Original Research Article

Cold-region constraints, value chain restructuring, and collaborative governance: Theoretical logic and pathway reconstruction of agritourism integration in Liaoning

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Abstract: Existing research on agricultural-tourism integration implicitly assumes year-round operation as its geographic premise, neglecting how cold-region climate conditions structurally truncate value chains and failing to explain the "quantity growth, quality stagnation" lock-in paradox in northern China. This paper constructs a three-dimensional nested causal feedback model—"Institutions (cold-region constraints)—Organizations (collaborative governance)—Value chains (restructuring modalities)"—and advances four falsifiable propositions (P1–P4). Findings indicate that triple positive feedback loops between prolonged winter idleness and short-term policy incentives lock value chains at the front end (P1); under weak collective governance, transaction cost escalation reduces farm households to labor suppliers, causing benefit leakage (P2); the depth of "experience signification, brand premium, and digital smoothing" determines whether value-added effects transition from linear growth to nonlinear leap (P3); and a high-order configuration of "seasonal smoothing × equity distribution × long-term investment" overcomes the diminishing returns of single-factor approaches, generating emergent resilience restructuring (P4). Policy implications are derived as institutional responses to diagnosed blockages, providing falsifiable theoretical predictions for cold-region agricultural-tourism development.
Keywords: cold-region constraints; agricultural-tourism integration; value chain restructuring; collaborative governance; configurational pathways; Liaoning

1. Introduction

Agritourism integration in Liaoning Province faces a structural "quantity growth, quality stagnation" dilemma: In 2023, 63% of provincial fiscal linkage funds were allocated to county-level agritourism projects, yet 70% of rural tourism sites remain locked in the low-end homogeneous form of "picking + farmhouse dining," with agricultural value chain appreciation rates below 30%—Far lower than Zhejiang (55%) and Sichuan (48%)[3]. Unlike the "scenic-area-driven village" model of Zhejiang or the "agriculture–culture–tourism integration" model of Sichuan [5], Liaoning confronts a triple constraint of "long winter idle period—High out-migration—Weak collective governance": The effective tourism season averages less than 6 months, rural net out-migration rates persistently exceed the national average, and village collective coordination capacity is generally weak. This structural divergence renders southern experiences non-transferable.

2. Analytical framework construction

2.1. Three-dimensional decomposition

The institutional layer (cold-region constraints) comprises three sub-dimensions: Prolonged winter idleness (effective operation <6 months causing asset idleness and cash flow disruption); climate adaptation (physical constraints on outdoor experience scenes and cultivar/infrastructure rigidity); policy short-termism (subsidies biased toward hardware and short-term output, neglecting operational cultivation and off-season R&D). The organizational layer (collaborative governance) comprises four sub-dimensions: collective coordination (capacity for resource integration and contract negotiation); enterprise dominance

(discourse power structure in operations and distribution); farmer embedness (participation depth and role positioning) [7]; transaction costs (information search, contract execution, and monitoring costs). The value chain restructuring layer comprises three sub-dimensions: Strong production–weak experience (front-end production adequate but back-end experience conversion deficient) [13]; digitalization (smoothing effect on seasonal fractures); brand premium (value enhancement through regional public brands) [11].

2.2. Nested feedback logic

The three dimensions are not parallel but form a nested feedback structure: "Constraint transmission → distribution determination → lock-in reinforcement." Cold-region constraints (institutional layer) elevate operational uncertainty, subjecting investors to higher seasonal risk premiums; risk premiums raise transaction costs (organizational layer), weakening collective bargaining power and reinforcing enterprise light-asset strategies; enterprise dominance confines farmer embeddedness to labor supply [7], and residual claim deficits cause benefit leakage to external capital (value chain layer); leakage undermines local reinvestment capacity, locking the value chain at front-end production into a "low-input, low-experience, low-return" equilibrium; this equilibrium feeds back to reinforce policy short-termism (institutional layer), forming a self-reinforcing closed loop. The institutional layer provides exogenous starting conditions, the organizational layer serves as transmission medium, and the value chain layer represents outcome manifestation—Constituting a "constraint → transmission → lock-in → feedback" causal logic.

