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The Impact of M&A Strategy on the Cultivation of Chain Leader Enterprises: Comparative Empirical Study of Horizontal and Vertical Merger

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Highlights

- Develops a five-dimensional Chain-Leader Capability Index using annual firm-level indicators.
- Separates horizontal and vertical M&A through transparent industry-code and input-output rules.
- Combines fixed effects, staggered DID, event studies, balancing methods, and mechanism tests.
- Treats innovation and supply-chain coordination as distinct transmission channels.
- Provides publication-ready tables and figures without manufacturing empirical estimates.

***Abstract*--This study develops a comparative empirical framework for examining how horizontal and vertical mergers and acquisitions (M&A) influence the development of chain-leader capability among Chinese A-share listed manufacturing firms. Chain-leader capability is conceptualized as a firm's capacity to organize and upgrade an industrial chain through innovation leadership, market influence, interfirm coordination, operational efficiency, and resilience. The framework combines the resource-based view, transaction cost economics, dynamic capability theory, and supply-chain governance. It proposes a firm-year panel for 2010–2024, classifies completed transactions using industry relatedness and input-output linkages, and constructs a multidimensional Chain-Leader Capability Index using entropy weighting, with principal-component and recognition-based measures as robustness checks. The empirical sequence comprises firm and year fixed effects, formal comparison of horizontal and vertical coefficients, mechanism analysis through innovation and supply-chain coordination, propensity-score or entropy balancing, staggered difference-in-differences estimation, event-study tests, placebo exercises, and heterogeneity analysis. Unlike studies that evaluate acquisitions only through accounting returns or market reactions, the design focuses on whether M&A strengthens the acquiring firm's ability to coordinate and stabilize the wider industrial chain. Numerical results are deliberately omitted from this version because the underlying firm-level data were not supplied. The manuscript therefore provides a complete, non-fabricated analysis architecture that can be populated directly with verified database output.**

***Keywords*-- mergers and acquisitions; horizontal integration; vertical integration; chain-leader enterprise; industrial chain; supply-chain resilience; China**

I. INTRODUCTION

Industrial competition increasingly occurs between coordinated value chains rather than isolated firms. A manufacturer may possess efficient plants and profitable products yet remain strategically fragile if it depends on a small number of suppliers, lacks access to distribution channels, or cannot mobilize complementary firms when technology and demand change. This has elevated the role of chain-leading enterprises: focal firms that organize resources, set technical or quality standards, diffuse innovation, coordinate upstream and downstream partners, and help an industrial chain absorb disruptions. China's recent industrial policy places particular emphasis on the stability, security, and modernization of industrial and supply chains, while the 2026 State Council provisions formalize chain security as a national institutional concern (State Council of the People's Republic of China, 2026).

M&A is a potentially powerful route to chain leadership because it changes the boundary of the firm faster than internal development. An acquirer can obtain patents, engineers, specialized equipment, brands, suppliers, customer channels, logistics assets, or digital platforms in a single transaction. Yet acquisitions are not uniformly beneficial. Meta-analytic and review evidence shows substantial variation in post-acquisition outcomes because value creation depends on strategic fit, integration choices, learning, organizational compatibility, and the acquirer's ability to redeploy resources (King et al., 2004; Haleblian et al., 2009; Bauer & Matzler, 2014). The relevant question is therefore not simply whether M&A works, but which form of M&A develops which capability under which conditions.

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Horizontal and vertical acquisitions embody different strategic logics. Horizontal M&A combines firms at the same or a closely related stage of production. It may increase scale, remove duplicated assets, expand product coverage, and strengthen bargaining power. Vertical M&A links different stages of the chain, such as a manufacturer acquiring a component supplier, logistics provider, distributor, or customer-facing platform. It may reduce contracting frictions, protect relationship-specific investments, improve information flow, and stabilize critical inputs or channels (Williamson, 1985; Fan & Goyal, 2006; Atalay et al., 2014). These differences make a direct comparison necessary when the outcome of interest is industrial-chain leadership rather than a narrow profitability ratio.

Prior research provides important but incomplete foundations. Hong and Chen (2022) show that M&A type can affect the performance of Chinese listed agricultural firms through R&D input, using factor analysis, mediation models, and propensity-score matching. Recent Chinese evidence broadens the focus from firm performance to chain governance. Li et al. (2024) connect the Industrial Chain Leader System with green governance; Liang et al. (2025) find that artificial-intelligence adoption by chain-leading enterprises can reduce supply-chain disruption risk; Wu et al. (2025) report that vertical acquisitions improve supply-chain resilience among renewable-energy enterprises partly by reducing supplier concentration; and Ren et al. (2026) show that state-owned chain leaders can generate innovation spillovers for private firms in the chain. These studies indicate that chain leadership is multidimensional and relational, but they do not provide a unified comparison of horizontal and vertical acquisition strategies using a common chain-leader outcome.

This study addresses that gap by developing an annual Chain-Leader Capability Index (CLCI) that combines innovation leadership, market influence, supply-chain coordination, operational efficiency, and resilience.

The design uses Chinese A-share listed manufacturing firms because manufacturing provides observable upstream-downstream linkages, patenting activity, production and inventory indicators, and detailed M&A disclosures. Horizontal transactions are identified through industry-code relatedness; vertical transactions are identified through China's input-output tables and validated with transaction announcements and product-chain descriptions. Unrelated acquisitions are retained as a separate category or excluded from the principal comparison, depending on sample size.

The intended empirical contribution is threefold. First, the paper moves beyond post-merger profitability and examines whether acquisition strategy enhances the acquirer's capacity to lead an ecosystem. Second, it distinguishes the mechanisms of horizontal and vertical M&A: related-resource redeployment and market influence for horizontal deals, versus coordination, supply security, and reduced dependence for vertical deals. Third, it strengthens identification by combining panel fixed effects with balancing methods, staggered difference-in-differences, event-time diagnostics, placebo tests, and multiple alternative measures. This sequence preserves the logical clarity of established M&A studies while using an original outcome, original coding protocol, and more current causal methods.

