliminary awareness of “leveraging external resources to advance projects.” However, this awareness remains largely confined to the “resource acquisition” level, with limited capacity for proactive collaborative innovation.

However, social responsibility awareness scored the lowest (3.05). Only 29.3% of students had participated in digital and intelligent innovation and entrepreneurship projects addressing social issues. 62.5% of students indicated in the questionnaire that “economic benefits are the primary consideration for innovation and entrepreneurship,” demonstrating insufficient attention to social benefits such as “digital and intelligent technologies promoting common prosperity” and “green entrepreneurship for sustainable development.” The social responsibility awareness of college student entrepreneurs urgently needs to be strengthened.

## 4. Conclusion

This study employs a grounded theory-based qualitative research methodology to systematically explore the composition of college students’ innovation and entrepreneurship capabilities and competencies in the digital and intelligent context, constructing a theoretical framework. Empirical research clarifies the current state of these capabilities and competencies among college students. It provides theoretical guidance for further enhancing college students’ innovation

and entrepreneurship capabilities and competencies, while also offering practical references for reforming innovation and entrepreneurship education in higher education institutions and cultivating innovation and entrepreneurship talent. This promotes the organic integration of the education chain, talent chain, and industrial chain. However, this study has some limitations. Due to limitations in sample coverage, insufficient exploration of agricultural and arts disciplines may affect the universality of the conclusions. Furthermore, as technology evolves, the demands on students' innovation and entrepreneurship capabilities and competencies will dynamically change. The conclusions of this study are based on data analysis at a specific point in time. Therefore, future research may consider expanding the sample scope to enhance the universality of conclusions while incorporating the temporal factor of technological iteration and establishing a dynamic adjustment mechanism.

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# The Impact of Performance Expectation Gap on Enterprise Innovation Performance

## ——Mediating Effect Test Based on Outcome Control

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**Abstract:** Whether an enterprise can realize its innovation transformation through internal control is increasingly related to the survival of the enterprise. Based on the performance feedback theory and the internal control paradox, this paper explores the impact of the performance expectation deficit on the innovation performance of enterprises, introduces the negative intermediary of result control to reveal the specific impact path of the performance expectation deficit on the innovation performance of enterprises, and deeply analyzes the impact of internal and external social responsibility on both. Through in-depth analysis of manufacturing enterprises, it is found that the performance expectation deficit has a positive impact on enterprise innovation performance; The performance expectation deficit can improve the innovation performance of enterprises by inhibiting rigid management and hindering the result control of innovation; Compared with the performance of external social responsibility, the performance of internal social responsibility can significantly strengthen the impact on enterprise innovation performance. The research conclusion of this paper enriches the pre research of enterprise innovation performance, reveals the negative mediating effect of result oriented internal control, and provides a theoretical basis for the diversified collaborative strategy that enterprises should focus on fulfilling their internal social responsibility when facing the performance expectation deficit.

**Keywords:** Performance Expectation Deficit; Enterprise Innovation Performance; Internal Control; Result Control; Corporate Social Responsibility

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## 1.Introduction

In the context of the global scientific and technological revolution, scientific and technological innovation has become a key area of international competition. China's "14th five years plan" and the central economic work conference in 2023 clearly pointed out that scientific and technological innovation is the core, enterprises are the main body, and high-quality innovation resources are gathered <sup>[1]</sup> As the pillar of China's economic development, the innovation performance of a considerable number of enterprises is still low, and the gap between enterprises' innovation performance continues to expand <sup>[2]</sup>. Innovation is the only way for manufacturing enterprises with performance expectation deficit to realize the reversal against the wind. It is also more realistic to study the promotion effect of performance expectation deficit on enterprise innovation performance. However, when the performance expectation deficit of enterprises is large, the obstacles to innovation will also be large,

especially when the internal control management system of enterprises tends to result control, which will further increase the resistance to enterprise innovation.

As far as manufacturing enterprises are concerned, the evaluation method of internal control is mainly designed based on the achievement of the five major goals of internal control strategy, operation status, accuracy of financial reports, compliance with laws and regulations and asset security<sup>[3]</sup>. The internal control measured by this method is actually more focused on result control, which will stifle the management of enterprises and hinder the innovation intention of enterprises, which is not conducive to the improvement of enterprise innovation performance. Existing research shows that the main resistance of enterprises in the implementation of innovation is the obsolescence and fossilization of ideas, resources and management caused by internal result control, which is the “paradox of internal control”. The hypothesis asserts that the institutionalized internal control mechanism is bound to lead to a certain degree of management rigidification, which inevitably conflicts with the flexibility required for the investment, integration and absorption of innovation activities, thus inhibiting the innovation of enterprises<sup>[4]</sup>. Therefore, in order to study how manufacturing enterprises break through the internal rigidity and resistance in the performance expectation deficit and improve the innovation performance, it is necessary to introduce the result control between the performance expectation deficit and enterprise innovation performance to explore its negative mediation mechanism, and also provide a basic analysis framework for further exploring under what circumstances the resistance can be effectively reduced.

Further analysis found that enterprises often face the risk of high initial investment, long cycle and uncertain results when implementing innovation<sup>[5]</sup>, so external resources are needed to help enterprises implement innovation. Research shows that enterprises actively fulfill their internal and external social responsibilities, can effectively meet the needs of internal and external stakeholders, promote the establishment of good relations between enterprises and stakeholders, and provide rich resource support for technological innovation activities<sup>[6]</sup>. At the same time, for enterprises whose result control hinders technological innovation, such external assistance is more needed to increase the flexibility of their internal management. Therefore, this study also needs to explore whether and how corporate social responsibility can strengthen the inhibitory effect of the performance expectation deficit on the result control of the promotion mechanism, which is of great significance to promote the development of enterprise innovation and ultimately realize the dual benefits of economy and environment in China at this stage.

Therefore, based on the performance expectations of listed manufacturing enterprises in China, this paper makes an empirical study on whether the performance expectation deficit can promote the innovation performance of enterprises, explores the negative mediating effect of the result control between the two, and further analyzes the moderating effect of the internal and external social responsibilities of enterprises on the impact of the performance expectation deficit on the innovation performance of enterprises, and weakens the negative mediating effect of the result control between the two. Based on the performance feedback theory and internal control theory, this paper enriches the pre research of enterprise innovation performance, and supplements the research on the impact mechanism of performance expectation deficit on enterprise innovation performance from the perspective of internal control paradox; At the same time, it explores how manufacturing enterprises can effectively improve their innovation performance by cooperating with the appropriate performance of corporate social responsibility under the premise of performance expectation deficit, and alleviate the result control of enterprise innovation, so as to provide a scientific basis for enterprises to carry out innovation and social responsibility at the same time.

## **2. Research theory and hypothesis**

### **2.1 Performance expectation deficit and enterprise innovation performance**

Technological innovation is the key way for enterprises to maintain competitive advantage. Due to its high investment, long-term and uncertain return and other risk characteristics, enterprises tend to be cautious when deciding to implement innovation strategies. Although innovation activities contain technical and market risks, for enterprises with poor performance, even if the innovation fails, the resources they lose are relatively limited<sup>[7]</sup>. On the contrary, innovation strategy is regarded as a key means for enterprises to deal with existing performance challenges, correct inappropriate behavior

patterns, and stimulate operational vitality<sup>[8]</sup>. Wang Qian and others<sup>[9]</sup> believe that when an enterprise fails to achieve the expected performance, it will drive managers to search for problems, and the enterprise will increase R&D investment to obtain core competitiveness through technological innovation. Based on the performance feedback theory, when the enterprise is in the performance expectation deficit, it means that the enterprise's first practice has not achieved the desired effect. At this time, managers are motivated to search for innovation opportunities<sup>[10]</sup>, conduct in-depth analysis on the reasons why the enterprise fails to achieve the expected goals, and explore the corresponding solutions<sup>[11]</sup>, that is, when the enterprise is faced with the performance expectation deficit, it will be more motivated to engage in enterprise innovation.

Based on the research background of manufacturing industry, this paper finds that manufacturing enterprises can promote the improvement of enterprise innovation performance when facing the performance expectation deficit. First of all, under the current background of innovation and transformation, the managers of manufacturing enterprises are more inclined to adopt the long-term strategy of innovation because of their strong motivation and willingness to change. Secondly, in the process of innovation and transformation of manufacturing enterprises, the performance expectation deficit is only temporary and will not change the long-term enterprise innovation and transformation strategy. Finally, in the process of implementing innovation activities, enterprises often need sufficient resources as support. At this time, the redundant resources reserved within the enterprise can significantly alleviate the problem of resource constraints, thus promoting enterprises to increase R&D investment<sup>[12]</sup>. Manufacturing enterprises usually have abundant redundant resources, which provide necessary material and capacity support for their innovation and transformation.

Therefore, based on the above research and analysis, this paper puts forward the following assumptions:

H1: The performance expectation deficit of manufacturing enterprises is positively promoting the improvement of enterprise innovation performance.

## **2.2 The Mediating Effect of performance expectation deficit and result control in enterprise innovation performance**

Based on the above research findings, the larger the performance expectation deficit, the more unfavorable it is for the improvement of the quality of enterprise result control, and the enterprise will conduct "problem search". At this time, the enterprise tends to think that the current conventional practices of the organization can not effectively respond to the changes in the external environment, so when facing the performance expectation deficit, the enterprise will promote the enterprise to carry out in-depth strategic reflection and change. However, enterprises that frequently make strategic adjustments will further reduce the overall quality of internal control<sup>[13]</sup>. Therefore, when an enterprise is faced with a small performance expectation deficit, the quality of its internal control biased towards result control is often high. In this case, the internal control system, as the management framework of the enterprise, shows the characteristics of stability and standardization, but it also means that there is a certain degree of rigidity.

The current research on the impact of performance expectation deficit on enterprise innovation performance expectation, enterprises will actively seek change, so as to optimize the internal control mechanism. However, internal control is a specific policy that is based on the constraints of the management system and penetrates into all levels of the company. There will inevitably be a certain conflict between its inherent standard and the flexibility required for innovation investment activities<sup>[14]</sup>. It is found that process control supports the view of "internal control promotion theory", while result control supports the view of "internal control paradox". As a traditional industry, the management rules and financial evaluation indicators implemented through internal control in the manufacturing industry reflect the internal control that is biased towards result control. At the same time, manufacturing enterprises usually pay more attention to the control and measurement of results due to the high investment and capital occupation in the early stage. In view of the fact that the overall average innovation investment level of China's listed companies is far lower than that of Companies in developed countries, for manufacturing enterprises, the "internal control paradox" plays a major role at this time, and enterprises' excessive reliance on the internal control management system that tends to control results may have a restrictive effect on the innovation performance of enterprises.

Through the above research and analysis, it can be found that the performance expectation deficit has a negative effect on the



result control, and the higher the result control is, the worse the improvement of enterprise innovation performance is. At the same time, the impact of performance expectation deficit on enterprise innovation performance is not direct, but indirectly through result control, and result control plays a negative intermediary role between the two. The performance expectation deficit stimulates the innovation vitality of enterprises by weakening the result control. However, it is a pity that there are few negative studies on the effect control of performance expectation deficit, and the effect control hinders the improvement of enterprise innovation performance.

Therefore, this paper proposes the following assumptions to verify this conclusion:

H2: Result control plays a negative intermediary role between performance expectation deficit and enterprise innovation performance.

### **2.3 The moderating effect of corporate social responsibility on performance expectation deficit and corporate innovation performance**

As an important strategic concept, corporate social responsibility (CSR) has attracted much attention in business and academia for a long time. The performance expectation deficit of enterprises can promote the innovation performance of enterprises<sup>[15]</sup>, but this promotion also requires enterprises to obtain external resources, and enterprises' active performance of social responsibility can bring these external resources to enterprises. According to the stakeholder theory, enterprises can adopt positive strategies to practice corporate social responsibility, so as to attract and win the attention and support of various stakeholders, and then effectively obtain the economic and social resources provided by these stakeholders<sup>[16]</sup>, so as to provide resources for enterprises to carry out innovation. In the context of increasingly fierce competition, enterprises in the process of promoting innovation will inevitably face the challenge of taking into account all aspects of corporate social responsibility, so the choice between external and internal social responsibility is particularly critical. The study found that when enterprises actively fulfill their internal social responsibilities, they will show the following aspects: stimulate the innovation enthusiasm of internal employees, and then improve the R&D efficiency of enterprises<sup>[17]</sup>; Enhance the confidence of shareholders. Urge shareholders to add capital to the enterprise's product research and development; Improve the quality of innovative products and services; Good relationship with suppliers. However, some studies have found that enterprises' excessive undertaking of external social responsibility will not only consume a large amount of enterprise resources, but also seriously disperse the focus and energy of enterprises in innovation activities, and easily lead to enterprises' deep involvement in complex relationships with external stakeholders. Therefore, compared with the external social responsibility and the internal social responsibility, it can be found that when facing the performance expectation deficit, it is more effective for enterprises to actively fulfill the internal social responsibility than the external social responsibility.

Many scholars pointed out that enterprises' active performance of social responsibility will help them obtain unique and valuable professional knowledge and skill resources from external stakeholders. These precious resources can be further used to enrich and expand the knowledge system within the enterprise<sup>[18]</sup>, so as to ease the rigidity of internal management, increase flexibility, and make internal control more inclined to process control rather than result control. From the above research, it can be found that result control will hinder the innovation of manufacturing enterprises, but enterprises can loosen the original traditional and more fixed concept of result control by actively performing their external social responsibilities and introducing some external resources.

Therefore, based on the above research and analysis, this paper puts forward the following assumptions:

H3: Corporate social responsibility positively moderates the impact of performance expectation deficit on corporate innovation performance;

H4: Compared with external corporate social responsibility, internal corporate social responsibility more positively moderates the impact of performance expectation deficit on innovation performance;

H5: Corporate internal and external social responsibilities further strengthen the inhibitory effect of performance expectation deficit on result control.

## **3. Research design**

### **3.1 Model construction**

In order to test the previous research hypothesis H1 to H5, this paper constructs the following model for analysis:

To verify H1, the following model was built:

$$R\&D=\alpha_0+\alpha_1GAP+\alpha_2LIFE+\alpha_3STA+\alpha_4REVENUE+\alpha_5SIZE+\alpha_6ER$$

To validate H2, the following model was built:

$$GAP=\alpha_0+\alpha_1IC+\alpha_2LIFE+\alpha_3STA+\alpha_4REVENUE+\alpha_5SIZE+\alpha_6ER$$

$$IC=\alpha_0+\alpha_1R\&D+\alpha_2LIFE+\alpha_3STA+\alpha_4REVENUE+\alpha_5SIZE+\alpha_6ER$$

$$R\&D=\alpha_0+\alpha_1GAP+\alpha_2IC+\alpha_3LIFE+\alpha_4STA+\alpha_5REVENUE+\alpha_6SIZE+\alpha_7ER$$

To verify H3, the following models were built:

$$R\&D=\alpha_0+\alpha_1GAP+\alpha_2CSR+\alpha_3C\_GAP*C\_CSR+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

To validate H4, the following models were built:

$$R\&D=\alpha_0+\alpha_1GAP+\alpha_2CSR_N+\alpha_3C\_GAP*C\_CSR_N+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

$$R\&D=\alpha_0+\alpha_1GAP+\alpha_2CSR_W+\alpha_3C\_GAP*C\_CSR_W+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

To verify H5, the following models were built:

$$IC=\alpha_0+\alpha_1GAP+\alpha_2CSR+\alpha_3C\_GAP*C\_CSR+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

$$IC=\alpha_0+\alpha_1GAP+\alpha_2CSR_N+\alpha_3C\_GAP*C\_CSR_N+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

$$IC=\alpha_0+\alpha_1GAP+\alpha_2CSR_W+\alpha_3C\_GAP*C\_CSR_W+\alpha_4LIFE+\alpha_5STA+\alpha_6REVENUE+\alpha_7SIZE+\alpha_8ER$$

### 3.2 Variable selection and description

Explained variable: enterprise innovation performance (r&d). We use r&d investment as an indicator to measure the innovation performance of enterprises, and use the method of Li Yingmei<sup>[19]</sup> and others to measure the ratio of R&D investment to operating income (r&d).

Explanatory variable: performance expectation deficit (GAP). The explanatory variable of this paper is the gap between actual performance and expected performance (P-A) when the enterprise fails to achieve the expected performance of the organization. P is measured by the rate of return on total assets (ROA). A is the expected performance calculated based on the linear combination of historical and social expected performance. This paper uses the research of Wang Jing<sup>[9]</sup> for reference to measure. The specific calculation formula is:

$$A_{i,t}=a_1HA_{i,t}+(1-a_1)SA_{i,t}$$

Among them, ha is the historical expected performance of company I, which is measured by the return on total assets of company I in T-1 year; SA is the average return on total assets of companies other than company I in the industry where company I is located in the T year. This paper uses the research of Wang Jing<sup>[9]</sup> for reference, and takes A1 as 0.5 for calculation.

Intermediate variable: result control (IC). Select “Dibo · internal control index of Listed Companies in China”, which is designed based on the realization of the five major objectives of internal control compliance, reporting, asset safety, operation and strategy. Based on the design of the index, it can be found that the measurement of internal control is more focused on result control.

Moderating variable: corporate social responsibility (CSR). The total score of the social responsibility report of listed companies released by Hexun is used as the standard to measure the performance of corporate social responsibility.

Referring to the existing research, this paper mainly controls the enterprise life, the number of employees, revenue, size and property right ratio.

### 3.3 Data sources

This study selected samples of A-share listed manufacturing companies from 2012 to 2021 for analysis, and sorted out the data obtained as follows: (1) eliminate ST listed companies; (2) Companies with a period or a missing indicator and an internal control index of 0 are excluded; (3) In the regulatory effect test, the explanatory variables and regulatory variables were decentralized, and 13551 sample observations were obtained. The descriptive statistics of the main variables involved in this paper are shown in Table 1.

Table 1 Definitions of major variables

| Variable Name | Variable Meaning                         | Calculation Method   |
|---------------|--|--|
| r&d           | Enterprise innovation performance        | R&D investment as a percentage of operating income   |
| gap           | Performance Expectation Deficit          | (P-A)The higher the value, the greater the expected performance deficit of the enterprise                  |
| ic            | Result control                           | The internal control index is added to 1 and then the natural logarithm is taken                           |
| csrn          | Internal Corporate Social Responsibility | Shareholder Responsibility, Employee Responsibility, Supplier, Customer and Consumer Rights Responsibility |
| csrw          | External Corporate Social Responsibility | Environmental Responsibility Social responsibility   |
| life          | Business life                            | The natural logarithm of the time of incorporation of the company  |
| sta           | Number of employees                      | The total number of employees in the current year is logarithmic   |
| revenue       | Main business income                     | The logarithm of the company's main business income  |
| size          | The size of the enterprise               | Take the logarithm of the total assets at the end of the period  |
| er            | Equity ratio                             | Total Liabilities/Ownership Equity   |

## 4. Empirical results and analysis

### 4.1 Correlation analysis

Table 2 shows the regression results of the impact of performance expectation deficit on enterprise innovation performance. The coefficient of performance expectation deficit (GAP) is 0.656, and it is significantly positively correlated at the 1% level, indicating that the larger the performance expectation deficit, the more the promotion of enterprise innovation performance, that is, the performance expectation deficit has a positive impact on enterprise innovation performance, and H1 is established.

Table 2 Descriptive statistics of the full sample size

| Variable Name | Mean   | Standard Deviation | Minimum  | Maximum  |
|---------------|--------|--------------------|----------|----------|
| r&d           | 4.78   | 6.755              | 0        | 342.34   |
| gap           | 0.005  | 0.562              | -24.207  | 48.031   |
| ic            | 6.189  | 1.34               | 0        | 6.886    |
| csrn          | 16.966 | 9.829              | -12.09   | 57.32    |
| csrw          | 5.037  | 6.117              | -15      | 38.42    |
| life          | 2.824  | 0.337              | 1.099    | 3.97     |
| sta           | 7.752  | 1.134              | 2.398    | 12.342   |
| revenue       | 21.41  | 1.478              | 0        | 27.489   |
| size          | 22.063 | 1.163              | 17.277   | 27.547   |
| er            | 1.093  | 14.899             | -340.171 | 1556.429 |

### 4.2 Mediating effect test

According to the traditional practice, we use the sequential regression test procedure to test the mediating effect of the result control. Table 3 reports the mediating effect of result control on the impact of performance expectation deficit on enterprise innovation performance. The (1) list shows that the performance expectation deficit has a significant negative impact on the result control, the (2) list shows that the result control has a significant negative impact on the enterprise innovation performance, and the (3) list shows that the performance expectation deficit has a significant positive impact on the enterprise innovation performance, which all meet the first three conditions of the intermediary test. At the same time, table (3) shows

that the estimated value of performance expectation deficit on enterprise innovation performance is significantly positive, which shows that the result control plays a partial intermediary role in the impact of performance expectation deficit on enterprise innovation performance. In general, when the enterprise is in the performance expectation deficit, it will reduce the inhibitory effect of result control on enterprise innovation performance, thus promoting the positive impact of enterprise on enterprise innovation performance in the case of performance expectation deficit. It verifies that result control plays a negative intermediary role between performance expectation deficit and enterprise innovation performance, and supports H2.

*Table 3 The impact of performance expectation deficit on enterprise innovation performance*

|                | (1)                    |
|----------------|------------------------|
|                | r&d                    |
| gap            | 0.656***<br>(6.596)    |
| life           | -0.050<br>(-0.293)     |
| sta            | -0.778***<br>(-8.519)  |
| revenue        | -1.699***<br>(-23.391) |
| size           | 1.667***<br>(16.215)   |
| er             | 0.001<br>(0.361)       |
| _cons          | 10.544***<br>(7.518)   |
| N              | 13551                  |
| R <sup>2</sup> | 0.076                  |
| F              | 184.425                |

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

### 4.3 Test on the moderating effect of corporate social responsibility

As can be seen from table 4, columns (1) - (3) respectively test the regression effect of corporate social responsibility and performance expectation deficit, corporate internal social responsibility and performance expectation deficit, and corporate external social responsibility and performance expectation deficit on corporate innovation performance. Table (1) shows that the interaction coefficient of corporate social responsibility and performance expectation deficit is positive, and H3 is established through the significance level test. The data in columns (2) - (3) show that the interaction coefficient of corporate internal social responsibility and performance expectation deficit is positive and significant at 1%, while the interaction coefficient of corporate external social responsibility and performance expectation deficit is -0.031 and not significant at 1%. It can be seen that when corporate social responsibility positively regulates the impact of performance expectation deficit on corporate innovation performance, corporate internal social responsibility plays a major role, supporting H4.

As can be seen from table 4, columns (4) - (6) respectively test the regression effect of corporate social responsibility and performance expectation deficit, corporate internal social responsibility and performance expectation deficit, and corporate external social responsibility and performance expectation deficit to result control. Table (4) shows that the interaction coefficient of corporate social responsibility and performance expectation deficit is 0.022, which is significant at the level of 1%, indicating that corporate social responsibility enhances the inhibitory effect of performance expectation deficit on result control. Table (5) - (6) shows that the coefficient of the interaction between corporate internal social responsibility and performance expectation deficit is 0.029, while the coefficient of the interaction between corporate external social responsibility and performance expectation deficit is 0.052, which is significant at the level of 1%. It shows that both internal and external corporate social responsibility can strengthen the inhibitory effect of performance expectation deficit on result control. Support H5.

*Table 4 Outcome control mediating effect test*

|                | (1)<br>ic              | (2)<br>r&d             | (3)<br>r&d             |
|----------------|------------------------|------------------------|------------------------|
| gap            | -0.132***<br>(-6.516)  |                        | 0.638***<br>(6.409)    |
| life           | -0.441***<br>(-12.792) | -0.103<br>(-0.602)     | -0.109<br>(-0.641)     |
| sta            | 0.111***<br>(5.954)    | -0.740***<br>(-8.090)  | -0.763***<br>(-8.347)  |
| revenue        | 0.116***<br>(7.857)    | -1.682***<br>(-23.075) | -1.684***<br>(-23.130) |
| size           | -0.152***<br>(-7.276)  | 1.615***<br>(15.674)   | 1.647***<br>(15.989)   |
| er             | -0.005***<br>(-5.942)  | 0.001<br>(0.138)       | 0.001<br>(0.197)       |
| ic             |                        | -0.150***<br>(-3.565)  | -0.135***<br>(-3.206)  |
| _cons          | 7.454***<br>(26.123)   | 12.124***<br>(8.441)   | 11.553***<br>(8.040)   |
| N              | 13551                  | 13551                  | 13551                  |
| R <sup>2</sup> | 0.028                  | 0.073                  | 0.076                  |
| F              | 64.785                 | 178.890                | 159.655                |

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

#### 4.4 Robustness test

The measurement of gap, the key explanatory variable, is based on the industry dimension to measure the level of performance expectations, and different information sources involved in the performance feedback of this dimension may lead to biased or inconsistent model estimation coefficients. Therefore, this paper draws lessons from the practice of xuyuandeng et al. (2022)<sup>[20]</sup>, uses the return on total assets (ROA) of the sample enterprise in year t minus the return on total assets of the enterprise in year T-1, and the overall performance expectation is negative as the proxy variable (Gap1) of the performance expectation deficit. Again, the regression test is conducted on the main effect, and its control variables are consistent with the previous results. The regression results are shown in Table 5. It can be found that the coefficient of



the main effect of the proxy variable (Gap1) of the performance expectation deficit is 0.437, and the coefficient of the main effect of the performance expectation deficit is 0.656, which both pass the significance test, and the sign of the performance expectation deficit is basically the same as the previous results. Consistent, indicating that the research conclusion of this paper is robust.

*Table 5 Moderating effect of corporate social responsibility*

|                | (1)                    | (2)                    | (3)                    | (4)                   | (5)                   | (6)                    |
|----------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|------------------------|
|                | r&d                    | r&d                    | r&d                    | ic                    | ic                    | ic                     |
| gap            | 1.404***<br>(5.216)    | 1.785***<br>(6.470)    | 0.502***<br>(2.605)    | 0.387***<br>(7.196)   | 0.437***<br>(7.991)   | 0.107***<br>(2.732)    |
| csr            | -0.011***<br>(-2.855)  |                        |                        | 0.017***<br>(21.213)  |                       |                        |
| c_gap*c_csr    | 0.034***<br>(3.061)    |                        |                        | 0.022***<br>(9.907)   |                       |                        |
| life           | -0.107<br>(-0.624)     | -0.038<br>(-0.219)     | -0.139<br>(-0.817)     | -0.335***<br>(-9.797) | -0.295***<br>(-8.673) | -0.413***<br>(-11.988) |
| sta            | -0.755***<br>(-8.252)  | -0.774***<br>(-8.464)  | -0.727***<br>(-7.934)  | 0.088***<br>(4.804)   | 0.091***<br>(5.037)   | 0.100***<br>(5.402)    |
| revenue        | -1.671***<br>(-22.887) | -1.692***<br>(-23.149) | -1.671***<br>(-22.972) | 0.087***<br>(5.987)   | 0.075***<br>(5.155)   | 0.111***<br>(7.549)    |
| size           | 1.642***<br>(15.954)   | 1.648***<br>(16.022)   | 1.656***<br>(16.089)   | -0.151***<br>(-7.321) | -0.147***<br>(-7.204) | -0.157***<br>(-7.534)  |
| er             | 0.001<br>(0.338)       | 0.002<br>(0.423)       | 0.001<br>(0.279)       | -0.004***<br>(-5.511) | -0.004***<br>(-5.364) | -0.004***<br>(-5.853)  |
| csrn           |                        | -0.000<br>(-0.025)     |                        |                       | 0.031***<br>(26.171)  |                        |
| c_gap*c_csrn   |                        | 0.062***<br>(4.399)    |                        |                       | 0.029***<br>(10.446)  |                        |
| csrw           |                        |                        | -0.063***<br>(-6.688)  |                       |                       | 0.017***<br>(8.954)    |
| c_gap*c_csrw   |                        |                        | -0.031<br>(-0.840)     |                       |                       | 0.052***<br>(7.003)    |
| _cons          | 10.741***<br>(7.656)   | 10.769***<br>(7.677)   | 10.347***<br>(7.380)   | 7.550***<br>(26.939)  | 7.449***<br>(26.803)  | 7.586***<br>(26.674)   |
| N              | 13551                  | 13551                  | 13551                  | 13551                 | 13551                 | 13551                  |
| R <sup>2</sup> | 0.077                  | 0.077                  | 0.079                  | 0.064                 | 0.079                 | 0.037                  |
| F              | 140.832                | 140.934                | 144.398                | 115.836               | 145.739               | 64.668                 |

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

## 4.5 Heterogeneity test

The above model is used to further analyze the relationship between the performance expectation deficit of China's state-owned enterprises and non-state-owned enterprises, enterprises in the eastern region and enterprises in the central and western regions and enterprise innovation performance. The samples with missing values in property rights and regions are deleted, and the main effect is not affected by the test of the whole sample.

From the comparison between state-owned enterprises and non-state-owned enterprises in Table 6, it can be seen that the coefficient of performance expectation deficit of non-state-owned enterprises is 0.652, which is significant at the level of 1%. The results show that non-state-owned enterprises are more likely to drive enterprise innovation when facing the performance expectation deficit. The main reason is that non-state-owned enterprises face more fierce market competition and need to be responsible for their own profits and losses. Therefore, when facing the performance expectation deficit, non-state-owned enterprises have a stronger sense of innovation to improve the innovation performance of enterprises, so as to reverse the decline.

Table 6 Robustness test

|                | (1)                    | (2)                    |
|----------------|------------------------|------------------------|
|                | r&d                    | r&d                    |
| gap1           | 0.437***<br>(5.500)    |                        |
| life           | -0.037<br>(-0.220)     | -0.050<br>(-0.293)     |
| sta            | -0.779***<br>(-8.517)  | -0.778***<br>(-8.519)  |
| revenue        | -1.707***<br>(-23.482) | -1.699***<br>(-23.391) |
| size           | 1.669***<br>(16.216)   | 1.667***<br>(16.215)   |
| er             | 0.001<br>(0.377)       | 0.001<br>(0.361)       |
| gap            |                        | 0.656***<br>(6.596)    |
| _cons          | 10.637***<br>(7.581)   | 10.544***<br>(7.518)   |
| N              | 13551                  | 13551                  |
| R <sup>2</sup> | 0.075                  | 0.076                  |
| F              | 182.043                | 184.425                |

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Comparing the correlation coefficients between the eastern region and the central and western regions in Table 7, it can be found that the coefficient of the eastern region is 0.999, which is much higher than that of the central and western regions by

0.654. Combined with the current domestic development, we can find the following reasons: first, enterprises in the eastern region have formed a relatively perfect industrial system and industrial chain, which provide strong industrial support for local enterprises to carry out innovation; Secondly, there are many universities, scientific research institutions and innovative enterprises in the eastern region, which provide technical support for enterprises in the eastern region to carry out innovation, making enterprises in the eastern region more advantageous in technological innovation; Third, the geographical position of the eastern region is relatively superior, which is convenient to integrate with the international market, absorb foreign advanced technology and management experience, and the eastern region government also provides more preferential policy support for enterprises, which is more conducive to enterprises' innovation activities.

Table 7 Examination of property heterogeneity

|                | Full sample            | State-owned enterprises | Non-state-owned enterprises |
|----------------|------------------------|-------------------------|-----------------------------|
|                | rd                     | rd                      | rd                          |
| gap            | 0.656***<br>(6.596)    | 0.477<br>(1.022)        | 0.652***<br>(5.895)         |
| life           | -0.050<br>(-0.293)     | -0.983***<br>(-3.762)   | 0.381*<br>(1.794)           |
| sta            | -0.778***<br>(-8.519)  | -0.340***<br>(-2.687)   | -0.876***<br>(-7.511)       |
| revenue        | -1.699***<br>(-23.391) | -1.912***<br>(-17.166)  | -1.624***<br>(-18.096)      |
| size           | 1.667***<br>(16.215)   | 1.845***<br>(13.117)    | 1.600***<br>(11.835)        |
| er             | 0.001<br>(0.361)       | 0.003<br>(1.106)        | -0.012<br>(-0.769)          |
| _cons          | 10.544***<br>(7.518)   | 9.990***<br>(5.786)     | 10.115***<br>(5.089)        |
| N              | 13551                  | 3929                    | 9622                        |
| R <sup>2</sup> | 0.076                  | 0.102                   | 0.065                       |
| F              | 184.425                | 74.163                  | 111.773                     |

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

#### 4.6 Further analysis

When discussing the innovation activities of enterprises, we must face up to its long-term nature, high risk and many accompanying uncertainties. The mainstream research trend also tends to use the number of patent applications<sup>[21][22]</sup> to measure the innovation performance of enterprises. Therefore, this paper further uses the number of patent applications to measure the innovation performance of enterprises for regression analysis. Table 8 shows the enterprises' innovation performance (patents) measured by the number of patent applications, and makes regression effect test. The coefficient of performance expectation deficit (GAP) is 0.083, and it is significantly positively correlated at the level of 10%, indicating that the larger the performance expectation deficit is, the more conducive it is to improve the number of patent applications of enterprises and promote the improvement of innovation performance of enterprises. Once again, H1 is verified to be true.

Table 8 Regional heterogeneity test

|                | Full sample            | Eastern region         | Midwest                |
|----------------|------------------------|------------------------|------------------------|
|                | rd                     | rd                     | rd                     |
| gap            | 0.656***<br>(6.596)    | 0.983***<br>(3.989)    | 0.638***<br>(4.131)    |
| life           | -0.050<br>(-0.293)     | -0.581***<br>(-4.387)  | 1.771***<br>(3.473)    |
| sta            | -0.778***<br>(-8.519)  | -0.480***<br>(-6.509)  | -1.518***<br>(-6.018)  |
| revenue        | -1.699***<br>(-23.391) | -1.561***<br>(-25.106) | -1.924***<br>(-10.764) |
| size           | 1.667***<br>(16.215)   | 1.505***<br>(17.397)   | 2.023***<br>(7.775)    |
| er             | 0.001<br>(0.361)       | -0.007<br>(-0.683)     | 0.001<br>(0.245)       |
| _cons          | 10.544***<br>(7.518)   | 10.518***<br>(9.020)   | 7.724**<br>(2.121)     |
| N              | 13551                  | 9440                   | 4111                   |
| R <sup>2</sup> | 0.076                  | 0.104                  | 0.073                  |
| F              | 184.425                | 182.285                | 53.541                 |

\*\*\*p&lt;0.01, \*\*p&lt;0.05, \*p&lt;0.1

## 5. Research conclusions and Prospects

Based on the performance feedback theory, internal control paradox and stakeholder theory, this study examines whether enterprises can improve their innovation performance when facing the performance expectation deficit, and finds that: (1) the larger the performance expectation deficit, the more conducive it is to improve their innovation performance. (2) The internal control of manufacturing enterprises tends to result control, so the performance expectation deficit can weaken the negative effect of result control on enterprise innovation performance by reducing the quality of result control. (3) Corporate social responsibility positively moderates the impact of performance expectation deficit on corporate innovation performance. Compared with corporate external social responsibility, corporate internal social responsibility plays a major role. (4) Corporate social responsibility positively moderates the impact of performance expectation deficit on result control. Compared with internal corporate social responsibility, external corporate social responsibility can strengthen the inhibitory effect of performance expectation deficit on result control. (5) When facing the performance expectation deficit, non-state-owned enterprises and enterprises in the eastern region have a stronger willingness to carry out innovation and improve enterprise innovation performance than state-owned enterprises and enterprises in the central and western regions.

The practical significance of this study for enterprises includes the following four aspects: (1) when facing the gap of performance expectations, enterprises should adhere to the thinking of change and take adversity as an opportunity to actively promote the innovation transformation and innovation development of enterprises. (2) When optimizing the internal control management system of enterprises, enterprises should pay attention to process control rather than simple result orientation,

so as to prevent the rigidity and rigidity of management mechanism. (3) For enterprises in performance adversity, they can perform their social responsibilities in a targeted way. Enterprises' active performance of internal social responsibilities can more effectively promote the improvement of enterprise innovation performance, absorb new and flexible management concepts and resources from the outside, and then optimize the result control management system, and finally promote the improvement of enterprise innovation ability through the innovation of internal control mechanism. (4) The government should reform the current management mode of state-owned enterprises to promote the innovation and development of state-owned enterprises, and should strengthen the investment and construction in the central and western regions, so as to promote the innovation and development process of enterprises in the region.

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# Impact of SRDI Enterprise Process Digitization on Customer Structure

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**Abstract:** Under the macro background of the construction of digital China, the ability of business process digitization to empower “Specialized, Refined, Distinctive, and Innovative” (SRDI) enterprises to adjust their customer structure has become the focus of academic attention. Based on the data of A-share national and provincial SRDI listed companies from 2011 to 2022, this paper empirically examines the relationship between business process digitization and customer structure, and the role of the mechanism in it. It is found that process digitization of SRDI enterprises reduces the degree of concentration of customer structure. It is further found that process digitization reduces customer concentration through two paths: improving the technological innovation ability and enhancing the market position of enterprises. The study not only reveals the impact mechanism of process digitization on customer structure, enriches the research on process digitization and supply chain management of SRDI enterprises, but also provides theoretical references for small and medium-sized enterprises (SMEs) to rationally adjust their customer structure.

**Keywords:** Digitalization of Business Processes; SRDI; Customer Concentration; Technological Innovation; Market Position

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## 1.Introduction

The digital economy, centered on data as a key factor, is emerging as a vital engine driving high-quality development. Corporate digital transformation involves deeply integrating digital technologies across the entire business chain to build a data-driven value creation system, enabling adaptation to technological innovation and fostering competitiveness. The “14th Five-Year Plan for Digital Economy Development” emphasizes the systematic advancement of digital restructuring in enterprise business processes. It encourages leading enterprises to build intelligent platforms to break down data silos, enhance collaboration, and elevate operational and decision-making capabilities. As trailblazers among small and medium-sized enterprises, the high-quality development of “Specialized, Refined, Distinctive, and Innovative”(SRDI) enterprises has become a crucial practical focus.

Customer concentration, as a core metric in supply chain relationships, exhibits a double-edged sword effect in its economic implications. Strategic partnerships can reduce transaction costs, generate synergies, and foster long-term value creation<sup>[1]</sup>. However, excessive concentration leads to an imbalance in bargaining power, forcing enterprises to accept unfavorable terms that squeeze profit margins and heighten operational risks<sup>[2]</sup>. Given this risk exposure, the China Securities Regulatory Commission (CSRC) has mandated disclosure of the top five customer share since 2014 and instituted specialized IPO inquiries. This underscores the urgency of balancing customer relationship management efficiency with risk prevention, while

also providing a practical basis for research.

This study examines the impact of enterprise process digitization on customer structure and its underlying mechanisms, using SRDI enterprises listed on China's A-share market from 2011 to 2022 as research samples. Theoretically, it enriches the existing research on the influence of enterprise process digitization on customer structure and provides a theoretical basis for supply chain enterprises to rationally adjust their customer structure in business operations.

## **2.Literature Review and Research Hypotheses**

### **2.1 Literature Review**

Process digitization refers to the systematic engineering of enterprises employing digital technologies to profoundly restructure core business processes<sup>[3]</sup>. Existing literature indicates that process digitization not only significantly enhances corporate management efficiency and market competitiveness but also serves as a vital driver for innovation and development<sup>[4]</sup>. By optimizing resource allocation, reducing manual intervention, and increasing information transparency, enterprises can respond more efficiently to customer demands while effectively lowering costs. Particularly in supply chain management and customer relationship maintenance, the application of digital tools enables more precise demand forecasting and real-time operational monitoring<sup>[5]</sup>.

With the deep application of digital technologies, traditional linear supply chain structures have undergone deconstruction and reorganization. Their networked and dynamic characteristics have driven exponential growth in corporate customer acquisition channels, expanding customer coverage beyond geographical and industry boundaries<sup>[6]</sup>. In this evolutionary process, customer concentration—as a core metric reflecting customer structure distribution—has drawn sustained academic attention due to its dynamic evolution patterns and economic implications. Existing literature primarily explores the transmission mechanisms linking customer concentration to corporate performance and capital market outcomes, yet no theoretical consensus has emerged. Some studies indicate that increased customer concentration exacerbates the decline in supplier bargaining power, leading to a significant rise in equity financing costs<sup>[7]</sup>. Conversely, other research confirms that a moderately concentrated customer structure can reduce transaction costs through economies of scale, exerting a significant positive incentive on corporate operational efficiency<sup>[8]</sup>. Notably, existing research predominantly focuses on analyzing the impact effects of customer concentration, with insufficient attention paid to the shaping effect of strategic transformations like enterprise process digitization on customer concentration itself.

### **2.2 Research Hypotheses**

#### **2.2.1 Digitalization of Processes and Customer Structure for SRDI Enterprises**

The essence of a company's excessive reliance on major clients lies in a structural dilemma stemming from a lack of core competitiveness and inefficient resource allocation<sup>[9]</sup>. Under resource constraints, weak bargaining power forces companies to accept asymmetric terms imposed by major clients, resulting in persistent compression of profit margins. Simultaneously, a monolithic customer structure intensifies the lock-in effect of investments in specialized assets, triggering systemic operational risks when major clients depart. Process digitization, however, empowers value chain operations by integrating digital technologies. On one hand, enterprises leverage digital tools to enable real-time collection and dynamic matching of supply chain data, thereby constructing resilient supply chain networks that enhance responsiveness in niche markets and broaden customer bases to reduce reliance on any single client<sup>[10]</sup>. On the other hand, smart manufacturing replaces traditional labor to generate economies of scale, lowering unit production costs. Alternatively, digital technologies reduce transactional uncertainty and decision-making trial-and-error costs, forming a portfolio advantage. This composite cost restructuring enables enterprises to transcend geographical and industry boundaries to acquire incremental customer segments. Based on this, this paper proposes:

H1: Process digitalization in SRDI enterprises reduces customer concentration.

#### **2.2.2 The Mediating Role of Technological Innovation in Enterprises**

The deep digitalization of core business processes significantly enhances the timeliness, completeness, and analyzability of data elements, thereby providing dual support for technological innovation activities<sup>[11]</sup>. First, enterprises integrate internal and external data through digital technologies to establish precise demand identification mechanisms, effectively capturing

latent needs and emerging trends in fragmented markets<sup>[12]</sup>. Second, leveraging digital technologies compresses new product R&D cycles and reduces the marginal costs of customized production, thereby enhancing corporate technological innovation capabilities.

Enhanced technological innovation capabilities have driven a fundamental shift in corporate customer structures, with the continuous introduction of new customer segments significantly reducing customer concentration. Enterprises leverage digital technologies to develop differentiated market solutions, breaking through limitations imposed by traditional core customer bases. Through data-driven precision marketing and personalized customer relationship management systems, they efficiently penetrate new geographic regions and cross-industry markets, building diversified customer portfolios. Based on the above analysis, we propose the following hypothesis:

H2: SRDI enterprise process digitization reduces customer concentration by enhancing technological innovation capabilities.

### 2.2.3 The Mediating Role of Corporate Market Position

A company's market position, as a key indicator measuring its relative strength and overall competitiveness, holds significant strategic importance for its survival and development. It typically manifests as brand influence, customer recognition, and economies of scale advantages<sup>[13]</sup>.

Enterprise process digitization enhances market positioning by restructuring and empowering operational systems, thereby driving diversification in corporate client structures. From a value chain perspective, digital technologies systematically compress internal operational response times and reduce transaction costs through automated processing, data interconnectivity, and intelligent algorithms. Process reengineering across procurement, production, logistics, and customer service eliminates redundant non-value-added activities, elevates operational efficiency and system reliability, and significantly enhances the precision and agility with which enterprises respond to market dynamics and customer demands. According to the resource-based view, the data assets and intelligent systems accumulated during digital transformation constitute difficult-to-imitate heterogeneous strategic resources<sup>[14]</sup>. These support enterprises in establishing sustainable competitive advantages in critical areas such as product innovation, agile decision-making, and risk management, driving market share expansion and strengthening market position. Enhanced market standing further amplifies economies of scale, propelling customer diversification. Based on the above analysis, the following hypothesis is proposed:

H3: SRDI enterprise process digitization reduces customer concentration by elevating the enterprise's market position.

## 3. Research Design

### 3.1 Sample Selection and Data Sources

This study selected SRDI enterprises listed on China's A-share market from 2011 to 2022 as the research sample. The list of SRDI enterprises was sourced from the CSMAR database. Based on this, the list of SRDI enterprises among A-share listed companies was matched according to the first six batches of national and provincial-level SRDI enterprises published by the Ministry of Industry and Information Technology. To avoid data interference, the following treatments were applied: First, samples from the financial and insurance sectors were excluded; Second, samples classified as ST or \*ST were excluded. Third, samples with missing primary variables were discarded. To mitigate the impact of outliers, all continuous variables underwent trimmed processing at the upper and lower 1% levels, yielding a final sample size of 8,269 observations. Patent data for this study was sourced from the CNRDS database, while all other data originated from the CSMAR database.

### 3.2 Variable Definition

Customer Concentration (Cus): Measured by the ratio of sales to the top five customers to total annual sales.

Business Process Digitization (DT): Following the methodology of Wu Fei (2021) et al., this study measures DT using the total frequency of relevant keywords in company annual reports<sup>[15]</sup>. Specifically, the frequency data for process innovation terms in the CSMAR database is adjusted by adding 1 and taking the logarithm to assess business process digitization.

Patent Innovation (Pat): Measured by taking the logarithm of the sum of patent applications for invention patents, design patents, and utility model patents, plus one.

Market Position of Enterprises (PCM): Following Peress (2010), the Lerner Index is employed to measure an enterprise's market position. The calculation formula is:  $PCM = (\text{Operating Revenue} - \text{Operating Costs} - \text{Selling Expenses})$

Administrative Expenses) / Operating Revenue<sup>[16]</sup>.

The control variables selected for this study include: Firm Age (Age), defined as the natural logarithm of the observed year minus the founding year plus one; Return on Assets (ROA), calculated as net profit divided by total assets; Board Size (Board), defined as the natural logarithm of the total number of board members plus one; Dual Role (Dual), valued as 1 if the chairman and general manager are the same person, otherwise 0; Ownership Type (Soe), valued as 1 for state-owned enterprises, otherwise 0; Debt-to-Asset Ratio (Lev), calculated as total liabilities divided by total assets; Net Cash Flow (Cash), calculated as net cash flow from operating activities divided by total assets.

### 3.3 Model Setup

To empirically examine the impact of SRDI enterprise process digitization on customer structure, this paper constructs the following benchmark regression model:

$$Cus_{i,t} = \alpha_0 + \alpha_1 DT_{i,t} + \alpha_2 Control_{i,t} + Year_t + Industry_{i,t} + \delta_{i,t} \quad (1)$$

Among these, *Cus* represents customer concentration; *DT* denotes enterprise process digitization indicators; *Control* signifies a set of control variables; and  $\delta$  represents the random error of the model. Additionally, this paper controls for industry (Industry) and year (Year) effects.

To further examine the mediating role of technological innovation capabilities and market position in the impact of process digitization on customer structure, mediation effect models (2) and (3) were constructed based on model (1):

$$Med_{i,t} = \beta_0 + \beta_1 DT_{i,t} + \beta_3 Control_{i,t} + Year_t + Industry_{i,t} + \delta_{i,t} \quad (2)$$

$$Cus_{i,t} = \gamma_0 + \gamma_1 DT + \gamma_2 Med_{i,t} + \gamma_3 Control_{i,t} + Year_t + Industry_{i,t} + \delta_{i,t} \quad (3)$$

Among these, *Med* represents the mediating variables, encompassing technological innovation capability (Pat) and firm market position (PCM).

## 4. Empirical Analysis

### 4.1 Descriptive Statistics

Descriptive statistics for key variables are presented in Table 1. The mean customer concentration ratio stands at 36.249%, with a minimum of 4.49% and a maximum of 95.69%, and a median of 31.16%. This indicates that a high proportion of sales attributable to major clients is a common phenomenon among SRDI enterprises. The mean and standard deviation for business process digitization were 1.544 and 1.475, respectively, with minimum and maximum values of 0 and 5.278. This indicates that the level of business process digitization among SRDI enterprises is uneven and varies significantly.

Table 1 Descriptive Statistics

| Variable     | Observation | Mean   | Standard Deviation | Min    | Max    | Med    |
|--------------|-------------|--------|--------------------|--------|--------|--------|
| <i>Cus</i>   | 8269        | 36.249 | 21.629             | 4.490  | 95.690 | 31.160 |
| <i>DT</i>    | 8269        | 1.544  | 1.475              | 0.000  | 5.278  | 1.099  |
| <i>PCM</i>   | 8269        | 0.165  | 0.131              | -0.236 | 0.553  | 0.152  |
| <i>Pat</i>   | 8269        | 2.024  | 1.282              | 0.000  | 4.828  | 2.079  |
| <i>Lev</i>   | 8269        | 0.310  | 0.174              | 0.039  | 0.793  | 0.283  |
| <i>Board</i> | 8269        | 2.183  | 0.161              | 1.792  | 2.485  | 2.303  |
| <i>Soe</i>   | 8269        | 0.115  | 0.319              | 0.000  | 1.000  | 0.000  |
| <i>Dual</i>  | 8269        | 0.418  | 0.493              | 0.000  | 1.000  | 0.000  |
| <i>Age</i>   | 8269        | 2.855  | 0.313              | 1.946  | 3.497  | 2.890  |
| <i>ROA</i>   | 8269        | 0.044  | 0.063              | -0.245 | 0.198  | 0.048  |
| <i>Cash</i>  | 8269        | 0.043  | 0.064              | -0.146 | 0.218  | 0.044  |

### 4.2 Baseline Regression Analysis

Table 2 presents the benchmark regression results for the impact of SRDI enterprise process digitization on corporate custom-



er concentration. Column (1) includes only the core explanatory variable, enterprise process digitization (DT); Column (2) incorporates industry and year fixed effects; Column (3) further includes control variables alongside year and industry fixed effects. The results indicate that enterprise process digitization significantly reduces corporate customer concentration and promotes the diversification of corporate customer relationships. Hypothesis H1 is thus confirmed.

*Table 2 Baseline Regression Analysis*

| Variable        | (1)<br>Cus | (2)<br>Cus | (3)<br>Cus |
|-----------------|------------|------------|------------|
| <i>DT</i>       | -0.440***  | -2.066***  | -2.155***  |
|                 | (0.159)    | (0.189)    | (0.186)    |
| <i>Constant</i> | 36.928***  | 14.128***  | 44.780***  |
|                 | (0.342)    | (1.833)    | (4.426)    |
| <i>Control</i>  | No         | No         | Yes        |
| <i>Industry</i> | No         | Yes        | Yes        |
| <i>Year</i>     | No         | Yes        | Yes        |
| N               | 8269       | 8269       | 8269       |
| R <sup>2</sup>  | 0.001      | 0.125      | 0.153      |

### 4.3 Robustness Test

To verify the robustness of the research findings, this paper replaced the dependent variable with the customer concentration Herfindahl Index (ccHHI), calculated as the sum of the squares of the ratios of the top five customers' sales to total sales, and reran the regression. The test results are shown in Column (1) of Table 3. DT regression coefficient is significantly negative at the 1% level, indicating that the core conclusion holds robustly.

Considering that the impact of SRDI enterprise process digitization on customer concentration may exhibit a certain degree of lag, this paper regresses the core explanatory variable DT and the control variable lagged by one period again in Model (1). The results are shown in Column (2) of Table 3. The regression coefficient of L.DT is significantly negative at the 1% level, indicating that the core conclusion remains robust.

*Table 3 Robustness Test*

| Variable        | (1)<br>ccHHI | (2)<br>Cus |
|-----------------|--------------|------------|
| <i>DT</i>       | -0.525***    |            |
|                 | (0.080)      |            |
| L.DT            |              | -2.132***  |
|                 |              | (0.199)    |
| <i>Constant</i> | 10.681***    | 40.818***  |
|                 | (1.850)      | (4.763)    |
| <i>Control</i>  | Yes          | Yes        |
| <i>Industry</i> | Yes          | Yes        |
| <i>Year</i>     | Yes          | Yes        |
| N               | 8269         | 6701       |
| R <sup>2</sup>  | 0.082        | 0.150      |

#### 4.4 Mechanism Verification

Table 4 columns (1) and (3) report the test results for Model (2). The findings indicate that digital transformation of business processes not only enhances technological innovation capabilities but also elevates market position. Columns (2) and (4) present the verification results for Model (3). Combined with the regression results in Column (3) of Model (1), it can be determined that the mediating effect between technological innovation capability (Pat) and market position (PCM) holds, exhibiting partial mediation. Specifically, SRDI enterprise process digitization promotes diversified customer relationship development by enhancing technological innovation capability and elevating market position. Hypotheses H2 and H3 are thus validated.

Table 4 Mechanism Verification

| Variable             | (1)<br>Pat          | (2)<br>Cus           | (3)<br>PCM          | (4)<br>Cus            |
|----------------------|---------------------|----------------------|---------------------|-----------------------|
| <i>DT</i>            | 0.138***<br>(0.011) | -2.076***<br>(0.188) | 0.004***<br>(0.001) | -2.037***<br>(0.186)  |
| <i>Pat</i>           |                     | -0.577***<br>(0.194) |                     |                       |
| <i>PCM</i>           |                     |                      |                     | -28.216***<br>(2.892) |
| <i>Constant</i>      | 1.062***<br>(0.289) | 45.393***<br>(4.422) | 0.108***<br>(0.021) | 41.731***<br>(4.417)  |
| <i>Control</i>       | Yes                 | Yes                  | Yes                 | Yes                   |
| <i>Industry</i>      | Yes                 | Yes                  | Yes                 | Yes                   |
| <i>Year</i>          | Yes                 | Yes                  | Yes                 | Yes                   |
| <i>N</i>             | 8269                | 8269                 | 8269                | 8269                  |
| <i>R<sup>2</sup></i> | 0.149               | 0.154                | 0.541               | 0.167                 |

#### 5. Conclusion

This study examines the impact of enterprise process digitization on corporate customer structure, using national and provincial SRDI enterprises listed on China's A-share market from 2011 to 2022 as research samples. It further investigates the mediating effect of technological innovation capacity and market position between these two factors. The findings reveal that process digitalization among SRDI enterprises reduces customer concentration and promotes diversification in customer relationships. Mechanism tests indicate that process digitalization lowers customer concentration by enhancing technological innovation capabilities and elevating market position.

Based on the above conclusions, this paper proposes the following recommendations: First, government departments must strengthen the coordinated development of digital infrastructure and data governance systems to provide institutional safeguards for the value conversion of technological innovation. Second, given the significant differences in process foundations and transformation capabilities across industries and enterprise sizes, local governments and industry organizations should offer differentiated enabling services to address both common and unique challenges in the implementation of enterprise process digitization. Third, specialized, refined, distinctive, and innovative enterprises must deeply embed themselves within industrial ecosystem networks. They should establish a trinity-based collaborative mechanism integrating "technology-data-supply chain" to consolidate market positions and enhance bargaining power, thereby reducing dependence on major clients.

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The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Too Much of a Good Thing? The Paradox of Entrepreneurial Self-Efficacy and Effort

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**Abstract:** Based on moderator-focus theory, this study reveals the nonlinear influence mechanism of entrepreneurial self-efficacy on entrepreneurial effort and explores the moderating roles of promotional and preventative moderator focuses. An experiment was designed within an entrepreneurial competition context, collecting 580 valid questionnaire responses. Hierarchical regression analysis was employed to test the model hypotheses. Empirical findings indicate: (1) A significant inverted U-shaped relationship exists between entrepreneurial self-efficacy and entrepreneurial effort; (2) Promotive moderation positively moderates the inverted U-shaped effect of entrepreneurial self-efficacy on entrepreneurial effort; (3) Preventive moderation negatively moderates the inverted U-shaped effect of entrepreneurial self-efficacy on entrepreneurial effort.

**Keywords:** Entrepreneurial Self-Efficacy; Promotional Moderation Focus; Preventative Moderation Focus; Entrepreneurial Effort

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## Introduction

Against the backdrop of the “Mass Entrepreneurship and Innovation” policy, the psychological cognitive mechanisms of entrepreneurs play a crucial role in entrepreneurial behavior outcomes. In research on entrepreneurial decision-making mechanisms, entrepreneurial self-efficacy—an individual’s subjective belief in their entrepreneurial capabilities and the likelihood of achieving goals—serves as a key predictor of entrepreneurial effort. However, existing research on their relationship presents contradictory conclusions: On one hand, entrepreneurial self-efficacy can significantly enhance goal commitment and resource allocation by reducing individuals’ perceptions of entrepreneurial risk and task difficulty; On the other hand, empirical studies also indicate that cognitive biases stemming from overconfidence may weaken the motivational effect of self-efficacy, or even lead entrepreneurs to reduce effort due to overestimating outcome controllability<sup>[1]</sup>. Scholars have yet to reach a consensus on whether entrepreneurial self-efficacy increases or decreases entrepreneurial effort. Regulatory Focus Theory provides a theoretical framework to explain this contradictory phenomenon. According to this theory, individuals’ motivational orientations can be categorized into Promotion Focus and Prevention Focus, corresponding to behavior driven by achievement pursuit and risk avoidance, respectively. Existing research indicates that Promotion Focus individuals tend to enhance task performance through opportunity recognition and goal attainment strategies, exhibiting a significant positive correlation between self-efficacy and effort levels. Conversely, Prevention Focus individuals, due to

excessive focus on potential losses and stability, may prioritize risk minimization strategies even under high self-efficacy, or reduce effort to avoid the negative consequences of failure<sup>[2]</sup>. The duality of moderator focus theory (promotive and preventive) suggests that entrepreneurs' moderator orientation may mediate the relationship between entrepreneurial self-efficacy and effort.

Given this, this study builds upon the contradictory conclusions of the dual-perspective integration approach. By introducing the moderation focus theory, it aims to reveal the nonlinear effect of entrepreneurial self-efficacy on entrepreneurial effort. Furthermore, it discusses the moderating roles of promotion-focused and prevention-focused moderation, adding empirical evidence to comprehensively understand the mechanism through which entrepreneurial self-efficacy influences entrepreneurial effort.