2.3. Framework diagram structure

The framework presents a vertically three-layer nested structure. Top layer (institutional): Oval box labeled "Cold-Region Constraints" containing "prolonged winter idleness," "climate adaptation," and "policy short-termism," with bidirectional arrows indicating mutual reinforcement. Middle layer (organizational): Rectangular box labeled "Collaborative Governance" containing "collective coordination," "enterprise dominance," "farmer embeddedness," and "transaction costs"; opposing arrows between collective coordination and enterprise dominance indicate a trade-off relationship; farmer embeddedness is moderated by transaction costs (dashed arrow). Bottom layer (value chain): Diamond box labeled "Restructuring Modalities" containing "strong production–weak experience," "Digitization," and "brand premium"; forward arrows from digitization and brand premium to strong production–weak experience indicate smoothing and breakthrough functions. Between layers: Solid bold arrow from institutional to organizational layer labeled "constraint transmission"; solid bold arrow from organizational to value chain layer labeled "distribution determination"; dashed feedback arrow from value chain to institutional layer labeled "lock-in reinforcement." Bottom configuration box: Dashed rectangular box labeled "High-Resilience Configuration: Digital Infrastructure × Collective Equity × Long-term Investment," with three dashed arrows connecting to core elements of each layer.

3. Mechanism deduction and theoretical propositions

This section follows a "proposition → logical chain → theoretical dialogue → boundary condition" structure. It should be noted that "value chain restructuring" as used herein denotes a paradigm shift in the logic of value creation, not a physical extension of the chain—Restructuring constitutes a logical leap from "primary product output" to "experiential value co-creation" to "standard and brand value output," synthesizing Gereffi's four-stage upgrading framework (process/product/functional/chain) [6,12] with Garrod et al.'s "countryside capital" concept .

3.1. P1: Path dependence and low-end lock-in

Observation: 70% of Liaoning's tourism entities are homogeneously stuck in "picking + farmhouse," with winter operations nearly absent. Logical chain: Evolutionary economic geography holds that initial conditions lock in development trajectories through positive feedback. Prolonged winter idleness constitutes the critical initial condition—Facilities average 5–6 months annual idleness, pushing investors toward light-asset, quick-return models to avoid sunk costs (first feedback); policy subsidies favoring hardware create incentive compatibility with light-asset preferences, reinforcing "emphasis on construction, neglect of operations" (second feedback); light-asset models preclude deep experience R&D (requiring long-term investment), formats converge on low-transaction-cost picking and catering, and low-experience products cannot generate brand premiums or repeat consumption, with constrained returns suppressing reinvestment

(third feedback) . Theoretical dialogue: Path dependence theory reveals endogeneity of lock-in but does not specify the threshold conditions for policy intervention. P1 introduces subsidy structure as a moderating variable: As the operational subsidy share increases, pioneers' risk premium is partially internalized and the positive feedback slope flattens. Boundary condition: Lock-in degree decreases with the rising share of policy operational subsidies.

Proposition P1: Prolonged winter idleness and short-term policy incentives generate triple positive feedbacks, converging agritourism integration toward low-transaction-cost homogeneous formats; lock-in degree decreases as the share of operational subsidies increases.

3.2. P2: Benefit distribution imbalance and externality leakage

Observation: Farmers in Liaoning's agritourism projects predominantly receive only land rents and wages, rarely participating in value-added distribution. Logical chain: Weak collective coordination capacity prevents villages from negotiating at parity with capital—Collectives lack financial and legal expertise, reducing their bargaining power. Micro-conduct chain: Operational uncertainty (prolonged winter idleness) → seasonal risk premium (capital demands short-term recovery) → transaction cost escalation (contract negotiation, monitoring, and renegotiation costs surge) → collective bargaining power erosion (information asymmetry and professional knowledge deficit) → asymmetric contracting (enterprises unilaterally set distribution rules) → farmer residual claim loss. Under collective absence, enterprises leverage information and capital advantages to position farmers as factor providers [7], and value-added benefits concentrate at the enterprise end through profit transfers—"Externality leakage"; leakage further suppresses farmer participation incentives, forming a "weak collective–strong enterprise–weak farmer" reproductive equilibrium. Theoretical dialogue. Proposition P2: When collective coordination capacity is weak, farmers can only participate at labor-supply level, generating external leakage; leakage degree decreases with rising collective equity share and increases with rising seasonal risk premium.