Research questions

- **RQ1.** Do completed M&A transactions increase the chain-leader capability of acquiring firms?
- **RQ2.** Do horizontal and vertical acquisitions have different effects on the overall CLCI and its component dimensions?
- **RQ3.** Are innovation capability and supply-chain coordination mechanisms through which acquisition strategy affects chain-leader capability?
- **RQ4.** Do digital transformation, ownership, technology intensity, financing constraints, and regional institutions condition the effect?

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Table 1. How the revised design uses—but does not reproduce—the reference study

Design element	Reference study (Hong & Chen, 2022)	Revised study
Research setting	120 M&A cases among listed agricultural firms, 2009–2019	A-share listed manufacturing firm-year panel, proposed 2010–2024
Main comparison	Horizontal, vertical, and mixed M&A	Horizontal versus vertical M&A; unrelated deals treated separately
Outcome	Composite post-M&A financial performance	Annual Chain-Leader Capability Index with five dimensions
Mechanism	R&D input	Innovation capability and supply-chain coordination
Identification	Regression, mediation, PSM, robustness checks	Firm/year FE, balancing, staggered DID, event study, placebo and heterogeneity tests
Originality safeguard	Not applicable	No transfer of text, sample, coefficients, factor loadings, or conclusions

II. Literature Review And Research Gap

2.1 M&A as resource reconfiguration

The resource-based view treats acquisitions as a means of obtaining valuable assets that would be slow or costly to develop internally (Barney, 1991; Penrose, 1959). Value does not arise from possession alone. It depends on whether the acquirer can combine, redeploy, and govern the acquired resources. Capron et al. (1998) and Capron (1999) show that resource redeployment is central to value creation in related acquisitions. Dynamic capability theory extends this argument by emphasizing the ability to sense opportunities, seize them, and reconfigure the asset base as technologies and markets evolve (Teece et al., 1997). M&A can therefore be viewed as a high-intensity reconfiguration action whose benefits depend on integration capability and deliberate learning (Zollo & Singh, 2004).

Knowledge-based studies similarly show that technological acquisitions can expand the acquirer's knowledge base, but excessive similarity or excessive distance can reduce the benefits of recombination (Ahuja & Katila, 2001). Coordination-autonomy trade-offs are especially important when the target contains innovative teams whose routines may be damaged by heavy-handed integration (Puranam et al., 2006). These insights imply that innovation leadership should be examined as a mechanism and as one dimension of chain-leader capability, rather than assumed from deal completion.

2.2 Horizontal M&A

Horizontal acquisitions combine firms operating in the same or closely related product markets.

Their expected advantages include economies of scale, market access, product-line expansion, elimination of duplicate assets, and the transfer of related commercial or technological resources. Similarity can facilitate valuation and integration because the acquirer understands the target's business. It can also create redundancy, internal rivalry, and antitrust constraints. The central chain-leader implication is that horizontal M&A may strengthen the focal firm's market influence and resource mobilization capacity without necessarily improving coordination across upstream and downstream stages.

The predicted effect is therefore dimension-specific. Horizontal acquisitions should have relatively strong effects on sales share, revenue rank, product breadth, and perhaps innovation when related technological assets are recombined. Their effect on supplier stability, customer diversification, or cash-conversion coordination is less direct. This distinction is important because an enterprise can become larger within one production stage without becoming a more effective organizer of the entire chain.

2.3 Vertical M&A

Transaction cost economics predicts vertical integration when market contracting is impaired by asset specificity, uncertainty, information asymmetry, or opportunism (Williamson, 1985). Acquiring an upstream supplier can secure inputs, protect specialized investments, and improve quality control. Acquiring a downstream distributor or platform can provide demand information, channel access, and faster feedback. Empirical work on vertical mergers documents patterned links between industry input flows and integration decisions (Fan & Goyal, 2006; Atalay et al., 2014).

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Vertical M&A is conceptually close to chain leadership because both concern the governance of interdependent stages. Recent evidence from Chinese renewable-energy firms indicates that vertical acquisitions can strengthen supply-chain resilience and reduce supplier concentration (Wu et al., 2025). Nevertheless, internalization can create bureaucracy, reduce flexibility, and lock the firm into particular technologies or suppliers. The net effect should therefore be evaluated through both the overall CLCI and its coordination and resilience components.

2.4 Chain-leader capability

A chain-leading enterprise is more than a large firm. It has the capacity to coordinate actors and resources beyond its legal boundary. Such capability can be observed in technology leadership, market attraction, supplier and customer governance, standard setting, risk absorption, and the diffusion of knowledge to smaller partners. Li et al. (2024) demonstrate that a chain-leader system can support green governance, while Ren et al. (2026) identify innovation spillovers from state-owned chain leaders to private firms. Liang et al. (2025) further show that digital adoption by chain-leading enterprises can reduce disruption risk through network transformation and cross-chain resource coordination.

These findings motivate a multidimensional firm-year index. A single recognition dummy is useful but incomplete because official lists differ across provinces and years. A composite index captures continuous changes before and after an acquisition and permits analysis of separate dimensions. Recognition status is retained as an external-validity measure rather than embedded mechanically in the baseline index.

2.5 Evidence map and unresolved questions

Table 2. Recent evidence informing the revised empirical design

Study	Setting / sample	Methodological contribution	Remaining gap
Hong & Chen (2022)	120 M&A cases; Chinese listed agricultural firms; 2009–2019	Factor-based performance index, mediation by R&D input, PSM and robustness tests	Outcome remains firm financial performance; limited panel causal identification
Li et al. (2024)	Industrial Chain Leader System in a Chinese resource-based city	Connects chain leadership with green governance	Does not compare acquisition strategies
Liang et al. (2025)	Chain-leading enterprises and AI adoption	Links digital capability to disruption-risk reduction and network coordination	M&A is not the treatment variable
Wu et al. (2025)	A-share renewable-energy enterprises; 2011–2023	Multi-period DID; supplier concentration as mechanism; resilience outcome	Focuses only on vertical M&A and one sector
Ren et al. (2026)	A-share private firms and top-five supply-chain partners; 2009–2023	Tests innovation spillovers from state-owned chain leaders	Does not evaluate horizontal versus vertical M&A

The unresolved issue is comparative and causal: whether horizontal and vertical acquisitions produce different changes in an acquirer's chain-leader capability, through which mechanisms, and with what timing.