## 1. Theoretical Foundations and Research Hypotheses

### 1.1 Self-efficacy theory

Regulatory Focus Theory suggests that individuals have two basic needs in life, growth needs and security needs. People with different needs have different preferred behavioral tendencies when pursuing goals, which leads to two types of regulatory tendencies: promotion focus (Promotion Focus) and prevention focus (Prevention Focus). Regulatory Focus Theory explains how individuals regulate their behaviors through Promotional Focus and Prevention Focus during goal pursuit. In an organizational setting, an employee's regulatory focus status directly affects his or her safety performance and his or her behavioral patterns. Specifically, individuals with facilitative focus first focus on growth needs, i.e., pay more attention to their own development and progress, choose to pursue the ideal self, and aspire to success, which leads to the root cause of their happiness or pain is gain or no gain; individuals with preventive focus first focus on safety needs, i.e., pay more attention to risks and changes, choose to pursue stability and responsibility, and avoid making mistakes through conservative behaviors that the root causes of their pleasure or pain are no loss and loss. Facilitative and preventive focuses exist independently of each other<sup>[3]</sup> so a person can have both facilitative and preventive tendencies.

Regulatory focus can be categorized into two areas<sup>[4]</sup> situational regulatory focus and trait regulatory focus. Trait-based regulatory focus is influenced by an individual's long-term stable psychological traits, including the Big Five personality, temperament, optimism, self-assessment tendency, and values, and is shaped by the individual's growth experiences. Trait-based regulatory focus is a personality tendency formed over time by the influence of parents and individual growth experiences, and individuals with different traits may develop relatively stable regulatory focus tendencies in the process of long-term adaptation. When parents pay more attention to development and progress in their children's growth process, the children are likely to develop a facilitative focus; while when parents pay more attention to safety and protection in their children's growth process, the children are likely to develop a preventive focus, which is more stable and less likely to change. Contextual regulatory focus is influenced by current environmental factors, such as organizational culture, safety systems, external incentives, etc., and can change dynamically in the short term. Contextual moderating focus is triggered by the current environment or task framework, a type of focus theory that suggests that different contexts can stimulate different states of moderating focus. When the context emphasizes ideals and progress, it can stimulate a facilitative focus, while when the context emphasizes safety and responsibility, it can stimulate a preventive focus. Therefore, in the work process, leaders can stimulate different behavioral tendencies of employees through their own behavior, language, feedback and other ways. Immediate psychological state, this state is relatively unstable, easy to be changed by the influence of the environment, the theory of regulatory focus that the different context can stimulate different states of regulatory focus. When the context emphasizes ideals and progress, it can stimulate a facilitating focus, while when the context emphasizes safety and responsibility, it can stimulate a preventive focus. Therefore, in the work process, leaders can stimulate different behavioral tendencies of employees through their own behavior, language, feedback and other ways.

### 1.2 The Influence of Entrepreneurial Self-Efficacy on Entrepreneurial Effort

The "too much of a good thing" effect reflects that positive drivers have a specific threshold for their beneficial impact. Once this threshold is exceeded, unintended negative outcomes may arise, illustrating an inverted U-shaped relationship between positive antecedents and positive outcomes. Based on the preceding analysis, the influence of entrepreneurial self-efficacy on



entrepreneurial effort exhibits multiple possibilities. This study posits that entrepreneurial self-efficacy exerts both positive and negative effects on entrepreneurial effort. Other scholars have suggested that within the highly uncertain and ambiguous context of entrepreneurship, self-efficacy may exhibit non-linear effect patterns<sup>[5]</sup>. Specifically, when an entrepreneur's self-efficacy reaches an extremely high level, they may encounter a critical threshold or inflection point. Beyond this point, further increases in self-efficacy no longer correspond to increased entrepreneurial effort, leading to stagnation in progress toward goals<sup>[3]</sup>. Therefore, this study posits that the “too much of a good thing” effect of entrepreneurial self-efficacy on entrepreneurial effort manifests in two aspects:

First, when self-efficacy falls below the critical threshold, research indicates that high entrepreneurial self-efficacy motivates individuals to pursue their goals more diligently. This occurs because high entrepreneurial self-efficacy implies individuals assess entrepreneurial activities as less difficult and goal attainment as more probable, prompting those with entrepreneurial ideas to increase their efforts. This perspective is supported by Social Cognition Theory. Entrepreneurial self-efficacy is a key component of Social Cognition Theory. High entrepreneurial self-efficacy motivates individuals to engage in entrepreneurial activities, prompting them to set more challenging goals and increase goal commitment. More challenging goals and higher commitment further drive individuals to exert greater effort. Therefore, when entrepreneurial self-efficacy is below the threshold, entrepreneurs' efforts increase incrementally with rising self-efficacy.

However, when entrepreneurial self-efficacy exceeds the critical threshold, some scholars suggest that high self-efficacy may lead to overconfidence, causing individuals to believe any approach will yield positive outcomes<sup>[1]</sup>. Overconfident individuals exhibit hyper-rational confidence in their future prospects and existing information, a psychological tendency that partially alleviates their fear of failure. This may cause individuals to subsequently relax, reducing effort allocation to current goals and redirecting it toward other objectives<sup>[6]</sup>. This perspective is supported by cybernetics. Yeo and Neal (2013) discovered through resource compensation mechanisms that self-efficacy negatively impacts effort at the individual level<sup>[7]</sup>. Specifically, when individuals with high self-efficacy perceive their resources as limited, they may reduce effort to conserve resources for other tasks or challenges. Consequently, beyond a certain threshold of entrepreneurial self-efficacy, entrepreneurs' effort diminishes as their self-efficacy increases.

Based on the above analysis, before entrepreneurial self-efficacy reaches the threshold, entrepreneurial effort increases as self-efficacy rises. However, once entrepreneurial self-efficacy surpasses this threshold, some high-efficacy entrepreneurs may fall into the “overconfidence trap,” exhibiting irrational resource allocation<sup>[5]</sup>, thereby reducing entrepreneurial effort. Therefore, this study proposes the following hypothesis:

H1: Entrepreneurial self-efficacy and entrepreneurial effort exhibit an inverted U-shaped relationship: as entrepreneurial self-efficacy gradually expands from low to moderate levels, entrepreneurial effort increases; when entrepreneurial self-efficacy expands from moderate to high levels, entrepreneurial effort diminishes.

### 1.3 The Moderating Role of Focus

Entrepreneurial self-efficacy determines the initial intensity of entrepreneurial motivation, while the moderating focus may influence the trajectory of motivational intensity during the entrepreneurial process<sup>[8]</sup>, thereby exerting a complex moderating effect on the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort.

A promotion-oriented focus, grounded in achievement motivation and progress orientation, regulates goal setting and stimulates effort-directed behavior. Its core concern lies in achievement acquisition and personal goal attainment. Specifically, when entrepreneurial self-efficacy is low, a high promotion-oriented focus strengthens the positive effect of entrepreneurial self-efficacy on entrepreneurial effort. Entrepreneurs with a promotion focus are driven by ambition and achievement, tending to adopt approach strategies to attain their desired goals<sup>[9]</sup>. Compared to those with lower promotion focus, higher promotion focus levels motivate entrepreneurs with strong self-efficacy to demonstrate greater persistence, investing more effort and resources to concentrate on entrepreneurial practices<sup>[10]</sup>. Thus, high promotion focus strengthens the positive relationship between entrepreneurial self-efficacy and entrepreneurial effort.

Simultaneously, once entrepreneurial self-efficacy reaches a certain threshold, a high promotion-focused orientation intensifies the negative impact of entrepreneurial self-efficacy on entrepreneurial effort. Because a promotion focus

drives entrepreneurs to set higher goals based on growth and development needs, when self-efficacy exceeds a specific threshold, individuals tend to become overconfident about early progress, thereby reducing effort and resource allocation in entrepreneurial tasks. Consequently, a high promotion focus level intensifies the negative relationship between excessive entrepreneurial self-efficacy and entrepreneurial effort.

In summary, this study proposes the following hypotheses:

H2: The promotion focus exerts a positive moderating effect on the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort: For entrepreneurs with high promotion focus, the positive relationship between entrepreneurial self-efficacy and entrepreneurial effort is amplified, while the negative relationship between overly high entrepreneurial self-efficacy and entrepreneurial effort is also intensified.

Prevention-focused regulation is grounded in individuals' need to fulfill responsibilities and comply with obligations, regulating behavior through cautious risk-avoidance strategies. Its core lies in circumventing potential risks and obstacles to ensure the secure attainment of goals. When entrepreneurial self-efficacy is low, a high preventative regulatory focus inhibits its promotional effect on entrepreneurial effort. This occurs because preventative-focused entrepreneurs prioritize duty fulfillment and security, often adopting defensive strategies to achieve objectives<sup>[8]</sup>. Compared to entrepreneurs with lower precautionary focus levels, those with high precautionary focus, when possessing self-efficacy, may moderately reduce effort levels upon recognizing their ability to accomplish tasks. This serves to avoid resource waste and minimize negative consequences. Consequently, high precautionary focus weakens the positive relationship between entrepreneurial self-efficacy and entrepreneurial effort.

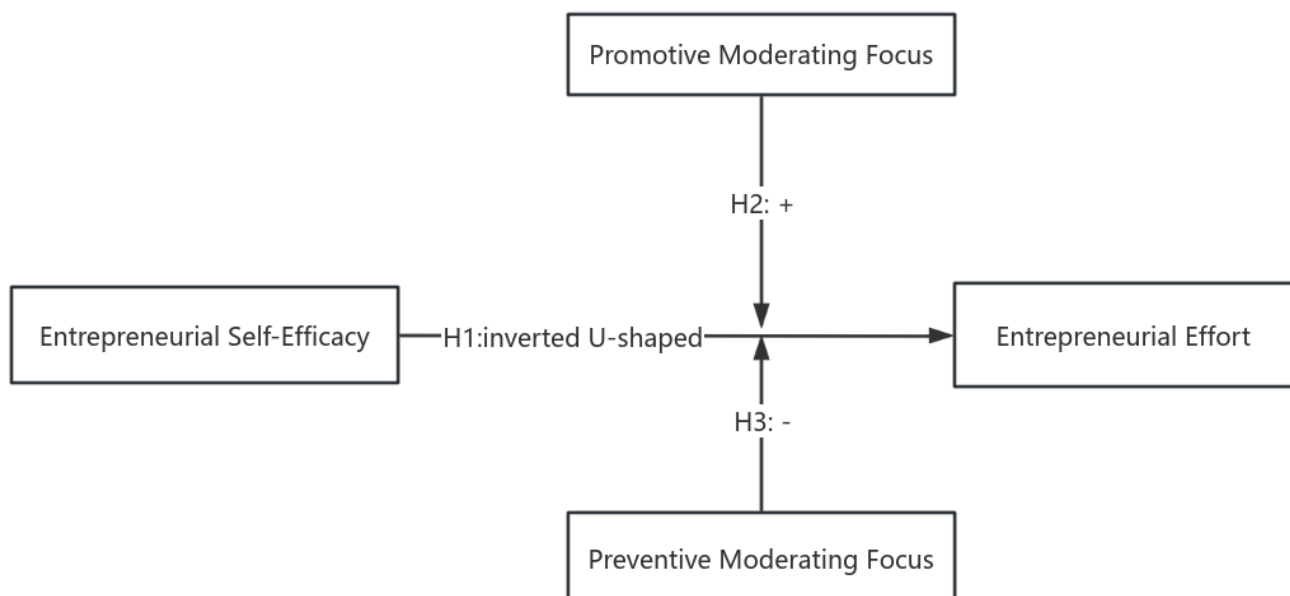
Simultaneously, when entrepreneurial self-efficacy reaches a certain level, high preventative focus entrepreneurs mitigate the negative impact of entrepreneurial self-efficacy on entrepreneurial effort. This occurs because, once entrepreneurial self-efficacy exceeds a specific threshold, high preventative focus entrepreneurs increase their effort levels to achieve expected goals and avoid negative outcomes, driven by considerations of responsibility and safety. Thus, a high level of preventative focus mitigates the negative relationship between excessively high entrepreneurial self-efficacy and entrepreneurial effort.

In summary, this study proposes the following hypotheses:

H3: Prevention focus negatively moderates the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort: For entrepreneurs with high prevention focus, the positive relationship between entrepreneurial self-efficacy and entrepreneurial effort weakens, while the negative relationship between overly high entrepreneurial self-efficacy and entrepreneurial effort also weakens.

In summary, the theoretical model of this study is depicted in Figure 1.

Fig.1 Research model



## 2. Research Design

### 2.1 Research Method

This study focuses on two groups: first, actual entrepreneurs who have engaged in entrepreneurial activities; second, university students (including MBA students, academic master's students, and undergraduates) who voluntarily participate in entrepreneurship competitions. Against the backdrop of highly educated youth serving as the main force in entrepreneurship, the group of students intending to participate in entrepreneurship competitions possesses high representativeness as subjects for research on business entrepreneurship and social entrepreneurship. Existing research indicates that cognitive components of personality traits (such as entrepreneurial self-efficacy) are susceptible to contamination effects from real-world experiences. Therefore, student entrepreneurs offer greater reliability in measuring and studying individual traits<sup>[11]</sup>.

This study employs a combined strategy of scenario experiments and questionnaire surveys to test the aforementioned hypotheses. Addressing the research limitation of student populations' general lack of authentic entrepreneurial experience, this study utilizes scenario experiments, which offer both high internal validity and good operational feasibility. Leveraging the "Business Competition Simulation Contest" and the "Xuechuang Cup" National College Student Comprehensive Entrepreneurship Simulation Competition as experimental platforms, participants were guided into entrepreneurial decision-making scenarios through simulated environments. Following task completion, questionnaires measured relevant variables, and hierarchical regression analysis verified the hypotheses. For established entrepreneurs, direct questionnaire surveys were employed to leverage their practical experience for valid data collection.

### 2.2 Research Process

On one hand, questionnaires were precisely targeted and distributed to entrepreneurs via the Credamo platform, with 300 questionnaires issued and 268 ultimately returned, yielding an 89.33% response rate. On the other hand, participants were recruited through Xi'an University of Engineering's entrepreneurship open course, with a unified rules briefing session held at the experiment's commencement. The experimental design comprised two phases: a pre-experiment and a formal experiment. Phase 1: Pre-experiment. Twenty-four MBA students participated to validate the questionnaire's reliability and validity in a simulated competition setting. Two rounds of task testing optimized the experimental workflow, ensuring 85% of participants completed operational procedures and data submission within the designated decision-making timeframe.

The second phase was the formal experiment, recruiting 360 student participants. It utilized corporate competition simulations and comprehensive entrepreneurship simulations to construct a highly dynamic market competition environment. Standardized questionnaires were distributed post-experiment. After screening out invalid responses, 312 valid questionnaires were obtained, yielding a validity rate of 86.67%.

### 2.3 Variable Measurement

The questionnaire comprised scales measuring entrepreneurial self-efficacy, entrepreneurial effort, regulatory focus, and control variables. The entire questionnaire employed a seven-point Likert scale, detailed as follows:

(1) Independent Variable: Entrepreneurial Self-Efficacy. The scale developed by Jill (2005) was adopted, comprising four dimensions: opportunity recognition, relationships, management, and risk tolerance<sup>[12]</sup>. It included four measurement items such as "I can handle challenges in new tasks with ease."

(2) Dependent Variable: Entrepreneurial Effort. Referencing the entrepreneurial effort scale used by Foo and Uy et al.<sup>[13]</sup>, and incorporating measurement items from the study by Li Jizhen et al., this includes three items such as "How much effort have you invested in your entrepreneurial endeavors over the past period?"

(3) Moderating Variables: Promotive Moderating Focus and Preventive Moderating Focus. Drawing from the moderating focus scale developed by Zhang Hao et al. (2018), which comprises two dimensions and eight items. Promotive Moderating Focus includes four items such as "I tend to invest more effort in endeavors with potential for success." Preventive Moderating Focus includes four items such as "I place greater emphasis on avoiding failure than on achieving success."

(4) Control variables: Gender, age, education level, entrepreneurial experience, entrepreneurial knowledge. Adapted from Hechavarría (2016)'s coding method for variables related to entrepreneurs' personal demographic characteristics<sup>[14]</sup>. Gender (assigned 1 for male, 0 for female), Age (divided into 6 age brackets, assigned 1-6), Education Level (divided into 6 education

levels, assigned 1-6), Entrepreneurial Experience (assigned 1 if experienced, 0 otherwise), Entrepreneurial Knowledge (assigned 1 if studied, 0 otherwise).

## 2.4 Research Model Design

This study employs SPSS 26.0 statistical analysis software to examine main effects and moderation effects using hierarchical regression analysis. The research model is as follows:

$$EE = \alpha + \beta_1 ES + \beta_2 ES^2 + \beta_3 X + \varepsilon \quad (1)$$

$$EE = \alpha + \beta_1 ES + \beta_2 ES^2 + \beta_3 P_1F + \beta_4 ES \times P_1F + \beta_5 ES^2 \times P_1F + \beta_6 X + \varepsilon \quad (2)$$

$$EE = \alpha + \beta_1 ES + \beta_2 ES^2 + \beta_3 P_2F + \beta_4 ES \times P_2F + \beta_5 ES^2 \times P_2F + \beta_6 X + \varepsilon \quad (3)$$

In Model (1), the inverted U-shaped effect of entrepreneurial self-efficacy on entrepreneurial effort is tested (H1). In the equation,  $\alpha$  represents the constant term, EE denotes entrepreneurial effort, ES denotes entrepreneurial self-efficacy, X denotes control variables, and  $\varepsilon$  denotes the random disturbance term.

Model (2) tested the moderating effect of promotion-focused regulation (H2). In the equation,  $\alpha$  represents the constant term, EE denotes entrepreneurial effort, ES denotes entrepreneurial self-efficacy,  $P_1F$  denotes promotion-focused regulation,  $ES \times P_1F$  denotes the interaction term between entrepreneurial self-efficacy and promotion-focused regulation, and  $ES^2 \times P_1F$  represents the interaction term between entrepreneurial self-efficacy and the quadratic term of promotional moderating focus, X represents control variables, and  $\varepsilon$  denotes the random disturbance term.

Model (3) examines the moderating effect of preventive regulatory focus (H3). Where  $\alpha$  is the constant term, EE represents entrepreneurial effort, ES represents entrepreneurial self-efficacy,  $P_2F$  represents preventive moderation focus,  $ES \times P_2F$  represents the interaction term between entrepreneurial self-efficacy and preventive moderation focus,  $ES^2 \times P_2F$  represents the interaction term between the quadratic interaction of entrepreneurial self-efficacy and preventive moderation focus, X represents control variables, and  $\varepsilon$  is the random disturbance term.

## 3. Empirical Findings and Analysis

### 3.1 Descriptive Statistics and Variable Correlation Analysis

Descriptive statistics and correlation coefficients are presented in Table 1. The correlation coefficients between variables did not exceed 0.7. Furthermore, the highest variance inflation factor (VIF) in the entire model was 1.284, below the critical value of 10. Thus, no multicollinearity issues exist among the explanatory variables.

Table 1 Descriptive Statistics and Correlation Coefficient Matrix

| Variable                         | 1       | 2       | 3       | 4      | 5      | 6       | 7      | 8       | 9     |
|----------------------------------|---------|---------|---------|--------|--------|---------|--------|---------|-------|
| 1. Entrepreneurial Effort        | 1       |         |         |        |        |         |        |         |       |
| 2. Entrepreneurial Self-Efficacy | 0.455** | 1       |         |        |        |         |        |         |       |
| 3. Promotive Regulatory Focus    | 0.044   | 0.074   | 1       |        |        |         |        |         |       |
| 4. Preventive Regulatory Focus   | 0.450** | 0.485** | 0.125** | 1      |        |         |        |         |       |
| 5. Gender                        | 0.029   | 0.063   | -0.008  | 0.048  | 1      |         |        |         |       |
| 6. Age                           | 0.041   | -0.04   | 0.015   | 0.083* | 0      | 1       |        |         |       |
| 7. Education                     | 0.046   | -0.034  | 0.012   | 0.038  | 0.049  | -0.042  | 1      |         |       |
| 8. Entrepreneurial Experience    | 0.017   | 0.029   | 0.034   | 0.03   | -0.067 | 0.145** | -0.022 | 1       |       |
| 9. Entrepreneurial Knowledge     | 0.001   | 0.074   | -0.012  | 0.055  | 0.026  | 0.106*  | 0.011  | 0.291** | 1     |
| Mean                             | 4.055   | 4.116   | 4.811   | 4.085  | 1.472  | 3.471   | 3.379  | 1.114   | 1.176 |
| Standard Deviation               | 1.686   | 1.471   | 1.291   | 1.556  | 0.500  | 1.158   | 0.986  | 0.318   | 0.381 |

Note: \* indicates  $p < 0.1$ ; \*\* indicates  $p < 0.05$ ; \*\*\* indicates  $p < 0.01$

### 3.2 Main Effects Analysis

To mitigate potential multicollinearity issues between the linear and squared terms of entrepreneurial self-efficacy, this study adopted the approach proposed by Geng Zizhen et al. by centering the squared term of entrepreneurial self-efficacy around its mean. The results examining the relationship between entrepreneurial self-efficacy and entrepreneurial effort are presented in Table 2.

The regression results of Model 2 indicate that the regression coefficient of the squared term of entrepreneurial self-efficacy on entrepreneurial effort is significantly negative ( $\beta = -0.141$ ,  $p < 0.01$ ), while the regression coefficient of its linear term is significantly positive ( $\beta = 0.424$ ,  $p < 0.01$ ), confirming H1.

Thus, an inverted U-shaped relationship exists between entrepreneurial self-efficacy and entrepreneurial effort. This implies that as entrepreneurial self-efficacy increases from low to moderate levels, entrepreneurial effort tends to rise; however, when entrepreneurial self-efficacy rises from moderate to high levels, entrepreneurial effort tends to decline. This suggests that maintaining moderate levels of entrepreneurial self-efficacy is most conducive to promoting entrepreneurial effort.

Contrary to the “linear relationship theory” in existing research, this study finds that entrepreneurial self-efficacy exerts both positive and negative effects on entrepreneurial effort, resulting in a complex nonlinear relationship under their combined influence.

*Table 2 Test of the Relationship between Entrepreneurial Self-efficacy and Entrepreneurial Effort*

| Variable                                   | Entrepreneurial Effort |                      |
|--|------------------------|----------------------|
|  | Model 1                | Model 2              |
| Gender                                     | 0.216<br>(0.141)       | 0.211*<br>(0.123)    |
| Age  | -0.076<br>(0.061)      | -0.095<br>(0.054)    |
| Education                                  | -0.068<br>(0.071)      | -0.102<br>(0.062)    |
| Entrepreneurial Experience                 | 0.101<br>(0.232)       | 0.107<br>(0.204)     |
| Entrepreneurial Knowledge                  | 0.321*<br>(0.192)      | 0.329*<br>(0.168)    |
| Entrepreneurial Self-Efficacy              |                        | 0.424***<br>(0.048)  |
| Entrepreneurial Self-Efficacy <sup>2</sup> |                        | -0.141***<br>(0.033) |
| Constant                                   | 3.742***<br>(0.468)    | 2.473***<br>(0.456)  |
| R <sup>2</sup>                             | 0.013                  | 0.247                |
| $\Delta R^2$                               | 0.013                  | 0.234                |
| F  | 1.554                  | 26.799***            |

Note: \* indicates  $p < 0.01$ ; \*\* indicates  $p < 0.05$ ; \*\*\* indicates  $p < 0.01$ ; values in parentheses are standard errors

### 3.3 Moderation Effect Analysis

The moderating effect of promotional focus on the relationship between entrepreneurial self-efficacy and entrepreneurial effort is shown in Table 3. Results indicate that the regression coefficient for the interaction term between the squared term of entrepreneurial self-efficacy and promotional focus is significantly negative ( $\beta = -0.066$ ,  $p < 0.05$ ), confirming that promotional focus positively moderates the inverted U-shaped relationship between entrepreneurial self-efficacy and



entrepreneurial effort, thus validating H2. At higher levels of facilitative moderation focus, both the positive and negative effects of entrepreneurial self-efficacy on entrepreneurial effort are amplified.

Model 4 examined the moderating effect of preventive regulatory focus on the relationship between entrepreneurial self-efficacy and entrepreneurial effort. Results showed that the regression coefficient for the interaction term between the squared term of entrepreneurial self-efficacy and preventive regulatory focus was significantly positive ( $\beta = 0.047$ ,  $p < 0.05$ ), indicating that preventive regulatory focus negatively moderates the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort, thus validating H3. When the level of preventive moderation focus is high, both the positive and negative effects of entrepreneurial self-efficacy on entrepreneurial effort are weakened.

To further analyze the moderating effects of promotional and preventative regulatory focuses, this study constructed corresponding moderation diagrams (Figures 2 and 3). Figure 2 shows that compared to the inverted U-shaped curve under low promotional focus, high promotional focus steepens the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort, further confirming the positive moderating effect of promotional focus. Figure 3 shows that compared to the inverted U-shaped curve under low preventative regulatory focus, high preventative regulatory focus flattens the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort, further validating the negative moderating effect of preventative regulatory focus.

Table 3 Results of Moderating Effect Test

| Variable   | Entrepreneurial Effort |                      |
|--|------------------------|----------------------|
|  | Model 3                | Model 4              |
| Gender   | 0.240**<br>(0.120)     | 0.126<br>(0.112)     |
| Age  | -0.091*<br>(0.052)     | -0.113**<br>(0.049)  |
| Education  | -0.111*<br>(0.060)     | -0.111*<br>(0.057)   |
| Entrepreneurial Experience   | 0.118<br>(0.197)       | 0.065<br>(0.185)     |
| Entrepreneurial Knowledge  | 0.396**<br>(0.164)     | 0.288*<br>(0.153)    |
| Entrepreneurial Self-Efficacy  | 0.274***<br>(0.052)    | 0.221***<br>(0.049)  |
| Entrepreneurial Self-Efficacy <sup>2</sup>                             | -0.186***<br>(0.040)   | -0.087***<br>(0.032) |
| Promotive Regulatory Focus   | 0.436***<br>(0.085)    |                      |
| Promotive Regulatory Focus×Entrepreneurial Self-Efficacy               | 0.095**<br>(0.037)     |                      |
| Promotive Regulatory Focus×Entrepreneurial Self-Efficacy <sup>2</sup>  | -0.066**<br>(0.032)    |                      |
| Preventive Focus   |                        | 0.249***<br>(0.069)  |
| Preventive Regulatory Focus×Entrepreneurial Self-Efficacy              |                        | -0.090***<br>(0.029) |
| Preventive Moderation Focus×Entrepreneurial Self-Efficacy <sup>2</sup> |                        | 0.047**<br>(0.020)   |
| Constant   | 1.044*<br>(0.550)      | 2.615***<br>(0.505)  |
| R <sup>2</sup>   | 0.297                  | 0.384                |
| $\Delta R^2$   | 0.050                  | 0.137                |
| F  | 24.089***              | 35.445***            |

Note: \* indicates  $p < 0.01$ ; \*\* indicates  $p < 0.05$ ; \*\*\* indicates  $p < 0.01$ ; values in parentheses represent standard errors

## 4. Conclusions and Discussion

### 4.1 Research Findings

Is entrepreneurial self-efficacy merely a catalyst for entrepreneurial effort, or does it function as a potential double-edged sword? This study, grounded in the “too much of a good thing” effect perspective, employs a mixed-methods approach integrating situational experiments and questionnaire surveys. Analyzing 580 samples (268 from entrepreneurs and 312 from students), it delves into the nonlinear relationship between entrepreneurial self-efficacy and entrepreneurial effort, its underlying mechanisms, and the moderating roles of promotional and preventive regulatory focuses. Results indicate: The nonlinear effect of entrepreneurial self-efficacy on entrepreneurial effort is significant, exhibiting a typical inverted U-shaped relationship. Specifically, an optimal range of entrepreneurial self-efficacy intensity exists that maximizes entrepreneurial effort; beyond this range, excessively high self-efficacy paradoxically reduces effort levels. Promotive moderation focus exerts a reinforcing positive moderating effect. Its increased intensity significantly amplifies the original inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort, manifesting as a steeper inverted U-curve when promotive moderation focus is higher. Preventive moderation focus, conversely, produces a weakening negative moderating effect. Increasing its intensity significantly weakens the inverted U-shaped relationship between entrepreneurial self-efficacy and entrepreneurial effort, manifested as a flatter inverted U-shaped curve when the preventative regulatory focus is high.

The theoretical contributions of this paper are twofold: First, it deepens theoretical understanding of the mechanism linking entrepreneurial self-efficacy and entrepreneurial effort. Addressing divergent conclusions in existing literature regarding the influence of entrepreneurial self-efficacy on entrepreneurial effort, this study introduces a moderation focus theoretical perspective, constructing and validating an integrated influence pathway and theoretical framework incorporating moderation focus. Empirical findings reveal a nonlinear inverted-U relationship between entrepreneurial self-efficacy and entrepreneurial effort. This discovery not only offers a new theoretical lens to reconcile existing research perspectives on this relationship but also deepens our understanding of their interaction. It provides a theoretical basis for entrepreneurs to optimize their self-efficacy levels to enhance effort commitment. Second, it creatively uncovers distinct moderating mechanisms of promotional and preventive regulatory focus within this nonlinear relationship. This study simultaneously investigates and clarifies the differentiated moderating roles of promotion-focused and prevention-focused regulation in the nonlinear relationship between entrepreneurial self-efficacy and entrepreneurial effort. Results confirm that promotion-focused regulation exerts a positive moderating effect, intensifying the steepness of the inverted U-shaped curve, while prevention-focused regulation exerts a negative moderating effect, weakening the intensity of this nonlinear relationship. This finding not only breakthroughs the application boundaries and practical implications of moderation focus theory in the field of entrepreneurial motivation, systematically elucidating the underlying mechanisms of different moderation focus types in the cognition-to-effort conversion pathway, but also provides decision-making references for entrepreneurs regarding the level of entrepreneurial effort under different promotion-focused and prevention-focused moderation conditions.

Based on the aforementioned theoretical analysis and empirical research findings, the following management implications emerge: (1) Research confirms that entrepreneurial self-efficacy exerts a significant inverted U-shaped influence on entrepreneurial effort. This nonlinear mechanism suggests that entrepreneurs should accurately calibrate their self-efficacy to avoid the “confidence trap”: maintaining confidence levels within a moderate range is essential for optimizing effort intensity. For entrepreneurs with low or moderate self-efficacy, foundational efficacy should be built through progressive achievement goals, positive mentor feedback, and specialized training in core entrepreneurial competencies. Conversely, highly self-efficacious entrepreneurs exhibiting overconfidence require mechanisms to curb cognitive biases—such as establishing critical reflection routines, actively seeking negative feedback, and conducting scenario-based risk simulations—to prevent reduced effort due to blind confidence. (2) Promotionally focused entrepreneurs prioritize growth, rewards, and ideals. Entrepreneurship educators should actively cultivate an achievement-oriented motivational environment. Clearly and meticulously outline diverse pathways to realizing grand visions, explicitly presenting the potential rewards inherent in each path to foster intuitive and profound understanding of success prospects. When assigning highly challenging tasks, closely

monitor the dynamic shifts in their sense of efficacy. During the ascending phase (transitioning from low-to-moderate levels), provide timely, robust, and specific positive feedback alongside ample resource support—effectively fueling their momentum to cultivate a fearless, determined confidence akin to a “foolhardy calf unafraid of tigers,” propelling them steadfastly toward their goals. However, when efficacy approaches its theoretical inflection point and enters an excessively high range, it is prudent to introduce preventive considerations. For instance, emphasize the severe consequences of missed opportunities or competitive threats. By leveraging the “avoidance of harm” potential inherent in their “gain-seeking” motivation, effectively countering potential complacency in efficacy. This fosters a rational confidence rooted in the principle that “caution ensures lasting success,” enabling more stable development while maintaining effort levels. (3) Entrepreneurs with a preventive focus exhibit pronounced preferences for stability and loss aversion. Management should prioritize alleviating their risk anxiety and breaking rigid thinking patterns. Carefully cultivate a safe environment that permits trial and error and tolerates minor setbacks—such as establishing dedicated experimental funds or implementing rapid prototyping validation processes—to tangibly reduce psychological burdens and barriers to action. Particularly at critical decision points, when their sense of efficacy is low, provide detailed feasibility analyses, comprehensive risk management plans, and clear operational guidelines. This helps them tangibly “see” the glimmer of success, steadily elevating their efficacy to a moderate level that effectively drives effort. Given that cultivating efficacy among such entrepreneurs requires adherence to a more sustained and evidence-based accumulation process, managers must shoulder the responsibility of providing continuous, constructive performance feedback. This facilitates the gradual establishment of a stable, moderate efficacy perception system, ensuring sustained effort within safe boundaries and thereby driving steady growth of entrepreneurial projects.

## 4.2 Research Limitations and Future Directions

This study faces limitations in sample size, industry diversity, and geographic scope, which may affect the generalizability and accuracy of findings, introducing uncertainty. Consequently, future research should focus on expanding industry representation, broadening geographic coverage, and increasing sample size to strengthen the research foundation. Building upon expanded samples, comparative studies across industries and regions should be conducted. Through multidimensional, multi-perspective analysis, the similarities and differences in research conclusions across various industries and regional contexts can be explored in depth. This will further validate, refine, and improve the conclusions of this study, enhancing their reliability and applicability. Furthermore, this study primarily relies on questionnaire data. Due to inherent limitations of survey methods, it struggles to dynamically and precisely capture the evolving trajectory of entrepreneurs’ effort levels, which partially constrains the depth and comprehensiveness of the findings. Consequently, future research could adopt dynamic tracking surveys of the entrepreneurial sample, employing time-series analysis to continuously observe and systematically analyze effort levels and related variables across different time periods. Time-series research can provide an in-depth analysis of the dynamic relationship between entrepreneurial self-efficacy and entrepreneurial effort, revealing its patterns and characteristics over time. This would deepen the research conclusions, add new empirical evidence to the theoretical study of the relationship between entrepreneurial self-efficacy and entrepreneurial effort, and further enrich and refine the theoretical framework in this field.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# The Impact of College Young Teachers Work-family Support on Career Growth: The Mediation of Work Engagement

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**Abstract:** Young teachers are newcomers in the field of higher education, playing a foundational role in the development of universities. However, the unique nature of universities also limits the development space for young teachers. High school young teachers have a large scale, and their career growth dilemma has increasingly become a prominent issue and research focus in the current field of education management. Based on this, the present study is grounded in the Job Demands-Resources model and, from an “enrichment” pathway perspective, conducted a survey of young teachers at G University to examine the impact mechanism of work-family support on their career growth. Results showed that work-family support has a positive predictive effect on the career growth of young teachers. Work engagement plays a partial mediating role between work-family support and career growth. This study hopes to bring about research breakthroughs in the management of young teachers in universities and the growth of young teachers, and to provide path references and suggestions for cultivating young teachers in universities, helping the development of universities and the growth of young teachers.

**Keywords:** Young Teachers in High School; Work-Family Support; Work Engagement; Career Growth

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## 1.Introduction

High schools have become a major target for the expansion of higher education enrollment nationwide in recent years. In order to match the rapidly expanding scale of education, high schools have recruited a large number of young teachers to supplement the teaching staff, gradually forming a teaching staff structure dominated by young teachers. According to data released by the Ministry of Education in 2021, there are more than 1.24 million full-time teachers under the age of 45 in China's higher education system, accounting for 67% of the total number of higher education teachers. With young teachers becoming the main force in the faculty of higher education institutions, the development of young teachers has become a strategic issue in the development of universities. The construction of the faculty team in universities is a key measure for the connotative development of higher education, which is related to promoting the development process of higher education and achieving the overall modernization of education<sup>[1]</sup>.

Young teachers, as newcomers in the field of higher education, bear heavy responsibilities in cultivating students' moral character and promoting the development of educational institutions. At the same time, they also face significant work pressure. Challenges such as limited development opportunities, high work intensity, and low salary have become survival labels for these “young peppers.” In recent years, the personnel system of “promotion or leave” set for young teachers



in many affiliated schools has attracted wide social attention and academic discussion, but there is less concern for young teachers in universities. In the situation of “Slow advancement is regression” inter-school competition, universities must pay attention to the sustainable career growth (CG) of young teachers in order to consolidate the talent team and seek high-quality development<sup>[2]</sup>. Through past research, scholars have explored the antecedents of young teachers’ career growth from both individual factors (gender, study abroad experience, etc. ) and organizational factors (university level, academic lineage relationships, academic evaluation system, etc. )<sup>[3]</sup>. Despite the rich perspectives on career growth, the impact of work-family support on the career growth of young teachers has been overlooked.

Recently, scholars have found that work-family support has a positive impact on individuals. For example, work-family support can facilitate employees’ career growth<sup>[4]</sup>, subsequently contributing to improved job performance and creativity<sup>[5]</sup>. This research finding supports the viewpoint proposed in the Job Demands-Resources model, that sufficient work resources increase employees’ work engagement, thereby generating positive effects such as high organizational commitment, high intention to stay, and high job performance<sup>[6,7]</sup>. In fact, work resources have inherent motivational properties. Increasing work resources, such as work-family support, job autonomy, and feedback, can stimulate employee motivation, improve work involvement, and ultimately have a positive impact<sup>[7,8]</sup>. Therefore, this study introduces individual characteristics closely related to the Job Demands-Resources model - work engagement as a mediating variable, revealing the mechanism of the impact of work-family support on career growth among young teachers.

In the higher education system, universities play a crucial role; and among universities, young faculty are a large group with frequent issues. This study is based on the Job Demand- Resources model, starting from the perspective of the “gain” path, with the representative university G as the survey object. By using a questionnaire survey, it explores the relationship between work-family support and the career growth of young teachers and investigates the mechanism between the two. Hope to bring breakthroughs in research on the management and growth of young college teachers, and provide paths, references, and suggestions for cultivating young teachers in colleges, to promote the development of colleges and the growth of young teachers.

## 2.Theory and hypotheses

### 2.1 Relationship between Work-Family Support and career growth

Scholars have mainly experienced three stages of research on work-family relationships: work-family conflict, work-family balance, and work-family facilitation. The so-called work-family enrichment refers to the individual’s experience in one role enhancing their performance in another role, while work-family support - a specific form of work-family enrichment - refers to the individual’s experience in one role improving their performance in another role<sup>[9]</sup>. Research related to work-family support and work-family enrichment is relatively limited, and a unified concept has not yet been formed<sup>[10]</sup>. Haar (2004) states that work-family support refers to “a series of measures implemented by organizations or employers to safeguard employees’ family lives and promote work-life balance, emphasizing that work-family support is a one-way process, meaning support provided by the work domain to the family domain<sup>[11]</sup>. “Scholars such as Zhao et al. (2008) do not agree with the notion that work-family support is one-sided<sup>[9]</sup>. They argue that work-family support, like work-family enrichment, should be seen as a bidirectional relationship. Therefore, they define work-family support as “various supports that employees receive from both the work domain and the family domain that benefit their lives. “ According to this definition, support from one domain can positively impact an employee’s work life in another domain<sup>[9]</sup>.

The basic theoretical concept of career growth can be traced back to 1957, when Argyri (1957) pointed out in a study on the conflict between organizational systems and individuals that career growth is the process in which individuals transition from relative dependence on the organization to relative independence, and it is also the process through which personal development becomes independent and mature. Weng et al (2010) further developed the concept proposed by Loscertales, arguing that career growth is not just the pursuit of growth rate, but should be analyzed from two levels: one is the growth process of career growth in the process of employees changing jobs, and the other is the growth process of career growth internally in employees<sup>[12]</sup>. Campbe and O’Meara (2013) proposed that the work-life atmosphere<sup>[13,14]</sup>, opportunities provided by the organization, and resources have a significant impact on teachers’ professional development<sup>[11]</sup>. Muhammad and

Faizuniah (2016) found that when the professional rewards in the career growth of university teachers are low, employees' intention to leave increases<sup>[15]</sup>.

Through literature review, it is generally acknowledged by scholars that there are certain obstacles and dilemmas in the professional development of university teachers. Scholars have also analyzed the factors influencing the career growth of university teachers from the personal and environmental levels, focusing on individual motivation, organizational support, interpersonal relationships, and other individual factors. However, these variables are strongly correlated and difficult to separate. Therefore, based on the Job Demands-Resources model, this paper attempts to explore the relationship between work-family support and career growth<sup>[16]</sup>. Campbell and O'Meara (2013) suggested that the work-life environment and the relevant resources provided by organizations have a significant impact on teachers' career growth<sup>[14]</sup>. Carmeli et al. (2004) pointed out that organizational fairness enhances teachers' sense of responsibility and enables them to obtain better opportunities for career growth<sup>[17]</sup>. King et al. (1995) found that organizational support plays a certain role in promoting employees' career growth<sup>[17,18]</sup>. Based on the above analysis, this study proposes the hypothesis:

Hypothesis 1: Work-family support has a significant positive impact on the career growth of young teachers.

## 2.2 The relationship between work-family support and work engagement

Schaufeli (2002) proposed that work engagement is a positive, enthusiastic, and energetic state at work, characterized by vigor, dedication, and absorption<sup>[19,20]</sup>. Dedication refers to employees being willing to sacrifice their own time and energy for work, being passionate about their work; vitality refers to employees having abundant energy in the work process, and being able to maintain a persevering attitude even in the face of difficulties; lastly, it is the level of focus, which refers to the degree to which employees are immersed in their work. Schaufeli also introduced the Job Demands-Resources model into the area of work engagement, which has been widely used as well<sup>[20]</sup>. Domestic and foreign scholars have conducted relatively mature research on work engagement, but there are few studies focusing on university teachers. Bakker's (2007) study illustrates that leadership support and a relaxed organizational atmosphere can significantly positively influence the work engagement of university teachers<sup>[21]</sup>. Bert (2014) research suggests that the higher the level of organizational satisfaction among university teachers, the higher their level of work engagement<sup>[22]</sup>. Xanthopoulou (2013) found through longitudinal studies that leadership support can significantly predict the work engagement of university teachers<sup>[23]</sup>. Through literature review, it can be observed that: Firstly, the research results on the current level of work engagement among college teachers are inconsistent in academia, and further empirical evidence and extensions are needed. Secondly, work engagement, as a behavioral manifestation of motivation, is often used as a mediator.

Work and family are two important domains in employees' daily lives, and support from these domains is one of the important work resources for employees. According to the Job Demands-Resources model, increasing job resources can stimulate employee motivation, enhance work engagement, and subsequently have a positive impact<sup>[8]</sup>. Naruse Takashi et al. (2013) found that young teachers exhibit significantly higher levels of work engagement when there is a positive relationship between their work and family, as opposed to young teachers experiencing a negative relationship between work and family. Furthermore, research has shown a significant correlation between support from superiors and work engagement<sup>[24]</sup>. Similar to this, Othman and Nasuridin (2013) conducted a study on 402 young teachers to explore the impact of social support (supervisory support and colleague support) on work engagement. The results showed a significant positive correlation between supervisory support and work engagement, while colleague support did not have a significant impact on work engagement<sup>[25]</sup>. Brummelhuis and Bakker (2012) found that when employees engage in high-intensity household labor after work, their levels of psychological detachment and relaxation are lower, and they have a negative impact on their work engagement the next day<sup>[26]</sup>. This suggests that family life has a significant influence on employees' work engagement. Based on the above analysis, this study proposes the hypothesis:

Hypothesis 2: Work-family support has a significant positive impact on young teachers' work engagement.

## 2.3 Relationship between work engagement and career growth

High levels of work input can help teachers maintain a positive work attitude, enabling them to actively internalize and acquire new knowledge, complete tasks assigned by universities, and achieve career growth.

Demerouti et al. (2002) argued that employees with high levels of engagement in their work often exhibit enthusiasm and maintain a positive attitude, which can help individuals broaden and increase their occupational resources such as physiological, social, and psychological resources, thereby promoting their career growth<sup>[27]</sup>. Bakker et al. (2009) study suggests that employees' salary levels will vary with the extent of their job involvement<sup>[21]</sup>. Gillet et al. (2013) believe that job involvement has a positive impact on individuals' job satisfaction<sup>[28]</sup>. Kimberley et al. (2015) proposed that a high level of work engagement can increase employees' innovative behavior<sup>[29]</sup>. Bue et al. (2018) believe that the work engagement of vocational school teachers is significantly positively related to their career growth<sup>[30]</sup>. Based on the analysis above, this study puts forward the hypothesis:

Hypothesis 3: Work engagement has a significant positive impact on the career growth of young teachers.

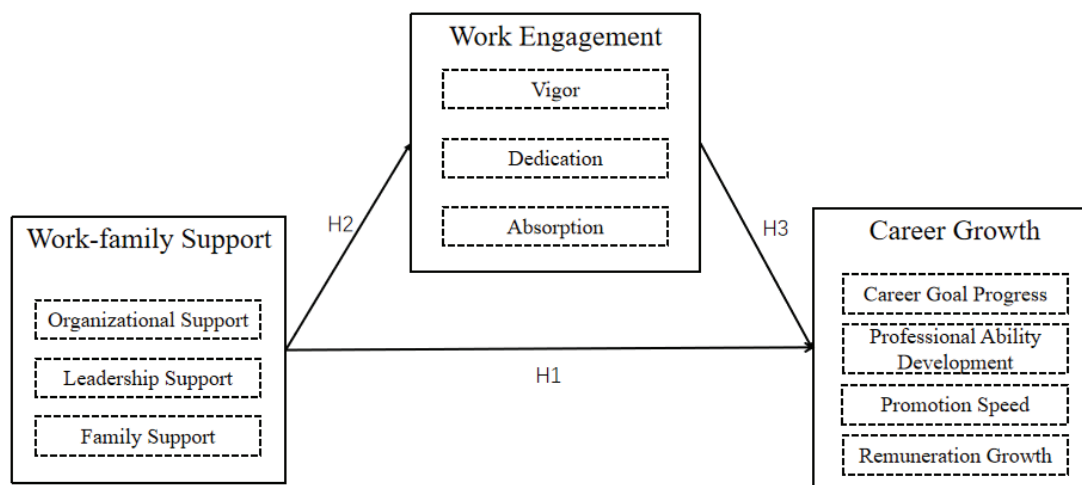
## 2.4 The mediating effect of work engagement

Many scholars have studied the relationship between work-family support and career growth, but little attention has been paid to the underlying impact processes. This study posits that work-family support can be categorized into instrumental and emotional support, which possess both dispositional (stability) and situational (developed) characteristics. Similarly, career growth is not only an emotional state, but also a cognitive process. Work-family support can drive individual work engagement, and the successful experiences brought by work engagement can in turn strengthen career growth. Emotional factors will run through the entire mechanism of career growth. In addition, previous studies have focused more on elementary and middle school teachers, knowledge employees in enterprises, or certain specific occupational groups, such as young teachers, with less exploration on young teachers in universities. Whether the conclusions of these studies can be applied to the career growth of young university teachers remains to be verified. Based on this, this study posits the hypothesis:

Hypothesis 4: The work engagement of young university teachers plays a mediating role between work-family support and career growth.

In conclusion, this study constructs the following conceptual model, intending to explore their mutual relationships through questionnaire method and validate the model.

Figure 1. The conceptual model.



## 3. Method

### 3.1 Sample and procedure

This study selected young teachers from G University as research subjects (full-time teachers under the age of 45 at the time of the survey). There are several reasons for selecting young teachers from G University as the research subjects: Firstly, in terms of the level of regional economic development, the funding received by G University is consistent with the majority of universities, representing the financial support in universities with generally limited resources. Secondly, G University has a complete range of disciplines, is a comprehensive high-level institution, which is convenient for this study to conduct research activities on young teachers in various disciplines, ensuring the breadth of the sample. Thirdly, G University has a

large number of teachers, a balanced proportion of young teachers, which is conducive to the collection of samples.

This study collected, organized, and analyzed data through a combination of sampling surveys and online survey questionnaires. The questionnaire was conducted anonymously to allow participating teachers to make more objective judgments. Questionnaires were distributed in February 2024, and collected in early March. A total of 72 questionnaires were sent out in this study, with 70 ultimately collected. After excluding 10 invalid questionnaires, a total of 60 valid questionnaires were collected, resulting in a response rate of 83.33%. Based on previous research results, this study selected six demographic variables of young teachers: age, gender, education level, years of tenure, marital status, and number of children, for statistical analysis. Among them, 28.22% are male and 71.78% are female; in terms of age, 18-25 year olds account for 27.78% of the respondents, 26-35 year olds account for 33.13%, and 36-45 year olds account for 39.09%; in terms of education, the majority of the surveyed individuals have a Ph.D., accounting for 76.58%; 47.41% of respondents have been working for 11-15 years, 23.90% have been working for 6-10 years, 10.77% have been working for less than 5 years, and the rest account for 17.92%.

### 3.2 Measures

This study selected mature scales commonly used in research to measure the desired constructs. The original English scales were translated in both directions and modified as needed based on the context to ensure accurate and clear linguistic expression. All scales utilized a 5-point Likert scale, with 1 indicating “strongly disagree” and 5 indicating “strongly agree”.

#### 3.2.1 Work-Family Support Scale

In order to investigate the current status of work-family support for young faculty members in universities, this study appropriately simplified and adapted the work-family support scale developed by Boyar<sup>[31]</sup>. The measurement content included three dimensions of organizational support, leadership support, and family member support (each with 10 items), totaling 30 items, such as “My organization strongly considers my goals and values,” “My supervisor is understanding of my family responsibilities,” and “Family members share family-related ideas and advice with me,” etc.

#### 3.2.2 Work Engagement Scale

The measurement of work engagement was conducted using the UWES scale developed by Sdmifeli (2002)<sup>[32]</sup>, which consists of three dimensions: vigor, dedication, and absorption. The vigor and absorption dimensions each include 6 items, while the dedication dimension consists of 5 items, totaling 16 items, such as “When I get up in the morning, I feel like going to work,” “My job inspires me,” and “Time flies when I am working.”

#### 3.2.3 Career Growth Scale

Using the career growth scale developed by Weng et al.<sup>[33]</sup>, measurements include four aspects: progress in career goals, development of professional skills, speed of promotion, and increase in compensation, with a total of 20 items, such as “My present job moves me closer to my career goals,” “My present job encourages me to accumulate richer work experiences,” “My promotion speed in the present organization is fast,” and “My salary is growing quickly in my present organization.”

## 4. Results

### 4.1 Homogeneity of Variance Test

Using Harman single-factor test, the homologous bias interference problem of this study was tested based on the related parameters of characteristic roots. After the test, there are 10 common factors greater than 1 in this study, with the first factor explaining the variation reaching 34.827%. According to the standard suggested by Podsakoff et al., which is less than 40%, the homologous bias in this study is within a controllable range<sup>[34]</sup>.

### 4.2 Examination of the reliability and validity of a questionnaire

#### 4.2.1 Reliability test

This study used Cronbach's alpha coefficient to measure the reliability of the questionnaire. After calculation, the Cronbach's alpha values for work-family support, work engagement, career growth, etc. in this study were 0.958, 0.922, 0.915, respectively. The Cronbach's alpha values for each dimension of work-family support were 0.961, 0.951, 0.959. The Cronbach's alpha values for each dimension of work engagement were 0.948, 0.902, 0.910. The Cronbach's alpha coefficients of various dimensions of career growth are 0.917, 0.929, 0.924, and 0.920 respectively. The Cronbach's alpha

coefficients of all dimensions reach the standard of 0. 7, indicating that this survey questionnaire is effective.

#### 4.2.2 Validity testing

Through confirmatory factor analysis, the structural validity of questionnaires such as work-family support, work engagement, and career growth was examined. Additionally, a comparison was made between the three-factor model of work-family support (organizational support, leadership support, family member support) and the single-factor model, the three-factor model of work engagement (vigor, dedication, absorption) and the single-factor model, and the four-factor model of career growth (career goal progress, career skill development, promotion speed, and salary growth) and the single-factor model (Table 1). It can be seen from Table 1 that the fit index of the single-factor model of work-family support, work involvement, and career growth is better than that of its multifactor model, but the RMSEA value of work-family support reaches 0. 108, significantly higher than the standard of 0. 09 proposed by Hou Jie Tai and other scholars<sup>[35]</sup>. Therefore, after deleting a question with low load in work-family support, the RMSEA value of the work-family support model reaches the recommended standard.

*Table 1. Results of the confirmatory factor analysis of the Work-Family Support, Work Engagement, and Career Growth Questionnaire.*

| Questionnaire title | Model         | $\chi^2$ | DF  | $\chi^2/DF$ | NFI   | IFI   | TLI   | CFI   | RMSEA |
|---------------------|---------------|----------|-----|-------------|-------|-------|-------|-------|-------|
| Work-family support | Single factor | 1408. 93 | 405 | 3. 48       | 0. 38 | 0. 46 | 0. 41 | 0. 45 | 0. 21 |
|                     | Three factors | 678. 32  | 402 | 1. 69       | 0. 70 | 0. 85 | 0. 84 | 0. 85 | 0. 11 |
| Work engagement     | Single factor | 420. 28  | 104 | 4. 04       | 0. 52 | 0. 59 | 0. 52 | 0. 59 | 0. 23 |
|                     | Three factors | 140. 55  | 101 | 1. 39       | 0. 84 | 0. 95 | 0. 94 | 0. 95 | 0. 08 |
| Career growth       | Single factor | 705. 82  | 170 | 4. 15       | 0. 37 | 0. 43 | 0. 35 | 0. 42 | 0. 23 |
|                     | Four factors  | 225. 98  | 164 | 1. 38       | 0. 80 | 0. 94 | 0. 92 | 0. 93 | 0. 08 |

#### 4.3 Descriptive statistical results

In this study, SPSS 25.0 software was used to conduct a correlation analysis of all variables, and the correlation coefficients, means, and standard deviations of each variable are shown in Table 2. According to the correlation coefficients of each variable: organizational support is positively correlated with dedication ( $r=0.44$ ,  $p<0.01$ ) and focus ( $r=0.30$ ,  $p<0.05$ ), and organizational support is also positively correlated with career goal progress ( $r=0.46$ ,  $p<0.01$ ), career skills development ( $r=0.31$ ,  $p<0.05$ ), promotion speed ( $r=0.36$ ,  $p<0.01$ ), and salary growth ( $r=0.48$ ,  $p<0.05$ ). Similarly, leadership support and work engagement are positively correlated in all dimensions, while family support is only significantly related to focus, progress in career goals, and promotion speed. At the same time, vitality is not significantly correlated with professional development but is also not significantly related to dedication and promotion speed. All other dimensions show positive correlations with each other. The above results are consistent with the proposed hypotheses, providing initial support for the validation of the research model.

*Table 2. Mean, standard deviation, and Pearson correlation coefficients of each variable*

| FACTORS                   | 1       | 2       | 3       | 4       | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------------------|---------|---------|---------|---------|---|---|---|---|---|----|
| 1. Organizational Support | -       |         |         |         |   |   |   |   |   |    |
| 2. Leadership Support     | 0. 50** | -       |         |         |   |   |   |   |   |    |
| 3. Family Support         | 0. 40** | 0. 41** | -       |         |   |   |   |   |   |    |
| 4. Vigor                  | 0. 19   | 0. 58** | 0. 42** | -       |   |   |   |   |   |    |
| 5. Dedication             | 0. 44** | 0. 52** | 0. 58** | 0. 58** | - |   |   |   |   |    |



| FACTORS                             | 1      | 2      | 3     | 4      | 5      | 6      | 7      | 8     | 9    | 10   |
|-------------------------------------|--------|--------|-------|--------|--------|--------|--------|-------|------|------|
| 6. Absorption                       | 0.30*  | 0.51** | 0.20  | 0.37** | 0.27*  | -      |        |       |      |      |
| 7. Career Goal Progress             | 0.46** | 0.56** | 0.25  | 0.46** | 0.46** | 0.58** | -      |       |      |      |
| 8. Professional Ability Development | 0.31*  | 0.35** | 0.29* | 0.20   | 0.28*  | 0.45** | 0.28*  | -     |      |      |
| 9. Promotion Speed                  | 0.36** | 0.27*  | 0.20  | 0.25   | 0.25   | 0.27*  | 0.33*  | 0.28* | -    |      |
| 10. Remuneration Growth             | 0.48** | 0.60** | 0.30* | 0.41** | 0.44** | 0.49** | 0.59** | 0.33* | 0.24 | -    |
| Mean                                | 3.87   | 3.78   | 4.11  | 3.69   | 3.52   | 3.58   | 3.58   | 3.83  | 3.61 | 3.95 |
| SD                                  | 1.04   | 0.99   | 0.98  | 1.23   | 1.12   | 1.15   | 1.05   | 1.09  | 1.09 | 1.02 |

Note: \*  $p < 0.05$ ; \*\*  $p < 0.01$  (two-tailed), the same below.

#### 4.4 Analysis of the mediating role of work commitment

To verify the mediating effects of this study, stepwise hierarchical regression was conducted using SPSS-25.0 software to build models 5, 7, 9, and 11. The results are shown in Table 3: Model 5 indicates that the mediating effect of the focus dimension of work engagement between work-family support and the career goal progress dimension is significant ( $B=0.338$ ,  $p<0.01$ ), while Model 9 shows that the mediating effect of the dedication dimension of work engagement between work-family support and the promotion speed dimension of career growth is significant ( $B=0.006$ ,  $p<0.05$ ). Similarly, models 7 and 9 also indicate the mediating effect of work engagement.

To assess the credibility of the results, the predetermined standards of  $VIF < 5$  and Condition Index  $< 30$  were used as references to conduct multicollinearity tests on the predictive variables in the research model. The results show that the tolerance is between 1.00 and 0.52; the VIF is between 1.00 and 2.00; the maximum condition index is 26.39. The results are within the predetermined standards, therefore, it can be preliminarily confirmed that the severe collinearity effects between the predictive variables in this study can be basically ruled out, and the results are relatively reliable. It can be concluded that work engagement plays a partial mediating role between work-family support and career growth of young teachers, confirming hypothesis H4 (Work engagement of young university teachers acts as a mediator between work-family support and career growth). At the same time, hypotheses H1, H2, and H3 are further confirmed.