3.3. P3: Value appreciation and digital smoothing

Observation: Liaoning's agritourism value chain appreciation rate is below 30%, with income growth driven by substitution effects rather than multiplier effects [10]. Logical chain: Value chain theory locates appreciation at the "smile curve" ends—Front-end cultivar R&D and back-end experience scenification, branding, and digitization [6,12]. Cold-region constraints interrupt extension bidirectionally: Prolonged winter idleness breaks experience continuity [9], preventing deep and repeat consumption; climate constraints compress cultivar selection space, reducing front-end R&D marginal returns. When extension is insufficient, integration achieves only "agriculture + tourism" arithmetic addition—Tourist spending substitutes for daily spending (substitution effect) rather than generating incremental multiplier expansion (multiplier effect). Digital technology offers a smoothing pathway: Online pre-sales shift consumption timing forward, live stream e-commerce transcends geographic and seasonal boundaries, and virtual experiences compensate for offline gaps—The degree of digital smoothing determines the marginal return growth slope. Scene-driven theory further indicates that when scene design organically integrates production, experience, and consumption spaces, the value chain shifts from linear extension to networked restructuring, with appreciation undergoing nonlinear leap. Theoretical dialogue: Proposition P3: The marginal return of agritourism integration depends on the depth of "experience scenification–brand premium–digital smoothing"; when extension is insufficient, integration produces only substitution effects; the slope of digital seasonal smoothing determines the marginal return growth rate; when extension depth crosses a threshold, appreciation transitions from linear growth to nonlinear leap.

3.4. P4: Resilience restructuring and synergistic configuration

Observation: A few Liaoning agritourism projects show signs of breaking low-end lock-in, but single-dimension breakthroughs fail to sustain high performance. Logical chain: The law of diminishing returns on single-factor input shows that—Digital infrastructure alone without collective equity protection allows digital benefits to leak to capital; collective strengthening alone without digital empowerment improves distribution but cannot remedy experience continuity deficits; policy funds alone without operational matching sink into hardware without generating sustained value High-resilience integration depends on multi-factor synergistic configuration: Digital infrastructure smoothing seasonal fluctuations (foundational condition for breaking P1 path dependence), collective equity ensuring distributional fairness (institutional device for

breaking P2 external leakage), and policy instruments guiding long-term investment (governance guarantee for breaking P1 short-term incentives). Proposition P4: High-performance integration breaking cold-region constraints depends on the synergistic configuration of "digital infrastructure × collective equity × long-term investment," with marginal returns on single-factor inputs diminishing; the emergent effects of the configuration are moderated by peri-urban/remote location and collective economic foundation, with factor weights varying by context.

4. Theoretical corroboration through typical contexts

This section applies Yin's (2018) "analytical generalization" principle: Cases function as theoretical stress tests, not statistical inference. Three Liaoning cases introduced in Section 2 are condensed into a mapping table with a "case–proposition–mechanism–contextual conditions–corroboration logic–theoretical refinement" structure.

All three cases share the joint embedding of "digital + collective + long-term" factors; differences lie in dominant factor weights varying by location. Post-mapping theoretical refinement: P4 configuration weights are not constant but systematically moderated by location and collective economic foundation—peri-urban areas prioritize digital empowerment, remote areas prioritize collective coordination, and scenic-area radiation zones prioritize long-term investment. This refinement provides operationalizable conditional hypotheses for subsequent empirical testing.

5. Conclusions and implications

Three answers emerge. (1) Cold-region constraints form a self-reinforcing low-end lock-in logic through triple positive feed backs of prolonged winter idleness → light-asset preference → policy short-termism (P1). (2) Under weak collective governance, transaction cost escalation erodes collective bargaining power, asymmetric contracting locks farmers into labor-supply roles, and integration benefits leak externally (P2). (3) Single-factor inputs exhibit diminishing returns; only the synergistic configuration "digital infrastructure × collective equity × long-term investment" can break low-end equilibrium and achieve the paradigm shift from linear appreciation to nonlinear value chain leap (P3, P4).

This paper's mechanisms are derived from logical deduction and analytical generalization of secondary cases, not empirical testing; core propositions require subsequent empirical calibration.

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