The revised design answers this question using a common outcome, common sample, consistent coding rules, and event-time analysis.

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III. Theoretical Framework And Hypotheses

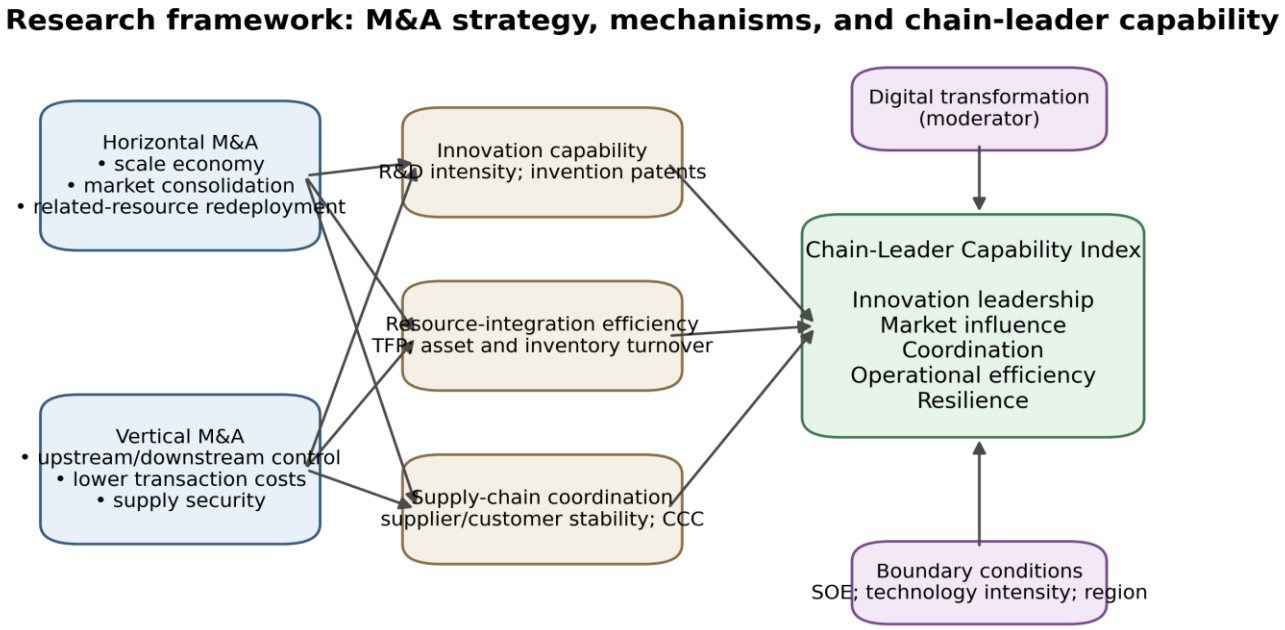

Figure 1. Research framework linking M&A strategy to chain-leader capability.

3.1 Overall M&A effect

Completed acquisitions can expand the acquirer's tangible and intangible resource base, improve market access, and accelerate capability recombination. When integration is effective, these changes should improve innovation leadership, operational efficiency, and the firm's ability to coordinate partners. Because integration costs and overpayment may offset benefits, the prediction concerns the average effect after controlling for firm-specific and year-specific shocks.

H1. Completed M&A transactions are positively associated with subsequent chain-leader capability.

3.2 Horizontal M&A and market-based leadership

Horizontal M&A consolidates related assets and increases the scale at which the acquirer can invest, negotiate, and set standards. Relatedness may facilitate resource redeployment and technology recombination. The strongest expected effects are market influence and operational efficiency, with a positive but less direct effect on cross-stage coordination.

H2. Horizontal M&A increases chain-leader capability, primarily through market influence, related-resource redeployment, and scale efficiency.

3.3 Vertical M&A and chain coordination

Vertical M&A internalizes upstream or downstream relationships, reducing exposure to contracting failures and improving visibility across stages. Backward acquisitions may stabilize inputs and quality; forward acquisitions may improve channels and demand information. These mechanisms are directly aligned with chain coordination and resilience.

H3. Vertical M&A increases chain-leader capability, primarily through supply-chain coordination and resilience.

H4. The effect of vertical M&A is stronger than the effect of horizontal M&A for the coordination and resilience dimensions of chain-leader capability.

3.4 Mechanisms and boundary conditions

Acquisitions can transfer patents, researchers, routines, and complementary knowledge. Successful absorption should raise R&D productivity and invention output, strengthening innovation leadership. Vertical acquisitions also change dependence structures and operating flows; lower supplier or customer concentration risk, more stable relationships, and shorter cash-conversion cycles should transmit part of the vertical-M&A effect.

International Journal of Recent Development in Engineering and Technology
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Digital capability can enhance both channels by improving data integration, traceability, and post-merger coordination.

H5. Innovation capability mediates the relationship between M&A strategy and chain-leader capability.

H6. Supply-chain coordination mediates the relationship between vertical M&A and chain-leader capability.

H7. Digital transformation strengthens the positive effect of M&A strategy on chain-leader capability.