Table 3. Analysis results of the mediating effect of work engagement

| Variables              | Vigor   | Dedication | Absorption | Career Goal Progress | Professional Ability Development | Promotion Speed | Remuneration Growth |       |        |         |        |
|------------------------|---------|------------|------------|----------------------|----------------------------------|-----------------|---------------------|-------|--------|---------|--------|
|                        | M1      | M2         | M3         | M4                   | M5                               | M6              | M7                  | M8    | M9     | M10     | M11    |
| Independent variable   |         |            |            |                      |                                  |                 |                     |       |        |         |        |
| Organizational Support | -0.241  | 0.148      | 0.069      | 0.253                | 0.240                            | 0.150           | 0.092               | 0.302 | 0.330* | 0.235   | 0.223  |
| Leadership Support     | 0.700** | 0.320*     | 0.563**    | 0.466**              | 0.116                            | 0.237           | 0.079               | 0.112 | -0.075 | 0.482** | 0.286  |
| Family Support         | 0.341*  | 0.461**    | -0.026     | -0.032               | -0.154                           | 0.162           | 0.172               | 0.049 | -0.005 | 0.014   | -0.050 |
| Mediating variable     |         |            |            |                      |                                  |                 |                     |       |        |         |        |
| Vigor                  |         |            |            |                      | 0.148                            |                 | -0.095              |       | 0.159  |         | 0.068* |
| Dedication             |         |            |            |                      | 0.173                            |                 | 0.069               |       | 0.006* |         | 0.101  |
| Absorption             |         |            |            |                      | 0.338**                          |                 | 0.359**             |       | 0.132  |         | 0.206* |
| R2                     | 0.403   | 0.440      | 0.264      | 0.353                | 0.515                            | 0.163           | 0.268               | 0.140 | 0.179  | 0.400   | 0.457  |

| Variables   | Vigor    | Dedication | Absorption | Career Goal Progress | Professional Ability Development | Promotion Speed | Remuneration Growth |        |       |          |         |
|-------------|----------|------------|------------|----------------------|----------------------------------|-----------------|---------------------|--------|-------|----------|---------|
|             | M1       | M2         | M3         | M4                   | M5                               | M6              | M7                  | M8     | M9    | M10      | M11     |
| Adjusted R2 | 0.371    | 0.410      | 0.225      | 0.318                | 0.118                            | 0.094           | 0.368               | 0.460  | 0.185 | 0.086    | 0.396   |
| R2 change   | 0.403    | 0.440      | 0.264      | 0.353                | 0.515                            | 0.163           | 0.268               | 0.140  | 0.179 | 0.400    | 0.457   |
| F-value     | 12.615** | 14.644**   | 6.695**    | 10.180**             | 9.371**                          | 3.638*          | 3.233**             | 3.043* | 1.920 | 12.427** | 7.442** |

Note:\*  $p < 0.05$ ; \*\*  $p < 0.01$  (two-tailed), the same below.

## 5. Discussion

### 5.1 Conclusion

The main conclusions of this study are as follows: firstly, there is a positive correlation between the work-family support and career growth of young teachers. This conclusion indicates that enhancing the level of work-family support for young teachers can promote their career growth, while intrinsic positive outcomes can facilitate the acquisition of good work-family relationships. When young teachers receive work-family support, they often develop a positive work attitude and increase their career growth rate.

Secondly, there is a significant positive correlation between the support from home and the work engagement of young teachers. When organizations provide a series of family-friendly support policies for employees, it can effectively alleviate the conflict between work and family, which plays an important role in promoting the work engagement of young teachers<sup>[36]</sup>.

Thirdly, work engagement has a significant positive impact on career growth. The impact of work engagement on career growth reflects the characteristics of high emotional labor of young university teachers. Emotional labor refers to the individual's need to manage their emotions during the work process and express emotions that comply with organizational rules and interests<sup>[37]</sup>. Through the exploration of the relationship between work engagement and career growth in this study, it is found that emotional labor is a part of teachers' job content. The higher the level of work engagement of young teachers, the more their emotional labor is in place, and their emotional expression and enthusiasm are closer to the needs of the organization, thereby promoting career growth.

Finally, work engagement plays an intermediary role between work-family support and career growth. It can be seen that work-family support can stimulate the dedication, work vitality, and focus of young teachers on teaching and academics, thus achieving personal development and growth.

### 5.2 Theoretical contributions

Firstly, this study enriches the bidirectional support relationship between work and family by providing more empirical evidence, further enriching the research in the areas of work-family support and career growth. Currently, scholars have started to pay attention to the role of work-family support on employees' work attitudes and behaviors, but there is still a lack of empirical research on this topic. Both support from the family domain and support from the work domain have important influences on employees' career growth, but the underlying mechanisms have not been fully explored. Therefore, this study further examines the impact of work-family support on career growth and its mechanisms.

Secondly, this study established a model of the impact of work-family support on the career growth of young teachers, and introduced the variable of work engagement during the research process to explore its mediating role in the causal mechanism. By adding the mediating variable, a deeper exploration of the mechanism by which work-family support affects career growth was conducted, enriching previous studies with a single perspective.

### 5.3 Managerial implications

In the higher education system, universities have the largest number and scale, and they accommodate the most students and teachers, making them an important component of higher education. Whether young teachers in high schools can grow into the talents needed for the development of higher education not only affects the growth and success of young teachers

themselves, but also relates to the process of connotative development within universities and the development of the higher education industry. Currently, young teachers in colleges and universities face common challenges in their professional development. This study explores the impact mechanism of work-family support on the professional development of young teachers, providing reference and suggestions for cultivating young teachers in colleges and universities, thereby contributing to the development of universities and the growth of young teachers.

#### 5.4 Limitations and future research

Firstly, due to constraints on conditions, the study utilized a self-report questionnaire, with data sourced from the same participant. Multiple data collection methods were employed in the study, emphasizing anonymity and confidentiality, to some extent compensating for the limitations of common method variance. Future research can collect data on relevant variables through different evaluation objects, making the subjects' responses more objective.

Furthermore, due to constraints such as time, energy, and social networks, this study employed a convenience sampling method and the sample size was not large enough. This may have a negative impact on the research findings, and the study of the conclusions needs to be further examined through more research. Therefore, future studies should seek ways to expand the sampling channels and regions to enhance the applicability and practicality of the research.

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#### Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Conceptual Framework of the Mechanism of Information Characteristics on Knowledge Sharing Behavior in Online Health Communities

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**Abstract:** By reviewing past relevant research and based on Social Presence Theory, this study proposes a research framework and constructs a theoretical model. Focusing on knowledge sharing behavior among doctors, it delves into how the richness and authenticity of information in Online Health Communities (OHCs) influence doctors' knowledge sharing behavior through the mediating role of social presence. Additionally, this study will consider the moderating role of perceived trust between information characteristics and social presence, aiming to reveal the underlying motivational mechanisms for knowledge sharing among doctors in OHCs.

**Keywords:** Online Health Communities; Knowledge Sharing; Social Presence; Information Characteristics; Perceived Trust

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Online Health Communities are a type of virtual community characterized by health themes, serving as a media platform composed of individuals possessing health knowledge and those with health needs, facilitating activities such as sharing health knowledge, seeking emotional support, and self-help<sup>[1]</sup>. With the national push for "Internet+Healthcare," OHCs, as a product of the mutual penetration of the internet and the healthcare industry, possess broader space and development opportunities. Research indicates that knowledge, as an important organizational resource, can provide advantages for sustainable organizational development, and knowledge sharing behavior contributes to the long-term development of OHCs<sup>[2]</sup>. Members of OHCs are mainly divided into general users and medically professional users<sup>[3]</sup>. Doctors, as holders of professional knowledge, their knowledge sharing in OHCs is crucial for community development and users' acquisition of health knowledge<sup>[4]</sup>. However, a virtual community itself is not a collection of all knowledge but an effective technical and social organizational platform for storing and exchanging knowledge; it does not guarantee that knowledge sharing will occur. The occurrence of knowledge sharing activities ultimately depends on psychological, situational, and other factors of the community members<sup>[5]</sup>. Due to the increasing public health awareness, research exploring factors affecting doctors' knowledge sharing in OHCs has garnered widespread and high attention from scholars domestically and internationally<sup>[6]</sup>. Regarding knowledge sharing, OHCs, as platforms integrating information exchange and support functions, provide important channels for knowledge sharing for both patients and medical professionals<sup>[7]</sup>. Knowledge sharing behavior in OHCs refers to the process through which community members (including patients, doctors, or other health-related participants) exchange health-related information, experiences, and knowledge via online platforms<sup>[8]</sup>. This behavior includes

sharing professional medical knowledge, health management experiences, disease coping strategies, and interpretations of information<sup>[9][10][11]</sup>. Based on the different service targets, knowledge sharing in OHCs can be categorized into doctor-patient Q&A communities serving both doctors and patients, patient-patient exchange communities specifically serving patients, and doctor-doctor service communities specifically serving doctors, such as the Dingxiangyuan Community<sup>[12]</sup>.

OHCs can be viewed as a complex system composed of three main elements: information, users, and the community. They break temporal and spatial limitations, providing users with convenient access to and channels for exchanging health knowledge and experiences, while also possessing the characteristics of virtual community network media—that is, providing abundant information inevitably accompanied by doubts about its authenticity<sup>[13]</sup>. Information is key to knowledge generation; frequent information exchange within the community changes the ways people acquire and share knowledge<sup>[10]</sup>. However, previous research on knowledge sharing behavior in OHCs has primarily focused on the convenience of information interaction brought by the online environment, neglecting other characteristics of information and their potential psychological impact on members. Research shows that information capital in virtual communities can affect knowledge sharing and inter-professional perceptions among members; users' health information seeking affects their perceived value of each other<sup>[14]</sup>. OHCs gather doctors with various knowledge backgrounds and social statuses, and the information contained in their interactions features richness and diversity, but this is accompanied by the presence of false information. When doctors have a demand for information resources, a strong perception of each other's presence forms, fostering a desire for deep interaction, thereby promoting knowledge sharing behavior in OHCs. Conversely, when information authenticity is questionable, doctors form a weaker perception of the presence of other professional doctors based on their professional knowledge, increasing the psychological distance between them, thereby reducing trust and communication, which is detrimental to knowledge sharing<sup>[15]</sup>. Therefore, this study posits that social presence—the perceived degree of others' existence in mediated communication—affects doctors' judgments about the community, thus influencing their knowledge sharing behavior.

In summary, past research has mostly focused on doctor-patient knowledge sharing behavior, with relatively few studies targeting knowledge sharing among doctors themselves, and even fewer adopting the research perspective of considering the online media environment's impact on doctors' mutual perception of presence. This study integrates Social Cognitive Theory and Social Presence Theory, exploring how media communication information influences doctors' social presence through cognition, thereby affecting their OHCs knowledge sharing behavior, based on the environment-individual-behavior framework. Therefore, from the perspective of social presence, this study will focus on knowledge sharing behavior among doctors, exploring the mechanism by which information richness and authenticity in the virtual media environment affect doctors' perception of each other's presence and their OHCs knowledge sharing behavior, and further analyzing the moderating role of perceived trust in this process, constructing a theoretical model.

## 1. Related Concepts and Theoretical Basis

### 1.1 Knowledge Sharing Behavior

The concept of knowledge sharing behavior originated from knowledge management theory in the 1990s, emphasizing the combination of organizational learning and social exchange<sup>[16]</sup>. Scholars initially placed knowledge sharing behavior within social relationships, believing that social capital (trust, network relationships, shared norms, etc.) were important factors influencing knowledge sharing<sup>[17]</sup>. With the deepening of knowledge management research, knowledge sharing behavior came to be viewed as specific actions where individuals actively contribute to and acquire knowledge, focusing on the two dimensions of knowledge contribution and adoption<sup>[18]</sup>. Against the backdrop of the internet's rise, research shifted towards knowledge sharing behavior in online communities, emphasizing the influence of technological media, user interaction, and virtual social relationships<sup>[19][20]</sup>. Knowledge in the medical context refers to facts, data, experiences, and information related to patient diseases or treatments mastered by doctors<sup>[21]</sup>. Knowledge sharing, as a core link in knowledge management, directly determines whether knowledge can be absorbed by the organization and the ability to integrate dispersed knowledge into systematic technology<sup>[22]</sup>. After continuous development, both the concept and connotation of knowledge sharing behavior have undergone significant changes. Synthesizing past research and the needs of this study, knowledge sharing

behavior is defined as doctors actively sharing data, experiences, and information related to patient diseases or treatments in the form of text, voice, images, or videos.

## 1.2 OHCs Information

Information is the name of the content exchanged with the external world in the process of an individual adapting to the external world and making this adaptation perceived by the external world. The concept of information in OHCs has evolved from one-way dissemination to two-way interaction, and further to contextualization and valorization<sup>[23]</sup>. Initially, scholars often drew on the Shannon-Weaver communication model, viewing information as knowledge or signals transmitted through media. At this stage, information primarily came from authoritative medical knowledge and diagnostic advice released by professional medical staff or health experts; information was seen as a carrier for disseminating professional medical knowledge<sup>[21]</sup>. With the popularization of the internet and the development of Web 2.0 technology, OHCs gradually transformed from one-way information release platforms to two-way interactive health support communities<sup>[24][25]</sup>. Information in OHCs is no longer just about knowledge dissemination but also a medium for interaction among users, including patients' experience sharing and emotional communication<sup>[26]</sup>.

Regarding the specific connotation of OHCs information, different scholars have approached it from functional, relational, emotional, and other perspectives, classifying information into various categories such as knowledge-based information, emotional information, professional information, user-generated information, structured information, unstructured information, static information, and dynamic information. Due to different research subjects and focuses, there is currently no consensus on the dimensions of OHCs information. Daft and Lengel (1986) emphasized that the richness of a medium depends on its ability to convey multiple cues<sup>[27]</sup>, provide immediate feedback, use natural language, and convey personal information. As a media platform for health information transmission, OHCs, due to the diversity and timeliness of information shared by users, contain information featuring basic health experiences, professional medical knowledge, psychological support, etc., and the information content aligns with the characteristics of richness<sup>[28]</sup>. Moreover, the forms of information presentation in OHCs are rich, including text, images, videos, etc.<sup>[11]</sup>. The form of multimodal expression not only enhances the intuitiveness of information but also increases its adaptability in complex scenarios. The multidimensional improvement in information quality and perceived content value makes users more willing to adopt and share information<sup>[14][29]</sup>. Simultaneously, research shows that users tend to choose information that is both detailed in data and reliable in source<sup>[28]</sup>. The credibility and accuracy of information are main factors affecting users' information adoption behavior; information quality and source credibility significantly influence users' adoption and sharing behaviors, affecting their decision-making behaviors<sup>[14]</sup>. That is, the combination of information richness and authenticity can enhance users' decision-making quality and behavioral intentions.

In summary, based on research needs, this study divides information into two dimensions: richness and authenticity. Drawing on Daft and Lengel's (1986) definition of media richness<sup>[27]</sup>, information richness is defined as the value, diversity of professional content, and richness of expression forms contained in the information transmission process. Meanwhile, information authenticity is defined as the accuracy, professionalism, and reliability demonstrated in the information dissemination process.

## 1.3 Social Presence

Social presence, also known as social representation or social existence, was first proposed by Short et al. (1976)<sup>[30]</sup>, who defined the theory as the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship, or the perceived degree of connection with others, in mediated communication and interaction. Currently, scholars have different definitions for social presence. From the perspective of media attributes, social presence as the perception of interaction based on online media, including the richness of social cues in information transmission and the individual's experience of the immediacy of the other party's response. From a psychological perception perspective, Gunawardena & Zittle (1997) emphasized that social presence is not only an attribute of media but also a psychological perception formed by participants during social interaction<sup>[31]</sup>. With the continuous emergence of new media, domestic and international researchers have promoted the development of Social Presence Theory based on different research backgrounds

and purposes, extending the research context from electronic communication to fields such as psychology and sociology. The dimension division of social presence has evolved from a single dimension to multidimensional models, with the research focus expanding from a sense of presence to multiple dimensions such as affect, behavior, and cognition. In the Community of Inquiry framework, social presence includes three dimensions: affective expression, open communication, and group cohesion (sense of belonging), and this model has been widely validated in the field of online education<sup>[32]</sup>. In virtual environments, targeting sharing economy platforms, Woo et al. (2024) proposed a three-dimensional model: Cognitive Copresence<sup>[33]</sup>, Psychological Involvement, and Behavioral Interdependence. Although different scholars have different standards for defining social presence, and its dimensions vary depending on the research context, looking at the commonalities across existing research, scholars generally support that social presence in virtual environments is the degree to which an audience perceives the existence of others during the use of media and the resulting individual psychological feelings. Therefore, according to the needs of this study, referring to Hassanein & Head (2007), social presence is divided into two dimensions: cognitive presence and emotional presence<sup>[34]</sup>. Combining Cui et al. (2013), OHCs cognitive presence is defined as the degree of cognitive connection<sup>[35]</sup>, based on professional ability and knowledge reserve, with other professional doctors perceived as real in the community during synchronous or asynchronous communication processes. OHCs emotional presence is defined as the degree of emotional connection, based on admiration, recognition, etc., with other professional doctors perceived as real in the community during synchronous or asynchronous communication processes.

#### 1.4 Perceived Trust

Trust, as a core topic in multidisciplinary research, has seen its definition and connotation continuously evolve with changing scholarly perspectives. Psychologist Deutsch (1958) first conducted research on trust in the prisoner's dilemma experiment, believing that trust is an individual's response to the situation<sup>[36]</sup>. Subsequently, scholars conducted extensive research on trust based on different contexts. Bachmann (2001) believed that trust is a mechanism to reduce complexity and uncertainty, used to cope with possible future uncertainties<sup>[37]</sup>. Rousseau et al. (1998) believed that perceived trust is a psychological state wherein one party is willing to be affected by the actions of another, reflecting positive expectations of the other's behavior<sup>[38]</sup>. Gefen et al. (2003) pointed out that perceived trust is an individual's expectation of the trustworthiness of others' behaviors, usually based on past experiences and the current situation<sup>[39]</sup>. Ridings et al. (2002) proposed that in virtual communities, perceived trust refers to an individual's cognition and judgment of the reliability of others, information, or the platform in internet-based interaction environments<sup>[40]</sup>. Therefore, integrating previous research, this study defines perceived trust as the cognition and judgment of the professionalism of other doctors in the Online Health Community and the reliability of the information they provide.

#### 1.5 Social Cognitive Theory

Social Cognitive Theory (SCT) was first proposed by psychologist Bandura (1977), emphasizing the triadic reciprocal relationship among individual cognition, behavior, and environment<sup>[41]</sup>. Its core concepts are metacognition, observational learning, and self-efficacy, aiming to study how people subjectively interpret others' behaviors, intentions, and emotions in social situations, and to explore the internal mechanisms of these cognitive processes. The core concepts in this field focus on individuals' mental representations of social interactions and their dynamics<sup>[42]</sup>. Core elements include emotion perception, Theory of Mind, and attributional style. Through these factors, individuals can shape their own behaviors via models, feedback, and self-regulation in the environment<sup>[43]</sup>. Individual behavior is influenced by both internal personal factors (such as cognition, emotion) and external environmental factors (such as social interaction, cultural background), and in turn affects the environment and self-cognition. The key characteristic of social cognition lies in its "social" nature, meaning that cognitive processes are shaped and constrained in social interaction: people's subjective interpretations often stem from group dynamics rather than isolated decisions<sup>[42]</sup>.

Although Social Cognitive Theory has been applied in multiple fields, there are some shortcomings in its application. On one hand, the theory's explanation of individual behavior sometimes seems to overemphasize cognition and individual subjective feelings, neglecting the influence of external factors such as social structure and cultural background. On the other hand, the theory focuses excessively on individual-level behavioral learning, paying less attention to the collective impact of group

behavior and social interaction on individual behavior.

### 1.6 Social Presence Theory

Social Presence Theory was proposed by psychologists Short, Williams, and Christie (1976), who believed that the occurrence and level of social presence are influenced by the information transmission capacity of the medium<sup>[30]</sup>. Its core definition is the degree to which an individual perceives the other party as a “real person” and the strength of the emotional connection established with others during communication through a medium, emphasizing the impact of the social attributes of the medium, such as warmth and humanization, on communication effects. That is, how individuals perceive the presence, interaction, and emotional connection of others through the medium without direct face-to-face contact. Presence refers to the psychological distance connected through the medium; the closer the psychological distance between parties, the more they can perceive each other. Against the backdrop of the universalization of virtual environments, early models emphasizing teaching presence, social presence, and cognitive presence have limitations<sup>[44]</sup>. Research shows that the explanatory power of social presence for learning satisfaction increases in online environments, indicating that social presence can compensate for cognitive deficiencies caused by physical isolation<sup>[45]</sup>. Therefore, the effect of social presence in virtual community environments remains to be explored.

## 2. Overview of Research Status

Past research indicates that studies on knowledge sharing behavior in OHCs have mostly focused on doctor-patient interaction behavior. From the perspective of serving patients, doctors are viewed as service providers, exploring service motivations such as external incentives<sup>[46]</sup>, perceived reciprocity<sup>[47]</sup>, etc., or service outcomes such as patient satisfaction, user participation behavior, etc.<sup>[13][48]</sup>. Only a few studies have explored the influencing mechanisms and outcomes of doctor-doctor interactions from the perspective of doctors' personal perceptions, and even fewer have considered the impact of whether doctors can perceive each other's presence in the virtual medium on their OHCs knowledge sharing behavior. However, the development of OHCs relies on the interaction and sharing of professional knowledge. Exploring the influencing mechanisms of doctors' OHCs knowledge sharing behavior in the media environment is conducive to improving the overall operational efficiency of OHCs and promoting the widespread dissemination and in-depth exchange of medical knowledge. In recent years, knowledge sharing behavior among doctors has gradually gained attention, with some studies beginning to explore how doctors enhance each other's professional levels and medical service capabilities through knowledge sharing<sup>[49]</sup>. However, the specific mechanisms influencing interaction behavior among doctors remain limited.

Research on knowledge sharing behavior in OHCs is mainly divided into two categories: antecedent influencing factors and consequent outcomes. The current academic focus is primarily on exploring the antecedents of OHCs knowledge sharing behavior. At the individual motivation level, external motivations such as reputation and reciprocity<sup>[46]</sup>, and internal motivations such as self-efficacy and altruism are considered driving forces for knowledge sharing behavior<sup>[49]</sup>. At the community environment level, community atmosphere, community norms, and trust all influence knowledge sharing behavior and intention<sup>[50]</sup>. Considering the impact outcomes of OHCs knowledge sharing behavior, existing research explores its value and challenges from multiple dimensions including users, doctors, and the platform. Research shows that knowledge sharing behavior significantly improves the health management level and satisfaction of community users, enhances doctors' professional reputation and patient trust, and promotes user stickiness and activity in the community, benefiting the sustainable development of online communities<sup>[26]</sup>. However, reviewing relevant domestic and international research reveals that most studies center on serving patients, exploring the direct impact of doctors' knowledge sharing behavior on themselves or patients, or from the platform's technical level, exploring how to promote doctors' participation and enthusiasm for knowledge sharing. Few studies from the perspective of interaction relationships among doctors to explore the complex mechanism between online environmental information characteristics and knowledge sharing behavior among doctors. Especially, the process of how information affects knowledge sharing under the mediation of social presence is largely ignored.

Social Presence Theory points out that in mediated interaction and communication processes, the degree of salience of interpersonal relationships or the perceived connection with others affects individual interaction behavior. High



social presence promotes more positive interaction behavior, while low social presence affects interaction behavior and effectiveness<sup>[30]</sup>. As a virtual media platform, OHCs possess information attributes that, due to their positive or negative utility, cause doctors to perceive the presence of other doctors rich in professional knowledge and ability as stronger or weaker, affecting mutual intimacy and thus influencing interaction behavior. With the development of the theory, Shen and Khalifa (2008) defined social presence as the perception formed during the process of emotional and cognitive connection with others in online communities<sup>[51]</sup>, a perception accompanied by emotional and cognitive connection with others, thereby realizing the existence of others. Thus, this study posits that the richness and authenticity of information in OHCs can, through the process of emotional and cognitive connection among doctors, evoke doctors' social presence perception of other doctors cognitively or emotionally, further influencing doctors' knowledge sharing behavior. Simultaneously, doctors' perceived credibility of information significantly affects their trust and professional identification with the provider, and individual perceived trust positively influences knowledge sharing at the team level<sup>[4]</sup>. Therefore, this study proposes that the process of how information attributes affect changes in social presence is subject to the moderating role of perceived trust.

Reviewing existing research, previous studies were mainly based on perspectives from psychology (e.g., motivation and cognition), economics (e.g., value and cost), and sociology (e.g., social capital), utilizing theories such as Social Exchange Theory, Social Cognitive Theory, MOA perspective, Social Influence Theory, Technology Acceptance Model, and Motivation Theory for exploration. As virtual health communities are derivatives of the internet, possessing some characteristics of the internet, their research has gradually become linked with related concepts and theories in the internet, such as online information characteristics and Social Presence Theory. However, research considering the characteristics of online virtual media remains to be explored.

Based on the review of research on knowledge sharing behavior, OHCs information, social presence, perceived trust, Social Cognitive Theory, and Social Presence Theory, it is found that: (1) Professional knowledge sharing behavior among doctors is beneficial for the sustainable development of OHCs. However, most research focuses on doctor-patient or patient-patient interactions, exploring the impact on patients or doctors centered around patients. The need for doctors to acquire professional knowledge themselves is neglected, and research centered on doctors is relatively scarce. (2) Research shows that users' health information seeking affects their perceived value of each other; information capital transmitted through media affects inter-professional perception and knowledge sharing among members. Previous research on OHCs knowledge sharing behavior mainly focused on the convenience of information interaction brought by the online environment, neglecting other characteristics of information and their potential psychological impact on members. Moreover, in knowledge sharing research, information often appears as a sub-dimension of community atmosphere or community support; relatively few studies treat information attributes as an independent variable. (3) Current research mostly focuses on static individual characteristics or environmental factors such as motivation, self-efficacy, platform atmosphere, etc., ignoring dynamic social interaction processes and individuals' immediate perceptions during interaction. Research considering mutual perception among members from the perspective of OHCs as a virtual medium is currently lacking, and there is a lack of research on social presence among professional doctors perceiving each other's existence in the OHCs context. However, existing research has shown that social presence in online interaction is believed to positively influence user behavior through emotional connection and trust, promoting users' knowledge sharing intention.

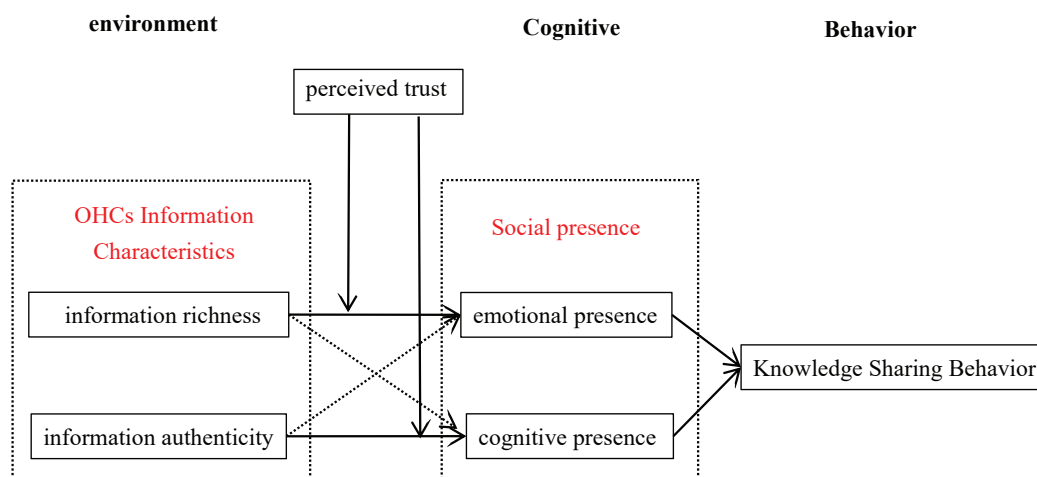
### 3.Theoretical Framework and Hypotheses

Reviewing existing literature reveals that research on knowledge sharing behavior in OHCs mostly centers on patients, viewing doctors in the role of service providers, focusing on doctor-patient and patient-patient interaction behaviors, while lacking research on the influencing mechanisms of knowledge sharing among doctors themselves. Furthermore, research on influencing factors of knowledge sharing behavior in OHCs mainly focuses on factors at the individual, team, or organizational level, paying less attention to the role of information at the media level in these behaviors. The impact of information characteristics on how individuals make sharing decisions when faced with a large amount of complex information has not been thoroughly studied. Simultaneously, existing research often stems from static individual characteristics or environmental factors, ignoring dynamic social interaction processes and individuals' immediate perceptions

during interaction.

Therefore, this study focuses on knowledge sharing behavior among professional doctors, starting from the media role of OHCs, constructs a theoretical hypothesis model, considers the impact of OHCs information characteristics on doctors' perception of the presence and interaction behavior of other professional doctors through affective/cognitive tendencies, and introduces perceived trust as a moderating variable to explore the boundary conditions in this process. Through this research, the aim is to integrate Social Cognitive Theory and Social Presence Theory, clarify the mechanism by which information richness and authenticity influence doctors' knowledge sharing behavior through social presence from the perspective of social presence, and use perceived trust as a moderating variable, in order to provide corresponding countermeasures and suggestions for optimizing doctor knowledge sharing and platform design in Online Health Communities. Please refer to Figure 1 below for the theoretical framework diagram.

Figure 1 Theoretical Framework Diagram



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# Study on the Impact of Social Media Use on Subjective Well-Being Among Youth —An Analysis of Chain Mediation and Moderating Effects Based on Psychological Anxiety and Psychological Resilience

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**Abstract:** In a media-saturated society, mental health issues among youth are particularly prominent, and research on subjective well-being remains a prominent topic. This study analyzes the relationship between social media use and subjective well-being among young people, introducing psychological anxiety and psychological resilience as mediating variables to construct a chain mediation model. Findings reveal that social comparison significantly reduces subjective well-being by triggering psychological anxiety and weakening psychological resilience. Conversely, social media use exhibits an emotional compensation effect among youth with high anxiety and low resilience, temporarily boosting well-being. Furthermore, the impact of social media use on well-being exhibits dynamic, nonlinear characteristics, highlighting the chained effects of underlying psychological mechanisms. This study unravels the psychological mechanisms underlying the negative influence of social media use on subjective well-being, offering a new theoretical perspective for understanding the subjective well-being of young people in the new era.

**Keywords:** Social Media Use; Subjective Well-Being; Psychological Anxiety; Psychological Resilience; Chained Mediation

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## 1.Introduction

Within the contemporary context of a mediated society, media is reshaping social structures and individual daily practices through its pervasive influence. The dynamic interplay between media and individuals constructs the complex reality of this mediated society. As active participants, young people serve not only as pivotal nodes within intricate networks but also as mediators for building stable relational ties. Social media functions as both a conduit for young people's pursuit of pleasure and a source of their perceived anxieties. Due to multiple real-world factors, mental health issues among youth are increasingly prominent, necessitating a reexamination of their well-being. Existing research indicates that social media use correlates with youth mental health (O'Day & Heimberg, 2021). Higher frequency of social media use correlates with more severe trait anxiety symptoms and a greater likelihood of developing anxiety disorders (Vannucci et al., 2017). Furthermore, depressive symptoms showed a significant yet modest correlation with both the duration and intensity of social network



usage(Cunningham et al., 2021). Thus, social media use can both enhance subjective well-being among youth and exacerbate their negative psychological perceptions. Consequently, as a perceptual manifestation of youth psychological well-being, the process by which its overall profile is shaped—and how it intertwines with structural factors—represents the core value for deepening research in this field.

Existing research has found that social media usage impacts subjective well-being among young people. For instance, studies indicate that social media use does indeed influence subjective well-being, but the effects vary significantly depending on usage patterns(Wei L & Chen W, 2015). Other perspectives also indicate that the magnitude of the effect of social media self-presentation on subjective well-being depends on the mode of self-presentation(Mao L, 2020). This is related to the social support young people receive on social media(Webster et al., 2021). The higher the level of social support obtained through social media use, the stronger the subjective well-being. Of course, some researchers have proposed conflicting views. Subjective well-being satisfaction requires long-term, sustained explanations to be supported(Kim, 2014). Internet use primarily exerts a negative influence on subjective well-being(Liao S et al., 2024). Evidently, social media usage in different contexts leads to variations in subjective well-being satisfaction. The relationship between social media use and well-being depends on how individuals utilize it(Bailey et al., 2020). However, continuous observation remains an empirical fact that cannot be verified through research. Social media use can generate both positive and negative psychological effects. The impact of social media use on young people's subjective well-being is unstable(Zhao Z, 2021). How negative psychological effects influence positive ones, and how individuals leverage their resilience under negative psychological impacts to ultimately return to positive psychological states—this complex, multifaceted chain process lacks empirical research support. Therefore, the intricate relationship between the positive and negative effects of social media use requires explanation through mediating mechanisms.

This study aims to explore the mechanism through which social media usage influences subjective well-being among young adults. Based on the reality of information exposure scenarios, a dual-mediation model incorporating psychological anxiety and psychological resilience has been constructed. The specific research questions are as follows: First, under what circumstances does social media usage increase psychological anxiety among young adults, thereby indirectly affecting their subjective well-being? Second, does the level of psychological resilience among young people promote their subjective well-being when confronted with psychological anxiety? Third, does a chained pathway exist that influences young people's subjective well-being? This research contributes to understanding the effects of negative psychological states and individual resilience on subjective well-being, thereby expanding the theoretical framework for explaining subjective well-being among young people.

## **2.Literature Review and Research Hypotheses**

### **2.1 The Interactive Effect of Social Media Use and Subjective Well-Being**

Social media use is understood as purposeful social interaction on social media platforms(Tuck & Thompson, 2024). The Uses and Gratifications Theory emphasizes that social media use is grounded in specific user needs, with media exposure serving to fulfill these needs(Katz et al., 1973). Based on this, measurements of social media usage rely on the Social Media Use Scale (SMUS), developed by Alison B. Tuck and Renee J. Thompson in 2024. The scale assesses five dimensions: social interaction, entertainment motivation, information seeking, convenience, and social comparison(Tuck & Thompson, 2024). Each subscale comprises multiple items used to calculate scores for that specific dimension, with the total score averaged across all dimensions. This conceptual breakdown aids in understanding variations in subjective well-being across different usage contexts.

Subjective well-being focuses on how and why people experience life positively, encompassing both cognitive judgments and affective responses(Diener, 1984) Early research on subjective well-being primarily emphasized three dimensions: happiness, life satisfaction, and positive emotions. As research deepened, new dimensions were gradually integrated into comprehensive measures of subjective well-being. In this study, subjective well-being was assessed using the BBC Subjective Well-Being Scale, a 24-item self-report questionnaire designed to measure individuals' subjective experiences. It

encompasses physical health, psychological health, independence, social relationships, environmental quality, and spiritual quality of life (Kinderman et al., 2011). Similarly, the overall measurement of subjective well-being is primarily divided into the following dimensions: physical and mental health, personal competence and self-actualization, positive emotions and life attitude, interpersonal relationships and social connections, and material and environmental satisfaction. Existing research confirms an association between social media use and subjective well-being among youth. For instance, one study examined the relationship between social media use and subjective well-being, using personality traits as a moderator (Gerson et al., 2016). Other research indicates that social media use among young people primarily influences subjective well-being through seeking support and obtaining positive feedback (Webster et al., 2021).

Based on this, the following hypothesis is proposed:

H1: Social media use among adolescents is positively correlated with their subjective well-being, and this correlation is also evident at the level of dimensional comparison.

## **2.2 The Interactive Effects of Social Media Use on Psychological Anxiety and Resilience**

Anxiety is a manifestation of mental health status. Social media can be described as a double-edged sword. Research has confirmed that social media use can enhance emotional and social support, but it can also trigger mental health issues (Keles et al., 2020). In fact, the relationship between social media use and mental health is influenced by multidimensional factors. Therefore, deepening research on this relationship is crucial. In this study, psychological anxiety was measured using the Hamilton Anxiety Rating Scale (HAM-A) (Hamilton, 1959). Building upon other dimensions of psychological anxiety measurement, this study subdivided psychological anxiety into five dimensions: emotional reactivity, sleep disturbance, impaired cognitive function, somatization symptoms, and behavioral expression.

Resilience is also an indicator of mental health status, broadly referring to an individual's capacity for stress resistance and persistence. Psychological resilience is measured using the Connor-Davidson Resilience Scale (CD-RISC) (Kuiper et al., 2019). Based on the scale's conceptual framework, the study decomposed the psychological resilience scale into four dimensions: Adaptability and Flexibility; Positive Coping and Sense of Humor; Growth Mindset and Stress Management; and Resilience. This dimensional breakdown facilitates deeper exploration of underlying perspectives. Based on this, the study proposes the following hypothesis:

H2: Social media usage among young adults positively correlates with psychological anxiety and psychological resilience, and this correlation also manifests at the dimensional comparison level.

## **2.3 The Interactive Effects of Psychological Anxiety, Psychological Resilience, and Subjective Well-Being**

Social media use exerts dual impacts: positive and negative effects. Psychological resilience differs from psychological anxiety in that the former leans toward positive psychology, while the latter emphasizes negative psychology. Most studies remain unclear about the complex psychological mechanisms underlying the relationship between social media use and subjective well-being. For instance, research indicates a weak yet significant association between increased time spent on social media and heightened depressive mood, social anxiety, and physical anxiety symptoms (Thorisdottir et al., 2020). Evidently, social media use can trigger both positive and negative emotions. This depends on the form and purpose of social media use. For example, "real-time interaction" is a core activity for alleviating psychological anxiety and enhancing subjective well-being (Zhai et al., 2024). Negative emotions induced by social media use can be mitigated by the network support gained. Research indicates that internet usage among youth positively impacts their well-being, with this effect mediated by social networks (Guo X et al., 2020). Individuals receiving greater network support exhibit stronger psychological resilience, which in turn influences their subjective well-being. For instance, research indicates that psychological resilience mediates the relationship between mental health and subjective well-being (Yıldırım & Arslan, 2022). Psychological resilience mediates the relationship between resilience and life satisfaction in adolescents (Usán Supervía et al., 2022). Therefore, incorporating psychological anxiety and psychological resilience as mediating variables allows us to explore the psychological mechanisms linking social media use to subjective well-being while uncovering transformative relationships among diverse psychological states among social media users. Currently, few studies have deeply examined the psychological mechanisms and chained

pathways of psychological state changes between social media use and subjective well-being.

Based on this, the following hypotheses are proposed:

H3: Psychological anxiety and psychological resilience among young adults correlate with their subjective well-being, and this correlation is also reflected at the level of dimensional comparison.

H4: Psychological anxiety and psychological resilience mediate the relationship between social media use and subjective well-being in a chained manner.

### 3. Research Design

#### 3.1 Research Sample and Data

This study selected college students from universities in Province J as research subjects. Sample selection was based on the following considerations: First, this demographic aligns with the age range of the youth population and exhibits a high level of social media literacy. Second, it was chosen for its overall convenience in questionnaire collection, response rate, and validity. The questionnaire was distributed primarily through two channels: First, it was uploaded to Wenshuaixing as an online survey, configured with group-specific visibility settings, and shared via link in WeChat Moments. Second, it was distributed through the author's own teaching classes, where class committee members were requested to share the questionnaire link in class group chats. The survey period ran from May to July 2024, yielding a total of 225 completed questionnaires. After thorough review and verification by the research team, no outliers were identified, achieving a 100% response rate. Questionnaire items employed a five-point Likert scale, where higher scores indicate greater levels of the corresponding variable.

The structural characteristics of the sample are as follows: (1) Gender distribution: 58.7% female, 41.3% male. (2) Age distribution: 92.0% of respondents were aged 18–25. (3) Educational attainment: 88.4% held a bachelor's degree. (4) Regional affiliation: 90.7% resided in central China; 40.4% held urban household registration, while 59.6% held rural household registration. (5) Regarding marital status, 94.7% of the sample were unmarried. (6) In terms of monthly spending, 40.0% of the sample spent between 1000-1500 RMB monthly, while 36.4% spent between 1500-2000 RMB monthly. Overall, this study primarily focused on a young demographic in central China consisting of females, undergraduate students, and unmarried individuals.

#### 3.2 Variable Specification

This study primarily encompasses four variables: social media usage, psychological anxiety, psychological resilience, and subjective well-being. Among these, psychological anxiety and psychological resilience serve as mediating variables. The purpose of constructing dual mediating variables is to clarify the psychological chain of effects linking social media users' media exposure to subjective well-being. To ensure measurement validity, standardized scales were employed for all variables. All scales employ a five-point Likert scale.

Specifically, social media usage as the independent variable is measured using the SMUS scale. This scale primarily encompasses five dimensions: social interaction, entertainment motivation, information seeking, convenience, and social comparison. The scale's Cronbach's alpha coefficient is 0.862, indicating high data reliability. Psychological anxiety as the mediating variable is measured using the HAM-A scale. This scale primarily encompasses five dimensions: emotional reactivity, sleep disturbance, impaired cognitive function, somatic symptoms, and behavioral manifestations. The Cronbach's alpha coefficient for this scale is 0.826, indicating very high data reliability. The measurement of psychological resilience as the mediating variable employed the CD-RISC scale, which primarily includes four dimensions: and resilience. Its Cronbach's alpha coefficient is 0.733, exceeding 0.7, thus indicating excellent data reliability. The dependent variable of subjective well-being was measured using the BBC Well-being Scale. This scale primarily comprises five dimensions: physical and mental health; personal competence and self-actualization; positive emotions and life attitude; interpersonal relationships and social connections; and material and environmental satisfaction. The Cronbach's alpha coefficient for this scale is 0.891, indicating high data reliability. Reliability analysis results show that the reliability coefficients for the independent variable (social media usage), the mediating variable (psychological anxiety), and the dependent variable

(subjective well-being) all exceed 0.8. The reliability coefficient for the mediating variable (psychological resilience) exceeds 0.7, confirming that the overall data possesses good reliability.

### 3.3 Reliability and Validity Testing

This study conducted confirmatory factor analysis (CFA) on the four variables and their dimensional combinations. The results indicate: (1) For the independent variable—social media usage—validity was assessed using KMO and Bartlett's tests. The overall KMO value for the variable was 0.832, exceeding 0.8, which indirectly indicates excellent validity. The composite reliability (CR) values for all five dimensions exceeded 0.7. Except for the "social interaction" dimension, whose AVE root mean square was 0.582, the AVE root mean squares for the other dimensions all exceeded 0.6, signifying good discriminant validity. (2) Mediating Variable—Psychological Anxiety The overall KMO value for this variable was 0.820, exceeding 0.8 and indicating strong validity. The composite reliability (CR) values for all five dimensions exceeded 0.7, signifying good convergent validity in this data analysis. For the "Emotional Reaction" dimension, its AVE root mean square error (RMSE) is 0.737, which is less than the maximum absolute value of inter-factor correlations (0.738), indicating poor discriminant validity. For the "Behavioral Performance" dimension, its AVE RMSE is 0.846, which is less than the maximum absolute value of inter-factor correlations (0.865), also indicating poor discriminant validity. The root mean square error of approximation (RMSEA) values for the remaining dimensions all exceeded 0.7, indicating good discriminant validity. (3) Mediating variable—psychological resilience: The KMO value for the mediating variable psychological resilience was 0.716, falling between 0.7 and 0.8, indirectly reflecting good validity. The composite reliability (CR) values for this dimension all exceed 0.7. The square root of the average variance extracted (AVE) for each dimension exceeds 0.6, and the absolute values of inter-factor correlations exceed 0.5, indicating good discriminant validity. (4) Dependent variable—Subjective Well-Being. The overall KMO value for this variable is 0.871, exceeding 0.8, which indirectly reflects excellent validity. The composite reliability (CR) values for the three dimensions (Physical and Mental Health, Personal Competence and Self-Actualization, Interpersonal Relationships and Social Connections) all exceed 0.7. However, the CR value for the "Positive Emotions and Life Attitude" dimension is 0.635, and the CR value for the "Material and Environmental Satisfaction" dimension is 0.626, indicating poor data aggregation validity for these dimensions. Regarding discriminant validity analysis, the square root of AVE for the "Physical and Mental Health" dimension was 0.596, which is less than the maximum absolute value of inter-factor correlations (0.681), indicating poor discriminant validity. The square root of AVE for the other dimensions all exceeded 0.6, suggesting relatively good discriminant validity for these dimensions. Thus, the overall validity of the four variables is relatively good, indicating the research data is suitable for information extraction. Except for the "Social Interaction," "Cognitive Impairment," "Physical and Mental Health," and "Positive Coping and Sense of Humor" dimensions, most AVE square roots for other variable dimensions exceed 0.6, demonstrating that the questionnaire scale possesses good convergent validity.

## 4. Research Findings

### 4.1 Descriptive Statistics and Correlation Analysis

Table 1 presents the means, standard deviations, Spearman correlation coefficients, and composite reliability (CR) values for the four variables. Regarding means, social media usage exhibited the highest score, while psychological anxiety showed the lowest. Mean differences between some variables were relatively small. This indicates that within the sample population, the mean social media usage score was 3.817 (SD=0.577), reflecting a generally high and relatively consistent usage frequency. The mean psychological anxiety score was 2.024 (SD=0.720), suggesting most respondents exhibited low anxiety levels, though individual variations existed. The mean for psychological resilience was 3.482 (SD=0.638), indicating strong psychological regulation and recovery capabilities among respondents. The mean for subjective well-being was 3.669 (SD=0.554), reflecting high levels of subjective well-being with minimal group differences. These characteristics provide a solid foundation for subsequent exploration of the relationship between social media usage and subjective well-being among young adults.

Table 1: Correlation Matrix and Mean, Standard Deviation, and Composite Reliability (CR) Values for Each Variable

| Variable Name            | Mean  | Standard Deviation | Social Media Use | Psychological Anxiety | Psychological Resilience | Subjective Well-Being |
|--------------------------|-------|--------------------|------------------|-----------------------|--------------------------|-----------------------|
| Social Media Use         | 3.817 | 0.577              | 0.915            |                       |                          |                       |
| Psychological Anxiety    | 2.024 | 0.720              | 0.125            | 0.947                 |                          |                       |
| Psychological Resilience | 3.482 | 0.638              | -0.032           | -0.335**              | 0.783                    |                       |
| Subjective Well-being    | 3.669 | 0.554              | 0.165*           | -0.409**              | 0.358**                  | 0.940                 |

Note: Diagonal values represent composite reliability (CR) coefficients; \*  $p < 0.05$  \*\*  $p < 0.01$ .

As shown in the table above, Spearman's correlation coefficient was used to examine the relationship between social media usage and three psychological factors: psychological anxiety, psychological resilience, and subjective well-being, with the coefficient indicating the strength of these correlations. Detailed analysis reveals: Social media usage exhibits significant correlations with all three variables, specifically subjective well-being. The correlation coefficients are 0.165, all greater than zero, indicating a positive correlation between social media usage and subjective well-being. Conversely, no significant correlations were found between social media use and psychological anxiety or psychological resilience, with correlation coefficients approaching zero. This indicates no relationship exists between social media use and these two variables. Psychological anxiety and psychological resilience showed a negative correlation, while psychological anxiety and subjective well-being exhibited a negative correlation. Psychological resilience, however, demonstrated a positive correlation with subjective well-being.

To explore the relationships among social media usage, psychological anxiety, psychological resilience, and subjective well-being, Spearman's correlation coefficients were employed to analyze the correlations between these variables. The results are presented in Table 2.

#### 4.1.1 Interaction effect between social media use and subjective well-being

Social media use and subjective well-being showed a significant positive correlation ( $r = 0.165$ ,  $p < 0.05$ ), indicating that higher social media usage frequency correlates with higher levels of subjective well-being. Thus, research hypothesis H1 was confirmed, partially supported at the dimensional level. To further explore the underlying relationship between social media use and subjective well-being, the correlations among the dimensions of these variables were analyzed. The results are as follows: (1) The five dimensions of social media use were significantly correlated with each other, particularly between social interaction and social comparison, which exhibited the highest correlation coefficient ( $r = 0.606$ ,  $p < 0.01$ ). This indicates that users engaging in more social interaction are more inclined to engage in social comparison. (2) Three dimensions of social media use—"Convenience," "Information Seeking," and "Social Interaction"—exhibit significant positive correlations with multiple dimensions of subjective well-being: for example, 'Convenience' shows significant positive correlations with both "Material and Environmental Satisfaction" ( $r = 0.212$ ,  $p < 0.01$ ) and "Physical and Mental Health" ( $r = 0.166$ ,  $p < 0.05$ ); "Information seeking" showed significant positive correlations with "personal competence and self-actualization" ( $r = 0.203$ ,  $p < 0.01$ ) and "physical and psychological well-being" ( $r = 0.180$ ,  $p < 0.01$ ); "Social Interaction" showed positive correlations with "Positive Emotions and Life Attitude" ( $r = 0.174$ ,  $p < 0.01$ ) and "Personal Competence and Self-Actualization" ( $r = 0.163$ ,  $p < 0.05$ ). (3) Although the social comparison dimension was highly correlated with other social media usage dimensions, its correlations with subjective well-being dimensions were weaker or non-significant. For instance, its correlation coefficient with "material and environmental satisfaction" was 0.095 and did not reach statistical significance. This may indicate that social comparison does not necessarily directly promote well-being and may even exert negative effects. Overall, dimensions of social media use with practical or interactive functions (e.g., convenience, information seeking, social interaction) exhibited more significant positive relationships with subjective well-being. This suggests social media may enhance well-being by providing information, strengthening social connections, and improving efficiency. Conversely, the social comparison dimension showed no significant correlation with subjective well-being, suggesting its role may be more



complex. Further research is warranted to explore its potential mediating or moderating effects.

#### 4.1.2 Interactive Effects of Social Media Use on Psychological Anxiety and Psychological Resilience

(1) Overall, the correlation coefficient between total social media usage scores and total psychological anxiety scores was  $r = 0.125$ ,  $p = 0.062$ , failing to reach statistical significance ( $p > 0.05$ ). This indicates no significant linear relationship between overall social media usage frequency and respondents' psychological anxiety levels. However, at the dimensional level: The social comparison dimension showed significant positive correlations with multiple anxiety dimensions, such as emotional reactivity ( $r = 0.241$ ,  $p < 0.01$ ), sleep disturbances ( $r = 0.185$ ,  $p < 0.01$ ), cognitive impairment ( $r = 0.180$ ,  $p < 0.01$ ), and somatization symptoms ( $r = 0.269$ ,  $p < 0.01$ ). In contrast, dimensions such as information seeking, convenience, and entertainment motivation showed no significant correlations with most anxiety indicators. Although overall social media use was not significantly related to anxiety, the "social comparison" dimension correlated with multiple anxiety manifestations. This suggests that frequent online social comparison behaviors may exert a certain influence on individuals' negative emotions, warranting attention. (2) Social Media Use and Psychological Resilience Overall, the correlation coefficient between total social media use and total psychological resilience was  $r = -0.032$ ,  $p = 0.637$ , also failing to reach significance. This indicates no relationship between overall usage frequency and individual psychological resilience. However, at the dimensional level: most social media usage dimensions showed insignificant correlations with the four dimensions of psychological resilience. Only social comparison exhibited significant negative correlations with the resilience dimensions of "resilience" ( $r = -0.162$ ,  $p < 0.05$ ) and "adaptability and coping ability" ( $r = -0.185$ ,  $p < 0.01$ ). Dimensions such as social interaction and information seeking showed extremely low or insignificant correlations with resilience indicators. This suggests that frequent social comparison behaviors may weaken an individual's psychological adaptability and resilience when facing stress; however, other social media usage behaviors driven by positive motivations do not necessarily impact resilience. Therefore, research hypothesis H2 was not confirmed overall but partially supported at the dimensional comparison level.

#### 4.1.3 Interactive Effects of Psychological Anxiety, Psychological Resilience, and Subjective Well-Being

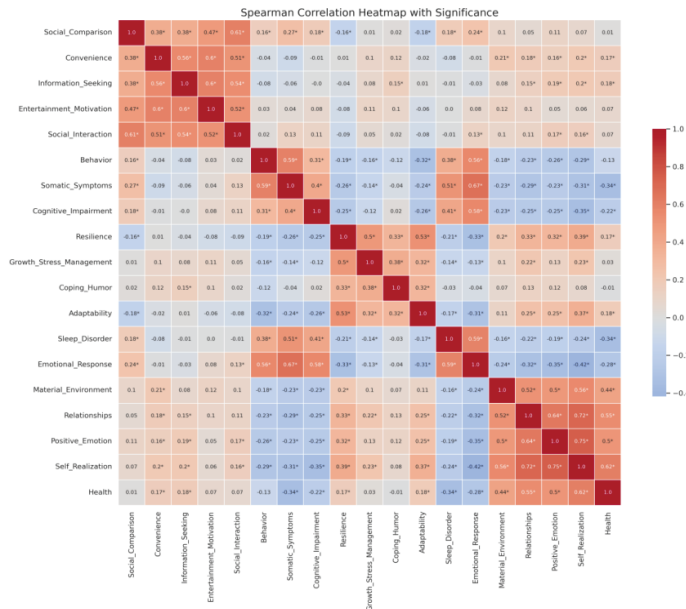
(1) Psychological Anxiety and Subjective Well-Being Overall, psychological anxiety and total subjective well-being scores showed a significant negative Spearman correlation ( $r = -0.409$ ,  $p < 0.01$ ), indicating that higher anxiety levels correlated with lower subjective well-being. Further analysis at the dimensional level reveals multiple significant negative correlations between all five dimensions of psychological anxiety (emotional reactivity, sleep disturbance, cognitive impairment, somatization, behavioral expression) and corresponding dimensions of subjective well-being. Among these, emotional reactivity exhibited the strongest correlations with each SWB dimension:  $r = -0.418$  ( $p < 0.01$ ) with "Personal Competence and Self-Actualization,"  $r = -0.346$  ( $p < 0.01$ ) with "Positive Emotions and Life Attitude," and "Interpersonal Relationships and Social Connections"  $r = -0.320$  ( $p < 0.01$ ), indicating that emotional instability and tension significantly impact well-being. Dimensions such as somatization symptoms and cognitive impairment also showed negative correlations with multiple well-being dimensions. Higher anxiety levels, particularly marked emotional tension and physical discomfort, made individuals less likely to experience satisfaction, health, and life happiness. (2) Psychological Resilience and Subjective Well-Being: Overall, the Spearman correlation coefficient between psychological resilience and subjective well-being was  $r = 0.358$ ,  $p < 0.01$ , indicating a significant positive correlation. This suggests that individuals with higher psychological resilience are more likely to experience positive well-being. At the dimensional level: All four dimensions of psychological resilience showed significant positive correlations with multiple dimensions of subjective well-being, notably: Resilience correlated with "Personal Competence and Self-Actualization" ( $r = 0.389$ ,  $p < 0.01$ ) and with "Interpersonal Relationships and Social Connections" ( $r = 0.332$ ,  $p < 0.01$ ); Adaptability and resourcefulness correlated with "Personal Competence and Self-Actualization" ( $r = 0.367$ ,  $p < 0.01$ ) and "Positive Emotions and Life Attitude" ( $r = 0.253$ ,  $p < 0.01$ ); Continuous Growth and Stress Management also showed significant correlations with dimensions like "Interpersonal Relationships and Social Connections" and "Self-Actualization." Relatively, the relationship between positive coping and sense of humor dimensions and well-being was weaker, showing only a slight positive correlation with "Interpersonal Relationships and Social Connections" ( $r = 0.127$ ,  $p > 0.05$ ). Individuals possessing stronger psychological resilience, adaptability, and stress

regulation abilities often exhibit more positive experiences and well-being in terms of cognitive engagement with life, interpersonal relationship building, and emotional pleasure. Thus, research hypothesis H3 is confirmed, though partially at the dimensional comparison level.

#### 4.1.4 Interactive Effects of Psychological Anxiety and Psychological Resilience

This study examined the relationship between psychological anxiety and psychological resilience, analyzing both overall levels and their respective dimensions. Overall, psychological anxiety and psychological resilience showed a significant negative correlation at the aggregate level (Spearman's  $r = -0.335$ ,  $p < 0.01$ ). This indicates that within the sample, higher levels of psychological anxiety were associated with lower psychological resilience, while stronger psychological resilience was linked to more effective coping with anxiety. At the dimensional level, most dimensions of psychological resilience (resilience, sustained growth and stress management, positive coping and sense of humor, adaptability and resourcefulness) showed significant negative correlations with most dimensions of psychological anxiety (emotional reactivity, sleep disturbance, cognitive impairment, somatization symptoms, behavioral manifestations). Specifically: Resilience showed significant negative correlations with all psychological anxiety dimensions, with the strongest associations observed for emotional reactivity ( $r = -0.333$ ,  $p < 0.01$ ), somatization symptoms ( $r = -0.256$ ,  $p < 0.01$ ), and cognitive impairment ( $r = -0.247$ ,  $p < 0.01$ ). Adaptability and coping ability also showed significant negative correlations with nearly all anxiety dimensions, particularly behavioral expression ( $r = -0.320$ ,  $p < 0.01$ ) and emotional reactivity ( $r = -0.310$ ,  $p < 0.01$ ). Although the negative correlations between continuous growth, stress management, positive coping, and sense of humor with anxiety dimensions were slightly weaker, some still reached statistical significance. This indicates that individuals possessing greater resilience, adaptability, and positive stress coping strategies tend to exhibit lower anxiety levels when confronting anxiety. Psychological resilience dimensions exerted significant moderating and buffering effects, particularly in counteracting emotional fluctuations, cognitive distress, and physical tension.