Table 3. Hypotheses and empirical tests

Hypothesis	Predicted relationship	Primary test
H1	M&A → CLCI (+)	Firm/year fixed-effects model with lagged treatment
H2	Horizontal M&A → CLCI (+)	Horizontal coefficient and component regressions
H3	Vertical M&A → CLCI (+)	Vertical coefficient and component regressions
H4	Vertical > horizontal for coordination and resilience	Wald test of coefficient equality
H5	M&A → innovation → CLCI	Mediator regressions and bootstrap indirect effect
H6	Vertical M&A → coordination → CLCI	Mediator regressions and bootstrap indirect effect
H7	M&A × digital transformation → CLCI (+)	Interaction model and marginal effects

IV. Research Design

4.1 Population, period, and unit of analysis

The proposed population is all nonfinancial A-share listed manufacturing firms from 2010 through 2024. The end year is set at 2024 to ensure that annual-report, patent, supplier/customer, and post-acquisition outcome data are substantially complete. The unit of analysis is the firm-year. M&A variables are coded from completed transactions, not announcements, because capability changes require transfer of control or assets.

The baseline sample includes both acquiring and non-acquiring firms so that treatment firms can be compared with observably similar controls. Financial firms are excluded because their balance sheets and regulatory environment are not comparable. ST, *ST, and PT firm-years are excluded in the baseline because distress and shell-restructuring motives can dominate ordinary strategy. Transactions involving only internal asset transfers, changes in the largest shareholder without operating control, debt restructurings, or missing target-industry information are removed. Continuous variables are winsorized at the 1st and 99th percentiles by year.

International Journal of Recent Development in Engineering and Technology
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Table 4. Sample construction protocol

Step	Rule	Reason
1	Start with all A-share manufacturing firm-years, 2010–2024	Defines the population and permits untreated controls
2	Remove financial-sector and non-manufacturing observations	Ensures accounting and chain comparability
3	Remove ST, *ST, and PT firm-years in the baseline	Limits distress-driven acquisitions and abnormal reporting
4	Retain completed acquisitions with identifiable acquirer, target, date, and industry	Supports strategy classification and timing
5	Exclude pure related-party asset transfers, debt restructurings, and ownership changes without operational acquisition	Focuses on strategic M&A
6	If multiple deals occur in one firm-year, classify the largest-value deal and construct count/value-intensity alternatives	Avoids ambiguous treatment while preserving robustness options
7	Require at least two pre-treatment and two post-treatment observations for event analysis	Supports pre-trend and dynamic-effect estimation
8	Winsorize continuous variables at 1% and 99% within year	Reduces influence of extreme reporting values

4.2 Data sources and merge architecture

Table 5. Data architecture

Data block	Preferred source	Key fields
M&A transactions	CSMAR or Wind M&A; company announcements	completion date, transaction value, acquirer/target industry, ownership transferred, related-party status
Financial statements	CSMAR, Wind, RESSET, annual reports	assets, liabilities, revenue, profit, operating cash flow, inventory, receivables, firm age
Innovation	CNRDS, CNIPA/IncoPat, CSMAR R&D	R&D expenditure, invention applications/grants, citations or patent value when available
Supply-chain relationships	CNRDS/CSMAR supply-chain data; annual-report top-five disclosures	supplier/customer concentration, partner identity, relationship persistence
Industry linkages	China input-output tables; CSRC industry codes	upstream-downstream coefficients and industry relatedness
Digital transformation	CNRDS digital index or annual-report text dictionary	digital investment, digital terms, software/intangible assets
Recognition and policy	provincial chain-leader lists; MIIT single-champion lists; official leading-enterprise lists	recognition year, category, province, industry

All sources should be merged by stock code and fiscal year. M&A events are assigned to the fiscal year in which the transaction is completed. Outcomes are examined from t to t+3 because integration benefits may be delayed.

A reproducible data log should record the source, download date, filters, number of observations removed, and manual classification decisions.

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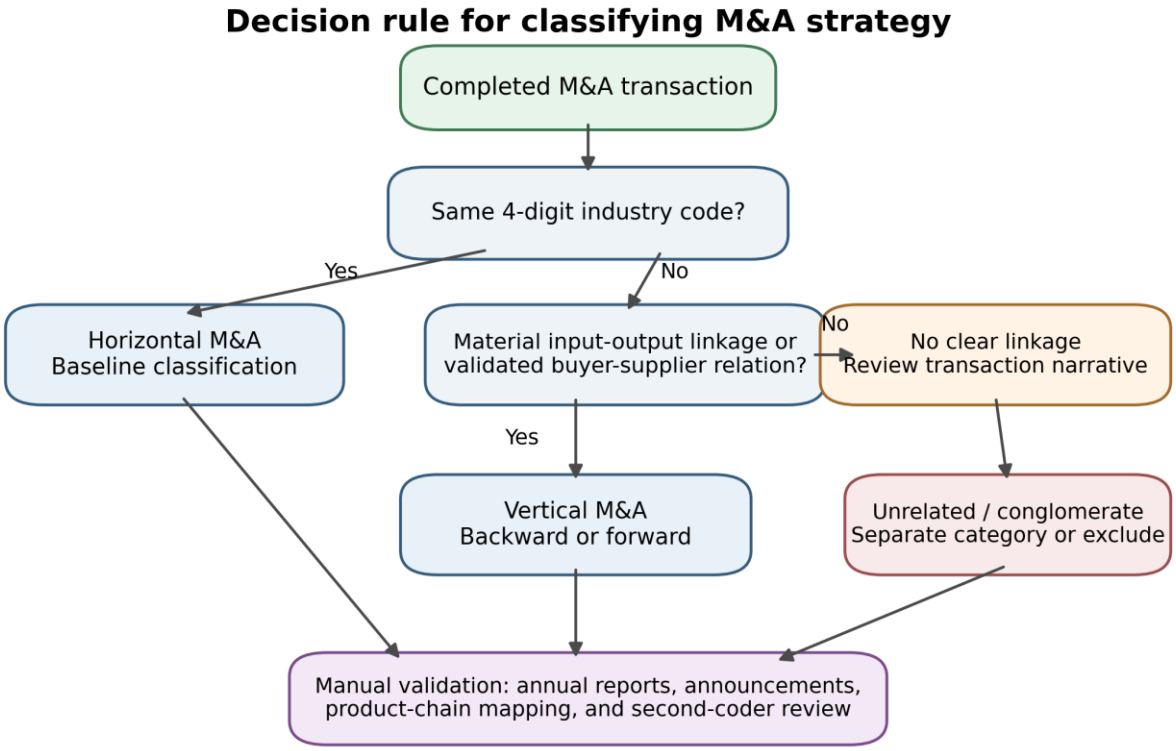

Figure 2. Decision rule for classifying horizontal, vertical, and unrelated acquisitions.

4.3 Classification of M&A strategy

A transaction is classified as horizontal when the acquirer and target share the same four-digit industry code. The same two-digit code is used as a broader robustness definition. A transaction is classified as vertical when the target industry is a material upstream or downstream input-output partner of the acquirer industry. The baseline threshold can be defined as an input-output coefficient above the median positive coefficient within the relevant table; alternative thresholds are tested for robustness.

Automated classification is followed by manual validation using transaction announcements, annual reports, product descriptions, and disclosed supplier-customer relationships. Backward vertical M&A identifies supplier-side acquisitions; forward vertical M&A identifies distributor, platform, logistics, or customer-side acquisitions. Deals that are neither horizontal nor vertical are coded as unrelated. Ambiguous deals are reviewed independently by two coders; disagreements are resolved using a written decision rule and inter-coder agreement is reported.

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Table 6. M&A variables and coding rules

Variable	Coding rule	Robustness / alternative
MA	1 if firm i completes a qualifying acquisition in year t; otherwise 0	Use t−1 treatment, three-year post indicator, deal count, or value/total assets
HorizontalMA	1 when acquirer and target share the same 4-digit industry code	Same 2-digit code; continuous industry-relatedness score
VerticalMA	1 when input-output linkage or validated buyer-supplier relation is present	Alternative linkage threshold; separate backward and forward vertical M&A
UnrelatedMA	1 when neither horizontal nor vertical criteria are satisfied	Exclude from main comparison or retain as reference category
CrossBorder	1 when target country differs from acquirer country	Domestic-only sample
RelatedDeal	1 for related-party transaction	Exclude related-party deals
MAIntensity	Sum of completed deal value divided by lagged total assets	Deal count; largest deal value; capped intensity

4.4 Dependent variable: Chain-Leader Capability Index

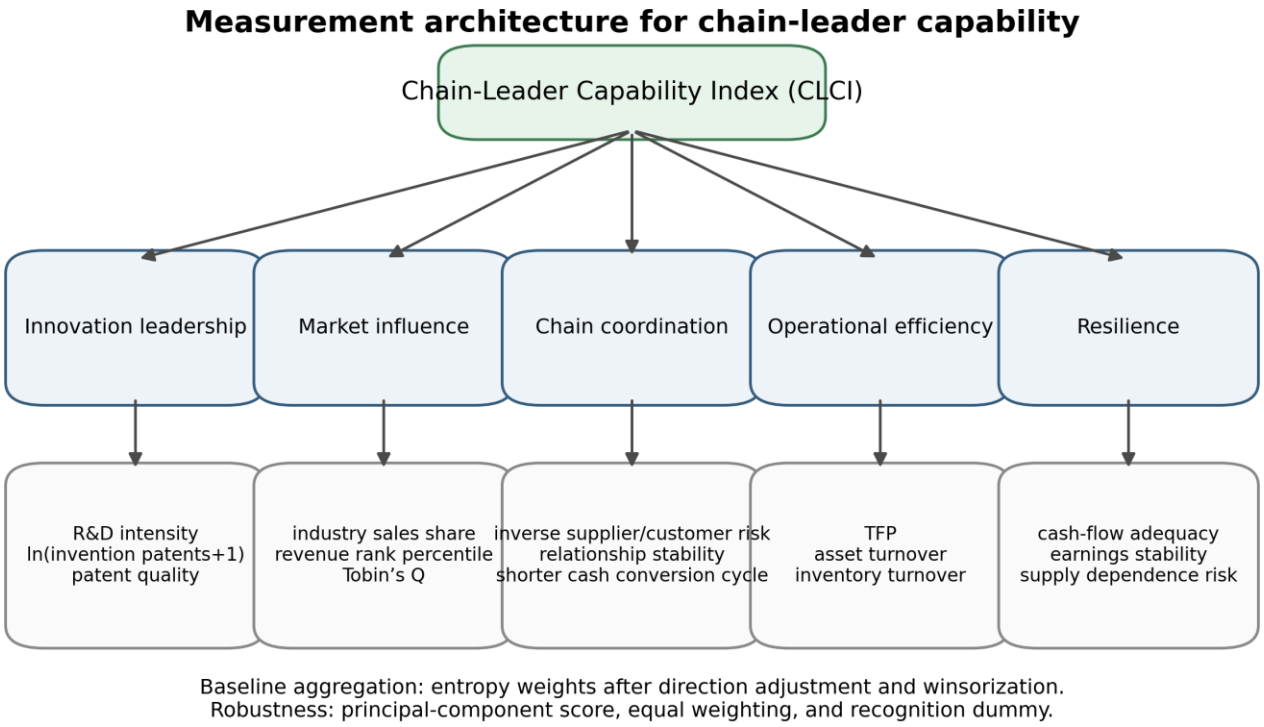

Figure 3. Measurement architecture of the Chain-Leader Capability Index.

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The CLCI is constructed annually from indicators that reflect the firm's ability to lead technology, markets, interfirm coordination, operations, and resilience. Indicators are selected only when they are consistently available across the sample and can be interpreted at the firm-year level. The baseline index uses entropy weights because the method assigns greater weight to indicators with more cross-sectional information and avoids arbitrary equal weighting. Before weighting, variables are direction-adjusted, winsorized, and normalized within year and two-digit industry to reduce mechanical scale and business-cycle effects.