Figure 1 Heatmap of Spearman Correlation Coefficients Among Variable Dimensions



#### 4.2 Testing Main Effects and Interaction Effects

This study employs stratified multiple regression to examine primary direct effects. Stratified regression is used to investigate model changes as independent variables (X) increase, typically applied for model stability testing, mediation, or moderation studies. The stratified regression analysis involves four models. Model 1 includes the following control variables: 1. Gender, 2. Age, 3. Educational Attainment, 4. Marital Status. Model 2 adds social media usage to Model 1. Model 3 incorporates psychological anxiety into Model 2. Model 4 includes psychological resilience on top of Model 3. The dependent variable across all models is subjective well-being.

This study employed hierarchical regression to examine the direct impact of social media usage on subjective well-being, as well as the potential mediating effects of psychological anxiety and psychological resilience. The analysis unfolded across four model levels, yielding the following results:

Model 1: Control variables (gender, age, education level, marital status). The model exhibited extremely low explanatory power ( $R^2 = 0.010$ ) and overall insignificance ( $F = 0.581$ ,  $p = 0.677$ ). None of the demographic variables significantly influenced subjective well-being, indicating these background variables exerted weak or no predictive power over subjective well-being in this sample.

*Table 2 Results of Stratified Regression Analysis*

|  | <b>Stratum 1</b>            | <b>Stratum 2</b>             | <b>Stratum 3</b>             | <b>Stratum 4</b>             |
|--|-----------------------------|------------------------------|------------------------------|------------------------------|
| Constant   | 3.776**<br>(11.192)         | 2.701**<br>(5.982)           | 3.157**<br>(7.985)           | 2.547**<br>(5.810)           |
| Gender   | 0.062<br>(0.810)            | 0.068<br>(0.910)             | 0.041<br>(0.630)             | 0.044<br>(0.702)             |
| Age  | -0.121<br>(-1.120)          | -0.052<br>(-0.482)           | -0.039<br>(-0.420)           | -0.046<br>(-0.503)           |
| Education  | -0.021<br>(-0.309)          | -0.034<br>(-0.525)           | 0.041<br>(0.725)             | 0.038<br>(0.684)             |
| Marital Status   | 0.101<br>(0.530)            | 0.185<br>(0.987)             | 0.192<br>(1.184)             | 0.204<br>(1.278)             |
| Social Media Use   |                             | 0.229**<br>(3.480)           | 0.254**<br>(4.432)           | 0.252**<br>(4.485)           |
| Psychological Anxiety  |                             |                              | -0.379**<br>(-8.542)         | -0.335**<br>(-7.297)         |
| Psychological Resilience   |                             |                              |                              | 0.153**<br>(2.994)           |
| Sample Size  | 225                         | 225                          | 225                          | 225                          |
| $R^2$  | 0.010                       | 0.062                        | 0.297                        | 0.325                        |
| Adjusted $R^2$   | -0.008                      | 0.041                        | 0.278                        | 0.304                        |
| F-value  | F (4,220)=0.581,<br>p=0.677 | F (5,219)=2.911,<br>p=0.014  | F (6,218)=15.383,<br>p=0.000 | F (7,217)=14.948,<br>p=0.000 |
| $\Delta R^2$   | 0.010                       | 0.052                        | 0.235                        | 0.028                        |
| $\Delta F$ value   | F (4,220)=0.581,<br>p=0.677 | F (1,219)=12.113,<br>p=0.001 | F (1,218)=72.963,<br>p=0.000 | F (1,217)=8.962,<br>p=0.003  |
| Note: Dependent variable = Subjective well-being * $p < 0.05$ ** $p < 0.01$ Values in parentheses are t-values |                             |                              |                              |                              |

Model 2: Adding the independent variable “social media usage.” The model showed significant improvement ( $\Delta R^2 = 0.052$ ,  $p = 0.001$ ), indicating that social media usage significantly explains variance in subjective well-being. The regression coefficient for social media usage on subjective well-being was  $B = 0.229$ ,  $\beta = 0.239$ ,  $p = 0.001$ , confirming it as a positive predictor. Higher social media usage frequency correlates with stronger subjective well-being, supporting the findings from the prior correlation analysis ( $r = 0.165$ ).

Model 3: Added the mediating variable “psychological anxiety.” The model’s explanatory power increased substantially ( $R^2$  from 0.062  $\rightarrow$  0.297,  $\Delta R^2 = 0.235$ ,  $p < 0.001$ ). Psychological anxiety exhibited a regression coefficient of  $B = -0.379$ ,  $\beta = -0.493$ ,  $p < 0.001$  for subjective well-being, indicating it is a strong negative predictor. The coefficient for social media usage slightly increased ( $B = 0.254$ ,  $\beta = 0.264$ ) but remained significant. Psychological anxiety is a significant negative factor

affecting subjective well-being. After including psychological anxiety, the effect of social media did not diminish, indicating that anxiety does not constitute complete mediation but has a highly significant impact on well-being itself.

Model 4: Incorporating the second mediating variable, “psychological resilience.” The model again showed significant improvement ( $\Delta R^2 = 0.028$ ,  $p = 0.003$ ), with the final model being overall significant ( $F = 14.948$ ,  $p < 0.001$ ). The regression coefficient for psychological resilience on subjective well-being was  $B = 0.153$ ,  $\beta = 0.176$ ,  $p = 0.003$ , confirming it as a significant positive predictor. Psychological anxiety remained significant ( $B = -0.335$ ,  $\beta = -0.436$ ), and social media usage retained significance ( $B = 0.252$ ,  $\beta = 0.263$ ). Psychological resilience made an independent and positive contribution to well-being after controlling for psychological anxiety. Simultaneously, social media use continued to exert a direct positive influence on well-being, indicating that the two mediating variables (anxiety and resilience) in the model partially mediated the relationship.

Overall: Social media use positively predicts subjective well-being, meaning moderate or positively motivated use enhances well-being. Psychological anxiety acts as a negative mediating variable, partially explaining the mechanism through which social media use influences well-being. That is, certain usage patterns may trigger anxiety, thereby inhibiting well-being. Psychological resilience acts as a positive mediating variable, demonstrating that individuals’ psychological adaptability in social contexts can buffer negative effects and enhance well-being. Collectively, social media use influences subjective well-being through two pathways—“reducing anxiety” and “enhancing resilience”—while also exhibiting a direct effect.

### 4.3 Testing the Chain Mediation Effect of Psychological Anxiety and Psychological Resilience

#### 4.3.1 Testing Parallel and Chain Mediation Effects

Mediation effects were examined using Bootstrap sampling with 5,000 iterations. Results indicate that for the mediation pathway ‘Social Media Use  $\Rightarrow$  Psychological Anxiety  $\Rightarrow$  Subjective Well-being’, the 95% confidence interval includes zero (95% CI: -0.115 to 0.076), suggesting this mediation effect does not exist. For the mediation path ‘Social Media Use  $\Rightarrow$  Psychological Resilience  $\Rightarrow$  Subjective Well-being’, the 95% confidence interval included zero (95% CI: -0.026 to 0.030), indicating that this mediation effect path does not exist. Analyzing the chained mediation paths, for the path ‘Social Media Use  $\Rightarrow$  Psychological Anxiety  $\Rightarrow$  Psychological Resilience  $\Rightarrow$  Subjective Well-being’, the 95% confidence interval includes zero (95% CI: -0.015 to 0.013), indicating that this mediation path does not exist. The data indicate that while the single mediation path (i.e., parallel mediation) is not significant, the dimensional chain mediation path is significantly established. Therefore, research hypothesis H4 is not confirmed, but partially confirmed at the dimensional comparison level.

#### 4.3.2 Testing Dimensional Mediation and Chain Mediation Effects

Social media use does not show significant correlations with psychological anxiety or psychological resilience at the overall level. Only social comparison within social media use exhibits significant correlations with psychological anxiety and psychological resilience. Frequent social comparison significantly impacts individuals’ negative emotions and weakens their psychological adaptability and resilience when facing stress. Therefore, to construct a chained pathway among social media use, psychological anxiety, psychological resilience, and subjective well-being, this study treats social comparison within social media use as an independent pathway variable to explore chained mediating effects.

Table 3 Indirect Effect Analysis

| Item  | Effect | Boot SE | BootLLCI | BootULCI | z      | p     |
|---|--------|---------|----------|----------|--------|-------|
| Social Comparison $\Rightarrow$ Psychological Anxiety $\Rightarrow$ Subjective Well-being   | -0.077 | 0.043   | -0.209   | -0.040   | -1.782 | 0.075 |
| Social Comparison $\Rightarrow$ Psychological Resilience $\Rightarrow$ Subjective Well-being  | -0.008 | 0.016   | -0.047   | 0.018    | -0.504 | 0.614 |
| Social Comparison $\Rightarrow$ Psychological Anxiety $\Rightarrow$ Psychological Resilience $\Rightarrow$ Subjective Well-being  | -0.009 | 0.007   | -0.031   | -0.002   | -1.250 | 0.211 |
| Note: BootLLCI denotes the lower bound of the 95% Bootstrap confidence interval, BootULCI denotes the upper bound, and the bootstrap method used is percentile bootstrap. Shaded cells indicate chained mediation, while others represent parallel mediation. |        |         |          |          |        |       |

The study employed Bootstrap sampling for mediation effect analysis with 5,000 iterations. Results indicate that for the mediation pathway ‘social comparison  $\Rightarrow$  psychological anxiety  $\Rightarrow$  subjective well-being’, the 95% confidence interval does not include zero (95% CI: -0.209 to -0.040), confirming the existence of this mediating effect. For the mediation pathway ‘social comparison  $\Rightarrow$  psychological resilience  $\Rightarrow$  subjective well-being’, the 95% confidence interval included zero (95% CI: -0.047 to 0.018), indicating that this mediation effect pathway did not exist. Next, analyzing the chained mediating effect paths, for the path ‘social comparison  $\Rightarrow$  psychological anxiety  $\Rightarrow$  psychological resilience  $\Rightarrow$  subjective well-being’, the 95% confidence interval does not include zero (95% CI: -0.031 to -0.002), indicating that this mediating effect path exists.

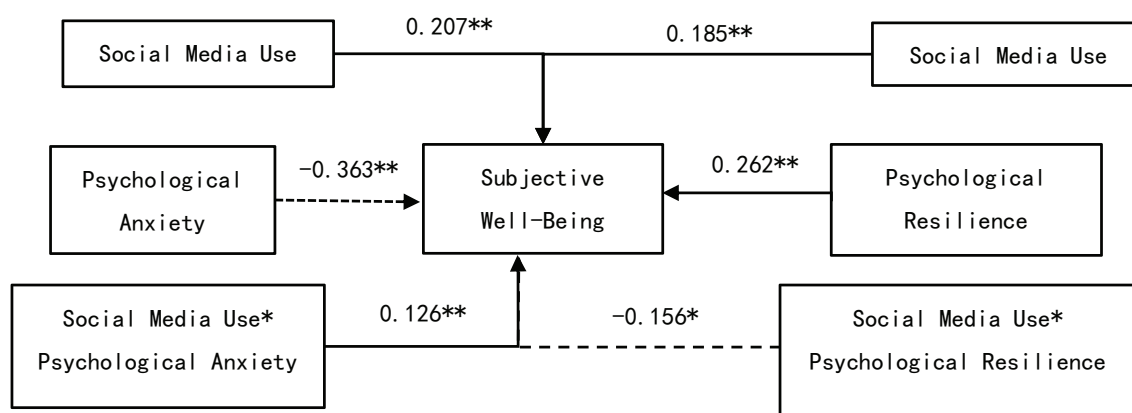
The chain mediation analysis results indicate that social comparison primarily exerts a significant negative influence on young adults’ subjective well-being through two pathways: by increasing psychological anxiety and via the chain mechanism where “anxiety weakens resilience.” Similar to previous studies focusing on social comparison’s impact on negative emotions, this research further reveals its layered psychological transmission mechanisms. Notably, psychological resilience did not form an independent mediating pathway between social comparison and well-being, suggesting resilience may primarily serve as a “secondary moderator” in coping with anxiety rather than being directly influenced by social comparison. This finding contributes to expanding the applicability of the “cognition-emotion-psychological adjustment” chain model in new media contexts. In summary, by distinguishing parallel mediation from chain mediation, this study deepens our understanding of the psychological mechanisms underlying youth well-being in social media contexts. It also provides concrete directions for digital psychological interventions: while reducing comparative content, efforts should strengthen individuals’ ability to recognize and regulate anxiety, preventing it from further eroding psychological resilience and ultimately affecting well-being levels.

### 4.3.3 Moderation Effect Test

To examine whether psychological anxiety moderates the relationship between social media use and subjective well-being, this study constructed a moderation effect model. Results indicate that psychological anxiety exerts a significant negative influence on subjective well-being ( $\beta = -0.472$ ,  $p < 0.001$ ), and the interaction term between social media use and psychological anxiety significantly predicts subjective well-being ( $\beta = 0.160$ ,  $p = 0.006$ ). Further analysis revealed that higher levels of psychological anxiety strengthened the positive effect of social media use on subjective well-being, indicating a significant positive moderation effect. This suggests that social media may serve a stronger emotional compensation function for highly anxious youth.

Moderation analysis revealed that psychological resilience not only significantly predicted subjective well-being ( $\beta = 0.302$ ,  $p < 0.001$ ) but also negatively moderated the relationship between social media use and subjective well-being (interaction term  $\beta = -0.149$ ,  $p = 0.020$ ). This indicates that when individuals possess higher psychological resilience, the positive effect of social media use on their well-being diminishes, while the opposite occurs for those with lower resilience. In other words, the impact of social media use on well-being is more pronounced among individuals with lower psychological resilience.

Figure 2: Moderated Effects Model Results



## 5. Research Findings and Discussion

### 5.1 Research Findings and Contributions



This study examined the interactive effects among social media usage, psychological anxiety, psychological resilience, and subjective well-being at both the overall and dimensional levels, along with chained mediating effects and moderating effects. Findings indicate that at the overall comparison level: - Social media use positively influences subjective well-being. - Social media use does not exhibit significant linear relationships with psychological anxiety or psychological resilience, though partial linear relationships exist across certain dimensions. - Psychological anxiety and psychological resilience show significant negative correlations. - Psychological anxiety negatively impacts subjective well-being, while psychological resilience positively influences subjective well-being. At the dimensional comparison level: (1) Social media use exhibits significant positive relationships with subjective well-being in the dimensions of convenience, information seeking, and social interaction, but lacks significant correlation in the social comparison dimension. This indicates that social media promotes subjective well-being among young people by providing information, strengthening social connections, and enhancing efficiency. (2) The social comparison dimension of social media use generally showed significant positive correlations with all dimensions of psychological anxiety. Simultaneously, this dimension exhibited significant negative correlations with all dimensions of psychological resilience. This indicates that frequent social comparison behaviors can influence negative emotions among young people and weaken their adaptive capacity and resilience when facing stress. Dimensions of psychological anxiety generally showed negative correlations with subjective well-being, while dimensions of psychological resilience generally showed positive correlations. This indicates that higher anxiety levels lead to more pronounced emotional tension and physical discomfort among young people, making it harder for them to experience subjective well-being. Simultaneously, young people with stronger psychological recovery, adaptation, and stress regulation abilities are more likely to experience positive emotions and subjective well-being. (4) Dimensions of psychological anxiety generally showed negative correlations with dimensions of psychological resilience. This indicates that young people with strong resilience, adaptability, and stress coping strategies tend to exhibit lower anxiety levels.

Chain mediation effects revealed that social comparison on social media primarily negatively impacts young people's subjective well-being through increased psychological anxiety and the chain pathway of "anxiety weakening resilience." This finding reveals a crucial psychological mechanism: social media use does not directly elevate or diminish well-being but instead impacts subjective well-being through a negative chain pathway—"social comparison → increased psychological anxiety → reduced psychological resilience → decreased well-being." The existence of this chain mediation pathway suggests that the effects of social media use are highly dependent on an individual's self-regulation capacity. The moderation effect indicates that social media may exert stronger emotional compensation functions for youth with high anxiety. The impact of social media use on subjective well-being is more pronounced among young people with lower psychological resilience.

First, social comparison significantly reduces subjective well-being by triggering psychological anxiety and weakening psychological resilience.

The interaction effect indicates that the positive impact of social media use on subjective well-being is more pronounced among youth with high anxiety and low resilience. Social media use encompasses both positive and negative effects. Positive and reasonable use can enhance subjective well-being among youth, while excessive social comparison behaviors trigger negative emotions, weaken psychological resilience, and consequently diminish subjective well-being. Existing research predominantly focuses on the social support individuals gain through social media, with limited differentiation of social media usage behaviors and their distinct consequences. This study broadens the theoretical perspective of subjective well-being research, emphasizing the need to distinguish specific social media usage behaviors and avoid the a priori assumption that it is solely a positive resource acquisition tool.

Second, the impact of social media use on subjective well-being reveals an emotional compensation effect among the "high anxiety/low resilience" group.

Moderation analysis indicates that while psychological anxiety is typically viewed as diminishing subjective well-being, this study finds that young adults with low psychological resilience and high emotional distress are more likely to gain emotional regulation and psychological comfort through social media, exhibiting a stronger increase in subjective well-

being. This reveals the dual nature of social media's "positive and negative effects," which can bring negative impacts while also providing active support in specific contexts. This finding suggests that social media may possess certain emotional compensation functions among highly psychologically vulnerable individuals, but such compensation is temporary, dependent, and more likely to lead to media dependency and psychological fluctuations. Future research should focus on the moderating role of individual psychological traits.

Third, the pathway through which social media use influences subjective well-being is dynamic and nonlinear, rather than a simple direct relationship.

Chain mediation analysis indicates that social media use affects subjective well-being through a sequential pathway: social comparison → increased psychological anxiety → reduced psychological resilience → diminished well-being. This chain mediation effect reveals a psychological mechanism through which negative influences impact subjective well-being. The impact of social media use on subjective well-being is dynamic and nonlinear, primarily operating through social comparison to trigger psychological anxiety and weaken psychological resilience, thereby indirectly reducing well-being among young adults. Within the social media environment, social comparison generates anxiety and psychological pressure, which deplete psychological resources, diminish adaptive capacity and resilience, and ultimately affect well-being experiences. This mechanism aligns with social comparison theory and psychological resource depletion models, emphasizing the crucial mediating roles of psychological anxiety and resilience in social media's impact. Thus, social comparison functions not merely as a surface-level behavioral aspect of media use but as a deep psychological activator influencing well-being, suggesting future research should focus on the interplay between cognitive biases, emotional fluctuations, and psychological resources.

## (II) Research Limitations and Future Directions

While this study systematically examined the complex relationships among social media use, psychological anxiety, psychological resilience, and subjective well-being, several limitations remain. First, data were collected via questionnaires without qualitative analysis; future research may consider combining quantitative and qualitative methods to more precisely uncover causal mechanisms. Second, the sample primarily consisted of young adults from a specific region, limiting its representativeness. Future research should broaden the sample scope and focus more on special populations to enhance the generalizability of findings. Third, the study focused solely on psychological anxiety and psychological resilience as mediating variables. Subsequent research could introduce additional mediating variables to construct a more comprehensive mediating-moderation model. Furthermore, given the diverse behavioral dimensions of social media use, this study did not sufficiently differentiate between different usage motivations and content. Future research could employ qualitative methods to refine the association between usage behaviors and psychological impacts. Finally, as digital media forms rapidly evolve, future research should examine the dynamic effects of emerging platforms and multimodal content on mental health and well-being to advance both theoretical understanding and practical applications.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# The Sublimation of Anti-Drama: Psychological Externalization, Anti-Climax, and Everyday Ethics in the Cinema of Hirokazu Kore-eda

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**Abstract:** This paper explores the aesthetic and ethical dimensions of Hirokazu Kore-eda's anti-dramatic cinema through the theoretical frameworks of Jacques Lacan's concept of desire and lack, Gilles Deleuze's notion of the time-image, André Bazin's realism, Hans-Thies Lehmann's postdramatic theatre, and Jane Bennett's vital materialism. In contrast to the affective excess of global melodrama, Kore-eda's films externalize interior psychological states through ambient sound, anti-climactic narrative structures, off-screen space, and the emotional agency of objects. These formal strategies transform cinematic affect into an ethical experience of reflection rather than catharsis. The article argues that Kore-eda's work redefines emotional engagement in contemporary Japanese cinema by turning the viewer from empathy to contemplation—what may be termed a post-emotional ethics of the everyday. Through close readings of *Still Walking* (2008), *After the Storm* (2016), *Shoplifters* (2018), and *Air Doll* (2009), this study shows how the refusal of climax and the prominence of silence generate a cinema of absence that speaks through the mundane.

**Keywords:** Hirokazu Kore-eda; Anti-drama; Psychological Externalization; Anti-climax; Off-Screen Space; Ambient Sound; Materiality; Everyday Ethics; Postdramatic Aesthetics

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## 1.Introduction: Toward a Poetics of Anti-Drama

In an era when global visual culture is dominated by hyper-narrativity and affective spectacle, the cinema of Hirokazu Kore-eda stands as an act of quiet refusal. His films consistently subvert the dramatic arc that underpins classical and melodramatic storytelling. Rather than offering viewers cathartic resolution, Kore-eda creates what Bazin once described as “the ontology of the photographic image” — an openness to duration, contingency, and moral ambiguity (Bazin, 1967). Through long takes, ambient soundscapes, and the near-absence of musical cues, Kore-eda allows the world to present itself without the coercion of plot or emotional manipulation. The problem this study addresses is how Kore-eda transforms cinematic form into a mode of ethical inquiry. By minimizing conventional drama, his cinema externalizes internal psychology through material and spatial cues rather than explicit dialogue or conflict. In *Still Walking*, for instance, the lingering sound of cicadas fills the void left by unspoken reconciliation, transforming nature's hum into a psychological resonance. Similarly, *Shoplifters* replaces courtroom confrontation with an off-screen silence that compels spectators to inhabit moral uncertainty (Chung, 2021, p.

354).

Scholarly interest in Kore-eda has largely focused on themes of family, loss, and social realism (Miura, 2019; Yoshida, 2019). However, relatively few studies address his formal aesthetics as a system of “psychological externalization” — a process by which interior affect is projected onto sound, space, and object. This article therefore bridges two discourses: the psychoanalytic reading of desire and lack (Lacan, 1977) and the phenomenological analysis of cinematic time and image (Deleuze, 1989). Kore-eda’s work, I argue, transforms the lack central to Lacanian desire into a visual and auditory absence, producing an ethical spectatorship grounded in incompleteness. From a Deleuzian perspective, Kore-eda’s films operate within the logic of the time-image: the dispersal of linear action into suspended temporality. Scenes of domestic routine—washing dishes, waiting for rain to stop—become cinematic meditations on being and relation (Lim, 2020). Lehmann’s concept of the postdramatic further clarifies this refusal of dramatic causality: the “drama” is no longer the locus of meaning, but a residue within the temporal field of the everyday (Lehmann, 2006). In Kore-eda, the aesthetic of the postdramatic is not theatrical but ethical—an invitation to witness without intervention.

Another crucial framework is Jane Bennett’s vital materialism (2010), which opens a dialogue between human emotion and the agency of things. In Kore-eda’s cinema, objects often serve as affective mediators: a yellow butterfly in *Still Walking*, a fishing rod in *Shoplifters*, or an umbrella carried through a typhoon in *After the Storm*. These items do not merely symbolize memory; they act, in Bennett’s sense, as vibrant participants in emotional exchange. Such object-centered empathy displaces anthropocentrism and aligns Kore-eda’s work with a posthumanist ethics of coexistence. This convergence of psychoanalytic, phenomenological, and materialist perspectives situates Kore-eda at the intersection of post-emotional cinema and ethical spectatorship. His anti-drama does not deny emotion but re-educates it, asking audiences to dwell in moments of suspension and silence. As Deleuze (1989) suggests, the time-image allows thought to emerge from hesitation rather than action. Kore-eda’s films thus replace catharsis with contemplation, transforming the viewer’s affect into a moral inquiry.

In methodological terms, this study employs textual and formal analysis of selected films between 2008 and 2018, contextualized within contemporary Japanese cultural discourse. It integrates aesthetic theory with humanistic ethics to reveal how Kore-eda’s minimalism articulates a cinematic form of moral reflection. By focusing on sound, narrative, and spatial restraint, the article traces how the “anti-dramatic” becomes a site of ethical intensity—a cinema where the absence of event becomes the event itself.

## 2. The Auditory Landscape: Ambient Sound as Psychological Externalization

Sound, for Kore-eda Hirokazu, is not an accessory to image but a vessel of interiority. His cinema replaces the emotional determinism of musical scoring with the unpredictable textures of the environment. In rejecting non-diegetic music, Kore-eda shifts the site of feeling from composition to perception: emotion no longer emanates from the soundtrack but from the audience’s attentive listening to silence, noise, and their fragile interstices. This turn toward ambient sound aligns with Michel Chion’s (1994) notion of the *acousmatic*—a sound detached from its visible source—and with Gilles Deleuze’s (1989) “time-image,” where sensory fragmentation reveals the temporality of thought itself.

### 2.1 Silence and Noise: The Rejection of Musical Catharsis

Across Kore-eda’s oeuvre, the near-absence of non-diegetic music establishes what film scholar Chung (2021) calls “the acoustics of ethical restraint” (p. 358). In *Still Walking* (2008), the chirring of cicadas and the soft clatter of dishes replace the conventional orchestral cue that would otherwise signal reconciliation. The auditory environment becomes a psychological extension of the characters’ inability to articulate grief. The ambient hum of the summer afternoon “speaks” for the family’s unspoken sorrow. Such moments realize Bazin’s (1967) realism as “the faith in the world’s density”—the belief that meaning arises not through dramatization but through attentive observation. Silence, in Kore-eda, is never empty; it is charged with moral vibration. When *After the Storm* (2016) reaches its emotional apex—the estranged father visiting his son during a typhoon—no music underscores the encounter. Instead, the scene is enveloped by the sound of rain hammering on the sliding doors. This sonic density externalizes the tension between paternal failure and quiet redemption. The rain itself becomes a moral medium, a “nonhuman witness” to the fragility of reconciliation (Bennett, 2010, p. 13). The refusal of score is therefore not an aesthetic minimalism but an ethical one: Kore-eda grants the environment an agency that resists sentimental coercion.



## 2.2 The Materiality of Sound and Emotional Projection

Kore-eda's soundscapes resonate with Jane Bennett's (2010) concept of vibrant matter, wherein the material world participates in affective communication. In his films, mundane sonic details—rattling windows, a distant train horn, or the hum of an air conditioner—become extensions of human feeling. The subject's inner turbulence migrates outward, diffused into the auditory field. This transference transforms the diegetic world into a space of shared affect between human and environment. In *Shoplifters* (2018), the sound of the crowded supermarket is not simply diegetic realism; it is the acoustic embodiment of moral ambiguity. The clinking of price tags and the rustle of plastic bags create a rhythm of complicity between survival and transgression. Rather than judging the characters' thefts, Kore-eda allows the soundscape to carry ethical ambivalence—what Deleuze might term “a direct image of time,” in which moral meaning is suspended rather than resolved (Deleuze, 1989, p. 17). The ordinary noise of consumption becomes a sonic critique of capitalist morality.

Recent scholarship situates this use of sound within an East Asian aesthetic of stillness—a mode of attention that transforms environmental sound into ethical perception (Lim, 2020; Kim, 2022). In Kore-eda's work, the “noise of life” operates like a phenomenological echo chamber: the more one listens, the more one feels the unbridgeable distance between subjects. This relational listening is both ethical and epistemological. As Kim (2022) notes, “Kore-eda's cinema teaches us to hear with responsibility—the world listens back” (p. 44).

## 2.3 Case Study: The Typhoon Night in *After the Storm*

The nocturnal typhoon sequence in *After the Storm* offers a concentrated study of psychological externalization through sound. The scene unfolds within a cramped apartment as Ryota, the failed novelist and absent father, takes refuge with his ex-wife and son during a torrential storm. The dialogue is minimal; instead, the rain's rhythm dominates the frame. The diegetic sound of dripping water, rattling shutters, and gusts of wind intertwines with muted breathing and soft sighs. The auditory field thus becomes a mirror of psychic turbulence.

Film critic Sharpe (2021) describes this as “Kore-eda's rain ethics”—the transformation of meteorological phenomena into moral allegory (p. 212). The storm is both external and internal: it stages the collision of the natural and the emotional, the meteorological and the moral. Ryota's failure as a father is not verbalized but absorbed into the acoustic texture of the scene. When the storm subsides, silence returns—not as closure but as suspension. This sonic gap enacts what Lacan calls *manque-à-être*, the “lack of being” that structures desire (Lacan, 1977, p. 290). The unspoken and the unheard merge into a shared ontological absence. Through this acoustic poetics, Kore-eda redefines cinematic empathy. Rather than identifying with characters through expressive dialogue or musical cues, the viewer is drawn into an auditory relation that demands ethical attention. The silence after the storm becomes the space where spectators confront their own interpretive responsibility. As Sobchack (2019) argues, affective engagement in cinema arises not from emotional overflow but from “corporeal listening”—the body's encounter with the unseen (p. 126). Kore-eda's anti-dramatic use of sound, therefore, externalizes psychology not through exposition but through phenomenological vibration.

In sum, Kore-eda's auditory minimalism transforms sound into a medium of ethical realism. The refusal of music, the prominence of ambient noise, and the interplay of silence and weather create a cinema of listening—one in which emotion is neither declared nor suppressed but dispersed into the sonic materiality of the everyday. This auditory ethics of restraint situates Kore-eda's work within a broader postdramatic tradition that redefines affect not as spectacle but as shared perception.

## 3. Narratives of Anti-Climax: The Pleasure of the Unfulfilled

Kore-eda's films habitually end where classical narratives would begin their emotional resolution. The expected cathartic climax—reunion, confession, or redemption—is displaced or omitted altogether. This aesthetic of anti-climax constructs what might be termed a “cinema of remainder”: the residue of emotion that persists after the drama has evaporated. In resisting narrative closure, Kore-eda transforms the audience's desire for satisfaction into an ethical awareness of lack, echoing Lacan's (1977) claim that *désir* is sustained precisely by what it cannot attain.

### 3.1 Structural Anti-Climax as Aesthetic Principle

In *Still Walking* (2008), the family's annual gathering to commemorate a deceased son never reaches reconciliation. The

father's bitterness, the mother's quiet resentment, and the surviving son's discomfort remain unresolved. As the film concludes, the family disperses without emotional climax. What remains is the gentle murmur of cicadas and the image of an empty dining table. The affective fulfillment promised by narrative convention is withheld, leaving what Yoshida (2019) calls "a lingering absence that becomes presence" (p. 131). The withheld apology or declaration becomes the locus of emotion. Similarly, *Like Father, Like Son* (2013) subverts the genre of domestic melodrama. The revelation that two boys were switched at birth sets up a scenario ripe for tearful resolution, yet Kore-eda withholds the expected reconciliation. The father's recognition of emotional failure emerges not in confrontation but in hesitation. The final act—his quiet decision to visit both children without resolution—transforms narrative incompleteness into ethical contemplation. Lehmann's (2006) concept of the postdramatic helps elucidate this structure: drama is no longer the engine of meaning, but a trace within a larger temporal and affective field.

This aesthetic of incompleteness reflects Deleuze's (1989) "time-image," where the sensory-motor link of classical action collapses into pure duration. In Kore-eda's cinema, action gives way to attention, and the viewer becomes a participant in the experience of time rather than its consumption. The absence of climax thus becomes a mode of thought. The viewer, deprived of narrative satisfaction, must fill the void with reflection—a process of ethical cognition through affective suspension.

### 3.2 The Lacanian Structure of Desire and the "Remainder of Pleasure"

The refusal of climax transforms desire itself into Kore-eda's central theme. Lacan (1977) conceptualizes desire as "the metonymy of lack": a structure that thrives on absence rather than fulfillment. In this sense, Kore-eda's anti-dramatic narrative enacts a Lacanian ethics of desire, in which satisfaction would annihilate the very structure that sustains meaning. The films' emotional power arises from what they do not give us—the apology unsaid, the embrace unshown, the justice unserved. In *Shoplifters* (2018), the anti-climactic structure is most fully realized. After the family's arrest, Kore-eda refuses courtroom dramatization or sentimental justification. Instead, he disassembles the "family" unit through ellipsis. Scenes that could deliver emotional closure—confession, regret, or reconciliation—are omitted, leaving the spectator to confront the silence of social judgment. The final image of the abandoned child on a balcony—quietly whispering "Papa"—encapsulates the film's refusal to resolve moral ambiguity. The spectator's desire for closure is redirected into an awareness of systemic injustice and emotional absence. Kato (2020) notes that Kore-eda's "ethics of deferral" constitutes a resistance to neoliberal narratives of productivity and resolution (p. 58). By suspending closure, his films challenge the ideology of narrative efficiency—the assumption that stories must end in meaning. Instead, they assert the dignity of the incomplete. This resonates with Žižek's (2012) re-reading of Lacan, in which enjoyment (*jouissance*) is bound to the impossibility of satisfaction: "we enjoy precisely in the failure to attain." Kore-eda's spectators, too, are invited to enjoy the lack—to experience affect as an ongoing ethical tension rather than a consumable resolution.

### 3.3 Case Study: The Anti-Climax of *Shoplifters*

In *Shoplifters*, the narrative's emotional apex occurs not at the revelation of crime or punishment, but in the quiet aftermath. When the surrogate mother Nobuyo is questioned by the police, Kore-eda avoids the emotional confrontation typical of melodrama. The camera remains still; her confession is partially off-screen. Instead of exposing emotion through tears, Kore-eda externalizes it through spatial and temporal fragmentation. The off-screen silence becomes the site of moral introspection. As Chung (2021) observes, "the film's ethical power resides not in what it shows but in what it withholds" (p. 361). The final act reinforces this ethics of incompleteness. The young girl Yuri, now renamed and reabsorbed into a normative family, stands on her balcony and looks into the distance. The camera holds for nearly a minute. There is no music, no narrative closure—only the sound of wind. The viewer is left in a suspended state between empathy and discomfort. This lingering temporality transforms lack into a shared affective experience. The anti-climax thus externalizes desire itself, making the viewer a participant in the film's moral oscillation between attachment and loss.

This aesthetics of the unfulfilled reflects what Deleuze (1989) terms the crystal-image: a temporal form in which past and present coexist without synthesis. The child's gaze backward toward an irretrievable past materializes the Deleuzian time-image—an image that "thinks time" rather than represents it. The film's final silence, therefore, is not emptiness but condensation: the condensation of desire, ethics, and temporality into a single suspended moment. In this sense, Kore-

eda's cinema enacts what Marks (2000) describes as "intercultural embodiment," wherein emotion is registered not through representation but through sensory duration. By replacing climax with suspension, Kore-eda crafts a humanistic cinema of ethical duration. His narratives invite the spectator to dwell in the interval between event and meaning, to inhabit the silence where feeling transforms into thought. This anti-dramatic ethics redefines the political function of narrative itself: to resist closure is to resist domination—to insist that life, like film, is never complete.

## **4. The Ethics of the Invisible: Off-Screen Space and the Agency of Things**

In Kore-eda Hirokazu's cinema, what remains unseen often carries the greatest ethical weight. His recurring use of off-screen space—the sounds, gestures, and emotions that occur beyond the visible frame—transforms the act of cinematic omission into a form of moral invitation. Rather than offering emotional exposition, Kore-eda's static compositions and refusals of reverse shots compel the spectator to participate imaginatively in the unseen. The invisible, in this sense, becomes an ethical field where empathy and restraint coexist.

### **4.1 The Gaze of Refusal: Off-Screen Emotion and Ethical Distance**

Kore-eda's use of long takes and fixed camera positions establishes what Bazin (1967) called "the integrity of the real": a cinematic faith in duration that resists manipulation. By holding the frame beyond the point of narrative necessity, Kore-eda foregrounds time as an ethical medium. In *Still Walking* (2008), the camera often lingers after a character exits, leaving the space momentarily vacant. These empty frames are not absences but intervals of contemplation, granting the audience time to process what remains unspoken. In one pivotal scene, the mother, Toshiko, quietly folds her late son's shirt while the camera remains in the doorway. Her face is unseen; the shot refuses intimacy. What occurs off-screen—her expression, perhaps tears—is imagined rather than delivered. This ethical withholding creates what Sobchack (2019) terms "embodied empathy," a mode of spectatorship in which feeling arises through the viewer's corporeal awareness of what is withheld (p. 125). By denying the close-up, Kore-eda converts the image into a moral space of restraint, where seeing less becomes a condition for feeling more.

This poetics of distance resonates with Lehmann's (2006) postdramatic theatre, where meaning emerges not from dramatic event but from the spectator's ethical engagement with presence and absence. In Kore-eda's films, off-screen space functions as the cinematic equivalent of the theatrical pause: a temporal aperture that allows the world to breathe. The camera's refusal to intrude transforms realism into reverence. In the ethics of the invisible, the unseen is not a void but a threshold—a site where subjectivity dissolves into shared attention.

### **4.2 The Narrative of Objects: Things as Emotional Substitutes**

Parallel to the ethics of off-screen space is Kore-eda's persistent investment in the agency of things. His films populate domestic spaces with objects that bear emotional residue: a yellow butterfly that may embody the spirit of a deceased son (*Still Walking*), a fishing rod left behind by a surrogate father (*Shoplifters*), or a doll that gains consciousness (*Air Doll*). These objects act as mediators of feeling—material proxies for what cannot be expressed verbally. Jane Bennett's (2010) vital materialism provides a framework for understanding this phenomenon. For Bennett, matter possesses "thing-power"—a vibrancy that exceeds human intentionality (p. 20). Kore-eda's objects participate in this vibrancy: they feel, remember, and mourn. When the camera lingers on the yellow butterfly, it is not simply symbolic; it is affective, a presence that animates the air between characters. As Sharpe (2021) notes, "Kore-eda's objects are not metaphors but interlocutors" (p. 209). They speak the unspeakable, rendering grief tangible through material continuity. In *Shoplifters*, the fishing rod symbolizes the tenuous bond between father and son figures. When the family disbands, the object remains—mute yet potent, embodying what Bennett would call the "ethical potential of the inanimate" (2010, p. 38). The camera's still gaze upon the rod suggests that objects, too, participate in the drama of loss. Through this material empathy, Kore-eda extends ethics beyond the human, inviting a posthumanist reconsideration of emotion itself.

### **4.3 Case Study: Air Doll and the Ontology of Sentiment**

*Air Doll* (2009) presents Kore-eda's most radical exploration of material subjectivity. The film's protagonist, an inflatable doll that gains consciousness, destabilizes the boundaries between object and person, material and affect. Her awakening embodies what Bennett (2010) calls "the conative force of matter"—the capacity of nonhuman entities to act and feel. As the

doll experiences loneliness, tenderness, and ultimately mortality, the film stages an allegory of affective circulation between the animate and the inanimate. The camera's visual grammar reinforces this ontological ambiguity. Kore-eda frequently frames the doll in reflective surfaces or through translucent curtains, situating her presence on the edge of visibility. The film's climactic moment—her deflation—occurs partly off-screen, replaced by the soft hiss of escaping air. This sound, echoing through an otherwise silent room, externalizes the fragility of being itself. The scene exemplifies what Deleuze (1989) describes as “the time-image of pure event”—the instant when perception detaches from action and becomes contemplation. Rather than sentimentalizing her death, Kore-eda transforms the doll's disintegration into an ethical meditation on the boundaries of empathy. The viewer is not asked to pity the object but to recognize the continuum between human vulnerability and material transience. In this sense, *Air Doll* completes the trajectory traced through Kore-eda's oeuvre: from the silent grief of families to the sentience of things. His cinema teaches us that ethical feeling is not confined to speech or human consciousness—it circulates among bodies, spaces, and matter itself.

#### **4.4 The Ethical Aesthetics of Withholding**

Through the combined strategies of off-screen emotion and material agency, Kore-eda constructs what may be termed an aesthetics of withholding. This aesthetic neither represses nor denies emotion; it reconfigures its medium. The unseen and the inanimate become vehicles for psychological externalization. The viewer's task is to perceive what is not shown—to listen to silence, to sense the weight of objects, to feel the air between gestures. In doing so, spectators are drawn into what Sobchack (2019) calls “the ethical labor of seeing”—a form of attention that acknowledges the autonomy of the world beyond the self. Kore-eda's cinema thus operates as an ethical pedagogy. By decentralizing human agency and amplifying the voices of things, it enacts a posthumanist compassion rooted in material coexistence. The moral of his films is not to feel more but to feel differently—to cultivate an awareness attuned to the invisible vibrations of everyday life. In a world oversaturated with spectacle, this ethics of invisibility offers an antidote: a cinema that teaches humility through the quiet persistence of matter.

### **5. Conclusion: From Emotional Catharsis to Ethical Reflection**

Hirokazu Kore-eda's cinema enacts a radical shift in the function of emotion within film aesthetics. His refusal of dramatic spectacle, narrative closure, and expressive excess marks not an absence of feeling but the transformation of affect into ethical reflection. Through the formal strategies analyzed in this study—ambient sound, anti-climax, off-screen space, and the agency of objects—Kore-eda constructs a new cinematic ethics in which the viewer's engagement is not cathartic but contemplative. The anti-dramatic becomes a pedagogy of attention.

#### **5.1 The System of Techniques**

Kore-eda's aesthetic system is built upon an intricate balance between what is shown and what is withheld. The auditory minimalism of his soundscapes externalizes interior emotion through the natural rhythms of the environment, replacing melodramatic music with the hum of existence. His anti-climactic narratives convert unfulfilled desire into an ethical tension, aligning with Lacan's (1977) principle that meaning is sustained through lack. The off-screen space functions as a site of moral imagination, where the viewer's empathy is activated by absence rather than presence. Finally, the agency of things, grounded in Bennett's (2010) vital materialism, expands compassion beyond the human realm, acknowledging the shared vitality of matter. Together, these formal devices generate what can be called a cinema of restraint—a mode of filmmaking that cultivates sensitivity to the invisible, the ordinary, and the incomplete. In resisting spectacle, Kore-eda revitalizes Bazin's (1967) realist ethics: a faith in the world's ability to reveal meaning through its own temporal unfolding. His still frames, ambient silences, and tactile attention to objects embody an ethical realism that honors the dignity of what cannot be dramatized.

#### **5.2 From Catharsis to Contemplation: The Pedagogy of Post-Emotional Cinema**

The substitution of catharsis with contemplation defines what this study terms post-emotional cinema. In classical Aristotelian aesthetics, catharsis served to purify emotion through identification and release. Kore-eda reverses this trajectory: rather than expelling emotion, he suspends it, transforming the viewing experience into an act of sustained reflection. The emotional residue that lingers after his films—the quiet discomfort, the ethical ambiguity—is the mark of a new cinematic morality. As Chung (2021) observes, Kore-eda's films teach spectators “to feel ethically rather than emotionally” (p. 360). This

ethical feeling is not passive empathy but an active attentiveness to relational complexity. Deleuze's (1989) notion of the time-image clarifies this process: by interrupting the linear causality of action, the image becomes a medium for thought. In *Shoplifters*, the unresolved ending compels viewers to contemplate justice and care; in *After the Storm*, the silence following the typhoon transforms grief into reflection. These suspended moments exemplify what Deleuze calls the "thinking image"—cinema as philosophy through affective delay. At the same time, Kore-eda's restraint enacts what Lehmann (2006) describes as postdramatic ethics: a refusal of narrative domination that opens space for the spectator's autonomy. The absence of climax is an ethical gesture, liberating both character and audience from the tyranny of resolution. The viewer's discomfort is not a failure of empathy but a reconfiguration of it. By withholding satisfaction, Kore-eda cultivates what Ahmed (2014) calls "critical emotion"—a form of feeling that resists closure and remains politically alive. This pedagogy of slowness and incompleteness responds to the affective acceleration of global media culture. In a world where emotion is commodified and immediacy fetishized, Kore-eda reclaims temporality as an ethical resource. His cinema demands time—time to look, to listen, to dwell. This temporality of care resonates with Tronto's (2013) ethics of care, which insists that moral life is sustained by attentiveness, responsibility, and responsiveness. Kore-eda's long takes, his devotion to the mundane, are cinematic enactments of that ethic. They transform spectatorship into an ethical practice of patience.

### 5.3 The Human and the More-Than-Human: Expanding the Ethical Horizon

One of the most profound implications of Kore-eda's cinema lies in its posthumanist reconfiguration of empathy. By extending affective agency to sound, weather, and objects, his films challenge the human-centered model of emotion. Bennett's (2010) theory of vibrant matter elucidates this shift: in acknowledging the liveliness of the nonhuman, we learn to feel across boundaries of species and substance. The yellow butterfly in *Still Walking* or the doll in *Air Doll* are not metaphors but collaborators in emotional communication. They remind us that to be ethical is to recognize the world's participation in feeling. This ecological dimension situates Kore-eda within a broader conversation about cinema and environmental ethics. The ambient soundscapes of his films—rain, wind, cicadas—redefine nature not as backdrop but as interlocutor. The natural world becomes a co-author of affect, dissolving the binary between human subject and external environment. In this sense, Kore-eda's realism is ecological: it acknowledges the continuity of being between humans and their material surroundings. His films suggest that ethical awareness arises not from transcendence but from immanence—from the quiet recognition that everything, even silence, is alive.

### 5.4 Future Directions and Theoretical Implications

This study has sought to articulate Kore-eda's poetics of anti-drama as both a formal and ethical revolution. Yet several avenues remain open for further inquiry. Comparative studies could situate Kore-eda within a transnational framework of slow cinema and postdramatic realism, linking his work to directors such as Tsai Ming-liang, Hou Hsiao-hsien, and Abbas Kiarostami. Future research might also explore the reception of Kore-eda's anti-dramatic style in global contexts—how non-Japanese audiences interpret the ethics of silence and incompleteness. Additionally, integrating cognitive film theory with affect studies could deepen understanding of how spectators internalize the temporal and emotional structures of Kore-eda's films. Ultimately, Kore-eda's cinema proposes an ethics of attentive coexistence. By externalizing inner life through material and acoustic phenomena, his films reveal that emotion is not a private possession but a shared vibration between beings. The anti-dramatic is not a withdrawal from feeling but its purification—a return to the elemental textures of sound, space, and time. Through silence, absence, and objecthood, Kore-eda teaches us to listen to the moral resonance of the everyday. His work stands as a quiet manifesto for a post-emotional humanity: one that feels less loudly, but more deeply.

## 6. Discussion

Kore-eda Hirokazu's anti-dramatic aesthetics not only reconfigures cinematic form but also rearticulates the human condition within late modernity. His films offer a laboratory for rethinking emotion as an ethical and epistemological structure. The subdued tones, suspended temporalities, and material resonances that define his work confront the contemporary subject's crisis of feeling—a crisis intensified by neoliberal acceleration and digital mediation. In this sense, Kore-eda's cinema performs what critical humanistic theory must increasingly pursue: the reclamation of affective depth in an age of affective overexposure. The post-emotional condition, as sociologists such as Illouz (2007) and Ahmed (2014) have described, marks



the commodification of emotion through media and market circulation. Kore-eda's refusal of spectacle and sentimentality stands as a counter-gesture to this emotional economy. His anti-dramatic form restores emotion's ethical dignity by slowing it down, by insisting on its incompleteness. In the absence of cathartic resolution, affect regains its critical thickness—it becomes something to think with, not to consume. This process aligns with Raymond Williams's (1977) notion of structures of feeling: the emergent forms through which societies register moral and historical change. Kore-eda's films thus serve as cinematic ethnographies of feeling, mapping how care, grief, and attachment persist amid the erosion of communal life.

From a broader humanistic standpoint, Kore-eda's aesthetics challenge the very boundaries of the human. His attention to nonhuman vitality—sounds, weather, objects—resonates with new materialist and posthumanist theories that seek to decenter the anthropocentric self (Bennett, 2010; Barad, 2012). Yet Kore-eda's posthumanism is distinctly humanistic in spirit: it does not erase human emotion but redistributes it, locating empathy in the interstices between beings. His films articulate a relational ontology of emotion, one that situates subjectivity within a network of co-affective forces. This vision extends the reach of humanistic ethics beyond sympathy toward what Haraway (2016) calls "response-ability"—the capacity to respond to more-than-human others.

The implications for critical humanistic theory are profound. In a cultural moment when the humanities are often pressed to justify themselves through instrumental value, Kore-eda's cinema demonstrates the critical necessity of slowness, ambiguity, and reflection. These are not aesthetic luxuries but ethical imperatives. The act of watching his films—waiting, listening, imagining the off-screen—becomes an education in moral perception. The viewer learns to inhabit uncertainty, to coexist with incompleteness, to feel responsibly. Such spectatorship enacts what Martha Nussbaum (2001) terms "the intelligence of emotion"—the idea that feeling is a mode of ethical reasoning. Kore-eda's anti-drama, therefore, models a form of aesthetic humanism grounded in vulnerability and attentiveness. In this light, the "post-emotional cinema" Kore-eda exemplifies should not be read as an abandonment of emotion, but as its philosophical renewal. It transforms the sensory experience of film into a mode of ethical critique, one that resists both emotional exhaustion and moral cynicism. By foregrounding silence, materiality, and incompleteness, Kore-eda reclaims emotion as a site of humanistic reflection—a way of thinking the world through the textures of care, loss, and impermanence. His cinema reminds us that the humanities' task is not merely to interpret meaning but to cultivate attention: to slow down, to listen, to feel ethically.

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# The Humanistic Expression of the Imagery of Flying Apsaras from Dunhuang in Contemporary Fashion Design

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**Abstract:** As a spiritual symbol and cultural emblem of ancient Chinese art, the Flying Apsaras (飞天) of Dunhuang encapsulate a synthesis of religious faith, aesthetic pursuit, and humanistic spirit. Centering on the artistic imagery of the Dunhuang Flying Apsaras, this paper explores its humanistic expression and spiritual continuity in contemporary fashion design from the perspective of cultural aesthetics. Employing methods of literature analysis and semiotic interpretation, the study systematically examines the religious symbolism, morphological language, and aesthetic philosophy embodied in Feitian art, revealing its transformation from religiosity to secularity and from divinity to humanism throughout history. The research argues that the aesthetic features embedded in the Flying Apsaras—such as the Aesthetics of Motion (动势美), Ethereal Artistic Conception (空灵意境), and the awakening of feminine spirituality—provide significant inspiration for contemporary designers to reconstruct Eastern Aesthetics and cultural confidence. Furthermore, this paper elucidates the contemporary pathways through which the Imagery of Flying Apsaras is visually translated and reinterpreted in modern design, emphasizing its practical value in bridging traditional art and modern fashion innovation. Ultimately, this study seeks to offer a new theoretical perspective and design approach for the creative transformation and cultural regeneration of traditional art in the modern era.

**Keywords:** Dunhuang Flying Apsaras; Cultural Imagery; Humanistic Expression; Eastern Aesthetics; Fashion Design

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## 1.Introduction

### 1.1 Research Background

Dunhuang, located at a strategic point on the ancient Silk Road, served as a vital hub for exchanges between Eastern and Western civilizations and stands as one of the greatest treasures of ancient Chinese art. The murals of the Mogao Caves are renowned for their grand artistic scale, profound religious spirit, and exquisite craftsmanship, among which the image of the Flying Apsaras is particularly remarkable. As one of the most representative symbols of Dunhuang art, the Flying Apsaras embody a synthesis of Buddhist faith, Eastern philosophy, and humanistic spirit<sup>[1]</sup>. Since the excavation of the Mogao Caves, the image of the Flying Apsaras has evolved across more than ten dynasties and over a thousand years, transforming from the original celestial musicians (伎乐神祇) into a symbol that carries the beauty of Eastern femininity and humanistic ideals<sup>[2]</sup>. With the rise of contemporary cultural consciousness and the revival of national aesthetics, the artistic value of the Flying Apsaras has regained renewed attention. An increasing number of scholars and designers have drawn inspiration from traditional culture, and the incorporation of Dunhuang artistic elements into sportswear and fashion design has gradually

become a new research direction<sup>[3]</sup>. The “Beauty of the Flying Apsaras” has thus been reinterpreted as an artistic symbol that harmonizes classical aesthetics with modern sensibilities. The Feitian is no longer merely a carrier of religious belief, but rather an important emblem of Eastern spirituality and cultural confidence in contemporary visual culture and fashion design. Existing research suggests that the “Rebirth” of the Flying Apsaras does not represent a continuation of religious worship but rather a transformation from divinity to humanism, in which the Aesthetics of Motion ( 飞动之美 ) embodies the dynamic vitality characteristic of Chinese art<sup>[2]</sup>. Other studies note that the serenity and ethereality of the Flying Apsaras reflect the integration of Buddhist cosmology with the traditional Chinese philosophy of “The unity of heaven and humanity” ( 天人合一 )<sup>[1]</sup>. These aesthetic traits not only demonstrate the artistic depth of the Flying Apsaras but also provide valuable spiritual resources for the cultural innovation of traditional art in contemporary society.

Therefore, examining the cultural imagery and humanistic expression of the Dunhuang Flying Apsaras from the perspective of fashion design not only helps to reveal the mechanisms of traditional art’s regeneration in the modern context but also offers new theoretical and practical directions for the contemporary expression of Eastern aesthetics. By reinterpreting the Feitian’s visual forms, chromatic systems, and morphological language, designers can reconstruct the aesthetic value of the Eastern spirit within modern design discourse, transforming traditional culture from a visual symbol into a vehicle of humanistic meaning. This integration of historical tradition and contemporary design thinking not only promotes the innovative development of traditional art but also provides valuable reference for constructing fashion expressions rooted in Eastern aesthetic characteristics.

## 1.2 Research Status

The art of the Dunhuang Flying Apsaras represents a quintessential synthesis of ancient Chinese religious art and Eastern aesthetic philosophy. Scholars in China generally agree that its aesthetic essence lies in the unity of “Movement and stillness” ( 动与静 ) and “Form and spirit” ( 形与神 ). The rhythmic linearity of the Feitian’s form embodies the Buddhist ideal of “Emptiness and harmony” ( 空寂与圆融 ), expressing a transcendence of the material world<sup>[1]</sup>. The theory of the “Rebirth of the Flying Apsaras” further posits that the Feitian image has transcended the singular meaning of a religious icon to become a universal symbol of human spirituality and faith<sup>[2]</sup>. These academic achievements have provided philosophical and religious foundations for understanding the spiritual dimensions of the Feitian, deepening insight into its aesthetic connotations and symbolic meanings, and illuminating the integration of religious faith and humanistic spirit. They have also laid a solid groundwork for subsequent interdisciplinary research<sup>[4]</sup>. However, most existing studies focus primarily on theoretical explorations from the perspectives of religion and aesthetics, while research on the morphological language and visual design characteristics of the Flying Apsaras remains relatively insufficient.

In terms of morphological features, scholars have primarily explored the visual language and formal aesthetics of Dunhuang’s Flying Apsaras. Morphological analysis of Tang dynasty representations reveals that the Feitian often features S-shaped curves and composite dynamics characterized by “Torso rotation and fluttering ribbons” ( 身体回旋 — 衣带飞动 ), whose aesthetics of movement and sense of flowing lines exhibit pronounced rhythmic vitality and structural tension, providing important inspiration for modern fashion silhouette design<sup>[5]</sup>. From a visual design perspective, the Feitian is characterized by “Graceful lines, symmetrical structure, and bright colors,” which align with modern aesthetic sensibilities. The dynamic interplay of body posture, ribbon trajectories, and flowing background motifs conveys the beauty of “Motion within stillness and rhythm within motion” ( 静中有动、动中生韵 ), reflecting the unique rhythmic quality of Eastern art<sup>[6]</sup>. Together, these studies reveal the gradual transformation of the Feitian from a religious symbol to an artistic expression, and from spiritual iconography to design semantics, providing a theoretical foundation for the semantic extension of traditional artistic elements in contemporary design. However, there remains a lack of systematic investigation into the mechanisms of cultural semantic transformation and the innovative application of the Feitian motif in modern design.

In the contemporary era of rapid digital advancement, scholars have begun to reexamine Dunhuang art through the lens of cross-media innovation and design technology. The digitalization and creative reconstruction of Dunhuang motifs have emerged as new research hotspots. As shown in Figure 1, some researchers have utilized three-dimensional virtual modeling techniques to integrate the Feitian image into digital fashion design, establishing an innovative chain of “Traditional art—

digital media–fashion design”<sup>[7]</sup>. Meanwhile, through analysis of the attire and patterns of donor figures (供养人服饰纹样), researchers have uncovered connections between ancient aesthetic systems and sociocultural contexts, providing a theoretical foundation for reinterpreting Dunhuang design elements<sup>[8]</sup>. International and cross-media studies often focus on digital humanities and virtual reconstruction, employing 3D modeling and algorithmic visualization to recreate the “Beauty of the Feitian” in virtual space, thus achieving the transformation of traditional art from physical heritage to digital regeneration<sup>[9]</sup>. Moreover, digital reconstruction not only preserves the formal characteristics of Dunhuang art but also establishes a dialogic mechanism between ancient and modern aesthetics, offering an operable pathway for the redesign and cultural renewal of traditional patterns<sup>[10]</sup>.

In summary, domestic research tends to emphasize the spiritual symbolism and visual form of the Flying Apsaras, while international scholarship focuses on its digital preservation and cross-media dissemination. Together, these studies have laid an academic foundation for the continuous renewal of the Feitian motif within the fields of cultural creativity and fashion design, providing both theoretical support and practical inspiration for this study.

*Figure 1 Virtual Clothing Effect - Ma Xintian (2022)*



### 1.3 Research Purpose and Significance

This study takes the cultural imagery of the Dunhuang Flying Apsaras (敦煌飞天文化意象) as its core focus, exploring the interaction between humanistic spirit and fashion aesthetics. By analyzing the religious symbolism, aesthetic philosophy, and morphological language embedded in Feitian art, the research aims to reveal how these elements are reinterpreted and visually represented in contemporary fashion design, thereby demonstrating the humanistic continuity and aesthetic innovation of traditional culture in a modern context.

Previous studies have primarily examined the spiritual connotations and formal characteristics of the Dunhuang Flying Apsaras from the perspectives of art history, religious studies, and form aesthetics, emphasizing the philosophical unity of “Movement and stillness” (动与静) and “Form and spirit” (形与神), as well as the symbolic meaning of Buddhist culture. However, these studies largely remain at the level of theoretical interpretation, lacking in-depth exploration of how the imagery of the Flying Apsaras can be systematically integrated into contemporary design practice and visual communication contexts. While some scholars have attempted to apply Dunhuang elements to clothing patterns or digital modeling, most efforts focus on morphological reproduction rather than on the interpretive and innovative expression of the Feitian’s cultural spirit within contemporary fashion design.

The objectives of this study are as follows: (1) To approach the subject from the perspective of cultural aesthetics and design integration, focusing on the continuity and contemporary reinterpretation of the Feitian’s humanistic spirit, thereby bridging the existing gap between spiritual analysis and design practice; (2) To systematically explore the modern transformation pathways of the Feitian image in terms of silhouette, line, color, and structure, based on its visual morphology and fashion design semantics, offering actionable design strategies for integrating traditional art into fashion design; (3) To examine,



from the standpoint of digital media and cultural communication, the mechanisms through which the cultural imagery of the Feitian is regenerated within new media and global fashion contexts, and to explore how Eastern aesthetics can be expressed in a contemporary manner.

The significance of this study lies not only in extending the academic discourse of Dunhuang art but also in constructing a cultural framework that integrates traditional Chinese art with modern design. By recontextualizing the classical image of the Flying Apsaras within contemporary design discourse, this research seeks to promote the creative transformation and innovative development of traditional art, allowing the “Beauty of the Feitian” to regain vitality and spiritual resonance in the cultural landscape of the new era. At the same time, the findings of this study are expected to provide valuable insights for the cultural and creative industries, fashion design education, and digital heritage preservation, carrying both theoretical research value and practical applicability.

## 2.The Origin and Spiritual Connotations of Dunhuang Feitian Cultural Imagery

### 2.1 The Origin and Artistic Evolution of the Flying Apsaras

The image of the Flying Apsaras originated from the Indian Buddhist figures Gandharvas (乾闥婆) and Apsaras (伎乐天). As Buddhism spread eastward into China, the image gradually underwent Sinicization under the influence of Central Plains culture. By the Northern Wei and Western Wei dynasties, the Feitian had developed into an independent artistic form, reaching its aesthetic peak during the Sui and Tang dynasties<sup>[11]</sup>.

As shown in Figure 2, the Flute-playing Flying Apsaras (吹笛飞天) of Cave 158 and the Flower-scattering Flying Apsaras (散花飞天) of Cave 320 at the Mogao Caves are representative masterpieces of Feitian art. The compositions vividly capture the rhythmic interplay between the figures' postures and the flowing lines of their ribbons, creating a strong sense of movement and elegant dynamism. This juxtaposition of “Fluidity and serenity” embodies the aestheticized vision of the Buddhist concept of the “Realm of emptiness and tranquility” (空灵之境).

The form of the Flying Apsaras is not merely a visual manifestation of religious belief but also a symbol of the ascension of life and the transcendence of the spirit. Their graceful, floating gestures and fluid, elegant lines express humanity's yearning for freedom and its pursuit of transcendence beyond worldly constraints, symbolizing the aesthetic ideal of ascending from the earthly realm toward a spiritual paradise.

*Figure 2: Flute Flute Soaring in Cave 158 of Mogao Cave*



### 2.2 The Aesthetics of Movement and Eastern Aesthetic Philosophy

Scholarly research has pointed out that “Movement” (飞动) in the art of the Flying Apsaras is not merely a visual form but also a spiritual symbol—an emblem of the soul's ascension and the freedom of the mind<sup>[2]</sup>. In Buddhist thought, the act of dance symbolizes the liberation of all beings from suffering and their journey toward nirvana (涅槃); while in the broader

context of Chinese philosophy, this movement embodies the pursuit of harmony between heaven and humanity and the ideal of spiritual transcendence<sup>[12]</sup>.

In Tang dynasty depictions of the Feitian, the fluttering ribbons, graceful curves, and swirling spatial compositions convey a vivid sense of rhythmic dynamism within motion. The painters of the Tang period skillfully expressed this rhythmic beauty of lines in motion through the rise and rotation of the ribbons, successfully creating a sense of airflow space, which serves as a visual manifestation of the concept of qi (气)—the vital energy fundamental to Chinese aesthetics<sup>[13]</sup>.

The ribbons and dance gestures of the Flying Apsaras thus serve as a concrete embodiment of this aesthetic spirit. Through fluid lines, light and graceful postures, and elegant rhythm, the Feitian achieve a perfect harmony between “Motion and stillness” and between “Form and spirit”, revealing the poetic sensibility and vital imagery characteristic of Eastern art. Therefore, the Aesthetics of Movement is not only a formal feature but also a profound cultural metaphor—it symbolizes the cosmological spirit of “Heaven’s vitality is ever vigorous” (天行健) and “Ceaseless generation and renewal” (生生不息) in Eastern philosophy, making the Dunhuang Flying Apsaras a quintessential symbol of Eastern aesthetics.

### 2.3 Serenity and Ethereality: The Spiritual Dimension of Buddhist Aesthetics

The spiritual connotation of the Dunhuang Flying Apsaras murals is primarily embodied in the dual aesthetic concepts of serenity and ethereality that characterize Buddhist aesthetics. As studies have suggested, serenity originates from the meditative tranquility cultivated in Zen practice (禅宗修行), symbolizing the pursuit of inner liberation and spiritual composure; while ethereality reflects the transcendental aesthetic ideal in Buddhist and Daoist thought—an aspiration toward purity, detachment, and spiritual freedom beyond the material world<sup>[1]</sup>.

As shown in Figure 3, the Flying Apsaras depicted in Mogao Cave 321 often appear with gently closed eyes and serene smiles, their postures light and graceful, expressing a sense of calm beauty that transcends religious devotion to embody a humanistic spirit (人文精神) of peace and gentleness.

Figure 3 Dunhuang Mogao Caves Cave 321



This transformation in aesthetic perspective enabled the Flying Apsaras to transcend their purely religious functionality and become a universal symbol of humanity’s spiritual aspiration. Research has pointed out that the “Rebirth” (再生) of the Feitian is essentially a process of the secularization and humanization of religious imagery, reflecting the eternal vitality of art itself<sup>[2]</sup>.

### 3.The Female Image and Humanistic Symbolism in the Flying Apsaras

#### 3.1 From Divinity to Humanity: The Evolution of the Female Image

In the history of art, the Dunhuang Flying Apsaras are not only incarnations of divine beings but also aesthetic symbols of the female image. The early Apsaras primarily served as figures of religious devotion and offerings, whereas by the Tang dynasty, the Feitian had evolved to embody qualities of independence, confidence, and resilience that characterize the feminine spirit<sup>[8]</sup>.

Morphological analysis of the High Tang period Feitian reveals that their characteristic postures often feature S-shaped curves and composite dynamics defined by torso rotation and fluttering ribbons ( 躯干回旋 — 衣带飞动 ). Their figures are full and rounded, their lines smooth and flowing, while the intricate details of their hairstyles and garments reflect the aesthetic preferences and cultural sensibilities of Tang society<sup>[5]</sup> (see Figure 4).

*Figure 4: South Wall of Cave 320 at Mogao Caves*



The image of the Flying Apsaras during this period was endowed with increasingly humanized characteristics. They were no longer depicted merely as attendants serving the Buddha but instead as symbols of self-awareness and individual spiritual autonomy. This transformation from divinity to humanity marks a crucial spiritual turning point in the aesthetic representation of women in ancient Chinese art.

#### 3.2 Spirituality and Softness: The Feminine Dimension of Humanistic Aesthetics

In modern design, the imagery of the Flying Apsaras embodies an aesthetic value of soft power—expressing feminine spirituality and inner strength through the interplay of line and flow<sup>[1]</sup>. The beauty of the Feitian arises not only from their visual lightness and ethereal movement but also from the spiritual tension they contain—a philosophical aesthetic of “Gentleness overcoming strength”.

Scholars have further emphasized that the Flying Apsaras symbolize the spiritual freedom of Eastern women, representing an essential motif in the transcendence of the human spirit<sup>[4]</sup>. This feminine symbolism transcends gender boundaries, evolving into a synthesis of spirituality and humanity, serving as an archetype of aesthetic and cultural integration that continues to inspire contemporary artistic creation.

#### 3.3 The Humanistic Symbolism of the Female Feitian Image

The graceful movements and serene smiles of the Flying Apsaras express not only feminine beauty but also humanity’s aspiration toward an ideal world. The Feitian’s visualization of the “Pure Land” ( 极乐世界 ) serves as an artistic metaphor for inner peace and spiritual purification. In this humanistic context, the Flying Apsaras are no longer merely “Sacred dancers” but have become “Humanistic flyers” ( 人文的飞翔者 )—representing humanity’s faith in goodness and beauty, as well as the longing to transcend worldly limitations.

Recent studies have pointed out that the reapplication of Dunhuang mural art in contemporary fashion design is not simply a formal reproduction of traditional motifs but an act of cultural awakening and spiritual inheritance. Through fashion as



a medium, the art of the Flying Apsaras has been reintroduced into modern life in an accessible form, evoking a sense of cultural identity and national confidence while highlighting the enduring spiritual strength of Eastern art<sup>[14]</sup>.

The agility, transcendence, and serenity of the Feitian woman have become emblematic symbols connecting traditional culture with modern humanistic values. In contemporary fashion design, this imagery is frequently reinterpreted through ribbon-like silhouettes, light gauze materials, and flowing linear compositions, forming a poetic visual metaphor for the spiritual essence of Eastern femininity<sup>[15]</sup>.

## 4. The Visual Language and Fashion Aesthetic Transformation of the Flying Apsaras

### 4.1 Color Imagery: The Resonance of Spirit and Vision

The color system of the Dunhuang murals is composed primarily of high-purity mineral pigments, creating a visual language imbued with sacred luminosity. Vermilion (朱红) symbolizes flame and light, signifying wisdom and salvation; azurite (石青) and malachite green (石绿) symbolize life and tranquility, evoking an ideal realm beyond the mundane world.

In contemporary fashion design, this chromatic system has been reconstructed: designers reinterpret the Feitian color palette through high-saturation warm-cool contrasts and mineral tonalities, reestablishing its visual logic while transforming the symbolic brightness and mystery of mural hues into modern aesthetic expressions. This color innovation retains the tactile qualities of traditional pigments while reflecting the spiritual vitality and transcendence embodied in the “Feitian Spirit” (飞天精神)<sup>[16]</sup>.

The aesthetic features of Dunhuang colors—high saturation, strong contrast, and harmonious unity—interweave symbolic meanings from both Buddhist doctrine and natural philosophy. For example, as shown in Figure 5, the Hanfu brand Shisanyu (十三余) extracted a tri-color combination of red, turquoise, and white from the Flying Apsaras of Cave 320 for its “Feitian Series.” Through the lustrous sheen of silk, the brand enhances visual layering and imbues traditional hues with renewed fashion semantics, achieving a dialogue between historical elegance and modern sensibility.

Figure 5: Over Thirteen Hanfu Brands’ “Flying Sky Series”



### 4.2 Imagery and Line: The Poetics of Dynamic Structure

The visual essence of the Flying Apsaras lies in the movement of lines. The distinctive charm of Chinese art is found in the principle of “Depicting form through lines” (以线写形), where the fluidity of line conveys the rhythm of life itself<sup>[12]</sup>. In the Dunhuang murals, the ribbons, long sleeves, and cloud motifs of the Feitian interweave to form a network of dynamic momentum, imbuing the compositions with an aesthetic quality of “Motion within stillness and rhythm within movement” (静中有动、动中有韵)<sup>[17]</sup>.

Modern fashion designers reinterpret this imagery through forms such as streamlined structures and encircling curves, translating the flowing ribbon lines into the contours of skirts, shoulders, or waists to evoke a visual perception of “The garment moving with the wind” (风动衣随). As shown in Figure 6, in ZIFEI WANG’s Autumn/Winter 2025 collection “Dust and Shadow” (尘沾影覆), this design approach vividly embodies the dynamic rhythm of the Feitian.

These flowing lines not only reproduce the physical beauty of the Flying Apsaras' form but also embody the aesthetic conception of balance between void and fullness rooted in Eastern philosophy. The interplay of lineal movement, spatial blankness, and compositional rhythm collectively constructs a poetic visual structure in which the work achieves spiritual equilibrium and tension between motion and stillness.

This structural beauty is not merely a formal language of Feitian art but also an enduring source of inspiration for contemporary fashion design. By reimagining the relationship between line and space, designers can extend the lively rhythm and spiritual grace of the Flying Apsaras into modern garments, thereby realizing a contemporary expression of traditional aesthetic spirit.

Figure 6: ZIFEI WANG 2025FW "Dust-Touched Shadow Cover"



### 4.3 Digital Reconstruction of Patterns and Motifs

The digital deconstruction of Dunhuang motifs is a crucial approach to the modern reinterpretation of traditional art<sup>[18]</sup>. Through digital scanning and vector-based modeling, researchers modularize the mural motifs of lotuses ( 莲花 ), clouds ( 云气 ), and scroll patterns ( 卷草 ), enabling their reappearance in textile prints and garment surface design.

This technology not only preserves the aesthetic charm of hand-painted craftsmanship but also establishes an innovative chain that links "Traditional patterns – algorithmic generation – fashion design." Through the coordinated application of high-resolution scanning, vector modeling, and parametric algorithms, designers are able to recreate these motifs while honoring the original artistic spirit of Dunhuang.

Digital reconstruction transforms the Flying Apsaras from static historical relics into a reconfigurable, regenerative, and transmissible visual language. It expands the expressive potential of traditional art and provides a sustainable pathway for its cultural renewal and long-term development.

## 5. The Humanistic Regeneration and Global Dissemination of the Feitian Cultural Imagery

### 5.1 From Religious Art to Humanistic Narrative

The modern dissemination of the Feitian imagery embodies a shift from religious symbolism to humanistic narrative. Studies have noted that this transformation essentially constitutes a "Reproduction of the classics", in which both art criticism and public aesthetics propel the Feitian's evolution from a religious icon into a cultural symbol<sup>[3]</sup>.

In contemporary design contexts, the Feitian is no longer treated as a Buddhist decorative element but as a visual emblem of Eastern spirituality and national identity. Its humanistic value is reflected in the integrated expression of freedom ( 自由 ), goodness ( 善 ), and spirituality ( 灵性 )—qualities that closely align with the modern pursuit of individualization and inner



expression in design.

## 5.2 Cultural Innovation within the “New Chinese Style” Context

Research indicates that the essence of New Chinese Style design lies in reconstructing traditional symbols through modern methods. Dunhuang decorative motifs have thus become exemplary models of cultural regeneration<sup>[19]</sup>.

Further studies point out that caisson patterns (藻井纹样), with their symmetrical structures and symbolic connotations, are reinterpreted in contemporary fashion as visual signs of philosophical beauty. For instance, the “Double Dragon Lotus” (双龙莲花) motif symbolizes the balance of yin and yang and the cyclical nature of life<sup>[20]</sup>.

These design practices demonstrate that the Feitian culture and its associated motifs are not merely decorative languages but embodied forms of cultural spirit. Through modern design expression, they have become vital cultural bridges for presenting Eastern aesthetics on the global stage.

## 5.3 International Communication and Cultural Soft Power

The explorations of Aurel Stein first introduced Dunhuang art to Western academia, initiating international scholarly exchanges in Buddhist art<sup>[21]</sup>. The global dissemination of the Feitian image has since demonstrated the cross-cultural resonance of Dunhuang art.

Today, Feitian imagery frequently appears in international brand collaborations, fashion week runways, and digital art exhibitions, becoming an important medium for expressing the spirit of Chinese art. This cross-disciplinary dissemination of “Feitian aesthetics” allows the Eastern artistic spirit to enter the global visual vocabulary of fashion. It not only affirms cultural confidence but also promotes humanistic empathy across cultures, revitalizing traditional art through contemporary modes of expression and ensuring its continual rebirth.

## 6. Contemporary Value: Spiritual Revival and Humanistic Resonance

The contemporary expression of the Feitian cultural imagery represents not merely a formal replication but a spiritual revival. The innovative application of Dunhuang art constitutes, in essence, a process of reawakening national spirit and cultural identity<sup>[14]</sup>.

The artistic elements of the Dunhuang murals provide new inspiration for modern fashion design. The creative reinterpretation of their forms and meanings enriches design language while advancing the contemporary expression of traditional culture<sup>[22]</sup>. On a practical level, the rebirth of Dunhuang patterns through modern techniques—in their curves, colors, and ornamental structures—embodies the fusion of traditional aesthetics and modern design concepts.

In an era defined by fast-paced globalization, the imagery of the Flying Apsaras—with its serenity, ethereality, and motion—offers spiritual solace to the modern individual. It symbolizes humanity’s enduring quest for freedom and transcendence—where “Flight” represents not only physical movement but the liberation of the soul.

Through creative reinterpretation, designers reconstruct the balance between spirituality and beauty on a visual level and achieve the contemporary articulation of cultural memory on a symbolic level. The Feitian stands as a paradigm of the rebirth of Dunhuang art—its renewal embodies the secularization and humanization of religious art, reflecting not only an artistic phenomenon but also a psychological awakening of society.

The Dunhuang Flying Apsaras have thus become a cultural bridge connecting past and future, symbolizing the pathway through which Chinese aesthetics journey from tradition toward global dialogue.

## Conclusion

The Dunhuang Flying Apsaras represent not only the sacred essence of ancient religious art but also a cultural symbol embodying Eastern aesthetic philosophy and humanistic thought. Centered on Feitian art, this study explored the interaction between cultural imagery and fashion design, analyzing its reinterpretation and transformation within a contemporary context. Findings reveal that throughout history, the Feitian imagery has undergone a transformation from religious symbolism to humanistic narrative. Its characteristics—dynamic beauty, ethereal charm, and feminine spiritual awakening—serve as major sources of inspiration for designers reconstructing Eastern aesthetics in modern fashion.

In contemporary practice, the revival of Feitian imagery manifests not only as a formal reference but also as a continuation of

spiritual essence. By reinterpreting elements such as line, color, and motif, designers revitalize Dunhuang art within modern garments. This fusion of tradition and modernity embodies the awakening of cultural confidence and highlights the unique expression of Eastern art within the global fashion system.

Ultimately, this study seeks to provide a feasible pathway for the contemporary expression of traditional art. The modern reinterpretation of the Dunhuang Feitian signifies not just an aesthetic innovation but a response to cultural identity and spiritual aspiration. Future research may further integrate digital technologies and global dissemination perspectives to explore how traditional art continues to sustain its vitality across broader cultural contexts—allowing the “Beauty of the Flying Apsaras” to become a visual language linking history and modernity, East and West.

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# Re-propagation of Traditional Culture and Public Opinion Construction on Digital Platforms: A Case Study of “Guochao Narratives” in Short Videos

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**Abstract:** This study systematically investigates the re-propagation of Chinese traditional culture through “Guochao” (national trend) narratives within the algorithmic public sphere of short video platforms. Traditional culture is being recontextualized and disseminated primarily via mobile, visually-driven content. The study utilizes theoretical frameworks encompassing Mediatized Narrative, Framing Theory, and the Algorithmic Public Sphere. A mixed-methods approach, combining qualitative content analysis of popular Guochao short videos with contextual analysis of platform engagement metrics, was employed. Findings indicate that a strategic, low-context narrative framing is consistently utilized. This framing emphasizes national pride, aesthetic modernity, and emotional resonance. These elements are demonstrably favored by platform recommendation algorithms. Consequently, the platforms do not function merely as neutral conduits; rather, they actively co-construct a public opinion characterized by high emotionality, rapid consensus formation, and a recurring tension between cultural appreciation and commercial superficiality. This analysis highlights both the unprecedented opportunities for cultural reach and the intrinsic challenges presented by algorithmic mediation in the digital cultural landscape. The findings bear significant implications for cultural policy and digital content governance.

**Keywords:** Guochao; Short Video; Algorithmic Public Sphere; Public Opinion Construction; Traditional Culture Repropagation; Mediatized Narrative

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## 1.Introduction

### 1.1 The Digital Shift in Cultural Dissemination

The advent of digital platforms has fundamentally altered the landscape of cultural communication. Traditional cultural products and practices, once preserved through established institutional channels, are now subject to the pervasive logic of the digital attention economy. The rapid proliferation of short video platforms, such as Douyin (TikTok) and Kuaishou, represents a profound shift. These platforms are defined by their characteristic features: brevity, immersive visuality, high interactivity, and, critically, algorithmic governance. In China, this digital transformation has given rise to the phenomenon known as “Guochao” (National Trend). Guochao is understood as the contemporary interpretation, commercialization, and fashioning of traditional Chinese cultural elements. This trend encompasses a wide array of content, including modernized Hanfu (traditional attire), national brand collaborations, neo-classical architecture, and reinterpreted folklore. Short videos

have become the dominant medium for the articulation and dissemination of these Guochao narratives<sup>[1]</sup>.

## 1.2 Problem Statement: Algorithmic Mediation and Narrative Co-construction

The re-propagation of traditional culture in this environment raises crucial academic questions. When traditional culture is mediated by a highly commercial and attention-driven technological infrastructure, its core meanings are inevitably transformed. Algorithmic recommendation systems dictate the visibility and reach of cultural content. This technological layer acts as a powerful, yet often opaque, gatekeeper, shaping the collective cultural experience<sup>[2]</sup>. It is currently unknown how the intrinsic logic of short video platforms—specifically, the prioritization of engagement metrics—influences the framing of traditional cultural narratives. The process through which content creators blend high-context cultural heritage with low-context digital storytelling remains under-investigated. Furthermore, the resulting public discourse, which forms the public opinion around Guochao, must be analyzed not as a spontaneous user response, but as a direct outcome of algorithmic amplification. Therefore, this study seeks to dissect the co-construction process involving content creators, platform affordances, and the audience, which together build the prevailing cultural discourse.

## 1.3 Research Significance

This research offers contributions across both theoretical and practical dimensions. Theoretically, this study extends the applications of Mediatized Narrative Theory. It is demonstrated how the technological constraints of the short video format impose specific structural requirements on the re-telling of complex cultural histories. The findings also enrich the understanding of the Algorithmic Public Sphere. The active role of algorithms in shaping cultural taste and promoting specific emotional frames is empirically highlighted, moving beyond the simplistic notion of an algorithm as a mere delivery mechanism. Practically, the findings provide critical insights for cultural policy and governance. An understanding of which narrative frames are algorithmically favored is essential for designing policies that encourage the dissemination of culturally deep, rather than merely commercially popular, content. Recommendations are provided for content creators seeking to balance engagement with authenticity<sup>[3]</sup>.

## 1.4 Research Questions

This study aims to answer the following specific research questions (RQs):

RQ1: How is traditional culture strategically re-framed within Guochao short video narratives, and what are the most prevalent thematic and aesthetic frames utilized?

RQ2: How do platform algorithmic mechanisms (e.g., recommendation and engagement features) influence the selection, amplification, and visibility of specific Guochao narratives and their associated frames?

RQ3: What is the resulting structure and emotional tenor of the public discourse (public opinion) constructed around high-visibility Guochao content, particularly concerning the tension between cultural value and commercialization?

# 2. Literature Review and Theoretical Framework

## 2.1 The Mediatized Narrative and Short Video Affordances

### 2.1.1 Defining Mediatization of Culture

The concept of Mediatization posits that media processes are not external to social and cultural life but are deeply embedded within them, reshaping institutions and practices. In the cultural sphere, mediatization refers to how the inherent logic, technologies, and affordances of a dominant medium influence the way culture is produced, stored, and experienced. Traditional culture, when entering the digital space, is subjected to this process<sup>[4]</sup>.

### 2.1.2 Short Video Constraints and Narrative Adaptation

Short video platforms present unique affordances and constraints that dictate narrative form. Brevity is paramount; narratives must be condensed into segments often less than sixty seconds. This constraint necessitates a low-context encoding of high-context cultural knowledge. Complex histories or philosophical meanings must be replaced by immediately recognizable symbols, strong visual hooks, and rapid emotional arcs. This shift is evident in the prevalence of formats such as the “transformation reveal” (e.g., modern clothing to Hanfu) or the dramatic micro-demonstration of a traditional craft<sup>[5]</sup>. The narrative structure is thus characterized by immediacy and spectacle, driven by the technical requirement of maximizing the viewer’s “completion rate.” Consequently, cultural depth is often exchanged for narrative efficiency.



### 2.1.3 The Visual Economy

Short videos are inherently visual and auditory. The production values—including editing speed, music selection (often blending traditional melodies with contemporary electronic beats), and high-definition cinematography—are critical to engagement. The narrative must communicate through imagery rather than lengthy exposition. This visual economy requires that traditional symbols (e.g., the silhouette of a pagoda, the brushstroke of calligraphy) are rendered as highly aesthetic, immediately consumable content, ensuring that the culture is seen as contemporary and aspirational<sup>[6]</sup>.

## 2.2 Framing Theory and Cultural Interpretation

### 2.2.1 Core Concepts of Framing

Framing Theory, as originally outlined by Goffman and later applied to media analysis by Entman (1993), suggests that reality is socially constructed. Frames are essentially “principles of selection, emphasis, and exclusion” used by communicators to organize discourse and guide audience interpretation. When traditional culture is framed, certain aspects are highlighted (e.g., the beauty, the fun, the national link) while others are downplayed (e.g., the historical context, the commercial motives)<sup>[7]</sup>.

### 2.2.2 Prevalence of Affective and Identitarian Frames

In the Guochao context, two dominant frame types are employed: Affective Frames and Identitarian Frames. Affective frames prioritize emotional responses over rational analysis. Guochao content frequently utilizes themes of nostalgia (a wistful longing for a past aesthetic) or awe/pride (a sense of national accomplishment)<sup>[8]</sup>. The explicit goal is to elicit immediate emotional approval, which translates directly into the platform’s desired engagement metrics (likes, shares). Identitarian frames, conversely, focus on group belonging and cultural continuity. The National Pride Frame is widely utilized, positioning Guochao as an embodiment of China’s cultural resurgence and strength. Viewing and sharing Guochao content becomes an act of expressing cultural confidence. This framing is potent because it merges personal consumption habits with a collective sense of heritage. Furthermore, the Innovation/Modernity Frame is used to counter the perception of tradition as stagnant, asserting that heritage is a dynamic source for contemporary creativity<sup>[9]</sup>.

### 2.2.3 The Commercialization Frame Tension

A critical tension exists around the Commercialization Frame. While the entire Guochao movement is inextricably linked to consumption (clothing, cosmetics, food), narratives often seek to foreground the cultural value while obscuring the commercial impetus<sup>[8]</sup>. This dichotomy generates significant public opinion fragmentation. Audiences debate whether the “revival” is genuine cultural appreciation or merely the commodification of national symbols for profit, a debate often played out within the platform’s comment sections<sup>[10]</sup>.

## 2.3 The Algorithmic Public Sphere and Attention Economy

### 2.3.1 Algorithms as Gatekeepers

The Algorithmic Public Sphere concept argues that digital discourse is no longer governed by human editors or traditional media owners but by algorithmic systems. These systems act as powerful gatekeepers, determining which cultural information is prioritized and which voices are amplified<sup>[11]</sup>. The algorithm’s primary objective is the maximization of user engagement, which directly correlates with advertising revenue. This technological mandate overrides the traditional public sphere ideals of rational-critical discourse.

### 2.3.2 Algorithmic Bias toward Affective Content

Research suggests that recommendation algorithms exhibit a measurable bias toward affective and sensational content. Videos that trigger strong emotional reactions (e.g., intense pride, excitement, or outrage) are more likely to generate comments and shares, signaling high engagement to the algorithm<sup>[12]</sup>. In the context of Guochao, this means that narratives using the National Pride Frame and maximizing aesthetic spectacle are algorithmically favored and amplified exponentially. This preference risks creating an “emotional echo chamber,” where only the most sensationalized or emotionally polarized cultural content receives widespread visibility. Subtler, more nuanced forms of cultural preservation or critique are systematically marginalized<sup>[13]</sup>.

### 2.3.3 The Co-construction of Public Opinion

In this sphere, public opinion is not organically formed but is co-constructed by three principal factors:

Creator Strategy: Deliberately using highly engaging, low-context narrative frames.

Platform Logic: The algorithm rewarding content based on engagement metrics.

Audience Feedback: Users supplying the emotional data (likes, comments) that fuels the algorithm.

The resulting public opinion, or cultural discourse, is therefore a technologically mediated artifact, characterized by rapid consensus around certain emotional frames and a fleeting attention span.

3.Research Methodology

3.1 Research Design and Scope

A mixed-methods approach was adopted for this investigation, combining qualitative content analysis of the video texts with quantitative and qualitative contextual analysis of engagement data. This approach allows for a robust linkage between the creative production (narrative frames) and the platform’s distributive effects (algorithmic amplification and public opinion structure)<sup>[14]</sup>. The study focused on content generated on Douyin, the leading short video platform in China, given its dominance in cultural content dissemination and its sophisticated recommendation architecture.

3.2 Sampling Procedure

A purposive, stratified sample of 100 Guochao-themed short videos was selected. The sampling criteria were established as follows:

- Platform: Videos published exclusively on Douyin between January 2024 and June 2025.
- Topic/Hashtag: Inclusion required the use of core Guochao-related hashtags or appearing on Douyin’s official “Cultural Trend” topic page.
- Engagement Threshold: Only videos that surpassed one million views and ten thousand comments were selected. This criterion ensured the analysis was focused on content that had already been significantly amplified by the platform’s algorithm, thus representing the established, high-visibility discourse.
- The final sample included a diversity of content creators (official cultural institutions, MCN-affiliated influencers, and independent users) and genres (fashion, crafts, food, micro-drama).

3.3 Content Analysis Coding Scheme

A detailed coding scheme was developed and applied by two independent coders. Inter-coder reliability was established at an average Cohen’s Kappa of K=0.85, confirming the robustness of the coding instrument. Key coding variables included:

Table 1: Content Analysis Coding Scheme

| Variable                  | Operational Definition   | Measurement   |
|---------------------------|--|---|
| Cultural Symbol Used      | Primary traditional artifact or practice featured.   | Categorical (e.g., Hanfu, Porcelain, Calligraphy, Opera)  |
| Narrative Structure       | Method of storytelling used to present the culture.  | Categorical (e.g., Transformation Reveal, Micro-Documentary, Humorous Skit, Dialogue/Vlog)          |
| Primary Thematic Frame    | The dominant interpretative frame emphasized (RQ1).  | Categorical (e.g., National Pride, Aesthetic Awe, Commercial/Product Focus, Educational/Historical) |
| Emotional Intensity Score | The calculated visual/auditory sensory input (e.g., fast cuts, loud music, dramatic lighting). | Ordinal Scale (1=Low, 5=High)   |

3.4 Algorithmic Contextual Analysis

- To address RQ2 and RQ3, quantitative data on audience response was meticulously collected for each video:
- Engagement Metrics: Total likes, shares, and save-to-favorites ratios were recorded.
- Comment Section Analysis: The top 50 comments for each video (N=5,000 comments) were extracted. These comments, highly visible due to algorithmic ranking, represent the dominant public discourse.
- Discourse Coding: The top 5,000 comments were coded for: a) Sentiment Polarity (Positive, Negative, Neutral); b) Primary Discourse Theme (e.g., Cultural Appreciation, National Identification, Authenticity Critique, Commercial Questioning). The

ratio of positive/negative sentiment was used as a proxy for the affective nature of the public sphere.

4.Findings I: Narrative Framing and Mediatization of Guochao

The content analysis revealed a consistent set of narrative strategies employed by high-visibility Guochao content creators, demonstrating a sophisticated adaptation to the short video medium’s demands.

4.1 The Strategic Deployment of Low-Context Aesthetics

4.1.1 The Dominance of Visual Spectacle

The core characteristic of Guochao narratives is the prioritization of visual spectacle over informational depth. The majority (78%) of sampled videos utilized a highly produced, “New Chinese Aesthetic” characterized by vibrant color palettes (often saturated reds, golds, and jades) and cinematic lighting. Historical accuracy was frequently secondary to aesthetic impact. For instance, in videos featuring Hanfu, the complexity of period tailoring was often simplified in favor of dramatic drape, flowing movement, and modern fabric choices. The cultural symbol was thus de-contextualized from its historical origin and re-contextualized as an object of immediate, aspirational beauty.

4.1.2 The Three-Second Hook and Transformation Reveals

To meet the high-engagement demands of the algorithm, nearly all videos (92%) employed a strong “three-second hook.” This hook typically involved an immediate visual transformation, a dramatic opening beat change in the background music, or the introduction of a captivating scenario. The Transformation Reveal structure (e.g., a rapid change from casual modern wear to full traditional attire) was identified as the single most effective narrative structure, accounting for 45% of the high-engagement sample. This structure capitalizes on the human psychological tendency to value sudden, high-contrast visual information. Cultural education, when present, was typically delivered in superimposed text during the final 15-20 seconds, only after viewer retention had been secured by the spectacle.

4.2 Prevalence of Affective and Identitarian Frames (RQ1)

The coding of the primary thematic frame revealed a clear hierarchy, with frames emphasizing emotion and collective identity being overwhelmingly dominant.

Table 2: Prevalence of Primary Thematic Frames

| Primary Thematic Frame                 | Percentage of Sample (N=100) | Narrative Function   |
|--|------------------------------|--|
| National Pride / Cultural Confidence   | 41%                          | Establishes the culture as a symbol of collective achievement and national identity.   |
| Aesthetic Awe / Emotional Appreciation | 35%                          | Focuses solely on the beauty, “coolness,” or dramatic effect of the cultural artifact. |
| Commercial / Product Display           | 17%                          | Explicitly links the cultural element to a product or brand for purchase.              |
| Educational / Historical Context       | 7%                           | Provides detailed background, technical information, or historical accuracy.           |

4.2.1 The Amplified National Pride Frame

The National Pride Frame was identified as the most frequent primary frame. These narratives employed techniques such as cross-generational comparison (e.g., a grandparent’s traditional craft inspiring a young, successful modern designer) or direct comparisons with external cultures (e.g., showing the superiority of Chinese design). The underlying message communicated was that engaging with Guochao is synonymous with celebrating national identity. This framing is highly effective because it transcends niche cultural interest, making the content relevant to a broad, identity-conscious audience, thereby maximizing the potential for mass amplification.

4.2.2 Marginalization of Educational Content

Conversely, videos primarily employing the Educational/Historical Context Frame were significantly underrepresented in the high-engagement sample (7%). When educational content was included, it was usually brief, shallow, and supplementary to a

dominant visual hook. This finding strongly suggests a systemic tension between the requirements of the short video medium and the delivery of nuanced, academically rigorous cultural information. Depth and detail are being systemically marginalized by the forces driving visibility.

### 4.3 Mediatized Symbolism: Simplifying High-Context Culture

The selection of cultural symbols was not random; high-context artifacts were consistently simplified into low-context, highly recognizable symbols. For example, traditional Chinese painting, with its complex history and philosophical underpinnings, was primarily represented by the immediate visual appeal of the color “China Red” or the stylized image of a mythical creature like the phoenix. The richness of the cultural source was condensed into a readily understood, visually striking signifier. This process aligns with the principle of mediatization, where cultural complexity is necessarily reduced to fit the technological parameters of the medium. The symbol is thus made accessible to the mass audience, but at the cost of its original, multi-layered significance.

## 5. Findings II: Algorithmic Amplification and Public Opinion

### 5.1 Algorithmic Bias toward Affective Framing (RQ2)

#### 5.1.1 Correlation between Emotional Intensity and Visibility

A significant positive correlation (Pearson  $r = 0.72$ ,  $p < 0.001$ ) was found between the video’s coded Emotional Intensity Score and its final engagement metric composite (total likes + shares + comments). This statistical relationship confirms that content designed to elicit a strong, immediate emotional reaction is systematically favored by the algorithm. The platform’s optimization for user retention and interaction implicitly translates into a structural bias toward affective framing. Creators who successfully integrated dramatic aesthetics and the National Pride Frame were demonstrably rewarded with higher visibility.

#### 5.1.2 Reinforcement of the “Quick Consensus”

The algorithmic recommendation system functions to create a “Quick Consensus” around highly engaging topics. When a Guochao video achieves high initial engagement (e.g., 500 likes in the first hour), the algorithm pushes it to progressively larger user pools. This mechanism rapidly converts isolated viewing into a mass cultural phenomenon. The short-lived, spectacular nature of the content is thus counteracted by the algorithm’s power to momentarily elevate the topic to the status of a collective cultural experience, which subsequently shapes the collective cultural memory.

### 5.2 The Emotional and Polarized Nature of Discourse (RQ3)

The analysis of the top-ranked comments provided a clear window into the algorithmic public sphere, revealing a discourse dominated by strong sentiment and internal fragmentation.

#### 5.2.1 Dominance of Positive Sentiment

The comment discourse was overwhelmingly dominated by positive sentiment. Overall, 82% of the top-ranked comments expressed explicit positive emotions, such as “Awe,” “Pride,” or “Admiration.” Typical phrases included, “This is true Chinese elegance!” and “I am so proud of our culture.” This high positivity is not merely a reflection of content quality; it is a direct consequence of the algorithmic ranking process. Comments that echo the video’s dominant emotional frame (e.g., the National Pride Frame) are more likely to be liked by other users, and these high-like comments are then boosted to the top of the comment feed. The algorithm, therefore, functions as a mechanism for sentiment stratification, amplifying consensus and suppressing critical discourse at the surface level.

#### 5.2.2 The Submerged Authenticity Critique

Despite the dominance of positive sentiment, a persistent vein of critical discourse—specifically, the Authenticity Critique and Commercial Questioning—was identified in 18% of the coded comments. These comments challenged the content’s historical accuracy or the creator’s commercial motives. Examples include: “This is beautiful, but that style is historically inaccurate,” or “Another ad disguised as culture.”

Crucially, while these critiques existed, they were rarely found at the very top of the comment feed. They were consistently ranked lower than the purely affective comments, suggesting that while the public sphere is aware of the commercialization frame tension, the platform’s ranking mechanism prioritizes emotional affirmation over rational critique. The critical

discourse is thus submerged, present but structurally disadvantaged in terms of visibility.

### 5.3 Public Opinion Construction: The Guochao-as-Identity Narrative

The totality of the findings suggests that public opinion regarding Guochao is being constructed around the central idea of Guochao-as-Identity. The cultural artifact itself (the Hanfu, the porcelain) is less important than its function as a readily available, aesthetic symbol of national strength and self-confidence.

The co-construction process proceeds as follows:

Creator Input: Creators use high visual spectacle and the National Pride Frame.

Algorithmic Filter: The algorithm promotes this affective content due to high initial engagement (likes/shares).

Audience Output: The audience is exposed to and responds with overwhelmingly positive, consensus-driven, and identity-affirming comments.

Feedback Loop: The positive comments further signal to the algorithm that the content is valuable, increasing its distribution. Through this loop, a public opinion is constructed where the dominant discourse affirms the beauty and value of Guochao, simultaneously reinforcing the viewer's sense of cultural belonging. The commercial and historical complexities of the cultural revival are deliberately sidelined by the combined forces of mediatized narrative and technological gatekeeping.

## 6. Discussion and Implications

### 6.1 The Dual Nature of Cultural Mediatization

The findings unequivocally demonstrate the dual impact of cultural mediatization. On one hand, the short video format has provided an unprecedented democratic platform for the re-propagation of traditional culture. Cultural knowledge, once restricted to scholarly texts or museums, is now immediately accessible to millions of digital natives<sup>[15]</sup>. The utilization of the low-context, high-spectacle aesthetic has successfully engaged a young audience that might otherwise be indifferent to traditional heritage. This fulfills the objective of cultural outreach.

On the other hand, this mediatization process imposes a tyranny of the spectacle. The imperative for virality and engagement necessitates the simplification of cultural complexity. The high correlation between emotional intensity and algorithmic visibility confirms that the platform structurally favors the emotional shell of culture over its intellectual core<sup>[16]</sup>. The cultural artifact becomes a performative symbol, valued primarily for its ability to elicit collective pride, rather than for its intrinsic historical or artisanal significance. This creates a critical challenge: a broad reach is achieved, but potentially at the expense of genuine, deep cultural understanding.

### 6.2 Algorithmic Bias and the Commodification of Pride

The study provides empirical support for the theoretical critique of the Algorithmic Public Sphere. The algorithm, driven by commercial goals, acts as an affective filter, consistently amplifying the National Pride Frame. This amplification effectively turns cultural affinity into a marketable commodity. When a user expresses pride or awe via a like, they are providing valuable data that can be monetized. The cultural experience is thus fundamentally integrated into the attention economy<sup>[17]</sup>. The submerged nature of the authenticity critique is particularly concerning. While users are capable of critical thought, the structural design of the platform minimizes the visibility of rational discourse. The algorithmic feedback loop rewards the simplest, most affirming expression of emotion, creating a skewed representation of public opinion. This systemic preference risks fostering a culture of superficial engagement, where the act of consuming and affirming the cultural symbol is mistaken for genuine cultural practice or knowledge acquisition.

### 6.3 Framing and the New Cultural Gatekeepers

The findings highlight a new form of gatekeeping that exists not at the level of censorship, but at the level of algorithmic prioritization. The most successful Guochao creators are those who have mastered the art of encoding high-context culture into low-context, algorithm-friendly narratives<sup>[18]</sup>. These creators, often operating within sophisticated MCN (Multi-Channel Network) structures, function as the new cultural gatekeepers. Their ability to successfully frame tradition as national pride or aesthetic marvel grants them privileged access to the mass public, shaping the cultural agenda more effectively than official cultural institutions. The question is no longer what content is allowed, but whose frame of culture is privileged.

### 6.4 Practical Implications for Policy and Practice



**Policy for Algorithmic Transparency and Value Weighting:** Platform governance must move beyond content moderation toward algorithmic accountability. Policy frameworks should incentivize platforms to introduce non-engagement metrics (e.g., educational value, historical accuracy review) into the recommendation weightings. This would require the integration of cultural experts into the algorithmic design process.

**Creative Strategies for Depth:** Content creators should be encouraged to integrate their emotional hooks with moments of genuine cultural insight. This could involve the use of the “Narrative Reveal”—where the spectacle (the hook) leads directly to a brief, verifiable cultural fact—as a means of balancing entertainment with education.

**Cultural Literacy Initiatives:** Efforts must be made to raise digital cultural literacy among audiences. Viewers need to be educated on the nature of the platform’s affective bias, encouraging them to seek out the submerged critique and demand greater historical accuracy, thereby fostering a more robust and self-aware algorithmic public sphere.

## 7. Conclusion

This study has confirmed that the re-propagation of traditional culture through Guochao narratives on short video platforms is characterized by profound mediatization. RQ1 was answered by identifying the dominance of the National Pride and Aesthetic Awe frames, which prioritize visual spectacle and emotional immediacy. RQ2 was addressed through the finding that platform algorithms exhibit a structural bias toward affective content, correlating highly emotional narratives with visibility and amplification. Finally, concerning RQ3, the public opinion constructed is one of high emotional consensus and sentiment affirmation, where the persistent critique regarding commercialization is systematically submerged by algorithmic ranking. The platform thus plays an active role in the co-construction of cultural discourse.

This study, while utilizing a large sample of high-visibility content, is limited by its reliance on publicly available metrics. The specific, proprietary mechanism of the Douyin algorithm remains a “black box.” Future research could mitigate this by conducting controlled experimental studies to isolate the effect of specific narrative variables (e.g., music tempo, visual contrast) on user engagement rates. Furthermore, comparative analysis across different short video platforms (e.g., Douyin vs. Kuaishou) or across international platforms (e.g., TikTok) would provide deeper insight into how varying algorithmic cultures affect Guochao’s narrative framing and reception in different national contexts. The long-term impact of this affective cultural consumption on actual identity formation and knowledge retention also warrants longitudinal investigation.

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# Teaching Control System and Comprehensive Evaluation Method for the Development of Coordination Ability of Volleyball Players

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**Abstract:** Coordination ability is the core element of volleyball skill formation, which directly affects the accuracy, timeliness and economy of technical movements. This paper aims to systematically construct and expound a set of teaching control system and comprehensive evaluation methods suitable for the development of coordination ability of youth volleyball players. This study uses literature data, logical analysis and systematic review to theoretically sort out and define the different types of teaching control (preliminary, operational, current, stage and final control). Further, the paper provides an in-depth analysis of the evaluation paradigm of coordination, covering from high-precision instrumental measurement methods (such as stabilizers, electromyography, and motion capture systems) to practical special motor testing methods (such as the Belyaev test series and the Garbuzov test series). The study points out that an effective training system must be based on systematic and multi-stage teaching control, and the evaluation results must be dynamically fed back to the personalized adjustment of the training plan. Finally, this paper proposes a comprehensive training model that integrates traditional training wisdom and modern technical feedback, aiming to provide theoretical basis and practical guidance for the development of coordination ability of youth volleyball players, and provide a systematic reference framework for training decision-making of grassroots coaches.

**Keywords:** Volleyball; Coordination Ability; Teaching Control; Motor Assessment

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## 1.Introduction

One factor in the success of volleyball training is the high level of coordination. It is the coordination of movements that ensures the accuracy, timeliness and economy of technical techniques such as serving, passing, attacking and blocking. In beginner volleyball players, coordination is usually at the stage of active formation, and the effectiveness of its development largely determines the further performance of the athlete during the game.

In recent years, more and more people have paid attention to innovative sports training methods that make the training process more efficient and efficient. Closed-loop technologies (video systems, motion sensors, special simulators, and digital-based applications) open up new opportunities for the development of coordination capabilities. They allow you to quickly obtain incorrect information about technique, body posture, and movement dynamics and correct them in real time. This

purposeful and timely feedback contributes to faster and better motor skill formation among novice athletes <sup>[6]</sup>.

Despite the promise and growing popularity of such methods, the question of how to utilize technical means and provide feedback when working with junior volleyball training teams is still understudied. Until now, the focus has been on sportsmanship at a higher level. At the same time, the early introduction of automatic control and analysis of movements makes it possible to form the correct motor stereotype at the basic stage of training. This not only improves overall training performance but also reduces the risk of reinforcement errors or jeopardizing healthy exercise patterns.

## **2.Theoretical framework for the control of volleyball players' coordination ability**

### **2.1 Teaching control**

Pedagogical controls that assess the development of coordination skills in volleyball players are an important part of the education and training process. Its main goal is to obtain objective data on the training and fitness level of young athletes, so that training methods and physical activity can be adjusted in a timely manner. One of the most commonly used control methods is control competitions and tests, the results of which serve as a reliable basis for management decisions. If the analysis shows no improvement or even deterioration in physical fitness, the coaching staff reviews the training content, adjusts the method and load distribution, and helps adjust the training plan to suit the student's current abilities and needs <sup>[4]</sup>.

The effectiveness of physical education directly depends on the timeliness and regularity of control. The content of the control depends not only on the specific situation of the subject, but also on the teaching tasks set at each training stage. In the context of athlete training management, instructional control can be divided into several types:

- 1) Initial control. This control is carried out in the initial stages to identify the basic abilities of the student. Its purpose is to assess students' ability to master physical exercise and meet the standards set by the curriculum. Based on the data obtained, the planning of teaching tasks is adjusted, and appropriate methods and means are selected, so that the overall and special physical fitness level of young volleyball players can be accurately judged. Initial control helps to check the performance of movements with a similar structure to the new task and to assess the knowledge, skills and abilities of the athlete after a long training break, which is important for the planning of individual training. It is important to note that the application of this control may be limited for physical exercise that requires long preparation of the body to withstand heavy loads.
- 2) Combat control. This control focuses on assessing the athlete's body's response during and after training. Here, changes that occur during the exercises are recorded, as well as analyzed based on the flexibility of student feedback, speed of decision-making, and timely correction of tasks. Control allows you to record the intensity of the load within a single movement and throughout the exercise. At the same time, some indicators are recorded before and after training, while others are recorded directly during training, allowing for a comprehensive assessment of the athlete's condition.
- 3) Current control. Unlike control, current control is carried out continuously for a certain period of time, such as within a week. It is designed to monitor learning and track changes in students' physical condition from class to lesson. This approach helps you identify the dynamics of individual indicators, assess the consequences of the load, and the effectiveness of the recovery process, which is especially important when developing subsequent stages of the training process.
- 4) Stage and final control. At each stage of the training and at the end of the training cycle, there are full controls so that you can evaluate the results achieved, compare them to the planned metrics, and adjust subsequent training goals. The final control not only summarizes the results, but also makes suggestions for the further development of athletes' coordination ability <sup>[3]</sup>.

### **2.2 Phased control**

Phased control is a set of measures designed to assess changes in the form of young volleyball players after a longer period of training, while developing the best strategy for subsequent macrocycles or independent phases of the training process. During this control, all aspects of training are comprehensively evaluated: from physical fitness to the tactical and psychological characteristics of the athlete. The analysis of the results allows us to identify the deficiencies of the current training system and potential reserves for improvement. Based on the information collected, an individual plan is developed that can cover both a specific training period and an entire macro cycle <sup>[12]</sup>.

Phased control includes the following key actions:

Generalized processing of current control data. In this phase, the results of previous measurements and observations are collected and systematized, allowing you to gain a comprehensive understanding of the overall characteristics and parameters of the teaching process in different stages and training cycles.

Perform final testing and diagnostic procedures. At the end of each phase, special tests and other diagnostic measures are performed to evaluate the cumulative effect of training. These procedures help determine changes in the status of trainees and how their readiness has changed.

Comparative analysis of indicator dynamics. Particular attention is paid to the comparison of the initial phase with subsequent measurements, which helps to assess the rhythm of an athlete's development and identify trends that require adjustments to the training process.

The final control aims to determine the effectiveness of the implementation of the annual plan of the educational process. Its tasks include assessing the resolution of tasks, as well as identifying positive and negative aspects of the physical education process and its components. The final control result becomes the starting point for developing subsequent plans and adjusting the educational process. The main indicators of final control are:

Final academic performance. Assessment of knowledge, skills and competencies acquired during the training process.

Number of athletes. Changes in the number of students required for composition and successful completion.

Sports records and achievements. Results achieved in competitions and internal inspections as indicators of the effectiveness of the training process.

Conclusions and suggestions for improvement. Recommendations based on the final data analysis can help further develop and adapt physical education programs <sup>[5]</sup>.

Based on the final control results, a decision is made to transfer to the next stage of training if the student meets the established control and transfer criteria. At the same time, health status, test success rate, athletic performance level and other key parameters are also taken into account so that further education systems can be built according to the individual characteristics and abilities of each athlete. The control of fitness levels is also divided into the evaluation of results in the general and special training areas <sup>[7]</sup>. During the initial training phase, controls are carried out twice a year. In addition, special events such as sports training competitions are scheduled in the competition schedule, which allows you to further assess developments and quickly adjust the training process.

Using instrumental and instrumental approaches, it is possible to objectively and quantitatively assess the coordination ability of young volleyball players and their various components. These methods not only accurately measure metrics but also highlight nuances related to the accuracy, speed, and economy of movements, which are essential for a comprehensive diagnosis of athletes' physical health.

To identify and analyze coordination, a variety of devices are used, each focused on studying specific parameters of motor activity:

Coordinators and tremolometers of varying complexity – coordinators are used to measure the accuracy, speed and economy of movements and thus evaluate the effect of neuromuscular coordination.

Kinometers, dynamometers, and reflectometers (reactionometers) are designed to evaluate the accuracy of reproduction, differentiation, and measurement of spatial, force, and temporal properties of motion.

Stabilizers are used to measure the ability to maintain balance, which is especially important for volleyball players working in dynamic games.

Photography and filming. Biomechanical techniques such as photography and video recording make it possible to determine the kinematic properties of motion – displacement, velocity and acceleration – and analyze performance techniques in different modes.

EMG helps to study the internal structure of exercise behavior, identify the degree of involvement of various muscles, and evaluate the economics of sports equipment.

Goniometry allows you to accurately measure angular motion and assess the accuracy of joint movement.

Radio telemetry is used to study multiple parameters under the natural conditions of an athlete's movement at the same time,



allowing a comprehensive understanding of their physical condition <sup>[14]</sup>.

It is important to note that despite the accuracy and informational value of instrumental teaching methods, they are often limited by the environmental conditions of the physical education school. In addition, these methods can only measure individual signals of coordination ability, and cannot provide a complete picture of the coordination phenomenon itself.

*Figure 1 : Coordination ability assessment tools and functions*

| tool                  | Function description                             | advantage   |
|-----------------------|--|---|
| Stabilizer            | Measure balance ability                          | Direct feedback on training dynamics                      |
| Electromyography      | Study muscle engagement                          | Analyze the internal structure of motor behavior          |
| Motion capture system | Record the dynamic characteristics of the action | Provides high-precision motion technology analysis        |
| Exercise test method  | Assess coordination and skill level              | Very practical and suitable for junior volleyball players |

### 3.Diagnostic coordination ability

The main method for diagnosing coordination is specially developed motor tests, which allow you to assess both explicit and implicit indicators. There are several stages to follow when creating and using them. First of all, it is necessary to choose a set of tests suitable for assessing the ability to coordinate in all age and gender groups. These tests should cover a wide range of characteristics, from the accuracy and speed of movements, to the ability to differentiate efforts. To ensure the accuracy of the results, it is necessary to develop detailed test methods, taking into account the features of the exercises. Testing as many students as possible allows for the collection of a large database for subsequent analysis. The results are carefully processed to help identify the most reliable and informative indicators of coordination. Based on the analysis, recommendations for use are developed for selected tests in physical education or general education schools. Each test develops criteria to assess the level of development of coordination skills <sup>[13]</sup>

The selected motor test must have a high degree of scientific validity and meet a number of requirements. The test should be easy to understand and feasible for participants of all ages and gender groups, while providing differentiated results in terms of coordination. In addition, testing does not require long-term special training or complex equipment, making it easy to use on a large scale. Test results should not be significantly distorted by differences in body size, segment length, or weight. The test should cover task performance in both “dominant” and “non-dominant” limbs, enabling the study of lateral and asymmetry of movements, taking into account age and gender <sup>[11]</sup>.

Before the exam begins, it is essential to ensure a high level of motivation and concentration of the participants. They should detail the purpose and procedure of the test, demonstrate the correct performance of the exercises, and provide trial attempts to adapt to the new task. Since test results can be affected by external conditions and interference, it is recommended to try the test multiple times. After each attempt, participants receive accurate feedback that helps maintain motivation and adjust movements for optimal results.

It is recommended to perform a test test at the beginning of the main training phase, immediately after a short warm-up, to avoid the effects of fatigue, which can reduce performance accuracy. It is recommended to repeat the test twice during the school year to track the dynamics of change and to test it separately before and after the passage of specific educational materials to assess their impact on the development of coordination skills. During training, motor tasks that underlie the test can be used in a variable form, but it is essential to avoid translating control tasks into solid motor skills, as this can skew the assessment of the initial level of coordination. To improve the motivation and effectiveness of the test, a competition format is usually used - two or consecutive tasks are completed, which not only objectively evaluates the results, but also stimulates the development of the competitive spirit <sup>[10]</sup>.

### 4.Evaluate the level of development of coordination ability

#### 4.1 Evaluate the main characteristics of coordination ability

The use of tools and equipment training methods, as well as specially designed exercise tests, allows you to deeply and comprehensively assess the level of coordination of young volleyball players. This integrated approach makes it possible

to identify the strengths and weaknesses of an athlete's athletic fitness, which in turn helps to adjust the training process and adapt it to the individual characteristics of each child. Despite some limitations, especially in sports schools, the use of these methods significantly improves the quality of diagnosis, provides science-based education and training planning, and contributes to high-level physical education performance in the future<sup>[15]</sup>.

In N.M. Kurkina's research, four main characteristics were identified as evaluating the coordination of schoolchildren: correctness of movements, in other words, when the action reaches the desired goal (completion of the necessary action); speed of results; rationality of actions and behaviors (do it when necessary); Motor wit helps a person to find a way out of a difficult dilemma that suddenly arises when performing an action<sup>[3]</sup>.

These assessments are qualitative and quantitative. The main qualitative characteristics of coordination ability assessment include adequacy, timeliness, initiative, quantitateness - accuracy, speed, economy and stability of movements. In fact, in addition to these indicators, other indicators are taken into account.

In many cases, the manifestation of coordination is not manifested in isolation, but combined into a complex aimed at achieving the highest athletic performance. Therefore, complex criteria are also widely used when determining coordination capabilities. These criteria include variants of shuttle running, speed, running in a changing direction, mode of movement, overcoming obstacles and ground running, jumping obstacles, accuracy of landing and accuracy in the area, throwing various projectiles from different starting positions to targets and distances (both hands)<sup>[9]</sup>.

#### **4.2 Determine the practice method of coordination ability through the test**

Belyaev proposed to determine the level of coordination development of children participating in volleyball through a number of special tests. His approach includes the following exercises:

Test No. 1. The first group includes a series of tasks designed to improve the accuracy and coherence of movements. The student sits on the body mat and passes the ball up. Then he talked about strength – you need to stand up and keep passing while moving forward. The last link is to complete an upper pass through the goal, then pass the ball back, and then pass the up and down passes alternately into the wall.

Test No. 2. The test mainly emphasizes balance, reaction and direction. The athlete needs to stand on the toe of his right foot while bending his left leg, and raise his arms and lift the ball. During the exercise, the ability to quickly reorganize motor activities, spatial navigation, and concentration are recorded.

Test number three. The task of this test is to assess strength, accuracy, and coordination when performing complex movements. First, the athlete serves with maximum force, aiming for the area marked 1, 6 and 5. After that, the upper and lower gears alternate in pairs, while completing a 360-degree turn. Another task is to pass the ball from different starting positions with two people changing partners at the same time, which requires quick adaptation and a high level of coordination.

Test four. This set of exercises is variable and includes a variety of activities: passing, throwing heavy balls, throwing to targets, and relay races for catching and passing. This complex not only demonstrates the level of coordination, but also promotes the development of reaction speed, the ability to orient and quickly change the direction of movement in space<sup>[1]</sup>.