Table 7. Proposed CLCI indicator system

Dimension	Indicator	Direction	Operationalization
Innovation leadership	R&D intensity	+	R&D expenditure / operating revenue
	Invention output	+	ln(1 + invention patent applications or grants)
	Patent quality	+	ln(1 + forward citations) or invention share when available
Market influence	Industry sales share	+	firm revenue / total revenue of same two-digit industry
	Revenue-rank percentile	+	reverse percentile rank within industry-year
	Tobin's Q	+	market value / replacement-cost proxy
Chain coordination	Supplier concentration risk	−	top-five supplier purchase share
	Customer concentration risk	−	top-five customer sales share
	Relationship stability	+	share of top partners retained from previous year
	Cash conversion cycle	−	inventory days + receivable days − payable days
Operational efficiency	Total factor productivity	+	LP or OP production-function estimate
	Asset turnover	+	operating revenue / average total assets
	Inventory turnover	+	cost of sales / average inventory
Resilience	Operating cash-flow adequacy	+	operating cash flow / total assets
	Earnings stability	+	negative rolling volatility of ROA
	Supply dependence risk	−	maximum supplier/customer share or concentration composite

Use a parsimonious subset when disclosure coverage is insufficient. Recognition status is an external-validity outcome, not a baseline index component.

Index construction

- Direction-adjust each indicator so that a larger value consistently represents stronger capability.
- Winsorize extreme values and normalize within industry-year using min-max scaling with a small positive constant.
- Calculate entropy-based information weights and aggregate indicators first within dimensions and then across dimensions.
- Standardize the final CLCI to mean zero and standard deviation one for coefficient interpretation.
- Assess internal structure using KMO, Bartlett's test, principal-component loadings, and correlations between dimension scores.
- Repeat the analysis using PCA scores, equal weights, and a chain-leader recognition dummy as robustness outcomes.

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4.5 Mediators, moderator, and controls

Table 8. Variable definitions

Role	Variable	Definition
Outcome	CLCI	Standardized entropy-weighted chain-leader capability index
Outcome components	Innovation, Market, Coordination, Efficiency, Resilience	Standardized dimension scores
Treatment	HorizontalMA; VerticalMA	Strategy dummies defined in Table 6, normally lagged one year
Mediator	Innovation capability	R&D intensity and ln(1 + invention patents); optional patent quality
Mediator	Supply-chain coordination	Inverse concentration risk, partner stability, and negative cash conversion cycle
Moderator	Digital	CNRDS digital-transformation index or standardized annual-report text measure
Control	Size	Natural logarithm of total assets
Control	Leverage	Total liabilities / total assets
Control	ROA	Net income / average total assets
Control	Growth	Annual operating-revenue growth
Control	Cash	Operating cash flow / total assets
Control	Age	Natural logarithm of years since establishment or listing
Control	SOE	1 for ultimate state control
Control	Board and ownership	Board size, independent-director ratio, largest-shareholder ownership
Deal controls	Deal value, payment method, cross-border, related-party	Transaction-level characteristics aggregated to firm-year

4.6 Econometric specifications

The baseline model estimates within-firm changes and absorbs common macroeconomic shocks through firm and year fixed effects. All time-varying controls are lagged one year where economically appropriate. Standard errors are clustered by firm; two-way clustering by firm and year is used as a robustness check (Petersen, 2009).

$$CLCI\_it = \alpha + \beta_1 MA\_i,t-1 + \gamma' Controls\_i,t-1 + \mu\_i + \lambda\_t + \varepsilon\_it \quad (1)$$

$$CLCI\_it = \alpha + \beta\_H HorizontalMA\_i,t-1 + \beta\_V VerticalMA\_i,t-1 + \gamma' Controls\_i,t-1 + \mu\_i + \lambda\_t + \varepsilon\_it \quad (2)$$

Equation (2) is the principal comparative model. H4 is evaluated using a Wald test of H_0: $\beta V = \beta H$. The model is repeated for each CLCI dimension, which prevents an overall index from concealing different strategic effects.

$$Mediator\_it = \alpha + a\ Strategy\_i,t-1 + \gamma' Controls\_i,t-1 + \mu\_i + \lambda\_t + \upsilon\_it \quad (3)$$

$$CLCI\_it = \alpha + c'\ Strategy\_i,t-1 + b\ Mediator\_it + \gamma' Controls\_i,t-1 + \mu\_i + \lambda\_t + \varepsilon\_it \quad (4)$$

Indirect effects are evaluated using nonparametric bootstrap confidence intervals rather than relying only on stepwise coefficient changes (Imai et al., 2010). Innovation and coordination mediators are tested separately and jointly to reduce mechanism conflation.

$$CLCI\_it = \alpha + \beta_1\ Strategy\_i,t-1 + \beta_2\ Digital\_i,t-1 + \beta_3\ Strategy \times Digital\_i,t-1 + \gamma' Controls + \mu\_i + \lambda\_t + \varepsilon\_it \quad (5)$$

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4.7 Endogeneity and dynamic effects

Acquirers are not randomly selected. Stronger, more innovative, or more connected firms may be more likely to complete acquisitions. The first response is rich fixed effects and lagged controls. The second is balancing: estimate the probability of treatment using pre-deal size, age, leverage, profitability, growth, cash flow, ownership, governance, digital maturity, industry, region, and pre-treatment CLCI. Apply propensity-score matching or entropy balancing and report standardized mean differences before and after weighting (Rosenbaum & Rubin, 1983; Austin, 2011).

The third response is staggered difference-in-differences because firms complete acquisitions in different years. Conventional two-way fixed effects may combine inappropriate comparisons when treatment effects vary over time (Goodman-Bacon, 2021). The preferred estimators are group-time average treatment effects (Callaway & Sant'Anna, 2021) or interaction-weighted event studies (Sun & Abraham, 2021). Never-treated or not-yet-treated firms serve as controls. The event window is t−3 to t+3, with t−1 omitted. Pre-treatment coefficients and a joint pre-trend test must be reported.

Placebo exercises randomly assign treatment years within eligible firms and repeat the estimation many times. The actual coefficient should lie in the tail of the placebo distribution. Additional checks exclude mega-deals, related-party transactions, cross-border deals, and policy-shock years; use alternative treatment windows; and control for industry-year and province-year effects.