A given test task not only evaluates the overall level of coordination, but also develops qualities such as reaction speed, rapid reaction ability to respond to signals, and lateral vision. Therefore, the development of coordination skills is an important part of the training process for young volleyball players, directly affecting their level of motor skills<sup>[8]</sup>.

In addition to the method of A. Belyaev, S.P. Garbtsov offers a number of test tasks to determine the initial level of coordination of athletes. He recommends the following exercises:

Test No. 1. This is an exercise in which you perform a sprint from a defensive stance, which is common for volleyball players and allows you to assess the speed and accuracy of your reaction.

Test No. 2. A task in which an athlete passes the ball to a certain point to demonstrate his ability to control movements accurately.

Test No. 3. The turnback run combined with the pass allows you to assess the coordination, coherence and dynamics of the movement.

Test No. 4. Exercises to identify dexterity, record the ability to quickly change positions and postures, which are an important part of game skills.

Test No. 5. It is an exercise in hitting or passing a ball to a specific target, helping to assess the accuracy and power of the movement.

These tests not only help identify the initial level of development of coordination skills, but also help to further improve coordination skills. They are an important tool in the training process, as systematic diagnostics allow for timely adjustment of training methods and adaptation of the training process to the individual characteristics of each athlete <sup>[2]</sup>.

*Figure 2 : Exercises to assess coordination by motor test*

| Test number       | Test Name                         | Evaluate the content   |
|-------------------|-----------------------------------|--|
| Test No. 1        | Upper passing and return practice | Movement accuracy and coherence  |
| Test No. 2        | Balance and reflexes test         | Rapid restructuring and concentration  |
| Test number three | Complex action serve test         | A combination of strength, accuracy, and coordination                              |
| Test No. 4        | Passing, throwing and relay races | Evaluate the overall coordination ability and the use of organizational strategies |

In short, the development of physical fitness in secondary school children's volleyball, including coordination ability, should be carried out systematically and continuously. Organizing the training process for young athletes requires careful selection of methods that not only ensure safe training, but also make it as efficient as possible. When planning training, the coach must take into account the goals and objectives, the individual characteristics of the student, as well as the material and technical support of the institution. An integrated approach based on step-by-step planning, organization, and control is the key to successfully developing sports skills, developing coordination, and ultimately achieving high volleyball results.

## Conclusion

Instructional control over the development of coordination skills in volleyball players is the most important component of the education and training process. The control system includes preliminary, work, current, phase, and final type, allowing you to objectively assess the fitness and dynamics of athlete development. Combining traditional exercise testing with modern instrumental methods helps identify strengths and weaknesses, allowing for timely adjustment of training methods and load distribution. This comprehensive approach provides personalization to the training process and provides a solid foundation for further successful development in young volleyball players.

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# An Empirical Analysis of Big Data Killing Phenomenon in Ride-Hailing and Food Delivery Platforms

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**Abstract:** This study examines the phenomenon of “Big Data Killing,” analyzing its occurrence, user behavioral responses, and reputational impacts based on questionnaire survey data. The survey reveals that 74.8% of valid respondents have encountered different prices for the same product. After experiencing price discrimination, users primarily discover price discrepancies by browsing at different times (84.8%), using different devices (52.3%), and accessing different accounts (52.3%). In response, 39.5% of users switched devices or accounts to place orders, 33.7% continued price comparison and observation, while only 10.4% made immediate purchases. 74.4% of users compared prices across different platforms, and 60.4% identified this phenomenon as “Big Data Killing” based on user profiling. Although only 12.7% of users significantly reduced platform usage as a result, 90.6% demanded that platforms clearly disclose their pricing rules. The study indicates that “big data price discrimination” is widespread and has drawn strong user concern. A systematic response is needed through government regulation, platform self-discipline, technological governance, enhanced user awareness, and collaborative industry-society governance to promote fairness and sustainable development in the platform economy.

**Keywords:** Big Data Killing; Price Discrimination; Platform Algorithm

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## 1.Introduction

With the continuous advancement of internet technology, online platforms such as ride-hailing and food delivery services have become deeply integrated into residents’ daily lives, emerging as one of the most vital “infrastructures” of modern urban living. By December 2024, China’s ride-hailing user base reached 539 million, while online food delivery users hit 592 million. Leveraging algorithms, big data, and artificial intelligence, these platforms deliver personalized, efficient, and convenient matching services that address residents’ daily transportation and dining needs. Simultaneously, they have created substantial employment opportunities for the public.

However, while technology enhances efficiency, it has also given rise to a controversial pricing strategy known as “Big Data Killing.” For users who frequently purchase goods or services on platforms and are less price-sensitive, platforms set higher product prices or charge higher service fees to extract greater revenue and profits. This phenomenon has grown increasingly severe, continuously drawing public attention and debate, with consumers expressing strong dissatisfaction with such platform practices in various settings. Among the 123,000 online pricing complaints received by the China Consumers Association in 2024, 38% were labeled as “suspected Big Data Killing,” marking a 12-percentage-point increase



from the previous year. “Big Data Killing” not only directly infringes upon consumers’ fundamental rights and challenges the principle of fair trade, but also poses a potential threat to market competition order and the sustainable development of the platform economy. Despite the rising public outcry, questions regarding whether price discrimination is widespread, its specific mechanisms and impacts, and how to protect consumer rights largely remain confined to case studies and theoretical discussions, lacking in-depth analysis.

## 2. Conceptual Definitions

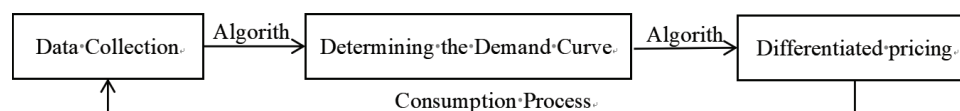
### 2.1 Concept and Causes

“Big Data Killing” typically refers to internet platforms leveraging user data they collect to charge relatively higher prices to consumers with high spending power, low price sensitivity, or strong loyalty when purchasing identical goods or services. At its core, this phenomenon stems from platforms engaging in price discrimination against consumers. Price discrimination is a common economic phenomenon where businesses set different prices for the same product among different consumers. Platforms leverage big data and algorithms to implement differential pricing, aligning product prices as closely as possible with consumers’ willingness to pay to maximize profits<sup>[1]</sup>. Simply put, consumers who purchase frequently and demonstrate high loyalty are willing to pay more than those who shop infrequently or show low loyalty. This means the former exhibit stronger payment willingness and accept higher prices for the same goods. As the primary gatherers of big data, platforms readily identify variations in consumer willingness to pay. They then employ algorithms to implement differential pricing—setting higher prices for loyal customers and lower prices for less loyal ones.

This phenomenon typically emerges during the developmental phase of internet platform economies. During this period, platforms possess absolute data advantages, algorithmic power, and strong profit-seeking motives within digital markets, effectively acting as data aggregators and controllers<sup>[2]</sup>. By tracking, collecting, and analyzing vast datasets—including consumer histories, device information, browsing habits, location, and even social connections—platforms construct granular user profiles. This enables precise assessment of price sensitivity and willingness to pay across different user segments. The prevalence of “Big Data Killing” stems primarily from three factors: First, platforms wield informational superiority and algorithmic control, rendering the pricing process entirely opaque, making it difficult for users to detect or prove. Second, regulatory oversight and legal accountability face significant challenges. There is lag in defining algorithmic collusion, identifying technical violations through evidence collection, and enforcing penalties, resulting in extremely low costs for non-compliance. Third, the profit-driven nature of platforms tilts business decisions toward maximizing profits, relegating consumer rights and fair transaction principles to secondary importance.

### 2.2 Mechanism

Figure 1: The Mechanism Behind “Big Data Price Discrimination”



As shown in Figure 1, Platforms can engage in price discrimination through three essential steps: collecting consumer data, identifying consumer demand curves, and implementing differential pricing based on these curves. First, as lifestyles and consumption habits evolve, most consumers rely on platform apps for activities like dining, transportation, and shopping. While this offers convenience, it also makes it easier for platforms to gather behavioral information. Platforms can effortlessly obtain valuable data such as consumer locations, search histories, purchase records, frequency of use, and browsing duration, building robust foundational databases. This foundational data undergoes screening, classification, cleansing, and transformation to yield actionable insights. Next, platforms leverage big data technologies to detect consumer demand curves. Two primary online methods exist: sellers display identical products at varying prices across different time slots to observe consumer reactions and gather data; alternatively, e-commerce platforms implement short-interval (e.g., 15-minute) price fluctuations for all consumers, monitoring their responses to these changes<sup>[3]</sup>. Upon successful detection, the platform gains a general understanding of the product’s consumer demand curve. Finally, and most crucially, the platform implements differentiated pricing for distinct consumers and consumer groups based on this demand curve—referred to as personalized

pricing and group discrimination pricing, respectively. The more data the platform collects and processes, the more accurately it can determine the maximum price consumers are willing to pay, enabling pricing strategies that increasingly align with this threshold when interacting with customers.

### 2.3 Impacts

The phenomenon of “Big Data Killing” severely undermines consumer interests. Platforms were originally established to provide consumers with more convenient purchasing methods, facilitate transactions between buyers and sellers, and appropriately address information asymmetry. However, when platforms discover that transaction-generated data holds exploitable value—such as for user profiling, differential pricing, and other profit-maximizing strategies—they implement price discrimination tactics, creating conflicts with consumers. Driven by profit motives, platforms exploit their informational advantage—or rather, the newly created information asymmetry—to intensify the exploitation of loyal customers’ consumer surplus.

## 3. Typical Cases

### 3.1 The “Apple Tax” on Ride-Hailing Apps

Professor Sun Jinyun and his team from the School of Management at Fudan University released a report on ride-hailing apps in March 2021, revealing the phenomenon of “Apple tax” occurring during rides. Through research in five cities—Beijing, Shanghai, Shenzhen, Chengdu, and Chongqing—the team found that iPhone users were more likely than Android users to be matched with pricier vehicle types (such as comfort or business class) when using ride-hailing apps. The number of such vehicles assigned to iPhone users was nearly three times that assigned to Android users. Additionally, iPhone users faced higher average fares and received fewer discounts. This clearly constitutes discriminatory pricing by ride-hailing platforms. They perceive iPhone users as having higher price acceptance and lower price sensitivity, justifying higher fares and reduced discounts. Following the report’s release, multiple authoritative media outlets covered the story, sparking widespread debate about “Big Data Killing.” Consequently, relevant ride-hailing companies were summoned by the Shanghai Consumer Council and required to clarify pricing rules while ensuring consumers’ right to know.

### 3.2 The devaluation of membership on food delivery platforms

In September 2020, an online post by a food delivery platform user about the platform charging higher delivery fees to members sparked widespread public attention. The user discovered that as a super member of the platform, not only did they fail to enjoy the membership benefit of free delivery when ordering from the same restaurant, but their delivery fee was actually higher than that of non-members. Furthermore, since 2022, the platform has consistently charged members higher prices than non-members for meals from the same merchant and for the same items, with the price difference typically ranging from 2 to 5 yuan. Simultaneously, members receive smaller discount coupons and less generous promotions. For instance, new users and non-members frequently obtain substantial coupons like “7 yuan off orders over 35 yuan,” while members are often pushed coupons like “5 yuan off orders over 50 yuan” or “6 yuan off orders over 60 yuan.” This creates a poor purchasing experience for members, contradicts the traditional economic definition of membership benefits, and undermines their interests. The frequent occurrence of such practices has drawn significant public and regulatory scrutiny. However, market authorities have not imposed any punitive measures, instead focusing on strengthening regulations for algorithmic recommendations and requiring platforms to enhance transparency in their algorithmic applications.

## 4. Research

### 4.1 Research Methods

This study employs a questionnaire method to investigate the phenomenon of “Big Data Killing,” focusing on three key aspects: whether netizens have encountered price discrimination, their responses upon encountering it, and their level of trust in platforms. The questionnaire comprised 10 questions (see Appendix 1). Questions 1-2 gathered respondents’ basic information. Questions 3-5 investigated whether users encountered price discrimination and how they discovered it. Questions 6-8 examined users’ responses and their perceived reasons for such actions. Questions 9-10 assessed the impact on users’ trust in the platform. All questionnaires were distributed online with anonymous responses. The collected data is solely

used for aggregate analysis.

## 4.2 Data Source

As of September 15, this survey collected a total of 124 questionnaires, including 119 via WeChat and 5 through other channels. After excluding 9 respondents who never shop online, the study retained 115 valid questionnaires. Among the valid respondents, 74.7% were female and only 25.3% were male, aligning with the gender characteristics of online shoppers. Adults comprised 96.6% of the sample, while 3.4% were minors who typically shop online using their parents' accounts.

## 4.3 Analysis and Conclusions

A total of 86 respondents encountered instances of the same product being priced differently, accounting for 74.8% of valid survey responses. Only 12.1% of respondents had never encountered such situations, while 13.1% had not noticed such occurrences. Respondents encountered price discrepancies through various means: browsing at different times accounted for 84.8% of cases, using different devices accounted for 52.3%, using different accounts accounted for 52.3%, price changes after claiming hidden coupons accounted for 43.3%, and checkout prices differing from cart displays accounted for 25.5%.

When encountering price discrepancies, user behavior varies significantly. Among those affected, 39.5% switch devices or accounts to place orders at lower prices; 33.7% add items to carts or wishlists to monitor prices over time; while 10.4% opt for immediate purchase and an equal 10.4% abandon the purchase altogether. To address price discrepancies, users typically adopt comparison strategies: 74.4% compare prices across different platforms, 43.0% use comparison software or websites, and 29% clear cache, switch accounts, or use incognito mode to view prices. Users attribute these price discrepancies to various factors. Among those encountering price differences, 60.4% believe it stems from platforms employing big data to charge loyal customers higher prices based on user profiles. Of course, other factors may also play a role, such as promotional strategies, operational cost impacts, technical display errors, or delays.

Among those who encountered price discrepancies, only 52 individuals felt affected by this phenomenon. Of these, 11 reported significant impact and expressed a tendency to reduce shopping on the platform, accounting for 12.7% of respondents. This indicates that the remaining 87.3% were unaffected in their platform usage. While most users would not choose to use the platform less due to price differences, they expressed high expectations for clear communication regarding the platform's pricing adjustment policies. Among those encountering price discrepancies, 47.6% believe platforms must explicitly notify users and obtain their consent. Additionally, 43.0% of users feel platforms should clearly outline such practices in their user agreements or privacy policies.

This survey reveals that differentiated pricing based on user profiling—commonly known as “Big Data Killing”—has become highly prevalent and widely recognized among e-commerce platforms. In response, most users demonstrate strong price comparison awareness and technical avoidance behaviors, highlighting a consumer trait where price sensitivity coexists with a willingness to resist algorithms. Although most users are aware that platforms are exploiting their surplus value, their usage levels remain unchanged, indicating a degree of usage stickiness. This may seem counterintuitive given the significant decline in trust levels, suggesting that most users are willing to accept such exploitation as long as it does not exceed their maximum tolerance threshold. Naturally, users hold high expectations for platforms' big data-driven pricing practices, with explicit notification and clear explanations being two key areas of concern. Research suggests that while big data price discrimination hasn't triggered massive user churn or credit erosion, it fundamentally erodes loyal consumers' trust and creates transactional unfairness. Platforms must establish more transparent pricing mechanisms and compliant data usage ethics to balance commercial efficiency with user rights protection.

## 5. Recommendations

### 5.1 Government

The government should take the lead in establishing a comprehensive governance system encompassing legislation, law enforcement, and the judiciary. The current legal framework is fundamentally incapable of restraining platform companies from identifying individual consumers and determining each consumer's maximum affordable price, thereby gaining pricing power and freely using data to inflate prices<sup>[4]</sup>. While such practices may enhance economic efficiency, they fundamentally undermine the fairness of transactions. The government urgently needs to build upon the E-Commerce Law, Personal

Information Protection Law, and Anti-Monopoly Law by introducing more targeted administrative regulations or judicial interpretations. These should precisely define “Big Data Killing” as “unreasonable differential treatment implemented through automated decision-making without user consent,” establishing clear penalty standards. Simultaneously, regulatory bodies must upgrade oversight methods, shifting from passive complaint handling to proactive technological supervision. The most effective approach involves adopting “reg-tech”—leveraging big data monitoring technologies for routine inspections of platform pricing to identify anomalous pricing patterns.

## 5.2 Platform

Platforms must recognize that while “Big Data Killing” may yield greater short-term profits for businesses, it fundamentally undermines transactional fairness and betrays the trust of loyal users—especially given that some platforms monopolize<sup>[5]</sup> and abuse<sup>[6]</sup> data. The principle of fair trading must be integrated into platforms’ operational decision-making frameworks, establishing ethical guidelines to constrain profit-driven behaviors. Regarding transparency, platforms should reduce hidden clauses, clearly disclose factors influencing price fluctuations to consumers, and commit to refraining from using big data for price discrimination. Additionally, platforms may establish “price dispute channels” where users can submit appeals when questioning pricing, with human customer service providing reasonable explanations.

## 5.3 Technology

Technology is both the tool for price discrimination and the antidote to its abuse. Platform technology teams should integrate fairness constraints throughout the entire algorithm development lifecycle—design, training, deployment, and monitoring. During the model design phase, “fair machine learning” techniques can be employed, such as adjusting training data distributions through preprocessing to eliminate reliance on sensitive attributes like user activity levels or spending power. During modeling, introduce fairness loss functions that incorporate “group fairness” and “individual fairness” as optimization objectives to constrain models from generating excessive price disparities. Post-deployment, establish continuous monitoring systems to track model outputs across user groups in real time and set fairness alert thresholds. By embedding technical constraints, discriminatory pricing can be minimized at its source, enabling algorithms to better serve humanity.

## 5.4 Users

In the face of complex algorithmic environments, consumers must enhance their digital literacy and shift from passive to active engagement. First, strengthen awareness of personal information protection. Exercise caution when granting apps permissions to collect personal data, regularly clear cache and cookies, and reduce the dimensions available for precise profiling at the data source. Second, master and effectively use price comparison tools. Develop shopping habits that involve cross-platform, cross-device, and cross-account price comparisons. Actively utilize third-party price comparison websites, browser price comparison plugins, and other tools to obtain more comprehensive price references and uncover the traps of personalized pricing. Finally, when suspecting “Big Data Killing,” consumers should boldly exercise their legal rights. This includes demanding explanations for pricing decisions under Article 44 of the Personal Information Protection Law and filing complaints with market regulators. Only through proactive consumer advocacy can a powerful grassroots oversight force emerge, compelling platforms to standardize their practices.

## 5.5 Industry and Society

To eradicate the persistent problem of “big data price discrimination,” it is essential to pool the collective efforts of industry, media, academic institutions, and other societal stakeholders to establish a multi-stakeholder governance framework. Industry associations should take a leading role by establishing blacklist systems and joint disciplinary mechanisms, setting ethical standards for the industry that exceed legal requirements. Third-party academic and research institutions should strengthen cutting-edge research, thoroughly uncover the mechanisms and societal harms of algorithmic discrimination, and provide independent, professional academic support for legislation and regulation. Media outlets must fulfill their duty of public oversight by exposing typical cases through in-depth investigative reporting, disseminating relevant legal knowledge, and raising public awareness. Consumer rights protection organizations can regularly publish evaluation reports to provide shopping guides for consumers and initiate public interest litigation on their behalf. Only by building this collaborative governance ecosystem—characterized by industry self-regulation, social oversight, and public participation—can we

continuously reduce the space for “big data price discrimination” to thrive and jointly foster an honest, fair, and healthy digital market environment.

## Funding

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Appendix

## Survey: Research on Experiences with Price Differences in Online Shopping

Dear Internet User, We are conducting an academic study on online shopping experiences to understand whether you have encountered price discrepancies during your shopping process and their impact. This questionnaire is anonymous, and all data will be used solely for aggregate analysis. We will strictly protect your personal information. The survey takes approximately 1-2 minutes to complete. Thank you for your participation!

### 1. What is your gender? [Single-choice question] \*

- ☐ A. Male
- ☐ B. Female

### 2. What is your age group? [Single-choice question] \*

- ☐ A. 18 years old and under
- ☐ B. 19-25 years old
- ☐ C. 26-35 years old
- ☐ D. 36-45 years old
- ☐ E. 46 years old and over

### 3. How often do you shop online (including platforms for food delivery, ride-hailing, etc.) on average each month? [Single-choice question] \*

- ☐ A. Never shop online
- ☐ B. 1-6 times
- ☐ C. 7-12 times
- ☐ D. 12 times or more

### 4. In your past online shopping experiences, have you ever encountered situations where “the same product displayed different prices at different times or on different devices (e.g., mobile/computer)”? [Single-choice



**question] \***

- ☐ A. Frequently encountered
- ☐ B. Occasionally encountered
- ☐ C. Never encountered
- ☐ D. Not sure/didn't notice

**5. If you have encountered this, under what circumstances did you typically discover it? [Multiple Choice]****\*(Answer if you selected A or B in the previous question)**

- ☐ A. Browsing at different times (e.g., morning/evening or before/after major promotions)
- ☐ B. Using different devices (e.g., mobile app vs. desktop web version)
- ☐ C. Using different accounts (e.g., member vs. non-member accounts)
- ☐ D. Price changes after claiming hidden coupons
- ☐ E. Price discrepancies between checkout and shopping cart display

**6. Upon discovering this price discrepancy, what would you typically do? [Single Choice] \***

- ☐ A. Purchase immediately (fearing further price increases or missing the current offer)
- ☐ B. Switch devices/accounts to place the order at a lower price
- ☐ C. Add to cart or bookmarks and continue monitoring prices
- ☐ D. Feel deceived and abandon the purchase
- ☐ E. Other

**7. Do you employ price comparison strategies due to price differences? [Multiple Choice] \***

- ☐ A. Yes, I frequently use price comparison software/websites
- ☐ B. Yes, I habitually compare across different platforms (e.g., Taobao, JD.com, Pinduoduo)
- ☐ C. Yes, I clear cache, switch accounts, or use incognito mode to view prices
- ☐ D. Never compare prices—it's too much hassle
- ☐ E. Depends on the item's value; I compare prices for high-priced items

**8. What do you believe are the primary reasons for this price discrepancy? [Multiple Choice] \***

- ☐ A. Platforms engaging in "big data price discrimination" based on user profiles
- ☐ B. Promotional strategies by platforms or merchants (e.g., new user discounts, random instant rebates)
- ☐ C. Variations in operational costs across different channels (e.g., higher subsidies on the app platform)
- ☐ D. Technical display errors or delays
- ☐ E. I am unaware of the specific reasons

**9. Would this experience affect your trust in e-commerce platforms? [Single-choice question] \***

- ☐ A. Severely affected; feel deceived and will shop less on this platform
- ☐ B. Somewhat affected, but will continue using it while being more vigilant and comparing prices
- ☐ C. Not affected at all; consider this normal business practice
- ☐ D. Unsure/Can't say

**10. Do you believe the platform has a responsibility to clearly disclose its pricing adjustment rules (such as Big Data Killing)? [Single Choice] \***

- ☐ A. Absolutely necessary; explicit disclosure and user consent are required
- ☐ B. Necessary; should be clearly stated in the user agreement or privacy policy
- ☐ C. Doesn't matter; I'm not concerned about these rules
- ☐ D. Unnecessary; this falls under the platform's commercial freedom

# Controlling Your Fingertips: Dark Patterns and Invisible Manipulation on Short-Video Platforms

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**Abstract:** Short video platforms such as TikTok have become pervasive in daily life, powered by algorithmic systems that enhance entertainment and convenience while embedding manipulative design strategies known as dark patterns. By exploiting cognitive biases and bounded rationality, these designs steer user behavior—encouraging likes and favorites or hindering unfollowing—to maximize engagement and profit at the expense of autonomy. This study examines dark patterns in the context of algorithm-driven, infinite-scroll platforms, categorizes their emerging forms, and evaluates their impacts on users and market competition. It further reviews regulatory responses in China and abroad, proposing governance measures to safeguard consumer rights and promote a sustainable digital ecosystem.

**Keywords:** Dark Patterns; Short Video Platform; Algorithmic Manipulation

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## 1.Introduction

In recent years, the rapid advancement of artificial intelligence (AI) and big data algorithms has fueled the rise of the “attention economy,” where user engagement time functions as the core currency (Cramer, B. W., 2017). Short video platforms such as TikTok and Douyin have emerged as central actors, profoundly transforming how individuals access information, what types of content they consume, and how decisions are made (Zuboff, S. 2019). While these platforms provide unprecedented convenience and entertainment and have become deeply embedded in everyday life, they also conceal a more troubling reality: the deployment of strategies that subtly manipulate user choices to maximize online engagement and corporate profit (Eyal, N., 2014). These strategies, commonly referred to as dark patterns (Brignull, H., 2010), represent a shift from overt advertising to covert psychological nudging, raising pressing questions about autonomy and free will in the digital era.

Studying dark patterns is crucial in the digital era, as they are concealed, flexible, and continuously evolving with new forms emerging (Nouwens, M., et al., 2020). Unlike traditional deceptive advertising, dark patterns are often embedded in platform design, making them difficult to detect and increasing users’ vulnerability to manipulation (Di Geronimo, L., et al., 2020). Their characteristics lead to significant negative consequences: users may waste substantial amounts of time, suffer financial losses, or experience privacy breaches when making decisions under misleading cues (Utz, C., et al., 2019). These risks underscore the urgent need for systematic research to deconstruct the mechanisms of dark patterns, clarify their ethical implications, and inform regulatory frameworks aimed at safeguarding user rights and privacy.

Existing research has collected and categorized various types of dark patterns, predominantly in e-commerce contexts, such

as the use of special icons to nudge users into subscriptions or data sharing. However, a significant research gap remains concerning the unique attributes of short-form video platforms. These platforms often embed subtle dark patterns that are difficult to detect—for example, autoplay features, designs that obscure users’ sense of time and progress, and mechanisms that steer user choices—creating a distinct set of manipulative practices that most users fail to recognize (Zhao, W., et al., 2022). This study seeks to address this gap by focusing on dark patterns in TikTok (international) and Douyin (China). Specifically, it aims to: (1) establish a contextualized definition of dark patterns in this domain; (2) identify and categorize the forms observed on TikTok with illustrative examples; (3) analyze their multilayered impacts; and (4) propose regulatory measures to support healthier platform development and protect consumer rights.

## **2. Definition and types of Dark Patterns**

### **2.1 Definition**

Dark patterns, first introduced by British user experience researcher Harry Brignull in 2010, describe deceptive interface designs that deliberately mislead users into actions they did not intend to take (Brignull, H., 2010). Subsequent scholarship has refined the concept to encompass broader forms of manipulation. For instance, Mathur, A., et al. (2019) define dark patterns as “user interface design choices that benefit online services by coercing, steering, or deceiving users into making unintended and potentially harmful decisions”.

On short-video platforms—digital platforms that allow users to create, share, and interact with brief video content, often personalized through recommendation algorithms—these practices are particularly pronounced. On platforms such as TikTok and Douyin, dark patterns are operationalized through algorithm-driven systems that leverage detailed insights into user behavior, making disengagement difficult, encouraging compulsive use, and channeling users toward revenue-generating activities, such as in-app purchases, e-commerce links, or content monetization.

The business model of short-video platforms largely relies on high user engagement and massive content consumption, generating revenue through advertising, live-stream tipping, e-commerce promotion, and in-app monetization features. This model incentivizes platforms to maximize user time spent and interaction frequency. Therefore, dark patterns are highly aligned with the platform’s profit logic. For example, features such as infinite scroll, autoplay, and algorithmic recommendations create a personalized content loop that keeps users continuously engaged, forming a “attention economy” cycle. By embedding dark patterns into core platform mechanisms, short-video platforms not only enhance revenue efficiency but also reinforce control and manipulation over user behavior.

### **2.2 Cause analysis: The role of Bounded Rationality**

These strategies are effective because they are carefully engineered using data-driven insights, deliberately exploiting cognitive biases and heuristics rooted in human psychology, and are often embedded in areas of the interface that users tend to overlook. Key mechanisms include scarcity bias, which creates an artificial sense of limited availability to induce urgency and stimulate purchasing behavior (e.g., “Only 2 left!”), and social proof, which provides subtle cues about others’ behavior to influence decision-making (e.g., “1,000 people bought this in the last hour”). In essence, dark patterns represent an integration of psychological manipulation and interface design, primarily aimed at maximizing user engagement, views, revenue, or data extraction. While these strategies may yield short-term business benefits, they often compromise user autonomy, erode trust, and can ultimately undermine the long-term sustainability of platforms and brands.

In fact, the effectiveness of dark patterns is largely explained by Herbert Simon’s concept of “bounded rationality,” which posits that individuals cannot make perfectly rational decisions due to time constraints, limited information, and cognitive processing capacity (Simon, H. A., 1955). Platforms exploit these limitations by creating environments characterized by information overload and rapid interactions. Under such conditions, users commonly rely on cognitive shortcuts, which dark patterns are deliberately designed to trigger. For instance, features such as autoplay and infinite scroll leverage the endowed progress effect, making disengagement a conscious effort rather than the default behavior, thereby subtly steering user engagement.

### **2.3 Types of Dark Patterns**

Although dark patterns are present across various digital services, their manifestation on short-video platforms such as TikTok

is distinctive, reflecting the platforms' core design principles: infinite scroll, algorithmic steering, and a strong emphasis on video and social metrics. Based on these observations, the primary dark patterns on these platforms can be categorized into four main types, as summarized in Table 1.

The taxonomy presented in Table 1 illustrates different types of dark patterns on TikTok and highlights how they exploit various aspects of user psychology. Patterns of Engagement and Addiction (e.g., autoplay) undermine users' self-control by eliminating obvious stopping cues. Algorithmic Steering shapes the way users process information, using keywords or contextual cues to capture attention. Social Coercion tactics exploit social anxiety and the desire for validation to drive measurable engagement metrics. Finally, Monetization and Data Extraction patterns lower friction for profit-generating actions while increasing it for privacy-preserving ones, creating an asymmetry that primarily benefits the platform.

*Table 1: A Category of Dark Patterns on TikTok/Douyin*

| Category                            | Dark Pattern               | Description & Purpose   | Example on TikTok  |
|-------------------------------------|----------------------------|---|--|
| Patterns of engagement              | Autoplay                   | Removes all natural stopping cues, making disengagement a conscious act of will. Designed to maximize the time user spend on the platforms.   | A new video automatically loads and plays immediately after the previous one finishes, with no obvious "pause" button.   |
| Algorithmic Steering & Misdirection | Algorithmic Rabbit Holes   | The algorithm intentionally steers users from mild content towards more extreme, emotional, or addictive topics to boost engagement. (The new topic is similar with the old(mild)one. | Pretending a user watching normal and harmless cooking videos is gradually fed content about extreme gourmet diets, leading to body image anxiety or misinformation.   |
|                                     | Fabricated Urgency         | Creates a false sense of liveliness or immediacy to prevent users from leaving.   | Displaying "LIVE" labels or "trending" badges on pre-recorded videos, or showing "X is typing..." in DMs when they are not.  |
| Social Coercion & Pressure          | Vanity Metrics Obfuscation | Highlighting metrics like views and likes primes social validation, and achieve a sense of self satisfaction, encourages constant posting and checking.                               | The immediate and prominent display of like counts and follower notifications creates pressure to seek validation and compare oneself to others.   |
|                                     | Gamified Reciprocation     | Pressuring users to engage in a "transaction" of social capital   | When a user is followed, a large red "Follow Back" button is prominently displayed, while the smaller grey "Dismiss" icon conveys a less positive option. This subtle design nudges users toward reciprocating the follow. |
| Monetization & Data Extraction      | Frictionless Spending      | Minimizes the cognitive steps between watching a video and spending money, exploiting impulse.  | In LIVE streams, large, glowing "Gift" buttons with one-tap purchasing (linked to pre-saved payment methods) encourage impulsive spending on digital gifts.  |
|                                     | Privacy Zuckering          | Making privacy controls complex and burdensome to navigate, nudging users toward the default, data-sharing option.  | Burying privacy settings for personalized ads deep within multiple menus with confusing language, making it easier to just leave them on.  |

### 3.The impact of Dark Patterns on platforms

#### 3.1 The impact on users

Dark patterns pose a significant threat to user autonomy by systematically eroding individuals' capacity for intentional and rational decision-making. By exploiting cognitive biases, these designs can escalate into compulsive usage patterns, leading to time overuse and a profound sense of loss of control (Di Geronimo, L., et al., 2020). Users often find themselves scrolling mindlessly for hours on platforms such as TikTok, driven by features like infinite scroll and autoplay. The erosion of autonomy is not uniform across all user groups; its negative impacts are disproportionately severe for vulnerable populations,

particularly children and the elderly.

For children and adolescents, whose brains are still developing and whose impulse control and risk-assessment abilities are immature, dark patterns can have especially severe consequences (Arain, M., et al., 2013). The gamified, reward-based structures of platforms like Douyin—such as pull-to-refresh mechanics and vanity metrics—manipulate neural circuits related to social recognition and reward, potentially fostering compulsive use, sleep disruption, academic decline, and premature social exposure (Meshi, D., et al., 2015; Twenge, J. M., & Campbell, W. K., 2018). Children are also highly susceptible to financial exploitation through hidden spending mechanisms and deceptive one-click purchase options, often linked to parental accounts, as they have limited understanding of money and difficulty distinguishing content from advertisement.

For elderly users, cognitive and sensory declines—such as slower reaction times and deteriorating eyesight—make it difficult to detect subtle dark patterns. Complex or ambiguous prompts can confuse users, leading them to select the more obvious option, which may inadvertently consent to extensive data tracking or subscriptions (Vroman, K. G., et al., 2015). Algorithmic steering further traps elderly users in “information cocoons,” exposing them to false information or conspiracies. Their high trust in digital content, combined with limited interface literacy, increases susceptibility to misinformation, which can affect health decisions and civic engagement (Vosoughi, S., et al., 2018).

Ultimately, dark patterns do more than manipulate choices—they exploit inherent vulnerabilities, exacerbating digital inequality. While all users experience a loss of autonomy, children face developmental and financial harms, and the elderly encounter cognitive confusion and misinformation risks, creating an unsustainable digital environment with persistent threats to privacy.

### 3.2 Impact on Fair Competition

Dark patterns not only manipulate user choices but also significantly distort market dynamics, creating an environment of unfair competition that undermines innovation. A central driver of this anti-competitive effect is the platform’s dual role as both marketplace regulator and competitor, enabling them to design rules through dark patterns that disproportionately favor their own interests (Khan, L. M., 2017).

One clear manifestation is self-preferencing and interface bias. Platforms can design interfaces to highlight their own products, providing them with a structural advantage. For example, TikTok’s e-commerce service, TikTok Shop, prominently displays “Add to Cart” or “Buy Now” buttons for in-platform products, often in bright colors and with a single-click purchase feature. In contrast, links to external websites are presented with small, ambiguous “Learn More” buttons accompanied by warnings such as “You are leaving TikTok. This link may be unsafe.” Such design choices nudge users toward in-platform purchases, generating profit while marginalizing external competitors.

Another related issue is the emergence of a pay-to-play prominence model. Success on major platforms increasingly depends on creators’ ability to pay for favorable placement rather than on product quality. Wealthy creators can integrate products seamlessly into popular content with one-click purchase features, whereas independent creators with high-quality but niche products face cumbersome barriers—requiring users to manually search for and purchase items externally. This “obstacle gap” engineered through dark patterns effectively determines market winners and losers.

If such ecosystems persist, long-term consequences are severe. Innovation is stifled as new and small enterprises often cannot afford platform fees, potentially forcing them out of the market or into acquisition by larger firms, thereby reducing consumer choice, market diversity, and product quality. Product prices may also rise, as platform fees and advertising costs are ultimately passed on to consumers. Over time, a few dominant platforms may consolidate control, making it nearly impossible for ethical competitors to emerge and forcing consumers to rely on these dominant services.

### 3.3 Impact on Creators

Beyond the commercial marginalization discussed earlier, dark patterns and the opaque algorithmic systems that support them create a psychological “panopticon” for creators, fundamentally reshaping creative expression. Continuous pressure to conform to engagement-oriented metrics traps creators in a passive cycle, optimizing their content primarily to satisfy the algorithm rather than for artistic value or audience connection (Bucher, T., 2018). For instance, a creator interested in producing content on women’s rights may find such topics poorly promoted or even restricted due to varying cultural



acceptance. Consequently, to maintain visibility and income, creators may pivot toward popular but personally unappealing topics, such as beauty products or trending challenges.

This environment suppresses experimentation and innovation. Platform dependency introduces financial instability, making the pursuit of novel forms or niche themes risky. Predictable, viral content ensures exposure, while innovative long-form series or unconventional works are unlikely to gain traction. As a result, creators without substantial financial backing often tailor their output to algorithmic recommendations, leading to widespread content homogenization. Users are consequently presented with repetitive, superficial, and imitative works, diminishing the visibility of unique creative voices and limiting the Internet's potential to broaden perspectives.

Moreover, this system institutionalizes a profound power imbalance. Creators are effectively tenants or employees of the platform rather than partners, subject to arbitrary rule changes and algorithmic adjustments beyond their control. Non-compliance results in restricted publication and visibility, generating anxiety and creative fatigue. Continuous optimization for engagement metrics becomes an urgent, overriding task, displacing sustainable artistic practices. In this sense, creators' labor is alienated: their works function primarily as data points for platform growth, while their livelihoods depend on appeasing a black-box system designed to serve the platform's interests rather than their own.

## **4. Regulatory Experience and Governance Measures for Dark Patterns**

### **4.1 Regulatory and Legislative Status Quo**

To date, global regulatory efforts addressing dark patterns remain fragmented, inconsistent, and largely lacking enforceable power. While some jurisdictions have recognized the problem, most rely on general legal guidelines rather than establishing dedicated frameworks, reflecting limited regulatory motivation.

The United States and the European Union are relatively more proactive, yet their approaches remain insufficient. In the U.S., the Federal Trade Commission (FTC) has acted against severe cases under Section 5 authority concerning unfair or deceptive practices. However, such interventions are reactive and case-specific, lacking broad deterrent effect (Chopra, R., & Groom, C., 2020). In the EU, the General Data Protection Regulation (GDPR) and the Digital Services Act (DSA) provide legal tools applicable to dark patterns, particularly regarding user consent and manipulative design. Nonetheless, enforcement is uneven across member states, and many platforms implement only superficial changes rather than comprehensive redesigns.

A critical observation is the near-absence of strong, deterrent enforcement worldwide. Platforms continue to employ dark patterns because the perceived risk of sanction is low. Guidelines alone constitute a positive first step but are insufficient without meaningful legal and financial consequences.

China faces a similar situation. There is no legislation explicitly targeting dark patterns, although the Ministry of Industry and Information Technology (MIIT) has launched campaigns against specific deceptive practices, such as forced download buttons. Most regulations rely on general consumer protection and administrative laws, lacking specificity for manipulative design. Consequently, China needs to intensify efforts to establish targeted laws and precise rules to regulate dark patterns effectively.

Globally, a key challenge remains inconsistency. Various countries (e.g., the UK, France, India) define and classify dark patterns differently, prescribing heterogeneous compliance standards. This divergence creates confusion, particularly for multinational companies, and prevents the establishment of a universal baseline for ethical interface design.

### **4.2 Governance Measures and Suggestions**

Effectively addressing the transnational challenge of dark patterns requires coordinated global cooperation to establish a balanced and consistent regulatory baseline. The following measures are proposed:

Firstly, establish a global normative framework. Countries should collaborate to form an international committee tasked with developing universal guidelines against dark patterns. Such a framework would provide standardized definitions, clear categorizations, and explicit prohibitions, creating a fairer and more transparent digital environment for global users. Secondly, enact targeted legislation and strengthen enforcement. National governments should translate international standards into domestic law with clear legal consequences. Regulators must be empowered to impose significant sanctions, including substantial financial penalties and, in severe cases, temporary suspension of platform operations for one to five

years. Penalties should be substantial enough to serve as genuine deterrents, moving beyond symbolic reprimands. Thirdly, promote ethical design by default. Regulations should mandate that major platforms conduct “Ethical Design Audits” to proactively identify and mitigate manipulative practices. This approach reduces risks for vulnerable user groups, shifts responsibility from users to platforms, and encourages the integration of user-centric principles into design processes. Finally, China should assume a leadership role in global governance. As a major player in digital innovation, China is well-positioned to contribute to the development of sustainable internet governance. Domestically, China should build upon its existing campaigns, establish targeted standards and implementation rules addressing specific dark patterns, and ensure effective enforcement. Such initiatives would protect Chinese consumers while providing a replicable model for other jurisdictions, reinforcing China’s role as a key contributor to global digital governance.

## 5. Conclusion

This study finds that Dark Patterns on short-video platforms such as TikTok represent a form of “invisible manipulation”, exploiting cognitive biases to undermine user autonomy, distort market competition, and suppress creators’ innovation. Current regulatory efforts, though increasing, remain fragmented and lack a consistent global baseline, allowing these deceptive practices to persist. To address this challenge, a cohesive international approach is urgently needed, including the establishment of global guidelines and targeted legislation with strong deterrents. Sustainable development of the digital ecosystem requires collaborative action to ensure platforms prioritize user welfare over profit, thereby fostering a healthier, more transparent, and accountable online environment.

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# When Worlds Collide: The EU's Institutional Vision for Investment Arbitration and Resistance within the International Legal Order

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**Abstract:** Recent years have seen extensive debate on the reform of investor-State dispute settlement (ISDS). The European Commission's proposal for a Multilateral Investment Court (MIC) seeks to recast ISDS by establishing a permanent two-tier adjudicatory system with an appellate instance, and by enhancing procedural transparency. The initiative aims to address the legitimacy crisis that has confronted conventional ISDS. However, resistance has emerged within the existing international legal order. Frictions have appeared in arbitral practice and treaty architecture. The MIC's jurisdictional scheme exposes structural tensions between the delegation of sovereign authority and global governance frameworks. This paper employs a methodology that combines normative analysis with targeted case studies. The central claim is that the EU's supranational model of judicial governance sits uneasily with sovereignty-centred premises of international investment law. Drawing on the CJEU's judgments in *Slowakische Republik v Achmea BV* and *République de Moldavie v Komstroy LLC*, the analysis maps the fault lines between the MIC initiative and existing arbitration mechanisms. The salient issues concern jurisdictional allocation, conflicts of applicable law, and the recognition and enforcement of arbitral awards. The paper also shows that the MIC's attempt to remedy arbitral inconsistency through institutional centralisation engages sensitive sovereignty concerns. Based on recent practice, the paper argues that the MIC is not a mere procedural reform. It constitutes a significant institutional transformation intended to shift international investment arbitration from decentralisation to centralisation. The EU's institutional vision carries potential for legal and institutional innovation. Its successful implementation, however, depends on complex processes of international coordination and legal integration. To mitigate these tensions, this paper advances the principle of 'differentiated and adaptive sovereignty'. The principle provides a flexible framework that preserves core sovereign prerogatives while accommodating reform, and that supports a more inclusive and adaptable international investment arbitration regime.

**Keywords:** Multilateral Investment Court (MIC); Investor-State Dispute Settlement (ISDS); Investment Arbitration; EU Judicial Governance; Differentiated and Adaptive Sovereignty

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## 1.Introduction

In recent years, the traditional investor-State dispute settlement (ISDS) mechanism has faced sustained criticism for inconsistent and unpredictable awards, opaque procedures, perceived arbitrator bias in favour of investors, and encroachment

on the regulatory sovereignty of host states.<sup>[1]</sup> The number and value of such cases have surged, while the proceedings remain lengthy and costly. Against this backdrop, the EU has proposed the establishment of a Multilateral Investment Court (MIC) as one pathway to reconstitute the rule of law in international investment.<sup>[2]</sup> The MIC seeks to remedy flaws in the current regime through institutional centralisation by creating a permanent and unified judicial body that strengthens the consistency and authority of decisions.<sup>[3]</sup> As Rosenfeld observes, this proposal ‘marks a critical milestone in the move towards a better model of dispute resolution between investors and states’.<sup>[4]</sup> The MIC blueprint has nevertheless triggered deep conflict and pushback within the international legal order, ranging from disagreement over applicable law and the allocation of jurisdiction to controversy about the enforceability of awards and tensions between treaty obligations and the preservation of state sovereignty. Building on a systematic analysis of the MIC’s institutional design and the drivers of reform, this paper examines the points of conflict between the MIC and the existing system of international investment arbitration and advances a coordination pathway informed by a perspective of ‘differentiated and adaptive sovereignty’, offering a flexible scheme that seeks to balance the diversity of state sovereignty with the drive towards transnational judicial integration.

## 2. The Legal Architecture and Institutional Drivers of the EU MIC

The EU’s push for reform arises from a comprehensive reassessment of the shortcomings of the traditional investor-State dispute settlement mechanism.<sup>[5]</sup> In the view of the EU, heavy reliance on ad hoc tribunals whose members are selected by the parties produces unpredictable outcomes, calls arbitrator impartiality into question, and leaves a one-shot system with no meaningful avenue for error correction.<sup>[6]</sup> During negotiations on the Transatlantic Trade and Investment Partnership, the EU first introduced the idea of an Investment Court System (ICS) as a transitional arrangement. Subsequent treaties adopted this two-tier permanent court model instead of conventional arbitration. These include the Comprehensive Economic and Trade Agreement between the EU and Canada, the Free Trade Agreement between the EU and Vietnam, and the Investment Protection Agreement between the EU and Singapore. In 2015, the EU issued a concept paper titled *Investment in TTIP and Beyond The Path for Reform*, which for the first time set out a vision for a Multilateral Investment Court.<sup>[7]</sup> The EU argued that a permanent system with an appellate instance could raise procedural transparency and enhance consistency of outcomes, while reducing risks of conflicts of interest in appointments and reducing conflicts that arise across cases.<sup>[8]</sup> In March 2018, the Council of the EU adopted negotiating directives that authorised the European Commission to open talks with states and international organisations on the establishment of a Multilateral Investment Court. The European Commission also stated that in current and future negotiations on EU investment agreements, this new system, would replace the existing ISDS mechanism.<sup>[9]</sup>

The Multilateral Investment Court is not only a procedural reform. This signals a shift towards a model of judicial governance defined by institutionalisation and centralisation. Under the EU proposal, the MIC would comprise two permanent tiers, a court of first instance and an appellate court. Judges on the first instance court would be permanent members who meet strict standards of independence and neutrality, and who assume corresponding ethical obligations.<sup>[10]</sup> The appellate court functions as an error correction mechanism that offers a channel of relief to parties who consider that the first-instance decision contains errors of law or fact. Judges at both tiers would serve on a full-time basis and would be pre-selected to a roster by the contracting states before any dispute arose. Unlike the current system, the parties to a dispute would not select the adjudicators. An appointment would be made jointly by the treaty parties. Terms would be fixed and non-renewable, and judges would receive fixed remuneration to insulate them from party-specific financial incentives. The MIC adopts a code of conduct for judges and requires a high level of procedural transparency. For example, proceedings would be public, and hearing records and decisions would be published except for confidential material.<sup>[11]</sup> Clear time limits would apply at both the first instance and on appeal to control costs. Through these features, the EU aims to build an investment adjudication system that is closer to a traditional court and addresses problems associated with the ad hoc nature of appointments and the phenomenon of multiple concurrent appointments. The creation of the MIC would mark an important institutional turn within international investment dispute settlement towards a more centralised and institutional model.

However, the MIC is not a perfect solution. The EU’s own experience shows that a permanent investment court has not always delivered as expected in treaty-making contexts. For example, negotiations with Japan and Singapore on investment



protection have not concluded because the counterparties did not accept the ICS. Some scholars also warn that the MIC may amount to a simple repackaging of ISDS that leaves core problems intact.<sup>[12]</sup> Zwolankiewicz criticises the MIC as a costume change that dresses the defects of ISDS in judicial attire and suggests that it may combine the weaknesses of the WTO and ICSID systems.<sup>[13]</sup> Even so, the EU's underlying motivation remains the pursuit of a systemic response to fragmentation in dispute settlement and the loss of public trust. Deng and co-authors note that the MIC emphasises consistency of decisions, independence of review, transparency and efficiency, and that it seeks through a standing institution, to overcome the contingencies of ad hoc tribunals and the mutually damaging outcomes that frequently arise.

### 3. Conflicts Between the MIC and International Investment Arbitration Regime

This chapter proceeds by examining two case studies.

#### Case I Achmea B.V.<sup>[14]</sup> and the Reform of Intra-EU BITs

At the inception of the MIC proposal, the intra-EU investment arbitration system had already suffered a major setback in Achmea (C-284/16). In March 2018, the Court of Justice of the European Union held that the arbitration clause in the Netherlands–Slovakia bilateral investment treaty was incompatible with EU law and, therefore, invalid. The ruling undermined the applicability of intra-EU BITs within the EU legal framework and had far-reaching consequences for both the EU-centred system and the international law-centred arbitration regime. Thereafter, 23 EU Member States signed the Termination Agreement, which, from 29 August 2020 brought to an end some hundred and thirty intra EU BITs and their arbitration clauses. Under this agreement, all intra EU BITs in force and related disputes are treated as inapplicable, and new intra-EU BIT arbitration is expressly prohibited. Member State courts have since invoked Achmea to set aside or refuse to enforce awards based on intra-EU BITs. The German Federal Court of Justice held the arbitration agreement invalid, and the Federal Constitutional Court dismissed Achmea's constitutional complaint against its annulment. As a result, within the EU, investors can no longer seek relief through ISDS and must turn to domestic courts. This shift has markedly reduced investment protection within the EU and is widely regarded as a negative development for legal certainty.

#### Case II Komstroy<sup>[15]</sup> and the Energy Charter Treaty

After Achmea, the shock to intra-EU arbitration spread further still. In 2021, in Komstroy (C-741/19), the Court of Justice ruled that the arbitration clause in the Energy Charter Treaty did not apply to disputes between EU Member States. In other words, the Achmea logic was extended to multilateral treaties. Investment disputes arising under the ECT between EU Member States are deemed incompatible with EU law. Faced with this position and the stalemate in the ECT modernisation process, most EU States opted to withdraw, and in June 2024, the EU formally notified its exit from the treaty, with an exit planned for 2025. The consequences for the energy sector are significant and far-reaching. Although EU law denies the jurisdiction of certain tribunals within the EU, in practice, some European investors have continued to bring ECT claims before the ICSID against the EU and its Member States and have obtained enforcement outside the EU. One example is the Klesch Group's claim against the EU, Germany, and Denmark. Even as enforcement within the EU has tightened, awards have retained their vitality beyond the EU. This contrast underscores the tension between the MIC vision and the existing international arbitration order.

#### 3.1 Conflicts over Applicable Law and Jurisdictional Allocation

The MIC blueprint goes to the heart of the forum and the authority of international investment adjudication. On applicable law, the EU tends to stress an integrated reading of EU law and investment treaties, while the traditional arbitral model, especially where the ICSID Convention applies, gives greater weight to general international law.<sup>[16]</sup> If the MIC were to take in multilateral instruments such as the Energy Charter Treaty, tribunals would be expected to factor EU law into treaty interpretation. This sits uneasily with the orthodox position in international arbitration that EU law need not be considered. In Achmea, the Court of Justice held that the arbitration clause in an intra-EU bilateral investment treaty was incompatible with the EU law. Although Achmea addressed the clash between party consent to arbitration and the primacy of EU law, it revealed the EU's broader tendency to extend its legal order into the investment field. In Komstroy, the Court of Justice carried this logic forward, concluding that Article 26 of the Energy Charter Treaty could not be relied upon for intra-EU disputes. The primacy of EU law therefore prevails, and arbitral review cannot be used to unsettle host-State policy within the EU. Taken

together, the EU position implies that for disputes inside the EU, EU law forms a non-delegable jurisdictional baseline, which sits in sharp tension with a model that relies on the autonomous interpretation of international treaties.

On jurisdictional allocation, the MIC would recentralise adjudicatory authority from national courts to a transnational court and would therefore unsettle the division of authority that underpins the current investment regime.<sup>[17]</sup> In *Achmea*, German courts expressed concern that their jurisdiction was being displaced, and the Court of Justice endorsed that view. The implication is that intra-EU bilateral investment treaties that channel disputes away from domestic courts are to be set aside, and that adjudicatory authority would be collectively pre-determined by States rather than left to the control of any single national system. For the ICSID architecture, this would mean accepting compulsory jurisdiction by a pre-constituted permanent court, which would collide with the Convention's premise of consent to jurisdiction on a case-by-case basis. Developed States that favour the MIC tend to support a deterritorialised judicial sphere, whereas many developing States continue to prioritise territorial jurisdiction.<sup>[18]</sup> The result is a marked divide between preferences for global governance and the defence of State sovereignty.

### 3.2 Challenges to the Enforceability of Arbitral Awards

Another major point of conflict between the MIC and the international arbitration system arises in the field of enforcement. Under the EU design, the MIC would create its own enforcement regime, and the EU takes the view that MIC decisions could be enforced directly under the New York Convention. Yet the stance of the Court of Justice and of EU institutions weakens the effect of these instruments within EU Member States. After *Achmea*, the European Commission stated that ISDS clauses in all intra-EU bilateral investment treaties are inapplicable, that the relevant tribunals lack jurisdiction, and that Member State courts should annul or refuse to enforce such awards.<sup>[19]</sup>

Within the EU, this means that even if an MIC decision is issued under an international treaty, a domestic court could decline recognition on the grounds that it conflicts with EU law. Komstroy reinforced this direction, holding that Article 26 of the Energy Charter Treaty does not apply to disputes within the EU. In substance, the EU's legal order uses judicial channels to limit what might otherwise appear to be unconditional treaty commitments.

Outside the EU, this conflict does not arise similarly. National courts and arbitral bodies consider that once a State and an investor are bound by instruments governing recognition and enforcement, such as the New York Convention and the ICSID Convention, those obligations should be honoured. A French court of appeal followed Komstroy and set aside the same award, while the Swiss Federal Supreme Court took the opposite view and affirmed the international effect of the Energy Charter Treaty. In short, the guarantees supplied by the Washington Convention and the New York Convention remain effective beyond the EU. Two parallel realities therefore coexist: within the EU, courts can refuse investment awards on EU law grounds; outside the EU, international mechanisms continue to support recognition and enforcement.

### 3.3 Tensions between Treaty Consistency and Sovereignty Reservations

The MIC reform brings to the surface a basic tension between the consistency of international treaty obligations and the desire of States to reserve elements of sovereignty. Many investment treaties do not allow a party to discard its obligations at will. Under the Vienna Convention on the Law of Treaties, parties are bound on an equal footing once a treaty enters into force, and termination requires the consent of the parties or compliance with an agreed-upon exit procedure. By contrast, the EU seeks through judicial interpretation and institutional integration to give priority to its own legal order over international commitments. The dynamic visible in *Achmea* and *Komstroy* illustrates this approach. In the EU's view, Member States must protect the autonomy of EU law and must not permit international adjudication to displace that autonomy unless control has been expressly conferred on the EU's judicial system. From the standpoint of general international law, States did not ordinarily lodge such reservations when concluding investment treaties. The mismatch generates what is, in effect, a manufactured conflict in treaty interpretation. Within the EU, that conflict has been resolved in favour of EU law. Intra-EU disputes are therefore handled on the premise that treaty obligations operate only within the limits set by the EU's legal order. The result is a sharp opposition between the principle of treaty consistency and the sovereign reach of regional legal systems. Many developing states worry that this approach allows treaty duties to be curtailed unilaterally, undermining sovereign equality and the expectation of *pacta sunt servanda* in the international legal order.

In sum, the MIC's centralising vision sits uneasily with the distributed model underlying current investment arbitration. Regarding applicable law, the MIC could require tribunals to consider EU law alongside international treaty norms. Regarding jurisdiction, it would ask States to accept the compulsory authority of a permanent court, which clashes with the ICSID Convention's premise of consent on a case-by-case basis and with the ultimate review authority of courts in EU Member States. On treaty stability, the primacy claimed for EU law stands in basic tension with the Vienna Convention's commitment to the continuity of treaty obligations.

#### **4. Paradoxes at the Intersection of MIC Reform and Global Governance**

The promotion of the MIC in international practice has met with resistance and cautious wait-and-see responses from many quarters. International arbitration institutions and existing mechanisms have largely taken a careful stance towards the MIC.<sup>[20]</sup> Bodies such as ICSID acknowledge that ISDS requires reform and have advanced ideas including an advisory centre and proposals for amendment among the Contracting States to the Washington Convention, yet there is little explicit support for a mandatory permanent court on the MIC model. Many specialists argue that party autonomy and the freedom to appoint arbitrators should be preserved rather than a complete move to a fixed bench of judges. They warn that if the MIC becomes the default, the accumulated case law and the system's flexibility would be weakened, and the advantages of international investment arbitration could be lost.

Among major capital-exporting States such as the United States, Canada, and Japan, support for the MIC is not strong. The United States did not adopt an EU-style two-tier investment court in the USMCA and retained many of its arbitral features. Canada accepted the ICS in CETA, yet did not transplant it wholesale into other multilateral arrangements such as the Trans-Pacific Partnership. Japan signalled reservations about the ICS in its talks with the EU. Its Economic Partnership Agreement was split into a trade agreement and an investment protection agreement, and the latter has not been concluded. These States are concerned that the MIC could constrain their preferred remedies for investors or require them to accept an unfamiliar judicial design. South Korea has also submitted papers to the UNCITRAL raising questions or reservations about the MIC. Overall, major Western capital exporters have not rallied behind the EU MIC agenda and remain cautious.

The positions of developing countries are more complex and divided. Some emerging economies worry that the MIC could deepen Eurocentrism and narrow their policy space. In the modernisation of the Energy Charter Treaty, many States, including India, chose to withdraw from the talks and opposed the automatic extension of dispute settlement to the updated rules. India stated that unilateral moves towards judicial unification would fragment the investment regime. Members of the African Union favour selective accession. The African Continental Free Trade Area, for example, allows States to decide whether to accept the jurisdiction of an international investment court. These choices signal a broad preference among developing countries to preserve greater autonomy over the balance between sovereignty and adjudication. In the design of the MIC, developed States tend to support compulsory jurisdiction, while developing States prefer consent on a case-by-case basis or optional accession. This North-South divide stems from the different assessments of the regulatory costs of ceding authority. Capital exporters prioritise investment protection and enforcement efficiency, whereas capital importers are wary of judicial intrusion into development policy.

The trends from 2023 to 2025 have intensified these challenges. UNCITRAL Working Group III has continued to negotiate ISDS reform, yet no framework agreement on the MIC has been reached. At its forty-ninth and fiftieth sessions in September 2024 and January 2025, the focus shifted from sweeping institutional blueprints to more granular work on procedures and cross-cutting questions, including appellate review and the operation of a standing mechanism.<sup>[21]</sup> The EU tabled a proposal for a permanent multilateral mechanism for investment dispute settlement, but positions remain far apart. Emerging economies, such as Brazil and South Africa, insist on consent to jurisdiction on a case-by-case basis, while the EU seeks gradual binding of States to the MIC. The outcome of the Energy Charter Treaty process was also striking. The EU formally notified its withdrawal in June 2024 with effect planned for 2025.<sup>[22]</sup> Courts outside the EU have provided avenues for the enforcement of investment awards. Courts in the United Kingdom have permitted the attachment of Spanish assets, and courts in the United States have authorised the enforcement of an award against Spain under the Energy Charter Treaty. By contrast, courts within the EU have been resistant. After *Komstroy*, the courts in France and Poland set aside the award in that case.

These developments illustrate the difficulty in securing broad acceptance for the MIC reform path. Progress requires sufficient consensus in multilateral forums such as UNCITRAL, yet arbitration institutions, major developed States, and developing States continue to diverge and friction persists. The arbitration community must account for the long-term effects of EU law on international investment law and find innovative ways to protect investors.

The international rollout of MIC faces several constraints. Tensions between sovereignty concerns and judicial design, and between the aims of integration and flexibility, make a uniform global agenda difficult to advance quickly. In particular, after the *Achmea* and *Komstroy* cases, further movement inside the EU meets legal and political headwinds, while the willingness to participate outside the EU is increasingly split. The negotiations and practice to come will need to strike a balance between development needs and institutional innovation. The next part therefore turns to ‘differentiated and adaptive sovereignty’ as a possible route to break the impasse.

## 5. Pathways to Coordination: Starting From ‘Differentiated and Adaptive Sovereignty’

Given the fundamental flaws in the all-or-nothing logic of sovereignty transfer revealed by MIC reform, a turn to the principle of ‘differentiated and adaptive sovereignty’ appears to offer a more inclusive institutional path. Differentiated and adaptive sovereignty rests on the recognition that transfers of sovereign authority can be gradual, conditional, and reversible, and that such transfers may evolve as States’ preferences and external conditions change. States can choose different trajectories and degrees of transfer in light of their political economy, investment policy needs, and levels of trust. Differentiated and adaptive sovereignty is not a principle already established in international law or traceable to a specific treaty or line of cases. Its intellectual roots lie in several adjacent, yet distinct, traditions. Neil Walker was among the first scholars in the EU context to address the interplay between ‘sovereignty and differentiation’, and he outlined layered routes for the transfer of sovereign competences.<sup>[23]</sup> Around 2000, Aihwa Ong advanced the idea of ‘graduated sovereignty’ to describe how States under globalisation allocate sovereign powers in differentiated ways across space, communities, and economic zones.<sup>[24]</sup> Stephen D. Krasner’s notion of ‘shared sovereignty’ adds a realist institutional template by proposing treaty-based arrangements for the joint exercise or trusteeship of sovereign functions. History shows that sovereignty is not immutable.<sup>[25]</sup> The creation of the WTO dispute settlement system itself reflects a functional cession of adjudicatory authority by States. Meanwhile, States maintain bottom lines in the exercise of sovereignty and must balance international obligations with domestic legitimacy. If the MIC is to embed the idea of ‘differentiated and adaptive sovereignty’ in its design, it should innovate in the following areas.

First, functions should be layered by distinguishing ‘transferable competences’ from ‘reserved domains’ in the MIC treaty design. A negative list can clarify which policy areas are excluded from the jurisdiction of an international court—for example, public health, cultural security, and food security—so that core sovereignty is preserved while allowing adaptive transfers of authority in less sensitive areas.

Second, a flexible participation mechanism should allow States to join in stages according to preference. The MIC framework could recognise an observer status or an associate membership track. States could first accept a non-binding appellate review and later decide whether to become full members. ‘Flexible opt-in’ clauses embedded in the agreement would give developing countries time and space for cautious adaptation and negotiation. This approach is comparable to the investment security exception under the RCEP. It would also soften the backlash that often follows a one-size-fits-all jurisdiction. Members should be able to make modular choices regarding the scope of MIC jurisdiction through opt-in and opt-out arrangements. A State could accede to the MIC while excluding specified provisions, or it could temporarily withdraw from parts of the jurisdiction. This is analogous to the joint interpretative practice under the CPTPP.

Third, nomination and decision-making should be structurally reset. The traditional appointment pattern dominated by capital-exporting States should be replaced by a dual-track nomination process. Candidates from developed countries could be coordinated through the OECD, while candidates from developing countries could be coordinated through the Group of 77. This would help achieve balance on the bench. For treaty amendments and major institutional decisions, a double-majority voting rule could be introduced that considers both the number of contracting parties and their share of investment flows. This would reduce the risk of a few large powers monopolising the reform agenda.

Finally, a multilevel solution should allow the MIC, an appellate mechanism, and existing arbitration to operate in parallel. In the near term, independent arbitral tribunals could be retained, and a common appellate body could be created. In the longer term, once a wider membership agrees, the system could transition to a fully fledged permanent court. Diverse dispute resolution tools, including mediation, negotiation, and domestic remedies, should also be preserved. This would reduce the impact of compulsory jurisdiction on national policy space and would leave room for a policy-space exception and case-by-case choices about whether to arbitrate. Treaty adjustments can proceed in stages. Limited reforms could be piloted in bilateral or regional agreements as transitional steps towards the MIC. The EU can draw on the experience of the modernisation process of the Energy Charter Treaty by adding an appellate review and adopting rules on the consolidation and consistency of awards, rather than launching an entirely new court in a single move. In this way, the dispute settlement architecture could be improved without stripping states of their ultimate judicial authority.

‘Differentiated and adaptive sovereignty’ offers a theoretical basis for compromise, yet implementation faces practical constraints. Developed countries place a premium on the consistency of outcomes and are reluctant to accept renewed fragmentation and the risk of divergent results in similar cases. Developing countries often struggle to coordinate their positions because their interests diverge, weakening collective bargaining for reciprocal concessions. Institutional switching costs were also high. Replacing the existing ISDS architecture would require reworking more than three thousand bilateral investment treaties, and negotiation costs and conflict-of-laws risks would be significant. However, the reform window is not closed. UNCITRAL Working Group III has placed appellate review and a multilateral court on its agenda, and the continued standstill of the WTO Appellate Body creates an opening for such institutional competition. If the elements of ‘differentiated and adaptive sovereignty’ are embedded in adjustable multilateral clauses and soft law, and if consensus is built through creeping codification, the MIC could still advance through compromise. One route is to place the principle in a code of conduct for transnational corporations or in annexes to investment agreements so that States can pilot new jurisdictional models. Another route is for the EU to promote a tiered application mechanism in the Mauritius Convention on Transparency or comparable multilateral instruments. Once a convention enters into force, members can choose which categories of investment disputes to submit to the MIC, in light of domestic ratification processes and national interests. Categories can be defined by sector or case type. This would signal a reform commitment by creating more third-party participation and appellate avenues while avoiding the immediate pressure to reopen existing treaties.

‘Differentiated and adaptive sovereignty’ seeks to advance the MIC vision through gradual and flexible steps while respecting sovereign equality and State consent. The approach recognises varied tolerance for transfers of authority and treats sovereignty adjustment as a dynamic balance. Staged participation and incremental binding can foster the shared acceptance of a supranational judicial mechanism. In this light, the MIC becomes a continuing process rather than a fixed end State. Developed and developing countries can experiment and converge at different levels and speeds in search of a workable equilibrium. Such flexibility preserves the MIC’s ambition to enhance consistency and encourages wider participation by allowing States to maintain essential sovereign control during the transition.

## Conclusion

The EU’s proposal for a Multilateral Investment Court (MIC) carries strong expectations for reform of investor–State dispute settlement.<sup>[26]</sup> It does more than recalibrate arbitral procedures. It also seeks to shift the operation of international investment law from a decentralised model to a centralised one. From the EU’s perspective, this direction promises to address the legitimacy crisis of ISDS and enhance fairness and efficiency across the system. Practice to date, however, shows that such a unilateral attempt at redesign collides with the principle of State sovereignty within the international legal order, and deep frictions have appeared in the allocation of jurisdiction, the identification of applicable law, and the enforcement of decisions. The conflict undermines the stability of existing arbitral practice and tests the boundary between EU law and international law. The legal regime of international investment law now stands at a crossroads between the old and new orders. A more cautious strategy and broader international dialogue are needed if the EU wants to advance its MIC vision. The principle of ‘differentiated and adaptive sovereignty’ may offer a flexible compromise, allowing States to take part in reform while preserving core sovereign prerogatives. Step by step, this could lay the groundwork for a more inclusive and adaptable system



of international investment adjudication. Only if sovereignty protection and systemic reform are pursued together can the MIC's potential for innovation take root within the international legal framework, and the widening stand-off between the EU and the broader order be avoided. Throughout this process, States should safeguard their legitimate interests and policy space, and participate in multilateral cooperation so that gradual reform can give new vitality to international investment arbitration.

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# Is Online Sentiment a Reflection of Public Opinion? Research on Innovative Mechanisms for Public Policy Formulation in the Digital Age

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**Abstract:** The formulation and implementation of public policies face increasing public scrutiny and protest. This phenomenon stems partly from the widespread adoption of internet technology, which amplifies citizens' opportunities to voice opinions, and partly from heightened civic awareness, driving strong public engagement in policies affecting personal interests. Consequently, traditional public policy mechanisms struggle to meet digital-age demands, making innovation imperative. This paper contends that online sentiment represents a certain measure of public opinion and should be incorporated into the scope of consideration for public policy formulation. However, attention must also be paid to the irrationality and potential distortion inherent in online sentiment expression. In light of this, this paper proposes a "Recognition-Transformation" framework to convert online sentiment into credible public opinion information (D-information). This D-information should then be integrated with leadership/bureaucratic hierarchical information (A-information), expert consultation information (B-information), and commissioned social survey information (C-information) to form a "Four-Source Information Synergy" model, serving as the information base for public policy formulation. Concurrently, by establishing an open, interactive system for public policy formulation and implementation, alongside a "monitoring-consultation-adjustment" policy-making procedure, an innovative mechanism for public policy formulation suited to the digital age is constructed.

**Keywords:** Public Policy; Digital Era; Innovative Mechanism; Public Interest; Online Sentiment

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## 1.Introduction

### 1.1 Research Background and Problem Statement

In recent years, with the proliferation of internet technology and heightened public awareness of social governance participation, tensions between public policy and public demands have become increasingly apparent. Public policy formulation and implementation frequently provoke strong public sentiment. For instance, in November 2025, the newly revised Public Security Administration Punishment Law<sup>[a]</sup>, stipulating that "records of violations of public security

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[a] China's newly revised Public Security Administration Punishment Law shall formally take effect on 1 January 2026. Article 136 stipulates: Records of violations against public security administration shall be sealed and shall not be provided or disclosed to any

management penalties, including drug use, shall be sealed,” provoked intense public sentiment, even evolving into broader public questioning of privilege and fairness. Similarly, in the same month, the Sichuan Provincial Department of Education’s policy to comprehensively implement the “Spring and Autumn Holiday System for Primary and Secondary Schools<sup>[b]</sup>” across the province similarly triggered parental emotions, sparking a wave of online public opinion. This demonstrates that conflicts between public policy and public demands have become a significant and unavoidable issue in digital-age social governance. The reasons for this are twofold: on the one hand, digital platforms have become crucial spaces for citizens to express their interests and disseminate their views (Zhang Yan, 2022). On the other hand, traditional public policy formulation mechanisms face structural challenges in absorbing and integrating public opinions, leading to diminished credibility and increased implementation resistance (Zhang Xiangdong, 2007). Against this backdrop, this paper poses the core questions: Can online sentiment serve as an effective representation of public opinion? How can governments incorporate online sentiment into public policy formulation through institutional innovation to enhance the scientific rigour, rationality, and effectiveness of policy-making?

## 1.2 Research Significance

Theoretically, this study seeks to introduce “online sentiment” as a novel influencing variable within public policy-making mechanisms. This aims to broaden perspectives on public policy information input mechanisms and innovate the logic and procedural mechanisms of public policy formulation. Practically, by constructing public policy-making mechanisms adapted to the digital network era, it provides theoretical foundations for government departments to mitigate public policy conflicts and enhance social governance efficacy.

## 1.3 Research Methodology and Structural Arrangement

This study employs a combined approach of theoretical analysis and mechanism design. It first traces the theoretical lineage of public policy and public interest, then critiques the inherent limitations of traditional public policy formulation mechanisms, before proposing a modern public policy formulation mechanism and framework that integrates online sentiment. The paper is structured into four sections as follows: Section One presents the research question; Section Two elaborates on the theoretical foundations of public policy, public interest, and public policy formulation; Section Three proposes a modern public policy formulation mechanism adapted to the digital network era; Section Four summarises research findings and offers recommendations.

# 2. Public Policy, Public Interest, and the Mechanisms of Public Policy Formulation

## 2.1 The Nature of Public Policy and the Multidimensionality of Public Interest

Traditional perspectives view public policy as collective action undertaken by government to achieve the singular, objective goal of public interest. Contemporary theory, however, tends to regard the essence of public policy as the authoritative allocation of societal values by government (Easton, 1965). Here, “values” encompass all matters cherished by society’s members, including power, wealth, services, and opportunities. Consequently, the process of formulating and implementing public policy is inherently political, with outcomes reflecting the competition and compromise between diverse interests and values.

The closely associated concept of ‘public interest’ likewise transcends classical, totalitarian understandings (such as

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organisation or individual. Exceptions apply where relevant state organs require access for case handling purposes, or where organisations conduct inquiries in accordance with national regulations. Entities conducting lawful inquiries shall maintain confidentiality regarding sealed records.

[b] On 5 November 2025, the Sichuan Provincial Department of Education and 10 other departments jointly issued a notice implementing a spring and autumn break system for primary and secondary schools across the province. The policy stipulates that spring and autumn breaks shall generally be scheduled around the mid-term periods of the spring and autumn semesters (i.e., April–May and October–November), with each break typically lasting three days. Spring and autumn breaks shall be coordinated by municipal (prefectural) authorities, with flexible arrangements tailored to regional circumstances. These breaks may be combined with statutory holidays, weekends, and seasonal excursions. Rural areas may align them with local farming seasons, while ethnic regions may coordinate them with local holidays.

Rousseau’s ‘general will’), exhibiting multidimensional, dynamic and constructed characteristics.1. The interplay of consequentialism and proceduralism. One perspective holds that public interest manifests in specific outcomes that maximise overall social welfare (utilitarianism). Another emphasises that public interest resides within fair, open, and inclusive decision-making procedures; provided the process is legitimate, its outcome acquires public interest legitimacy (Rawls, 1971; Habermas, 1996). 2. The perspectives of pluralism and corporatism. Pluralism views the public interest as the equilibrium achieved through free competition among countless interest groups in the political marketplace (Dahl, 1961). Corporatism, however, emphasises that the public interest is a consensus formed through state-led integration of major functional interest groups (such as trade unions and chambers of commerce) into institutional frameworks for deliberation (Schmitter, 1974). 3. Reconstruction of the Network Society. The rise of the internet has profoundly altered the form of the public sphere. The “decentralisation” and “fragmentation” of interest expression channels have enabled diffuse individual interests and sentiments—previously filtered or obscured by organised channels—to manifest on a massive scale and in real time (Castells, 2008). This has resulted in the composition of public interest no longer being confined to traditional dimensions such as class or industry. Instead, it revolves around the aggregation of specific events and communities of shared sentiment, becoming exceptionally complex, fluid, and contentious (Fang Dejiu, 2025). Public interest is no longer a static entity to be discovered, but rather a dynamic process continuously constructed and defined through the interaction of diverse discourses, particularly online discourse.

2.2 Information Input Mechanisms in Public Policy Formulation and Their Systematic Biases

The scientific rigour, rationality, and effectiveness of public policy formulation fundamentally depend on the quality of its information inputs. Traditional closed or semi-closed mechanisms for public policy formulation and implementation typically rely on three primary information channels, each inherently embedded with specific systemic biases.

Table1: Information Input Mechanisms and Systemic Biases in Traditional Public Policy Formulation

| Information Input Channel                                 | Operational Logic and Theoretical Assumptions  | Inherent Flaws and Systemic Biases   |
|---|--|--|
| A. Internal Research by Leadership/Bureaucratic Hierarchy | Based on Weberian rational bureaucratic models, it presupposes that information can be accurately transmitted bottom-up through the bureaucratic hierarchy, with decision-makers grasping the overall situation through reports and inspections. | Information distortion and filtering: Hierarchical reporting tends to simplify information, present selective narratives, and foster collusion of interests (reporting successes while concealing failures), creating “visual isolation” (Wilson, 1989). Surveys often devolve into “staged inspections” with small sample sizes, struggling to uncover genuine, acute frontline conflicts.  |
| B. Expert Consultation and Technical Rationality          | Rooted in technocracy or expert governance, this approach presupposes that societal problems can be optimally resolved through specialised knowledge and instrumental rationality.   | Technical Rationality and Value Blind Spots: Expert knowledge is often confined to specific domains, hindering cross-system value balancing (e.g., economic efficiency versus social equity, development versus environmental protection). Experts may develop “intellectual arrogance” through alliances with particular interests or detachment from public daily life, causing their rational recommendations to clash with public emotional perceptions and fundamental values (Fisher, 1990). |
| C. Commissioned Social Surveys                            | Based on positivist social science, this approach employs standardised sampling and questionnaire surveys to scientifically capture public opinion distribution in quantitative form.  | Static and superficial: Surveys entail high costs, lengthy cycles, and lagging results, rendering them incapable of responding to sudden public issues. Standardised questionnaire designs may fail to capture the complex, nuanced genuine sentiments of the populace or their latent, unexpressed demands. Their pursuit lies in statistical representativeness rather than profound understanding at the emotional and value levels.  |

Consequently, while traditional information input mechanisms may prove effective in relatively stable social environments, their closed nature, lagging responsiveness, and filtering tendencies inevitably prove inadequate when confronted with the diverse, immediate, and emotionally charged expressions of public sentiment in the digital network era. Should government departments rely solely on these channels, they will inevitably become trapped within an information silo. Consequently, the



public policies formulated therein may align with bureaucratic or technical rationality, yet they will lack social sensitivity and responsiveness due to their failure to adequately incorporate and recognise public sentiment. This constitutes the structural root cause of the implementation resistance encountered by many current public policies.

### **2.3 Online Sentiment as a Manifestation of Public Opinion: Theoretical Controversy, Dual Attributes, and Identification Frameworks**

The emergence of online sentiment poses a fundamental challenge to traditional conceptions of public opinion and the information foundations of public policy formulation. Online sentiment refers to the emotional inclinations, attitudes, and collective moods expressed en masse by netizens through text, images, symbols, and other mediums during the formulation and implementation of public policies. Regarding whether online sentiment should be incorporated into the scope of public policy formulation, two distinct viewpoints exist.

Supporters contend that online sentiment represents a revolutionary manifestation of public opinion in the digital age. 1. Scale and directness. Online sentiment provides unprecedented volumes of raw, behavioural public opinion data, transcending the sample limitations of traditional surveys. It captures the voices of silent and emerging groups, constituting a “direct pulse of democracy” (Katz et al., 2013). 2. Immediacy and early warning capability. Sentiment shifts function as societal sensors, mapping public reactions to policy in real time and furnishing governments with valuable early warning signals and feedback windows for adjustment (González-Bailón & Paltoglou, 2015). 3. Shaping the Public Agenda. Powerful online sentiment can bypass traditional media and bureaucratic agenda-setting mechanisms, propelling marginal issues directly into the public eye and reshaping policy discussion priorities, thereby genuinely embodying the agency of public opinion (Wang Yichun, 2010).

Critics, however, sharply contend that online sentiment carries significant risks of distortion as a representation of public opinion. 1. Participation bias and non-representativeness. Active online users do not constitute a cross-section of the entire population, exhibiting structural biases in age, geography, educational background, and other dimensions. Those expressing sentiment are often stakeholders or individuals with extreme views, potentially leading to the neglect of the “silent majority”. 2. Polarisation and distortion. Homogeneous social media circles and algorithmic recommendation systems readily foster the “echo chamber effect” and group polarisation, drowning rational discourse in extreme sentiment (Sunstein, 2017). Commercial interests and online troll armies may also manipulate public sentiment, fabricating false waves of public opinion. 3. Fragmentation and Irrationality. Online sentiment frequently manifests in fragmented, hashtag-driven, and satirical forms, lacking systematic expression and rational argumentation. This may divert attention from substantive issues, complicating public policy analysis.

Naturally, simplistically endorsing or rejecting online sentiment is unwise. The crux lies in how institutional design can transform online sentiment from noise into meaningful signals. This involves a “recognition-transformation” framework for online sentiment. At the identification level (what it is), leveraging technologies such as big data sentiment analysis, topic modelling, and social network analysis enables not only the detection of the intensity of netizens’ emotions (attention levels) but also the discernment of their depth (core demands), purity (authentic public sentiment versus manipulated outcomes), and group structure (emotional distribution across different interest groups) (Wang Xiwei, Zhuang Huixing et al., 2024). For instance, one must distinguish between cathartic anger and grievances rooted in specific injustices; discern whether complaints stem from localised group dissatisfaction or reflect broader societal anxieties. At the implementation level (actionable steps), the identified valid public sentiment information should be systematically integrated into the policy-making process. This includes establishing a system for analysing and reporting online public opinion to serve as supplementary material for public policy drafts; introducing selected representatives from diverse online communities holding differing emotional stances during public policy consultation phases; and incorporating online sentiment monitoring as a key indicator for post-implementation evaluation and dynamic adjustment of public policies.

In summary, as the digital network era advances, it is imperative to incorporate online sentiment into the scope of consideration for public policy formulation and implementation. Concurrently, attention must be paid to the dual characteristics of online sentiment, which simultaneously serves as an expression of public opinion while carrying risks of distortion. While it cannot wholly replace traditional public opinion, it undoubtedly constitutes an indispensable and dynamic

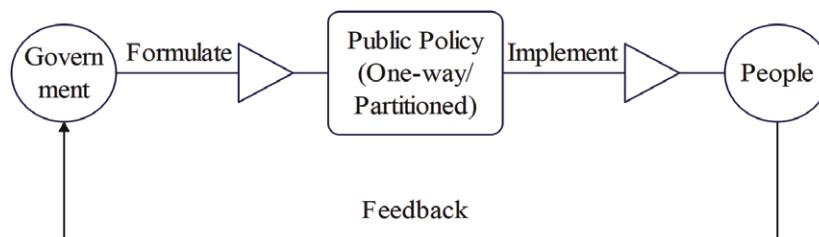
component of contemporary public sentiment. The modernisation of public policy formulation mechanisms does not hinge on whether online sentiment is considered, but rather on the ability to establish a refined, prudent, and institutionalised process for critically assimilating and rationally transforming such sentiment. This enables the formulation of policies that better serve the public interest amidst the cacophony of the digital age.

### 3.Modern Public Policy-Making Mechanisms in the Digital Network Era

Having systematically analysed the inherent flaws of traditional public policy-making mechanisms and their profound tension with public sentiment, this chapter proposes a constructive alternative. It argues that an effective mechanism for public policy-making in the digital network era requires not piecemeal, patchwork revisions to traditional processes, but a profound logical restructuring—a transformation of the public policy-making system itself. This entails evolving from a mechanistic execution system based on unidirectional information flow and limited feedback into an ecosystem grounded in pluralistic information and bidirectional coupling. The core logic of this innovative mechanism lies in institutionally designing the systematic and critical integration of vast, dynamic, and unstructured data—including network sentiment—into the entire process of public policy formulation and implementation. This establishes a new dynamic equilibrium between value rationality and instrumental rationality, as well as democratic participation and decision-making efficiency.

#### 3.1 Paradigm Shift: From “Closed-Linear” to “Open-Cyclical”.

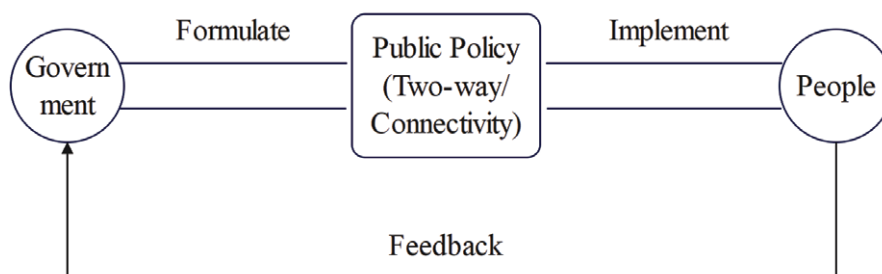
*Figure 1: Traditional Public Policy Formulation and Implementation Model*



Traditional public policy formulation and implementation followed an engineering paradigm approximating a “closed-linear” model (as illustrated in Figure 1). Within this paradigm, the government occupies a central position as the sole engineer, with public policy proposals regarded as optimal solutions derived under finite constraints. Citizens are presupposed as passive recipients and subjects of these proposals, possessing narrow, delayed, and easily filtered feedback channels. The system thus exhibits pronounced “unidirectional/disconnected” characteristics. This paradigm often functions effectively in contexts characterised by information scarcity, high social homogeneity, and weak public social awareness. However, its inherent closed nature renders it incapable of addressing the challenges posed by the information explosion and the highly heterogeneous nature of interest demands in the digital network era.

To adapt to the digital age, public policy-making bodies must transition towards an ‘open-loop’ ecological paradigm (as illustrated in Figure 2). Within this paradigm, public policy formulation is conceptualised as a continuously interactive ecosystem comprising multiple stakeholders including government, citizens, social organisations, market institutions, and media.

*Figure 2 Modern Public Policy Formulation and Implementation Model*



Public policy ceases to be a pre-designed blueprint, instead emerging as a collective choice forged through multi-stakeholder interaction, capable of continuous optimisation in response to environmental feedback. Consequently, the government’s role

evolves from a singular decision-making centre to that of an ecosystem platform builder, an enforcer of interaction rules, a facilitator of public dialogue, and an ultimate accountability bearer. Its core function lies in ensuring low-cost, high-fidelity, institutionalised “two-way/connected” and cyclical flow of information (including public opinion) within the system, thereby enhancing the adaptability and resilience of the entire public policy ecosystem.

### **3.2 Core Architecture: The “Four-Source Information Synergy” Model for Institutionally Integrating Online Public Sentiment**

The implementation of this new paradigm relies upon an institutionalised framework capable of synthesising diverse information streams, particularly one that rationally processes online sentiment. This paper proposes a “four-source information synergy” model for information integration. Building upon the optimisation of traditional three information sources (A. Leadership/bureaucratic hierarchical information, B. Expert knowledge information, C. Commissioned social survey information), it elevates a fourth source—D. Online sentiment and public opinion information—to an institutionally equal status. It further establishes complementary, verification, and synergistic mechanisms among these four sources.

Specifically, the institutional integration of online sentiment and public opinion information constitutes the key innovation of this model, operating through three progressive tiers. 1. Systematic Perception and Collection. Government departments must establish a cross-platform, full-cycle system for perceiving online social sentiment. This transcends simple public opinion monitoring, requiring the systematic collection of textual, visual, and interactive data from social media, forums, government message boards, and even comment sections on short-video platforms. The aim is to capture diverse, raw public sentiment and opinion patterns, avoiding information distortion caused by platform selection bias. 2. In-depth Analysis and Rational Identification. Confronted with vast volumes of unstructured sentiment data, multi-tiered analytical techniques must be employed to achieve the transformation from “data to information to knowledge”. This encompasses: firstly, identifying intensity and momentum – analysing the public discourse’s fervour and emotional intensity surrounding specific issues; secondly, distinguishing focal points from broader trends – utilising natural language processing and topic modelling to cluster specific public policy demands from the flood of sentiment, while analysing the distribution structure of these demands across different social groups; Thirdly, uncovering underlying structures by integrating socio-economic data to explore structural and institutional causes behind emotional outbursts (such as perceived lack of fairness or unstable expectations). This process aims to filter noise, identify rational elements, and transform emotional expressions into factual and value-based propositions suitable for public policy debate. 3. Institutionalised Input and Procedural Response. Analytical findings must be embedded within the public policy formulation process as statutory procedures, presented in standardised formats such as public opinion reports. Concurrently, these reports should be submitted alongside expert assessments and investigative reports for deliberation by decision-making bodies at critical junctures: public policy agenda setting, proposal drafting, risk assessment, and post-implementation evaluation. More crucially, establishing procedural response mechanisms requires that when public policy drafts are released, they must include annexes or dedicated sections providing public responses, explanations, or clarifications to the mainstream concerns and reasonable queries distilled from online public opinion. This action transforms the incorporation of public opinion from an optional, flexible gesture into a rigid, visible procedural responsibility.

Simultaneously, synergistic mechanisms among the four information sources prove crucial. Firstly, Source A and Source D should cross-validate bureaucratic hierarchical information. Secondly, Source B must be cross-referenced with the public value preferences revealed by Source D to bridge the gap between technical rationality and everyday rationality. Thirdly, the precision of Source C provides a calibration benchmark for representational biases in Source D. Thus, through mutual collision and checks and balances, the four information sources achieve full expression of all stakeholders’ interests, ensuring public policies maximally reflect the public good.

### **3.3 Process Reengineering: Establishing a Dynamic Closed-Loop System of “Monitoring-Consultation-Adaptation”**

Based on the model of synergistic four-source information, modern public policy formulation and implementation should be restructured into a dynamic closed-loop process of “monitoring-consultation-adaptation,” forming a cyclical system for public

policy iteration.

First, at the front end of the process: issue identification and risk early warning. Leveraging the real-time nature of D-source information, an early warning system for social risks and public concerns should be established. During the problem definition stage of public policy, the aggregation of online public sentiment itself can serve as a crucial source for agenda setting, ensuring that the public policy agenda remains in sync with the pulse of society.

Secondly, the mid-stage of the process: open consultation and co-construction of legitimacy. A tiered consultation mechanism is introduced during the formulation of public policy proposals. For public issues requiring strong expertise and presenting minimal controversy, public opinion may be gathered through means such as publishing policy infographics and soliciting online feedback. Conversely, for major livelihood concerns or highly contentious public issues, a formal consultation mechanism should be activated. This could involve leveraging digital technology to conduct large-scale online deliberations, simulated voting, and publicly streamed hearings, thereby transforming the consultation process itself into a public forum for building consensus and establishing communicative legitimacy.

Thirdly, the back-end process: implementation feedback and agile adaptation. Following public policy implementation, focus shifts to continuous monitoring of D-source information, enabling real-time assessment of societal acceptance and sentiment feedback. For widespread discomfort or unintended consequences arising during execution, establish agile policy adaptation procedures permitting rapid, minor adjustments to implementation methods, supporting regulations, or technical standards—provided core objectives remain unchanged. Public policy evaluation must also synthesise information from all four sources, particularly analysing the trajectory of online sentiment evolution. This transforms experience into institutional knowledge, completing the learning loop from one-off decision-making to continuous governance.

### 3.4 Potential Challenges and Boundary Constraints

Any institutional innovation must prudently consider its boundaries and risks. The public policy formulation mechanism proposed herein may face three major challenges. Firstly, the representativeness dilemma under the digital divide, wherein the absence of marginalised groups in online discourse may lead to new public policy injustices. The countermeasure lies in combining digital empowerment with traditional channels as a safety net, proactively providing alternative participation pathways for non-internet users. Secondly, the risks of sentiment polarisation and populism. The new mechanism does not equate to populist rule but rather values public input to enhance the scientific rigour of policy formulation, reduce implementation resistance, and improve outcomes. Consequently, the government must act as a rational gatekeeper and value balancer, employing expert analysis and public dialogue to mitigate extreme sentiments while guarding against the “echo chamber effect” and group polarisation (Sunstein, 2017). Thirdly, balancing decision-making costs and efficiency. Governments should establish differentiated participation rules based on policy types, applying high-intensity public engagement for fundamental and distributive policies while adopting streamlined procedures for routine and specialised policies to ensure governance effectiveness (Thomas, 2010).

The essence of modern public policy formulation and implementation mechanisms adapted to the digital network era lies in achieving a logical shift through systematic institutional design: from “government-led, public passive acceptance” to “government-facilitated platforms, multi-stakeholder collaborative governance”. The public policy formulation mechanism in the digital era requires a four-source collaborative model as its information foundation and a dynamic closed-loop process as its operational framework. This transforms the diffuse, noisy sentiments permeating cyberspace into rational proposals that drive public policy formulation. In essence, this represents not merely an upgrade of technological tools, but a profound transformation in the logic of social governance. It constitutes a new form of governance characterised by greater inclusivity, responsiveness, and iterative capacity. This mechanism provides a sustainable pathway for public policies to forge consensus within complex societies and maximise the public interest.

## 4. Conclusion

The advancement of internet technology and heightened public awareness of civic participation have rendered traditional public policy-making paradigms ill-suited to contemporary environments. This is evident in the persistent challenges to public policies and resistance encountered during implementation. Consequently, this paper proposes an innovative mechanism for

modern public policy formulation. Firstly, while incorporating online sentiment as an information source, it acknowledges its irrationality and potential distortions. Thus, it introduces an “identification-transformation” framework to convert online sentiment into effective public opinion. Secondly, it integrates online sentiment with three traditional information sources—internal research from leadership/bureaucratic hierarchies, expert consultations, and data from commissioned social research institutions—to form a four-source collaborative model. This provides diverse and comprehensive input for public policy formulation. Thirdly, by establishing an open public policy formulation system and rigorous procedural mechanisms, it enables the development of scientific, rational, and effective public policies. Undoubtedly, the contemporary mechanisms for formulating and implementing public policy in the digital age fundamentally reflect a transformative shift in governance paradigms, wherein governments must integrate public sentiment and opinions into the fabric of social governance.

For public policy-making bodies, it is imperative to set aside preconceptions about online sentiment and refrain from outright dismissing citizens’ emotional expressions. Whilst public policy cannot possibly satisfy every individual, widespread online questioning of such policies indicates inherent flaws in the formulation process. Indeed, harnessing online sentiment to promptly identify public interests and demands can significantly enhance the scientific rigour, rationality, and effectiveness of public policy formulation, ultimately improving the efficacy of policy implementation.

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# Yulin Bayin: Transformational from “Folk Ritual” to “Cultural Tourism IP”

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**Abstract:** Yulin Bayin, as a living embodiment of southeastern Guangxi’s folk music, is deeply rooted in traditional rituals and carries profound historical memories and cultural genes of the Lingnan region. Under the dual background of accelerated modernization and social restructuring, this ancient folk music form faces both inheritance crises and opportunities for transformation. Based on the Neo-Classical “Structure-Function Theory,” and combining existing literature and field research, this paper examines the adaptive status and developmental challenges of Yulin Bayin in contemporary society. It focuses on issues such as cultural functional adjustment, reconstruction of inheritance systems, and structural relationship transformations during its transition from a “folk ritual” to a “cultural tourism IP.” Furthermore, it proposes several academic topics worthy of in-depth exploration, aiming to provide new theoretical insights and practical references for the dynamic preservation of intangible cultural heritage.

**Keywords:** Yulin Bayin; Intangible Cultural Heritage; Neo-Classical “Structure-Function Theory”; Living Inheritance

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## 1.Introduction

Within the study of intangible cultural heritage (ICH) protection in China, Bronisław Malinowski’s “Cultural Functionalism” and A. R. Radcliffe-Brown’s “Structural Functionalism” have been widely adopted as two core theoretical frameworks by scholars. The former emphasizes culture’s function in satisfying specific psychological, physiological, and institutionally derived needs of individuals, while the latter views the function of cultural practices as maintaining the “stability and integration of social structures.” In light of the dynamic new social structures emerging from China’s ongoing development, scholars such as Zhang Jijiao have integrated Li Peilin’s theory of “Another Invisible Hand”, UNESCO’s “Endogenous Development” theory, and Michael Porter’s “Competitive Advantage” theory, synthesizing them to propose the Neo-Classical “Structure-Function Theory” analytical framework<sup>[1]</sup>. This theory advocates studying intangible cultural heritage within its own survival context or social structure (i.e., external structure) to understand the essential meaning of its existence within the overall structure. Simultaneously, it is necessary to regard intangible cultural heritage as a form of “heritage actor” possessing its own agency, in order to observe its development and transformation within specific fields (i.e., endogenous structure)<sup>[2]</sup>. From this theoretical perspective, the contemporary revitalization practices of Yulin Bayin can be interpreted as a dynamic adjustment of its endogenous cultural functions and a deep embedding within changing external structural relations. The

wisdom and underlying contradictions reflected in its developmental practices not only offer new ideas for ICH protection but also point to academic issues deserving further exploration.

## 2. Yulin Bayin as Intangible Cultural Heritage

Benefiting from the deepening integration of culture and tourism, Guangxi's tourism industry has shown rapid growth, with total tourism revenue exceeding one trillion yuan in 2024. The deep integration of elements such as intangible cultural heritage, rural revitalization, and ecological wellness with the tourism industry has given rise to new formats represented by "ICH markets," "red tourism study tours," and "rural leisure," initially achieving a synergistic enhancement of cultural and economic value. As a traditional wind and percussion music of Guangxi, Yulin Bayin, propelled by both policy support and folk inheritance, has begun to move beyond "niche circles" and integrate into the tourism market with a more vibrant presence. By combining with scenarios such as scenic spot performances, cultural festivals, and experiential study tours, the protection practices of Yulin Bayin have gradually shifted from mere skill preservation to diverse explorations of living inheritance and innovative development, demonstrating the potential for blending tradition with modernity.

### 2.1 The Historical Origins of Yulin Bayin

Yulin Bayin, also known as Southern Guangxi Bayin, is a traditional instrumental music form originating from court and military wind and drum music of the Qin and Han dynasties in China. During the late Ming and early Qing dynasties, this music migrated south with central plains immigrants to the Yulin region and, through long-term evolution, incorporated elements of southeastern Guangxi folk music, forming a musical system that combines ancient central plains traditions with regional Guangxi styles<sup>[3]</sup>. In 2007, Yulin Bayin was recognized among the first batch of Guangxi Zhuang Autonomous Region Intangible Cultural Heritage items. Subsequently, its influence continued to grow, successfully entering the National Intangible Cultural Heritage Extended Project List in 2011. As a representative of Yulin's ancient music culture, Yulin Bayin not only reflects the historical trajectory of local music but is also a precious treasure within the heritage of folk music.

Within the urban and rural areas of southeastern Guangxi, Bayin has become an indispensable part of people's lives. Whether at joyful occasions such as weddings, birthday celebrations, or full-month ceremonies, or during important moments like festivals, temple fairs, and New Year greetings, it plays a crucial role in creating atmosphere and a sense of ritual. Therefore, people often refer to Bayin as a national intangible cultural heritage hidden within the urban fabric, and music peers hail it as the "Symphony of Southeastern Guangxi." "Bayin" specifically refers to drum, gong, cymbals, flute, xiao (vertical bamboo flute), string instruments, qin (zither), and human voice. A Bayin ensemble typically consists of 6 to 8 performers, divided into seated and mobile performances. The repertoire often includes over a dozen pieces, encompassing classics such as "Eight Immortals Offering Birthday Congratulations" and "Spring Arrives." Yulin Bayin is commonly used for local residents' weddings and funerals, folk activities (e.g., Hanshan Dan, Beidi Dan), and holiday celebrations like New Year's Day. Even during non-special times, small Bayin bands can often be seen in streets and alleys, and Qingwanjiang Park occasionally hosts self-organized Bayin practice sessions. Currently, Yulin has established several Bayin inheritance bases. The content of inheritance primarily focuses on performing traditional repertoire, with a small number of innovative pieces (e.g., "Four Sons-in-Law Offering Birthday Congratulations," created under the guidance of the Yulin Cultural Center).

### 2.2 The Developmental Status of Yulin Bayin

Since 2023, the Yulin municipal government has focused on constructing a new development model of "ICH + Tourism." By creating a "Bayin+" cultural tourism IP, it integrates traditional instrumental performances with scenic spots, cultural and creative products, and digital dissemination, promoting Bayin's elevation from a local folk ritual to a cultural symbol with broad influence. Field investigations by the research team revealed that the Yulin municipal government's current protection and inheritance efforts for Bayin primarily revolve around three aspects. First, regular displays in museums. The Yulin Museum has dedicated sections for exhibiting Bayin historical documents, physical instruments, and audiovisual materials. Coupled with professional guided tours and digital interactive experience projects, it systematically presents a complete Bayin cultural display system, providing the public with a window to gain an in-depth understanding of this ICH item. Second, organic integration into local festival activities. Pengdong Village incorporates Bayin performances as a core element in its annual Lantern Festival "ICH Lantern Festival" event, effectively enhancing the cultural appeal of the activity. During

the “March 3rd” ethnic festival, the Kunpeng Village Music Festival achieves an organic combination of traditional music and modern cultural tourism by integrating Bayin performances into rural tourism settings. In April 2024, during the filming of the nation’s first large-scale New Folk Song live creation show “New Folk Song Assembly” in Pengdong Village and Shizi Street, Bayin was innovatively fused with elements like bronze drums and folk songs. Under the theme “Ancient Prefecture of a Millennium, Singing for a Millennium,” it showcased the contemporary vitality of traditional music. Third, creating Bayin experiential scenarios. Yulin possesses rich tourism resources. Besides existing attractions like Pengdong Ancient Village and Nangang Trendy Play Street, the Wanhua Lou Cultural Tourism Complex, officially opened in June 2024 as a key immersive tourism destination in Yulin, is planning cultural spaces including a Bayin Square and an Overseas Chinese History viewing platform. These spaces are poised to become important platforms for centrally showcasing Yulin Bayin in the future. Through on-site experiences and participatory creation, they will allow tourists to closely feel the unique charm of Bayin, enhancing their sense of identification and participation in ICH culture.

Furthermore, with its distinctive regional characteristics, Yulin Bayin has become a cultural Brand in diplomatic activities. During the 2025 Lantern Festival, diplomats and ambassadors from ten countries, including Malawi, Zambia, and Indonesia, visited Yulin. They showed keen interest in Bayin art, not only appreciating live performances but also participating in hands-on experiences with some instruments. This cross-cultural exchange has not only increased the visibility of Bayin but also injected external momentum into its preservation and inheritance. Through promotion in diplomatic activities, Yulin Bayin is gradually transitioning from a local ICH item to an international stage, becoming an artistic link connecting cultural exchanges between China and other countries.

### **3.The Transformation of Yulin Bayin Inheritance Practices**

The repertoire creation and performance forms of Yulin Bayin are deeply rooted in the longstanding life practices of the people in southeastern Guangxi. Its dissemination and manifestation across different historical periods are not only the crystallized wisdom of historical sedimentation but also a living resource imbued with structural integrity and functional adaptability. Within the theoretical framework of Neo-Classical “Structure-Function Theory,” we can clearly observe the dynamic evolution and self-developing capacity of Yulin Bayin. It transcends simple inheritance, instead achieving synergistic development between cultural diversity and socio-economics through adaptive changes in three dimensions: cultural function, inheritance system, and social structure.

#### **3.1 The “Dynamic Adjustment” of Cultural Function**

From a cultural anthropology perspective, the vitality of intangible cultural heritage does not stem from its immutable form but is rooted in its continuous interaction and energy exchange with social life. The centuries-long inheritance practice of Yulin Bayin vividly testifies to this “living” essence. In the context of traditional rural society, Bayin, carried by clan-based music troupes, was deeply embedded in ritual scenarios such as weddings and festivals. The performance activities of the Yan Clan Bayin Troupe at weddings directly illustrate its original function as a “ritual symbol.” This embeddedness within community life constituted the endogenous foundation of its inheritance. In contemporary times, Bayin has broken through the limitations of single ritual contexts, achieving connection with modern life through the “reconstruction of cultural spaces.” The Shizi Street Culture and Art Festival integrates Bayin with elements like arcade architecture and local cuisine, making live Bayin performances a key factor in attracting crowds and creating atmosphere. The development of peripheral cultural and creative products, such as musical score bookmarks and miniature instrument ornaments, further expands the boundaries of Bayin culture dissemination. The original song “Bayin Resounds” integrates into city image promotion in a “music + imagery” format, transforming Bayin from “folk accompaniment” into a carrier of regional cultural identity. This transformation echoes the autonomous agency implied by Neo-Classical “Structure-Function Theory”: on one hand, Bayin retains core cultural genes through stable preservation of core instruments like the six-hole flute, gongs, and drums, and its bright, lively melodic characteristics; on the other hand, it accomplishes dynamic adjustment from “ritual music” to “cultural consumption symbol” through scenario development and formal innovation. This dynamism is reflected both in the intergenerational evolution of instrument forms and playing techniques, and in the extension of contexts from clan rituals to cultural tourism performances, from local knowledge to cross-cultural exchange. Through continuous adaptation, circulation,

and interaction, Bayin consistently aligns with social and human needs, exploring a self-renewal logic of “resonating with social development,” thereby finding a balance between originality and adaptability.

### 3.2 The “Two-way Empowerment” of the Inheritance System

Historically, the inheritance of Yulin Bayin primarily relied on two core systems: first, the emotional bonds formed through intergenerational transmission based on blood and geographical ties within clans; second, the master-apprentice skill transmission system characterized by “oral instruction and mental assimilation.” This model operated effectively within relatively closed and stable social environments, but its motivational structure was relatively singular, with weak risk resistance. In contemporary times, the inheritance and development of Yulin Bayin have evolved into a multi-motivational landscape composed of both “endogenous drive” and “external empowerment.” From the endogenous perspective, the folk consensus that “it’s better to have less banquet than to lack Bayin” still maintains cultural identity. The accompaniment provided in various celebrations, rituals, and community folk activities like dragon and lion dances continues the production and dissemination chain of Bayin. The existence of religious music troupes and numerous folk Bayin teams, such as the Diaoma Village Bayin Team and the Zhoupei Community Bayin Team, is itself evidence of the flow of local knowledge within communities. From the external empowerment perspective, the government provides institutional support through cultural and art festivals, “ICH in Schools” activities, etc. Artists and designers integrate Bayin’s instrument forms and decorative symbols into the exterior design of audio products, realizing the transformation of artistic value into practical value. The involvement of professional institutions and talents promotes the innovation and enhancement of Bayin — for instance, composer Wang Qiaolin from the Guangxi Mass Art Center, after conducting fieldwork in Yulin, created “Four Sons-in-Law Offering Birthday Congratulations,” which incorporates Bayin elements. This piece has repeatedly won awards in major competitions and has become a representative work for Bayin dissemination. This multi-stakeholder collaborative governance platform breaks the limitations of previous single models dominated either by the “government” or “spontaneous folk efforts,” constructing a two-way empowering “cultural ecological community.” This means the inheriting community retains discourse power over the cultural essence, while the government and professional groups provide resources and technical support, forming a governance structure where “internal identity activates inheritance momentum, and external resources strengthen inheritance resilience,” injecting lasting impetus into the sustainable development of Bayin.

### 3.3 The “Deep Embedding” of Structural Relations

The dilemma of modern ICH inheritance does not lie within traditional communities themselves but in the transformation of their external context, including the establishment of modern systems, leading to a disconnect between the two<sup>[4]</sup>. Therefore, besides maintaining the original cultural inheritance mechanisms, protection work needs to address the interface between traditional culture and modern systems. The contemporary adaptation of Yulin Bayin has achieved an upgrade and expansion of its own value. It has evolved from primarily being a “representation” and “carrier” of regional culture in the past to becoming an active resource capable of catalyzing the “symbiosis” of multiple values — economic, social, and cultural. This leap transforms ICH protection from an undertaking focused on “preservation” into a development engine capable of generating comprehensive benefits. Economically, Bayin accomplishes value transformation through the integration of culture, commerce, and tourism. During the Cross Street Festival, Bayin performance was integrated with food consumption and cultural product sales, which not only enhanced the region’s cultural tourism appeal but also generated direct income for the music troupe, creating a virtuous cycle of ‘industry nurturing heritage’. Socially, Bayin has become a link connecting urban and rural emotions. The dissemination of musical works like “Bayin Resounds” provides emotional belonging for Yulin natives living far from their hometown. The Hanshan Dan temple fair and various cultural performances enrich grassroots public cultural life in the region, strengthening community cohesion. Culturally, Bayin not only serves as an important window for showcasing Lingnan culture in various domestic cultural exchange activities but also conveys the charm of Chinese traditional music to the world through the “Guangxi-ASEAN” platform. Its very inheritance is a living continuation of the ritual music culture, folk traditions, and historical memory of southeastern Guangxi. It is precisely by continuing traditional skills in the cultural dimension, achieving inclusive development in the economic dimension, and promoting emotional identity in the social dimension that Yulin Bayin accomplishes deep “embedding” within the local social structure.

This value shift responds to the cultural empowerment theory within Neo-Classical “Structure-Function Theory”: leveraging the power of modern transformation of excellent cultural heritage to promote endogenous local economic development.

## **4. Hidden Concerns in the Living Inheritance of Yulin Bayin**

The contemporary revitalization practices of Yulin Bayin are a vivid microcosm of folk music seeking cultural survival and self-development in a new social environment. Its “dynamic adjustment of cultural functions,” “two-way empowerment of the inheritance system,” and “deep embedding of structural relations” provide systematic inspiration for ICH protection from theory to practice. However, this transformational path is not without obstacles. The conflicts it highlights between cultural authenticity and innovation, between inheriting subjects and objects, and between traditional spaces and modern scenarios still require further exploration and resolution in the future.

### **4.1 The Boundaries of Cultural Adjustment: The Developmental Paradox Between Formal Innovation and Essential Alienation**

Bayin faces the core paradox of “variability” versus “originality” in its cross-boundary transformation. As Bayin transitions from wedding rituals to commercial performances, and from the improvisational playing of folk troupes to staged, choreographed performances, will its ritual attributes gradually dissipate? Ma Guoqing points out that under the influence of the cultural and creative industries, market-oriented ICH faces the dilemma of seeking quick success and instant benefits. Over-commercialization may reduce ICH to “hollow art,” possessing form but lacking spirit<sup>[5]</sup>. The current scenario expansion of Bayin already shows a tendency of “weakening ritual music and strengthening performance attributes,” raising concerns about the alienation of Bayin’s essence. What are the core characteristics of Bayin that cannot be stripped away — the instrument combination, melodic patterns, or cultural connotations? Where are the boundaries of commercial transformation? How can a dynamic evaluation mechanism be established to prevent cultural adjustment from leading to alienation? To navigate this, establishing a set of core criteria for “authentic” practice, coupled with continuous community consultation, is crucial for monitoring commercialization impacts.

### **4.2 Overcoming the Inheritance Gap: Cultural Identity and Participation Difficulties Among the Younger Generation**

Affected by both social development and population mobility, the core inheritors of Yulin Bayin (e.g., Zhang Yaodong, Pang Weiyuan) belong to the middle-aged and elderly demographic, most having been engaged in Bayin performance for over thirty years. The younger generation shows low enthusiasm for participating in Bayin inheritance due to reasons such as high academic pressure, low social recognition, and few vested interests. Additionally, roles within Bayin troupes are not fixed; each member typically needs to master multiple instruments and memorize dozens of commonly used pieces, requiring high memory capacity and practice time, resulting in relatively high technical barriers to inheritance. Existing research often focuses on the survival status and formal innovation of music troupes but seldom delves into analyzing the cultural cognition of the younger generation. For instance, what is the level of understanding of Bayin among the younger generation? Does its “traditional” label constitute an obstacle to acceptance? Can digital dissemination and cross-boundary integration effectively attract youth participation? Potential strategies include integrating Bayin into school curricula, offering structured mentorship programs, and leveraging popular digital platforms to rebrand it as a dynamic cultural activity.

### **4.3 The Reconstruction of Cultural Space: The Challenge of “Enclave” Protection in an Urbanization Context**

The original cultural space of Bayin is the clan society and agrarian life of southeastern Guangxi, and the urbanization process is causing this space to continuously dissolve. Although new scenarios like Shizi Street and Wanhua Lou achieve spatial substitution, this “artificially created cultural space” differs fundamentally in function and atmosphere from the original context. Bayin performances in rural weddings are an indispensable part of the ritual, often accompanied by community activities like clan gatherings and neighborhood mutual aid. In contrast, Bayin in commercial performances is more of a “cultural embellishment,” with audiences mostly participating as “spectators,” lacking emotional resonance and deep identification. This inevitably raises new questions: What impacts have changes in cultural space had on the functional attributes of Bayin? How can the “cultural ecosystem” essential for its survival be protected and reconstructed? Is the “enclave



protection” model of building a Bayin square in the urban core suitable for Bayin inheritance? Moving beyond isolated cultural enclaves, fostering community-embedded cultural hubs that combine performance, education, and social functions could help bridge the authenticity gap.

#### **4.4 The Transformation of Inheritance Subjects: The Survival Crisis and Identity Transition of Clan Music Troupes**

Clan-based music troupes were once the core carriers of Bayin inheritance. Jiang Xie’s investigation shows that the Yan Clan Bayin Troupe in Zhangmu Town was a locally influential religious music troupe, with its organizational operation and performance norms deeply bound to the clan system<sup>[6]</sup>. However, with the weakening of clan influence and increasing population mobility, traditional troupes face issues like member loss and organizational looseness. To adapt to the demands of commercial performances, some troupes have begun incorporating non-clan members, gradually diluting their “clan attributes” and weakening Bayin’s function as a “community bond.” This will trigger a series of subsequent questions: What impact does the dissolution of clan troupes have on the transmission of Bayin’s local knowledge? What differences exist between new commercialized troupes and traditional clan troupes in terms of skill transmission and cultural expression? How can the stability of inheritance subjects and the authenticity of cultural expression be maintained amidst changing social structures? Supporting hybrid models where troupes retain elder masters as cultural custodians while formalizing training systems for new members may help preserve core knowledge during transition.

In the future, with the deepening intervention of digital technology and the ongoing transformation of social structures, Bayin inheritance will face more uncertainties while also containing new possibilities, such as reconstructing original cultural scenes through virtual reality technology and breaking intergenerational communication barriers via social media. Regardless, its core challenge will always lie in balancing the “internal” and the “external”: it needs to embrace external innovation with an open attitude while steadfastly guarding the core characteristics of the cultural essence. The various issues mentioned above urgently require responses through field research and empirical studies to provide theoretical support for the positive interaction between ICH protection and social development.

### **5. Conclusion**

Examined from the perspective of Neo-Classical “Structure-Function Theory,” the transformational process of Yulin Bayin from “folk ritual” to “cultural tourism IP” vividly illustrates the vitality of intangible cultural heritage. Bayin does not exist merely to satisfy the needs of specific individuals or groups; the key to its survival lies in its role as a “structural node” embedded within the social structure and maintaining collective identity. Its process of adjustment is a direct reflection of adapting to the transformation of social structure. Therefore, ICH protection practices need to break away from the mindset of static preservation and shift towards a methodology emphasizing systemic integration and dynamic adaptation. This means that while guiding diverse social forces to participate, full attention must also be paid to the inherent self-renewal capacity of ICH — that is, its potential to achieve formal evolution, structural optimization, and functional reshaping amidst changes in the external environment. Through rational development and revitalizing utilization, such reactivated cultural resources have the potential to transform into endogenous drivers for local development, promoting mutual benefit and progress among ICH survival, industrial upgrading, and the construction of modern civilization.

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### **Conflict of Interests**

The authors declare that there is no conflict of interest regarding the publication of this paper.

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# Theoretical Logic of Narrowing the Income Gap Between Urban and Rural Areas Through Live Streaming E-commerce

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**Abstract:** The urban-rural income gap remains a key global challenge, especially in China. Existing studies lack analysis on live-streaming e-commerce's role in narrowing this gap. This paper first clarifies live-streaming e-commerce's traits (high stickiness, fast sales, low returns) and status (China's 2024 market scale: ~RMB 5.8 trillion). It then notes China's urban-rural income gap widened from RMB 7,238 (2005) to RMB 31,069 (2024), rooted in unbalanced wage/operating income. Theoretical analysis reveals that live-streaming e-commerce narrows this gap by expanding employment to boost rural wage income and fostering industries to increase rural business income, offering developmental insights for emerging economies. This research provides empirical support for narrowing the urban-rural income gap to achieve rural revitalization, while also offering developmental insights for other developing countries.

**Keywords:** Live-Streaming E-commerce; Urban-Rural Income Gap; Wage Income; Operating Income

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## 1.Introduction

### 1.1 Research background

In economic theory, the Kuznets Curve posits that without external intervention, income inequality narrows as the level of economic development advances. However, this is not the case in reality. Income inequality exists in many countries worldwide, among which the urban-rural income gap is extremely significant. Data shows that the contribution of the urban-rural income gap to national income inequality has been on a steady rise: it increased from 38% in 1988 to 43% in 1995, and further rose to 47% in 2002 (Zhang, 2021). Lagakosz (2020) points out that the urban-rural income gap is generally wider in developing countries. Taking Nigeria and India as examples, there are significant urban-rural disparities in areas such as housing, sanitation facilities, electricity access, television ownership, mortality rates, and health indicators. For instance, only 45.9% of rural areas in India have access to toilet facilities, compared to 89.5% in urban areas; in Nigeria, 38.9% of rural areas have access to electricity, while the figure stands at 82.7% in urban areas. Relatively speaking, the urban-rural gap is smaller in developed countries, but differences still exist between nations. For example, the urban-rural wage gap in the United States changed during specific periods, widening from the late 19th century to the pre-World War II era.