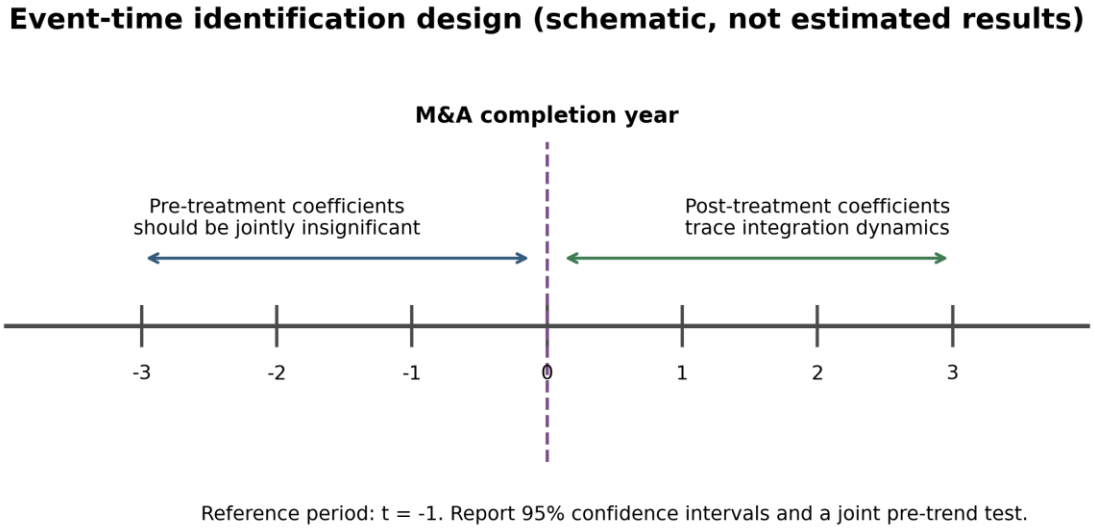

Figure 4. Event-time identification design. The figure is a schematic and contains no estimated coefficients.

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4.8 Analysis sequence

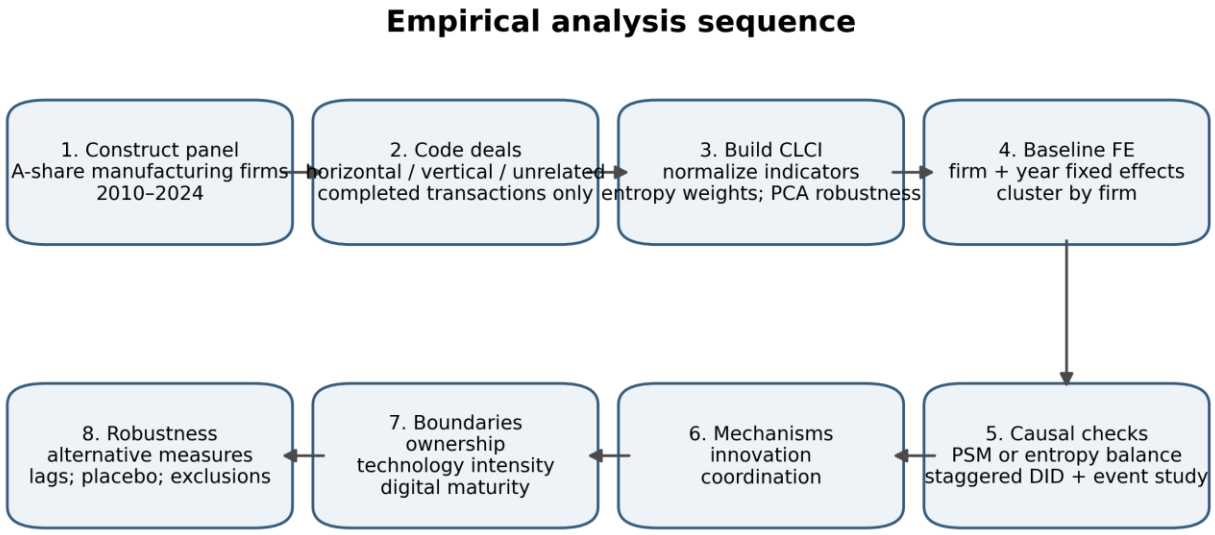

Figure 5. Empirical analysis sequence from data construction to robustness testing.

V. Empirical Analysis And Reporting Protocol

5.1 Sample description and index validation

The results section should begin with a transparent sample-flow table and annual distribution of transaction types. Report the number of unique firms, firm-years, acquiring firms, transactions, horizontal deals, backward vertical deals, forward vertical deals, and unrelated deals.

The index validation table should report KMO, Bartlett's test, eigenvalues or entropy weights, and correlations among the five dimensions. A satisfactory index should not be dominated by a single variable and should correlate positively with external chain-leader recognition without being mechanically defined by it.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 06, June 2026)

Table 9. Descriptive statistics shell

Variable	N	Mean	Std. dev.	P25	Median	P75	Min	Max
CLCI	—	—	—	—	—	—	—	—
HorizontalMA	—	—	—	—	—	—	—	—
VerticalMA	—	—	—	—	—	—	—	—
Innovation	—	—	—	—	—	—	—	—
Coordination	—	—	—	—	—	—	—	—
Digital	—	—	—	—	—	—	—	—
Size	—	—	—	—	—	—	—	—
Leverage	—	—	—	—	—	—	—	—
ROA	—	—	—	—	—	—	—	—
Growth	—	—	—	—	—	—	—	—
Cash	—	—	—	—	—	—	—	—
SOE	—	—	—	—	—	—	—	—

Replace em dashes with verified values. Report definitions exactly as in Table 8.

5.2 Correlation, balance, and multicollinearity

Report pairwise correlations, variance-inflation factors, and standardized mean differences between treated and comparison firms. A large raw difference in pre-treatment CLCI is evidence of selection and should motivate weighting; it is not a finding to be hidden. Balance plots should show covariate differences before and after matching or entropy balancing. Correlation does not test the hypotheses and should be interpreted only as a preliminary diagnostic.