As the world's largest developing country, China has a dual urban-rural system, making the issue of urban-rural income gap more prominent. In the early stage of reform and opening-up, rural-focused reforms led to a temporary narrowing of the urban-rural income gap. For most of the subsequent period, the gap fell on the left side of the inverted U-curve and gradually

widened. Since 2012, it has been on the right side of the inverted U-curve, showing a continuous downward trend. Zhang (2021) notes that although the internal income gap within both urban and rural areas has been gradually expanding, and the income gap between urban and rural areas has shown a narrowing trend, the urban-rural gap still occupies an important position and exerts a key impact in the composition of overall income inequality in society.

## 1.2 significance

Narrowing the urban-rural income gap serves as both a core driver for advancing rural revitalization and a significant contribution by China to addressing global urban-rural development imbalances. These two objectives mutually reinforce each other and hold profound practical significance.

On one hand, narrowing the urban-rural income gap ensures farmers' income growth, making them more willing to invest capital and technology in developing specialty agriculture, rural tourism, and rural e-commerce. Simultaneously, as the income gap narrows, rural employment opportunities and income levels gradually align with urban standards. This attracts groups like college graduates and returning migrant workers to start businesses or seek employment in their hometowns, injecting critical resources such as technology and management into rural areas and avoiding the awkward situation of "no one to carry out rural revitalization."

On the other hand, many developing nations struggle to balance urban-rural development due to vast territories and pronounced regional disparities, often falling into the trap of "the richer the cities, the poorer the countryside." China's practice of narrowing income gaps offers these countries a non-Western model for reference.

Therefore, reducing the urban-rural income gap serves as both a core driver for advancing rural revitalization and a significant contribution from China to addressing global urban-rural development imbalances. These two objectives mutually reinforce each other and hold profound practical significance.

## 1.3 current status & The work of this study

There is a large body of academic research on the urban-rural income gap, conducted from diverse perspectives. The reform and rights opening-up (or "rights empowerment") of the socialist system with Chinese characteristics have driven economic growth and significantly improved people's living standards. However, the unique dual-system has resulted in the lag of peasants' rights opening-up (or "rights empowerment") behind that of urban residents, which in turn has intensified the dual structure and widened urban-rural inequality (Liu and Li, 2024). Chen et al. (2010) contend that education, particularly the disparity in education investment levels, is the most crucial determinant of the urban-rural income gap. Cai and Yang (2000) suggest that the overall direction of government policies exerts an influence on the evolution of the urban-rural income gap. Huang et al. (2023) point out that the development of the digital economy can significantly narrow the income gap between urban and rural residents in China.

It can be seen that existing research has examined how to narrow the urban-rural income gap from various perspectives, particularly through the lens of e-commerce. However, there remains a lack of literature specifically addressing how live-streaming e-commerce contributes to reducing this gap. This paper, based on the characteristics of live-streaming e-commerce, clarifies the theoretical logic behind its role in bridging the urban-rural income divide, thereby filling a gap in the existing research.

# 2.Current Development Status of Live E-commerce

## 2.1 Definition and Feature

Live-streaming e-commerce refers to an e-commerce format that uses live streaming as a channel to achieve marketing goals, and it is a product of the two-way integration of live streaming and e-commerce in the context of the digital era. Live-streaming e-commerce reconstructs the three elements of "people, goods, and venues" by means of live streaming, but its essence remains e-commerce (Zhiyan Consulting, 2023). Live shopping (i.e., live-streaming e-commerce) represents a dynamic evolution of e-commerce, which combines live streaming videos with real-time purchasing functions to provide an interactive experience for viewers—they can directly interact with hosts, ask questions, and make purchases during the live broadcast (Firework, 2025). Mirchandani (2024) notes that compared with traditional e-commerce, live-streaming e-commerce has numerous advantages.

**Higher User Stickiness and Conversion Rates:** Live shopping delivers an interactive experience that traditional e-commerce cannot match. Viewers spend significantly more time on live streams, with an average duration of 15 to 30 minutes—far longer than the typical 54 seconds they spend on traditional e-commerce platforms (Firework, 2025; Mirchandani, 2024). This enhanced stickiness translates into lower cart abandonment rates and higher conversion rates, with live shopping's conversion rate reaching up to 60%, compared to the 2.5% average of traditional e-commerce (Mirchandani, 2024).

**Accelerated Sales:** The time required to complete a product sale varies substantially between traditional e-commerce and live-streaming e-commerce. Sales via traditional e-commerce may take hours to months, depending on factors such as brand visibility, search engine optimization (SEO), and market competition (Mirchandani, 2024). In contrast, live-streaming e-commerce typically drives faster sales within minutes to hours, thanks to real-time engagement, product demonstrations, and limited-time offers—elements that create a sense of urgency and encourage immediate purchases (Mirchandani, 2024).

**Lower Return Rates:** Hosts demonstrate products in detail and answer customer questions in real time, which helps consumers make more informed purchasing decisions. This reduces the average return rate of live-streaming e-commerce to 10%–15%, whereas the return rate of traditional e-commerce ranges from 20% to 30% (Firework, 2025; Mirchandani, 2024).

## 2.2 Status

In 2024, the market scale of live-streaming e-commerce in China stood at approximately RMB 5.8 trillion, with a Compound Annual Growth Rate (CAGR) of 18.0% projected for the period 2024–2026. For the same year, the Gross Merchandise Volume (GMV) of Kuaishou E-commerce reached RMB 1.3896 trillion, reflecting a year-on-year growth of 17.3%, while the average monthly number of buyers surpassed 143 million. In 2023, key monitored e-commerce platforms conducted a total of over 110 million live-streaming sessions, featuring more than 70 million live-streamed products and engaging over 2.7 million active hosts. By 2024, the number of professional live-stream hosts had increased to 38.8 million, marking a 150% year-on-year growth, and the total number of short video accounts had reached 1.62 billion (China International E-Commerce Center Research Institute, 2025). These data collectively indicate that e-commerce currently serves as a crucial component of both the real economy and the digital economy.

## 2.3 types of live-streaming e-commerce

Zou et al. (2023) pointed out that live-streaming e-commerce has expanded cross-regional urban supply chains, particularly in the agricultural and handicraft sectors. By helping agricultural products, rural cultural tourism products, and local specialties in rural areas access broader and more distant markets, live-streaming e-commerce exerts the most direct impact on rural revitalization. Large-scale live broadcasts and the reputation or credibility of hosts have promoted the sales of rural products and increased rural incomes. This is because most fresh agricultural product suppliers are located in central or western China; due to long market distances, these products have a high dependence on cold chain logistics. Such products have strict requirements for timeliness and are constrained by high transportation costs. Under traditional marketing models, most traders—especially farmers—struggle to break through their operational radius, which also explains why many agricultural products in central and western China fail to be sold. Live-streaming e-commerce has broken trade barriers in some industries in underdeveloped regions, effectively expanded the business service radius of these regions, and driven their economic growth. Zhu et al. (2021) noted that since online shopping is not restricted by location or time, it provides equal development opportunities not only in large cities but also in small and even remote towns and villages. Currently, top-tier streamers in China serve suppliers and customers across the country, while grassroots streamers are expanding their businesses in suburban and rural areas. Live-streaming commerce enables cross-regional connection of agricultural products, rural cultural tourism products, and other rural specialty products to broader markets. Through large-scale exposure and the influence of hosts, it promotes the sales of agricultural products and increases farmers' incomes. By linking unequal local products with urban purchasing power, e-commerce and live-streaming have driven significant economic growth; this growth is regarded as “not only an interesting development and employment initiative for rural and remote areas in China, but also likely applicable to other Asian countries with distinct rural characteristics and urban-rural gaps” (Zhou and Yu, 2021). From the perspective of employment, live-streaming e-commerce has also transformed the employment structure in rural and other marginalized areas. For instance, Alibaba's “Rural Live Streaming Initiative” has facilitated the transition of farmers' employment patterns.

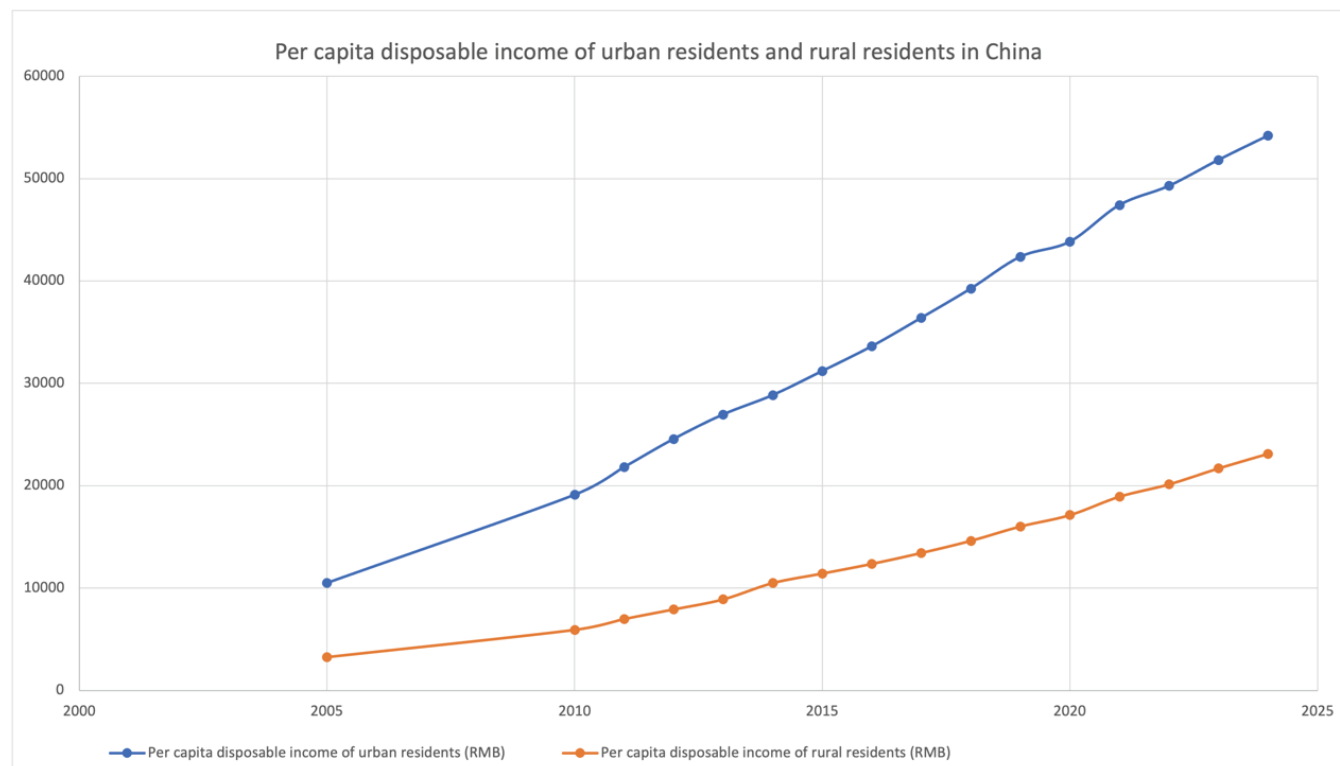


Mobile phones have become their “new farming tools,” and live streaming has turned into their “new agricultural activity” (Zou et al., 2023).

### 3. Urban-rural income gap

#### 3.1 Definition and Status

*Fig1 Per capita disposable income of urban residents and rural residents in China. Notes: The disposable income of urban residents in China and that of rural residents in China are respectively presented by blue and orange lines. Sources: All data are from the National Bureau of Statistics of China.*



As shown in Fig. 1, the gap between the disposable income of urban residents and that of rural residents in China exhibited an expanding trend from 2005 to 2024. With China’s rapid development, both the disposable income of urban residents and that of rural residents have increased steadily year by year; the income gap between urban and rural residents has risen from RMB 7,238 in 2005 to RMB 31,069 in 2024, which directly reflects the expanding trend of the urban-rural income gap. Although the disposable income of China’s urban residents and that of rural residents both increased significantly from 2005 to 2024, the gap between them has grown wider.

#### 3.2 Cause

The per capita disposable income of residents includes wage income, operating income, transfer income, and property income. Among these, wage income and operating income account for 70% to 80% of the total, making them the main components of per capita disposable income.

Liu and Li (2024) explicitly proposed through empirical data that the contribution rate of the wage income gap to the overall urban-rural income gap has remained above 70% over the past decade, making it the most influential factor among all income components. The core logic lies in the systematic differences between urban and rural labor forces in three aspects: “employment structure, human capital, and institutional discrimination,” as well as the disparity in the opening-up of rights between urban and rural areas after reform—urban areas have priority access to rights such as employment and education. These factors have kept farmers in a “passive participation” position in the labor market. Cai and Yang (2000) pointed out that even though the household registration system has been relaxed since 1993, local governments still restrict migrant workers from entering high-wage industries through policies such as “industry access restrictions” and “local employment protection,” forming a “cycle of wage discrimination.” Specifically, farmers find it difficult to accumulate human capital due to low

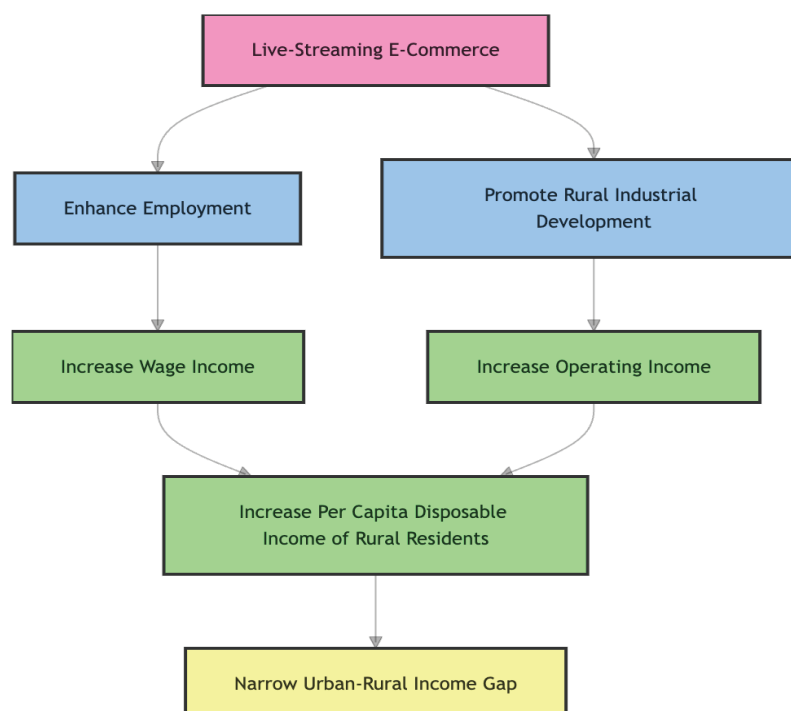
wages, which further deprives them of high-income opportunities.

Operating income was once the core income source for rural residents and a key force in narrowing the urban-rural gap in the early stage of reform. However, with institutional biases and changes in the industrial structure, its function of “narrowing the gap” has gradually weakened. Cai and Yang (2000) focused on analyzing the early reform stage from 1979 to 1985: during this period, the household contract responsibility system was implemented in rural areas, granting farmers independent management rights over land, which led to a significant increase in farmers’ operating income. After 1985, the urban-rural difference in operating income underwent a fundamental reversal—its function of “narrowing the gap” gradually disappeared and even became a driver of the expanding gap. There are two main reasons for this. First, the profit margin of agricultural operations has declined. Liu and Li (2024) noted that with the rise in agricultural production costs (the average total cost per mu of three major grain crops increased by 40.6% from 2011 to 2020), the net profit from agricultural production dropped significantly. Specifically, the net profit from grain production was negative for four consecutive years from 2016 to 2019; in 2020, the average net profit per mu of the three major grain crops was only RMB 47.14, and the cost-profit rate fell to 4.21%. Second, there has been an opening-up of operating rights in urban areas. Cai and Yang (2000) mentioned that after 1986, urban reform accelerated, and the non-public sector of the economy gained equal legal status. Urban self-employed individuals were allowed to enter high-benefit fields such as industry and services, while also enjoying policy support in areas like credit and taxation. This “disparity in the opening-up of rights” enabled the operating income of urban residents to catch up rapidly.

Therefore, to narrow the urban-rural income gap, attention must be paid simultaneously to the imbalance between urban and rural wage income and operating income.

#### 4.Theoretical Logic

Live-streaming e-commerce acts on the rural economy through two major pathways. On one hand, the expansion of its industrial scale and the demand for supporting services can enhance the employment level in rural areas, directly driving the growth of rural residents’ wage income. On the other hand, as a new sales channel and industrial empowerment tool, it can promote the development of rural characteristic industries and the extension of value chains, thereby boosting the operating income of rural residents (especially business entities). The dual growth of wage income and operating income jointly drives an increase in the per capita disposable income of rural residents, and ultimately has a positive impact on narrowing the urban-rural income gap.



## 4.1 The impact of live streaming e-commerce on rural employment and entrepreneurship

Live-streaming e-commerce, as an important new form of rural e-commerce, relies on digital technologies and platform ecosystems to play a significant role in solving rural employment problems and optimizing the employment structure.

### I. Expand Employment Scale, Covering the Entire Industry Chain and Special Groups

Centered on the production of physical products, live-streaming e-commerce can drive employment in multiple upstream and downstream links. From product design and raw material supply in the production process, to marketing, photography, and operation related to live streaming, and then to service links such as logistics and distribution, packaging, and after-sales, it can create direct and indirect employment positions. In addition, live-streaming e-commerce also accommodates the employment of special groups. First, it has relatively flexible requirements for skills, education, and physical conditions, providing a low-threshold employment path for rural vulnerable groups. Second, it also drives women's employment. The 2019 Report on Women's Entrepreneurship and Employment jointly released by China Women's University and Alibaba Research Institute pointed out that the average transaction amount of female store owners on the Taobao platform exceeded 200,000 yuan in 2018, an increase of more than 100% compared with 2014, and the growth rate was 30% higher than that of male store owners. Third, it promotes the employment of people with disabilities. People with disabilities can achieve home-based employment and entrepreneurship through e-commerce live-streaming platforms.

### II. Form Localized, On-Site, and Cluster Employment Effects

Yuan (2020) pointed out that the rise of e-commerce platforms has provided new employment space for migrant workers, and a large number of rural laborers' non-agricultural employment has shown a localized trend. Moreover, live-streaming e-commerce reduces the geographical threshold for employment and promotes the sinking of employment opportunities to grassroots levels such as towns and villages. In addition, employment and entrepreneurship driven by e-commerce show cluster characteristics. Centering on the core e-commerce industry, upstream and downstream supporting enterprises, service institutions, and employed people gather in the same region, forming a complete "production-sales-service" system.

### III. Attract a Large Number of Young Laborers to Return to Their Hometowns for Employment and Entrepreneurship

Yuan (2020) pointed out that the necessary conditions for entrepreneurship on e-commerce platforms are having internet skills or being familiar with smartphone applications, which are exactly the strengths of young people, and there is no minimum threshold requirement for monetary capital investment, thus attracting a large number of young people to return to their hometowns for employment and entrepreneurship. For example, Pu'er City actively encourages the development of rural e-commerce live streaming, courtyard economy, family farms, creative agricultural characteristic industries, etc., and increases support for returned migrant workers, college graduates, veterans, and others to start businesses and find employment in their hometowns. According to statistics from the People's Government of Yunnan Province, as of the end of May 2024, Pu'er City had issued 462 million yuan in entrepreneurial guaranteed loans, driving 5,127 jobs, and issued 152 million yuan in Yunnan Entrepreneurship Loans, driving 1,190 jobs.

## 4.2 The impact of live streaming e-commerce on rural industries

In promoting the development of rural industries, the core advantages of live-streaming e-commerce lie in reducing information asymmetry, optimizing value chains, stimulating the demand side, and lowering entry barriers.

### I. Reduce Information Asymmetry and Solve Agricultural Product Transaction Difficulties

Zan and Wang (2020) pointed out that real-time live streaming of the entire process of agricultural product seedling cultivation, fertilization, harvesting, and packaging allows consumers to directly observe the production environment and the use of input materials. This is equivalent to "real-time monitoring," which alleviates the asymmetry of quality information and enhances the credibility of agricultural products. Li et al. (2023) noted that with multi-dimensional information provided by "hosts (sufficient professional knowledge), co-viewers (similar needs), and guest speakers (high reliability)," the difficulty for consumers to judge the quality and uses of agricultural products is reduced, and decision-making uncertainty is minimized. Zeng et al. (2022) indicated that through "production traceability" and "operation demonstrations" in live streaming scenarios, the production process of agricultural products is made transparent. This eliminates consumers' doubts about the "authenticity of products" and lays a trust foundation for value transmission.

## II. Optimize Value Chains and Transform Long Chains into Short Chains

Both Zan and Wang (2020) and Zeng et al. (2022) pointed out that live-streaming e-commerce eliminates the intermediate links of the traditional “producer - buyer - wholesaler - retailer” model, realizing short-chain transactions of “producer - host - consumer.” This compresses circulation links and reduces physical costs and transaction costs. At the same time, live streaming showcases the value of products, helping high-quality agricultural products achieve “high quality for high price” and increasing industrial returns.

## III. Stimulate the Demand Side and Provide Stable Market Support for Rural Industries

Li et al. (2023) proposed that the group effect drives the consumption of agricultural products. The “information effect” (consumers are willing to accept information from hosts, co-viewers, and guest speakers) reduces decision-making difficulty, while the “normative effect” (consumers learn the propositions of hosts, co-viewers, and guest speakers) promotes conformity-based purchases.

In addition, “enhanced stickiness through attitude intermediaries” also drives agricultural product consumption. Through “affective attitudes” (reducing anxiety and enhancing a sense of belonging) and “instrumental attitudes” (efficiently evaluating products and meeting social image needs), the group effect is transformed into long-term consumption stickiness. Zeng et al. (2022) suggested that “multi-dimensional value output” enhances demand stickiness. For example, interactive companionship (emotional value) and rural scene displays (cultural value) in live streaming enable consumers to not only purchase products but also obtain additional value, forming stable consumer communities.

## 5. Conclusion

This paper concludes that live-streaming e-commerce can narrow China’s urban-rural income gap through two key pathways. It expands rural employment (covering the whole industry chain and special groups, forming localized cluster employment, and attracting young people back home) to boost rural residents’ wage income, and promotes rural industrial development (reducing information asymmetry, optimizing value chains, and stimulating demand) to increase their operating income, with the dual income growth narrowing the gap.

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# From Authentic Traces to Simulated Traces: The Material Reconstruction of Postmodern Collage in Contemporary Visual Design

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**Abstract:** This study examines the transmission of “authentic traces” in paper, such as texture, torn edges, halftone dots, ink smudges, and glue, in contemporary visual design based on the material tradition of postmodern collage. By building a three-dimensional analytical framework of “materiality—rhetoric—viewing,” this study compares historical handmade collages with contemporary digital visual samples and reveals the transmission logic of aesthetic changes from “authentic traces” to “simulated traces” and its impacts on layout hierarchy, readability of information, and visual ethics in a systematic way. Traces, as they are material evidences of creation processes, gradually become replicable stylistic symbols. The “trace translation” process weakens authenticity in design discourse and diffuses nostalgic rhetoric in a general way. The theoretical contribution of this study is to construct and explain the “trace translation” framework, which offers a new theoretical perspective to explore the material reconstruction logic of contemporary visual design in the digital age.

**Keywords:** Postmodern Collage; Materiality; Simulacra; Visual Rhetoric; Trace Translation; Contemporary Visual Design

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## 1.Introduction

From the very beginning, postmodern collage art radically emphasizes “material traces” in expression. Fiber texture, uneven torn edges, wrinkles left by glue, halftone dots, and ink smudges—elements once regarded as traditional fine aesthetics’ defects—were accepted as main carriers of meanings in postmodern collage. These “authentic traces” as indicative symbols are causally connected to the physical processes and material properties from which they come from and point directly to the creation site, just like fingerprints.<sup>[1]</sup>

However, from the perspective of the new screen-based image era of social media and mobile terminals, the new visual pressure gradually appeared. High definition, smooth, and frictionless rapid distribution became the new visual pressure. For traditional “authentic traces,” there were two possible situations: to disappear through technological purification in order to better realize the seamless interface or to be reintroduced and recreated in a highly controlled and infinitely replicable “distressed” visual effect. The latter formed a new visual category—“simulated traces.” Although the traces look like authentic traces, the logic of their generation has completely broken connection with their material origins and totally depended on the simulation of digital algorithms and styled invocation.<sup>[2]</sup>

Existing research on this phenomenon mostly focused on technological evolution or description of stylistic changes.<sup>[3]</sup>

Although these studies are valuable, they often lack systematic examination of the fundamental change of semantics and function of traces from a “materiality—rhetoric—viewing” theoretical dimension. Therefore, this study adopted a historical and contemporary sample comparison method and combined qualitative coding and visual rhetoric analysis to explore the following core questions: First, how are “authentic traces” in postmodern collage translated into “simulated traces” in contemporary digital visual design? Second, how does this translation process affect layout hierarchy, readability of information, and ethics of the viewer–image relationship?

The academic connotation of this study is to construct the “trace translation” theoretical model, to reveal the logic of traces’ evolution from “indexical trace” directly connected with creating process to “symbolic trace”, and to explore the academic logic of such evolution.<sup>[4]</sup>

## 2. Background and Related Research

From Dadaism’s photcollages to Pop Art’s use of commercial images, and then to the satire of main stream values in postmodern graphic design, the basic visual logic of collage art has always been the visual strategy of “heterogeneous juxtaposition” and “anti-grid”. In this case, the material trace is no longer a mere visual element, but an explicit declaration of “the visibility of the process”. The rough fibers of paper and hand-teared edges record the labor of the creator. In addition, it is an active resistance to the modernist design’s pursuit of purity, cleanliness and rationality. Creators often present a “failure aesthetic” or “poverty aesthetics”. Traces are an important way to declare an opposition to standardized production and to give a piece of work its own “aura”.<sup>[5-6]</sup>

Based on the visual rhetoric theory, images are never just visual elements; they are active in constructing and conveying meaning. In the process of creating collages, traces of materials have strong rhetoric. They can be used as “anchorage” symbols to direct viewers to a certain direction of interpretation; they can create “confrontation” with smooth images and generate visual tension to convey critical awareness; they can also produce “irony” through juxtaposition and dismantle the authority of the original image. More importantly, the visibility of the traces and the presentation way of them will directly influence viewers’ visual entry path, reading rhythm and implicit judgments. They constitute a micro “politics of looking”.<sup>[7]</sup>

With the arrival of the digital age, especially when mobile terminals become the main platform for image consumption, the visual environment has undergone tremendous changes. Thumbnail-level quick recognition, touch to view images, and pursuit of efficient information transmission all strongly limit visual design and drive image production to “dematerialization”—to remove any physical texture that may hinder the flow of information, to present a uniform smooth surface. Meanwhile, the “vintage distressed” style has flourished on social media. It seems that the material “traces” have not disappeared; instead, they have been taken out of context and re-encoded as a ready-to-call, easily recognizable style resource. They can be directly invoked and applied in production. Their inherent critical awareness is often weakened in the process.<sup>[8]</sup>

Although the previous studies make certain contributions, there are still the following deficiencies: Firstly, there is a lack of comparative studies with “traces” as the smallest analytical unit and connecting the three theoretical dimensions of “materiality—rhetoric—viewing” organically. Secondly, there is no theoretical framework focusing on the semantic transition from “authentic” to “simulated” traces in the digital age. Therefore, this study attempts to construct a theoretical framework of “trace translation”.<sup>[9]</sup>

## 3. Research Design and Methods

To systematically explore the logic of translation of material traces from “authentic” to “simulated”, this study follows a qualitative research path of historical and contemporary sample comparison. This study builds a three-dimensional analytical framework to code and compare two carefully selected visual samples.<sup>[10]</sup>

Based on a purposive sampling principle, this study selects two representative groups of samples for comparison. Group A (historical handmade collage samples) includes 28 works from the mid-20th century, such as Dadaist publications (e.g. MERZ), surrealist experimental collages and well-known postmodern graphic design works. Group B (contemporary digital visual samples) selects 35 works from the most popular designs in recent years on Behance and Pinterest, as well as some well-known brands, such as Apple Music’s “Lo-fi” posters and Aesop’s digital brand design.<sup>[11]</sup>

This study establishes a three-dimensional analytical matrix of “materiality—rhetoric—viewing” and codes the samples systematically. This study operationalizes the definition of each dimension, which is related to the following aspects: paper texture, torn edges, glue marks, halftone dots and inked areas.

#### 4. Case Comparison: Trace Translation Pathways

In terms of historical samples, such as handmade collages in independent magazines, paper texture is the initial and most direct physical appearance of the whole handmade collage. In contemporary UI design, designers usually use transparent and seamless digital texture materials to simulate “paper texture”.

In handmade collages, torn edges are very random and irreproducible. They bring visual tension to the layout. In digital works, most of the “damage” effects are symmetric, uniform and easily to be predicted, and usually just for decoration.

Historical printing dots are the process of printing, which will affect the absorption of ink. In addition to the original printed dots, there are “distortions” in the image. In contemporary designs, designers often use filters to simulate halftone effects. They present a clear and rule-based pattern.<sup>[12]</sup>

In handmade collages, there are definitely ink stains, fingerprints or scratches on the collage. They are all “accidents” in the process of making. These “accidents” are unpredictable, and they add narrative tension to the work. In the digital design workflow, these kinds of “accidents” are programmable. They are a kind of style in the “mood board” of designers.

#### 5. Analysis and Discussion

Obviously, the essence of “trace translation” is not the transfer of visual content, but the transfer of symbolic meaning of traces from “indexical” to “symbolic”.

Authentic trace is an “indexical” trace that points directly to the process of creation; simulated trace is a “symbolic” trace that is cut off from the physical causality.

In the handmade collages in history, traces are “constructors” of visual contents that directly influence the layout structure and readability of collages; in the digital designs of today, simulated traces often become passive decorative layers that reduce the clarity of information.

The translation of traces also triggers new types of ethical issues of misrecognition of style as historical truth in the view of visual rhetoric that transfers from authentic traces to simulated traces. Especially, when the sender and viewer of a collage involving public issues and collective memory use this transfer of traces as a tool of communication, it is important to distinguish between authenticity and simulation.

#### 6. Conclusion

This study follows the material tradition of postmodern collage and its drastic transformation in contemporary digital visual design through the framework of “trace translation”. From the perspective of stylistic transfer of traces from authentic to simulated, it is also an exploration of the transfer of cultural production of meaning.

Future research can further explore how audiences perceive these traces or apply this framework to other visual media, such as dynamic images or interactive installations.

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# Characteristics and Challenges of Youth identity in the age of Social Media

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**Abstract:** With the rapid development of social media, the identity process of youth groups presents unprecedented complexity and dynamics. Social media not only provides youth with a platform for multicultural communication, self-expression and public participation, but also brings problems such as information overload, cognitive solidification, and conflict between virtual and real identities, which leads some youth into identity crisis. This paper focuses on the performance of youth identity crisis, crisis and its reconstruction path in the context of social media. The study concludes that social media is a catalyst for identity crisis and also an important space for reconstruction. Solving the crisis requires the concerted efforts of individuals, society and platforms, including improving media literacy, building healthy online communities and optimising algorithmic mechanisms. The research in this paper provides theoretical references and practical insights for the healthy socialisation of youth groups and cyberspace governance.

**Keywords:** Social Media; Youth; Identity

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## Introduction

Under the perspective of media environmentalism, social media in the digital era, like an unstoppable torrent, has reshaped the expression ecology of youth culture. From linear communication to reticulated communication, from mass media to relational media, from traditional media to intelligent media, every leap in media form is accompanied by profound changes in language and culture. In this environment, social media has opened up a new space for youth groups to express themselves, and youth groups are no longer passive recipients of information, but active creators and disseminators of content. However, the high-frequency use of social media also brings new challenges to identity. On the one hand, young people use the platform to expand their social relationships, participate in public affairs, and explore their diversified selves; on the other hand, mechanisms such as virtual image management and algorithmic recommendation may cause cognitive closure and self-division. In the era of social media in the 21st century, the identity and self-expression of contemporary youth are undergoing unprecedented changes. With the rise of social media and the flourishing of network culture, youth groups increasingly construct their personal identity and self-expression through online platforms. The importance of identity theory as a theoretical framework for analysing how individuals and groups shape and maintain their identities in the social environment cannot be overstated.

This paper attempts to systematically analyse the performance of youth identity in the age of social media on the basis of



relevant theories, so as to reveal its characteristics and problems and put forward suggestions for identity reconstruction. This will not only help to understand the psychosocial changes of youth in the new media environment, but also provide ideas for related education and governance.

## **1. Expressions of youth identity in social media**

### **1.1 Circularisation of group affiliation**

When youths are able to express their emotions on social media platforms or express their opinions in the circles they belong to through their digital identities, they establish connections with like-minded people and form communities, in which social interactions play a crucial role. Young people connect with others through likes, comments, retweets and other interactions to form a close social network, which not only deepens mutual understanding and recognition, but also provides positive and effective feedback for the construction of digital identities, thus strengthening the identity of the self and gaining a sense of identity. This emotional bond not only motivates them to actively participate in group activities, but also builds a strong community cohesion and identity in an invisible way. In social media, group members have established a kind of “spiritual resonance” beyond the boundaries of reality due to their common hobbies. Even if they are located in different regions and have never met each other before, they can find a sense of belonging in the same online space and form a close community connection <sup>[2]</sup>. This connection not only deepens the emotional bond between group members, but also strengthens their perception of group identity through shared experiences, thus deepening their sense of belonging and identity. Youths continuously adjust and refine their digital identities to adapt to the changing social environment and personal development needs. They find resonance in interaction, strengthen their identity in resonance, and gradually define their identity in the virtual world.

In this process, the role of social media cannot be ignored, which provides groups with a communication platform that crosses the boundaries of time and space, enabling group members to quickly assemble, share information and deepen their emotions no matter where they are. In the process of these social media as a means of Internet communication, youth groups have found “companions”, gained a sense of belonging to the group in the virtual space, and gained identity resonance and collective identity. The generation of a sense of belonging to a group is a key element in the generation of youth identity in the process of social media, and this sense of belonging compensates to a certain extent for the isolation or marginalisation that may exist in reality. From a psychological perspective, online identity sometimes plays the role of a simple and quick surrogate for real identity. This mutual reinforcement of identity and group belonging not only deepens the close ties between group members, but also provides solid support for the construction of their self-identity in the media environment.

### **1.2 Diversification of self-expression**

In the era of social media, the diverse styles of social media fully reflect the self-expression of contemporary youth. With the rise of social media and the flourishing of network culture, youth groups increasingly use network platforms to construct personal identity and self-expression. Youths carefully create their digital images on social media platforms in the form of pictures, texts, videos and other forms, from the selection of personalised avatars to the setting of nicknames and signatures, every detail highlights their unique perception of self-identity, and youths have different identities at different times, places and social circles, and youths post life moments and share their insights and feelings on social media platforms, gradually building a three-dimensional identity in the virtual world. They post their life moments on social media platforms, share their opinions and feelings, and gradually build up a three-dimensional, vivid and personalised digital identity in the virtual world. Young people have different forms of expression according to different platforms, which not only satisfies their curiosity about new things, but also allows them to show their unique personalities and emotions in different social occasions. The multiple styles in social media not only reflect the self-expression needs of contemporary youth, but also reflect their unique pursuit of personalisation, innovation and emotional resonance, and also provide an important platform for youth to display themselves and realise their self-worth. The current self-expression of young people shows obvious diversity. From traditional words and language to images, videos and emoticons, they are no longer satisfied with traditional ways of expression, but seek more personalised and creative ways of expression, using various media and tools to express their thoughts and emotions. In this process, through diverse self-expression, young people have not only explored and confirmed their social

identities, established ties with society, and realised their self-worth, but have also, to a certain extent, promoted social and cultural diversity and innovation.

### **1.3 Enhancement of Public Identity**

The role of interaction and social media in self-identity. The “mirror me” theory was first proposed by Cooley in *Human Nature and Social Order*. According to Cooley, the “mirror me” refers to the formation of self-perception and self-evaluation through observing the reactions of others in social interactions with them. Each individual can become a reference point for other individuals and form a conception of self by looking back at themselves through the attitudes and opinions of others towards them.

Identity is the intrinsic motivation of digital identity construction. Youth continuously explore and confirm their identity through self-knowledge, social comparison and group belonging in the process of growing up. In the intelligent communication environment, digital identity becomes an important carrier and expression of their identity. Social media provide a virtual field for youth groups to display themselves, enabling them to explore and shape their identities in the network, and the deep-level social interactions reveal the abstract identity practices in the traditional vision. Youths carefully construct and display their digital identities in social media, expecting to gain the understanding and recognition of others, and thus strengthen their self-worth and the meaning of their existence. At the same time, identity also influences the direction of construction and the choice of content. Young people will choose elements that match their values and interests to construct their digital identities according to their identities, so as to make them more in line with their self-perceptions and social expectations. This identity is not only based on real-life experiences, but also realised through interaction and communication in virtual space.

Digital connectivity and the use of social media have changed the way youth interact globally and have made independent participation in social and political activities possible. This change has not only facilitated the dissemination of culture, but has also allowed cultural identities to be presented and shaped in new ways in virtual spaces. However, this new form of identity may lead to a paradox between real and virtual identities, thus affecting an individual’s true identity.

The rise of online social platforms has provided youth with a new space for social participation and self-expression. In this space, young people can display their thoughts, feelings and values in a variety of ways and connect with a wider social group. The emergence of this phenomenon has not only changed the way young people socialise, but also reshaped their mode of social participation. Through online platforms, young people can express their views and emotions more freely and participate in the discussion of social topics. Such participation not only enhances the social presence of youth, but also improves their social influence. At the same time, this phenomenon also reflects the youth’s sensitivity and sense of participation in social issues, as well as their positive attitude towards social change. In this process, youth participation through online platforms not only realises self-expression and identity construction, but also promotes social progress and development to a certain extent. Young people are increasingly active in public affairs and social issues on social media, such as public welfare activities, environmental protection, social justice, etc. By liking, retweeting, following and initiating topics and other behaviours, for example, in certain emergencies or public welfare fund-raising, the youth group is often the main force of communication and action. This kind of participation not only strengthens the identity of young people as “citizens”, but also allows them to develop a sense of responsibility in social practice. This kind of identity brings positive social energy, but there is also the problem of “fast-food” participation, that is, at the level of forwarding or liking, without in-depth thinking and sustained action. Young people are easily driven by short-term emotions to gain a sense of identity, but are not sufficiently engaged in long-term practice.

## **2. The issue of youth identity in social media**

### **2.1 Misalignment of virtual and real identities**

In the digital age, the identity of youth groups is no longer confined to the objective physical world, but crosses the boundaries between online and offline, forming a symbiosis between the virtual and the real. The emotions of youth groups in online virtual situations are often reproduced in the physical world, and their behaviours and experiences in the digital world feed back into reality, and vice versa. The over-reliance of some youth groups on social media can easily lead to the alienation

of real interactions. Social media, as one of the core elements of network ecology, even constructs a kind of spiritual world of warmth and self-protection mechanism in the extension of social relations and confirmation of group values. Long-term over-reliance on social media may easily lead to the escape from reality of youth groups, which in turn reduces their ability to interact in reality and hinders the development of interpersonal relationships. The high mobility and freedom of social media also make the construction of youth identity more complicated. In the “digital labyrinth” of social media, the collision between the virtual and the real, and the ideological confrontation between the master self and the other constantly strengthen the contradiction and alienation of youth identity. For example, when travelling on the plateau, one has to take a step by sucking in a mouthful of oxygen, but what is posted in the circle of friends is “always free”; when camping, one has to take a step by sucking in a mouthful of oxygen. For example, when travelling on the plateau, one has to take a step by inhaling a mouthful of oxygen, but one’s circle of friends posts “always free”; when camping, one encounters strong winds and a mess, but one’s circle of friends posts “the sun is just right, the breeze is not dry”. This phenomenon is the product of identity tearing under the collision of reality and virtual, when the online image of social media contradicts with the real-life self, the youth group can not help but fall into the prison of “self-pulling”, which leads to the breakage of self-identity, resulting in the crisis of self-identity<sup>[1]</sup>. Despite the flexibility of identity construction in social media, young people still need to face the concrete social roles and responsibilities in real life, and this transition between reality and the virtual world may exacerbate the uncertainty of identity.

## 2.2 Identity fluidity and instability

The fragmentation and diversification of social media may easily lead to the fragmentation of youth identity. Internet fashion trends are diverse and change rapidly at different times, which makes it difficult for youth groups to maintain long-term stability in the process of forming their identities<sup>[4]</sup>. Young people may use different buzzwords in different contexts according to their own circles, thus promoting diversified identities. However, it may also lead to anxiety in the identity process of youth groups. The rapid change of different linguistic symbols in social media leads to the lack of stability of self-perception of youth in the process of using them, which may easily lead to changes in identity. Youth display different self-orientation for different social circles. Although the mobility and plasticity of identity provide youth with multiple opportunities to explore their identity, the digital context makes identity symbols fluid, and the fluid identity space leads to ambiguity in identity positioning.

## 2.3 Prominence of Consumer Identity

Driven by the commercial logic of platforms, consumption has gradually become an important way for youth to express their identities. By buying trendy brands, using popular products, and “sunning their lives” on social media, young people use consumption behaviour to show off their individuality and social status. Consumption has become an important symbol for young people to show themselves and obtain group identity. However, the consumerised identity tends to cover up the real value of the youth, making them externally labelled, and even falling into the trap of comparison and utilitarianism. However, the formation of digital identity is not entirely determined by the subjective will of individual youth. The technical characteristics of social media platforms and the precise mechanism of algorithmic recommendation have a subtle influence on the behavioural choices and identity shaping of young people. These objective factors interact with the subjective initiative of young people to influence their digital identity. Technological features give digital identities a variety of presentation forms and a wide range of dissemination channels, while the algorithmic recommendation mechanism pushes customised information and services based on users’ specific behaviours and preferences, further highlighting the personalisation of digital identities.

Virtual reality and social media have jointly shaped the digital landscape of modern production society, and the rise of digital communities has enabled others to give individuals a concrete presentation of the landscape, which affects the individual’s perception of the real society and self-image, and thus further influences the construction of social relations. Youth is a critical stage of identity exploration, during which individuals are particularly concerned about their position in social groups. For example, young users who often swipe on brand-name products and high-end restaurants in social media may subconsciously influence their values, leading to a surge in material needs. Young people compare the “high-end” group with themselves,

showing their dissatisfaction with their own economic income and living status quo. The false prosperity of consumerism is constantly spread through the media, constructing an illusory and manipulated collective cognition, and the shaping of the mimetic environment creates identity anxiety among young people. Therefore, driven by the wave of consumer culture and diversified role-playing, young people are no longer satisfied with the function of image transmission, but regard social media as a performance tool, and make use of social media as a broad stage for social performances of digital impression management. The illusory and superior personal image created in “refined” social media seems to be a necessity for youth groups to fit in in the digital world, and the number of likes and comments in social media such as Jieyin and Weibo has become the basic basis for defining the popularity of an individual among others <sup>[3]</sup>. In this process, young people may overindulge in the “prefabricated” “images” in the circle of friends, focusing too much on their performance in the circle of friends to the neglect of real-world connections and experiences, leading to the formation of a chaotic perception of identity in the youth group.

### **3.Strategies for reconstructing youth identity in social media**

#### **3.1 Youth Consciousness: Shaping Positive Identity in Social Media**

In the contemporary society with high penetration of social media, youth groups are not only the main creators of network culture, but also a sensitive group with identity crisis. In the face of the diversity and complexity of information, young people must gradually develop a sense of self-awareness in the process of identity construction, and take the initiative to assume the responsibility of shaping a healthy identity. For one thing, young people need to realise that the recommendation mechanism of social media platforms is not completely neutral, but is based on the commercial logic of content distribution. Only with a certain degree of media literacy can they remain critical when acquiring information and avoid falling into identity homogenisation and value parochialism. Social media is full of fragmented, entertaining and even false information, and without basic media judgement, it is easy to fall into blind obedience and identity loss. Therefore, young people need to take the initiative to learn about the media, and have the ability to check the authenticity of information, understand the logic of communication and analyse the value orientation, so as to avoid being swayed by bad information. Secondly, young people should be good at balancing self-expression and value practice in social media, and have more space for self-expression on the Internet, but idealised “personas” cannot completely replace real-life self-worth. Young people need to learn to maintain tension and balance between their virtual and real identities, so as to avoid falling into the “ideal self” for a long time and creating a psychological gap. In the context of identity mobility and diversification, young people need to develop core values that can withstand external shocks through learning, practice and self-reflection. For example, a sense of social responsibility, family and national identity, and career goals can provide individuals with a relatively stable self-orientation. In addition to self-presentation, they should pay attention to the precipitation of inner values, and endeavour to keep their online identities in line with their real identities, so as to reduce the discrepancy between “virtual reality” and “reality”. In this regard, young people should give full play to their initiative, look at the impact of technology on individual cognition in a dialectical manner, and seek online identity on the basis of the reality as the main space for development, so as to cultivate the subjective idea of “guest self” and return to the self.

#### **3.2 Platform responsibility: creating a digital ecosystem conducive to youth identity construction**

Social media platforms play an important role in the construction of youth identity. Young people need a platform space to express their individuality and display their multiple identities. For one thing, platforms should avoid overly homogenised and homogenised content delivery mechanisms and give users multiple opportunities for expression. For example, by optimising the algorithmic recommendation mechanism and adding the function of “interest expansion”, the platform can help young people break out of the existing information circle and extend their self-identity in a broader context. While pursuing traffic and capital, platforms should also consider shaping public nature and assuming social responsibility as the core values of their operations. Platform algorithms often push highly customized content through user profiles and behavioural preferences, which to a certain extent strengthens stratified identity, but also leads to cognitive limitations and value deviations. Platforms should optimise technology to avoid users falling into overly closed opinion spaces. For example, they should encourage cross-circle content recommendation and introduce public discussions on diversified topics, so that young people can form

a more open and stable identity in a more diversified information environment. Secondly, platforms should continuously optimise their own mechanisms, gradually introduce anti-dependency systems for youth, and promote the construction of public values for digital platforms, so as to lay a solid foundation for the harmonious coexistence of platforms and society, in order to ensure that the direction of their development is compatible with the well-being of young people and even society as a whole. Social media platforms are not only a tool for information dissemination, but also an important field for the construction of social values. During the critical period of youth identity formation, platforms should assume certain social responsibilities. By strengthening the promotion of positive content, highlighting the multi-faceted coverage of public issues, and restricting the dissemination of false and extremist information, platforms can subconsciously help young people build positive social identities and civic awareness.

The social media platform is not only a carrier of youth identity, but also an important influence on identity crisis and reconstruction. It can not only promote youth to achieve diversified self-expression and social participation, but also may exacerbate identity dilemmas due to factors such as algorithms, consumerism and virtualisation. Therefore, platforms need to explore the optimisation of technology, value guidance, psychological care and the construction of public space, so as to achieve a balance between commercial interests and social responsibility, and thus become a real facilitator for the positive construction of youth identity.

### **3.3 Educational Leadership: Cultivating a Healthy Youth Identity in the Media Environment**

Education must proactively adapt to changes in the media environment, not only to develop young people's ability to use the media critically, but also to provide support in terms of values, mental health and pluralistic expression, so as to help them form a healthy, stable and positive identity in the complex online environment. For one thing, it is necessary to pay more attention to social media and deepen our understanding of youth identity trends. Government departments, schools and others should constantly strengthen the study of Internet buzzwords, and understand the ideology of youth groups from time to time. Guide them to recognise the dual attributes of social media: as a platform for self-expression, but also as a source of false information, excessive comparison and identity anxiety. Foster the ability of young people to be able to sift, judge and integrate massive amounts of information, and avoid being manipulated by representations and fragmented information. Second, education should incorporate media literacy into the curriculum system to help young students improve their ability to discern virtual information, think critically and express themselves rationally. In the age of social media, young people are more vulnerable to the impact of multiculturalism and consumerism, so education needs to play the function of "orientation" and provide them with stable value anchors. Youth should be guided to build up self-confidence, self-esteem and a sense of social responsibility through curriculum ideology, thematic education and campus culture. School education should strengthen the cultivation of correct values and collective identity in the curriculum and activities. Encourage students to express themselves in diverse ways inside and outside the classroom through new media works, short videos and online discussions. Instead of being passively "moulded" by social media, young people should be allowed to diversify and actively construct their identities in a positive educational context. Promote the combination of psychological education and media literacy education to help youth understand the difference between virtual and real identities and form a healthy self-identity.

## **4. Conclusion**

In the fast-changing information environment, social media play the roles of communication, identity and criticism, and can show the values of contemporary youth, which is an important carrier of youth cultural identity. In the process of using social media, based on its unique language form and communication mechanism, youth groups construct identity in the combination of virtual space and real space, reflecting the cultural adaptation in the face of social development. However, in the face of the challenges posed by social media, all parties should take various measures to clarify the long-term impact of social media on youth identity, and guide young people to build a stable and healthy identity in a diversified environment.

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# A Differentiated Approach to Cross-border Data Flows in the Hainan Free Trade Port: A Comparative Perspective with the Guangdong-Hong Kong-Macao Greater Bay Area

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**Abstract:** In the process of constructing a data governance system with Chinese characteristics for free trade ports, Hainan faces the dual challenge of balancing national data security with the highest level of openness. Unlike the Guangdong-Hong Kong-Macao Greater Bay Area (GBA)—which operates under the “one country, two systems, three legal jurisdictions” framework and centers its cross-border data strategy on “data crossing the river” (i.e., data flows among Guangdong, Hong Kong, and Macao)—Hainan’s island-wide customs closure and the legislative authorization granted by the Hainan Free Trade Port Law of the People’s Republic of China enable it to pioneer a more holistic and flexible regulatory model characterized by a “data customs” regime. Through comparative analysis, this paper examines the fundamental differences between Hainan and the GBA in institutional foundations, regulatory units, and core policy objectives. It argues for the legal legitimacy and practical feasibility of a differentiated path for Hainan—one grounded in a robust data classification and grading system, centered on a “certified data processor” regime, and piloted through a “cross-border data regulatory sandbox.” This approach aims to provide a systematic legal blueprint for Hainan to develop a secure, free, and efficient “Free Trade Port Model” for cross-border data flows.

**Keywords:** Hainan Free Trade Port; Cross-Border Data Flows; Guangdong-Hong Kong-Macao Greater Bay Area; Data Customs

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## 1.Problem Statement: Why Does Hainan Need a Distinct Path from the Greater Bay Area?

The promulgation of the Hainan Free Trade Port Law (hereinafter the “FTZ Law”) marks a new phase of “integrated institutional innovation” in Hainan’s data governance. Its provisions authorizing secure yet liberalized data flows offer a legal foundation for Hainan to transcend the existing national data export control framework<sup>[1]</sup>. Meanwhile, the Guangdong-Hong Kong-Macao Greater Bay Area (hereinafter “the GBA”), another national strategic initiative, is also actively exploring its own “GBA solution” for cross-border data flows<sup>[2]</sup>. Although both regions represent China’s frontier of openness, their institutional logics and implementation pathways necessarily diverge due to fundamentally different conditions.

Current domestic scholarship often discusses cross-border data initiatives across various pilot free trade zones and ports

within a single analytical framework, failing to recognize Hainan's unique institutional endowments and path dependencies compared to the GBA. Blindly emulating or simplistically analogizing the GBA's "data crossing the river" model—which focuses on data flows among Guangdong, Hong Kong, and Macao—may cause Hainan to overlook the systemic advantages conferred by its island-wide customs closure and miss critical opportunities for high-level regulatory stress-testing.

Thus, this paper's central proposition is to clarify Hainan's distinctive positioning and comparative advantages in cross-border data regulation through a systematic comparison with the GBA, and on that basis, construct a differentiated regulatory pathway aligned with its island-wide customs closure and capable of fully leveraging the legislative empowerment granted by the FTZ Law.

## **2.Divergent Models in Comparative Perspective: Fundamental Differences Between Hainan and the GBA**

Three core dimensions distinguish Hainan from the GBA in cross-border data governance, necessitating distinct regulatory strategies.

### **2.1 Institutional Foundation: "Stress Testing" Within a Single Jurisdiction vs. "Rule Alignment" Across Multiple Jurisdictions**

Hainan, as a unified customs territory and regulatory unit under a single legal system, can proactively design and implement systemic top-down reforms through local legislation authorized by the FTZ Law. This resembles a controlled laboratory environment for "stress testing"—exploring how a sovereign state can establish, within a designated zone, a data import/export regime that is more open than national standards while effectively managing risks.

In contrast, the GBA spans three distinct legal jurisdictions—Mainland China, Hong Kong, and Macao—each with its own data protection laws. The GBA's primary task is not to create a new unified legal regime but to achieve "alignment" and "cooperation" among existing rules. Initiatives such as cross-border credit reporting pilots and mutual recognition of digital identities aim to unblock data flows while respecting jurisdictional differences. Landmark instruments like the Implementation Guidelines for Standard Contracts on Cross-border Personal Information Flows between Mainland China and Macao/Hong Kong in the GBA exemplify this "point-to-point" approach to facilitating specific data transfers<sup>[3]</sup>.

### **2.2 Regulatory Architecture: "Data Customs" Under "Frontline Liberalization" vs. "Categorized Management" Across Complex Borders**

Upon full customs closure, Hainan will feature a clear "frontline" interface with overseas territories and a "second line" connecting it to the mainland. This spatial clarity enables the conceptualization of a "data customs" system at the frontline—akin to physical customs—where inbound and outbound data flows are classified, declared, inspected, and cleared based on risk levels. This represents a geographically anchored, holistic regulatory approach.

The GBA, however, lacks a unified border or centralized data checkpoint. Data flows occur in a decentralized, multi-node network. Regulation thus relies on scenario- and entity-based "categorized management," such as establishing sector-specific channels for finance, healthcare, or transportation, or granting special access to qualified enterprises. The emphasis is on "building channels," not "erecting customs."

### **2.3 Core Objectives: A Testing Ground for "Highest-Level Openness" vs. an Engine for "Regional Integration"**

Hainan's ultimate goal is to serve the broader Free Trade Port agenda by attracting global high-end resources and fostering a competitive digital economy. Its regulatory design must be forward-looking and internationally benchmarked—daring to experiment with high-standard digital rules from agreements like DEPA and CPTPP.

By contrast, the GBA's primary objective is to enhance the seamless flow of people, goods, capital, and data within the region to deepen economic integration. Its regulatory innovations prioritize solving real-world business bottlenecks and promoting socio-economic convergence.

## **3.Constructing Hainan's Differentiated Pathway for Cross-border Data Flows**

Building on these distinctions, Hainan should move beyond imitation and leverage its advantages as a single-jurisdiction,

fully enclosed free trade port to develop the following differentiated approach.

### **3.1 Foundational Pillar: Enact the Hainan Free Trade Port Data Classification and Grading Management Regulations**

This is the prerequisite for all subsequent innovations. Within the framework of China's Data Security Law, Hainan should develop more granular, industry-tailored local standards:

Core data must strictly follow the national catalog and remain prohibited from export.

Important data should be precisely defined through a Hainan FTZ Important Data Identification Guideline, incorporating sector-specific considerations (e.g., aerospace, deep-sea exploration, tropical agriculture, duty-free retail) to avoid overbroad classifications.

General data should be further subdivided. A new subcategory—"FTZ General Data"—could include non-sensitive information such as international trade documents, logistics status updates, and publicly available commercial promotions, thereby enabling freer cross-border flows.

### **3.2 Core Mechanism: Implement a "Certified Data Processor" System**

This institutional innovation shifts the regulatory focus from "controlling data" to "governing enterprises"—the heart of Hainan's differentiated model.

Under this system, enterprises registered in Hainan that establish robust data governance and compliance frameworks may apply for "Certified Data Processor" status. Once certified, they would enjoy streamlined procedures—such as exemption from mandatory security assessments or standard contractual requirements—when transferring "FTZ General Data" and limited volumes of personal information abroad within their approved business scope<sup>[4]</sup>. This approach enhances commercial efficiency while ensuring security through dynamic oversight and the threat of certification revocation. Compared to the GBA's project-based "whitelist" approach, this system is more scalable and institutionally coherent<sup>[5]</sup>.

### **3.3 Experimental Platform: Establish a "Cross-border Data Regulatory Sandbox"**

Leveraging the FTZ Law's explicit mandate for experimentation, Hainan should launch regulatory sandboxes in designated zones (e.g., Yazhou Bay Science and Technology City, Fuxingcheng Internet Information Industrial Park) or sectors (e.g., cross-border telemedicine, e-commerce). Participants in the sandbox could test more liberal data flow rules in real-world commercial contexts under temporary regulatory waivers or liability exemptions. These pilots would generate empirical evidence on the efficacy and risk profile of innovative rules, informing future island-wide legislation.

### **3.4 Enforcement Tool: Develop a "Data Customs" Smart Supervision Platform**

In alignment with island-wide customs closure, Hainan should build a Hainan FTZ Cross-border Data Flow Management Platform as the technological backbone of its "data customs." This platform would support functions such as registration, submission of self-assessment reports, traffic monitoring, anomaly detection, and post-audit reviews. Crucially, it would not impose blanket pre-approvals but serve as a transparent, traceable infrastructure for ex-post supervision of certified entities and facilitation of low-risk data flows.

## **4. Conclusion**

Due to fundamental differences in institutional foundations, regulatory architectures, and strategic objectives, Hainan and the GBA must pursue divergent paths in cross-border data governance. While the GBA excels in "rule alignment," Hainan's mission lies in "institutional innovation." Rather than following the GBA's lead, Hainan should fully harness its unique position as a unified legal jurisdiction under full customs closure. By envisioning a "data customs" system, piloting regulatory sandboxes, and pioneering a risk-based, enterprise-centered governance model, Hainan can forge a new paradigm for cross-border data flows that balances security with efficiency. The success of this "Hainan Path" will not only accelerate the Free Trade Port's high-quality development but also provide China with a vital "national testbed" for shaping global digital governance rules.

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