5.3 Baseline comparison

Table 10. Baseline fixed-effects regression shell

Variables	(1) CLCI	(2) CLCI	(3) CLCI	(4) Innovation	(5) Coordination	(6) Resilience
MA_t−1	coef. (SE)					
HorizontalMA_t−1		coef. (SE)	coef. (SE)	coef. (SE)	coef. (SE)	coef. (SE)
VerticalMA_t−1		coef. (SE)	coef. (SE)	coef. (SE)	coef. (SE)	coef. (SE)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	No	No	Yes	Yes	Yes	Yes
Observations	—	—	—	—	—	—
Within R^2	—	—	—	—	—	—
Wald test: βV = βH		p = —	p = —	p = —	p = —	p = —

Firm-clustered standard errors in parentheses. Report exact p-values for coefficient-equality tests. Do not infer "vertical is stronger" merely because one coefficient is significant and the other is not.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 06, June 2026)

Interpretation rules

- State the coefficient, uncertainty, economic magnitude, and specification before discussing theory.
- Translate standardized CLCI coefficients into standard-deviation changes; for raw outcomes, report percentage or unit changes.
- Use the Wald test to compare horizontal and vertical effects.
- Discuss component regressions even when the aggregate CLCI is insignificant.
- Avoid causal language until balancing, pre-trend, and placebo evidence are presented.

5.4 Mechanism analysis

Table 11. Mechanism-test shell

Path	Mediator equation	Outcome equation	Bootstrap indirect effect	Inference
Horizontal M&A → innovation → CLCI	a = — (SE —)	b = —; c′ = —	ab = —; 95% CI [—, —]	Support / not support H5
Vertical M&A → innovation → CLCI	a = — (SE —)	b = —; c′ = —	ab = —; 95% CI [—, —]	Support / not support H5
Vertical M&A → coordination → CLCI	a = — (SE —)	b = —; c′ = —	ab = —; 95% CI [—, —]	Support / not support H6
Vertical M&A → supplier risk → resilience	a = — (SE —)	b = —; c′ = —	ab = —; 95% CI [—, —]	Mechanism extension

A mediator should not be declared solely because the treatment coefficient decreases after inclusion. Report the treatment-to-mediator path, mediator-to-outcome path, direct effect, indirect effect, and bootstrap confidence interval. Because R&D expenditure may decline temporarily during integration while patent output rises later, innovation measures should be tested at more than one lag.

5.5 Staggered DID and event-time results

Report group-time average treatment effects separately for horizontal and vertical acquisitions.

The event-study figure should display point estimates and 95% confidence intervals from t−3 to t+3. The text should answer three questions: whether pre-treatment coefficients are jointly indistinguishable from zero; when the post-treatment effect first appears; and whether it persists, increases, or reverses. Integration costs may produce a weak or negative effect in year 0 followed by later gains; such dynamics are substantively meaningful and should not be compressed into a single average.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 06, June 2026)

Table 12. Causal-identification and robustness shell

Test	Implementation	Required diagnostic	Result to report
Entropy balance / PSM	Weight or match on pre-treatment firm and deal predictors	Standardized mean difference < 0.10; common support	Weighted ATT and balance table
Staggered DID	Callaway–Sant'Anna or Sun–Abraham estimator	Joint pre-trend p-value; cohort support	ATT by event time and strategy
Placebo timing	Random eligible treatment years; ≥500 replications	Actual estimate in tail of placebo distribution	Placebo p-value and density figure
Alternative CLCI	PCA, equal weight, external recognition dummy	Direction and magnitude consistency	Coefficient table
Alternative classification	2-digit horizontal; alternative IO thresholds	Reclassification rate and agreement	Coefficient table
Sample exclusions	Remove cross-border, related-party, mega-deals, policy years	Observation counts and reasons	Coefficient table
Alternative inference	Two-way clustered or wild-bootstrap SE	Stable confidence intervals	p-values / CIs

5.6 Heterogeneity and boundary conditions

Table 13. Heterogeneity matrix

Dimension	Split / interaction	Theoretical reason	Statistical requirement
Ownership	SOE versus non-SOE	Access to policy resources, finance, and coordination authority	Test coefficient difference, not separate significance only
Technology intensity	High-tech versus traditional manufacturing	Knowledge complementarity and absorptive capacity	Use official industry classification
Digital maturity	High versus low digital index; continuous interaction	Integration, traceability, and information sharing	Plot marginal effects with confidence intervals
Financing constraints	High versus low SA/KZ/WW index	Ability to fund integration and resilience investments	Use pre-treatment measure
Vertical direction	Backward versus forward	Input security versus channel/demand access	Mutually exclusive coding where possible
Region	Eastern/central/western or marketization index	Institutional quality and partner availability	Control for province-year shocks

VI. Discussion Framework

The discussion must be written from the estimates rather than from the hypotheses.

Four outcome patterns are possible, and each has a different theoretical interpretation.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 06, June 2026)

Table 14. Result-contingent interpretation guide

Observed pattern	Interpretation	Managerial implication
Both horizontal and vertical M&A positive	Multiple acquisition paths can build chain leadership, but through different dimensions	Select strategy according to the capability gap rather than copying competitors
Vertical effect larger, especially for coordination/resilience	Chain leadership depends on governing interdependence across stages	Prioritize critical suppliers, logistics, channels, and data interfaces; preserve flexibility
Horizontal effect larger	Scale, related knowledge, and market influence dominate in the sample	Focus on related-resource redeployment and remove duplicated assets quickly
Short-run negative, later positive	Integration costs precede capability realization	Use staged integration targets and evaluate deals over multiple years
Insignificant or negative effects	Acquisition alone does not create chain leadership; fit or integration may be weak	Strengthen due diligence, integration capability, and post-deal accountability

6.1 Theoretical contributions

First, the study reframes acquisition performance as capability development at the industrial-chain level. This extends M&A research beyond shareholder returns and accounting ratios while retaining measurable firm-year outcomes.

Second, it separates two forms of strategic fit. Horizontal fit concerns similarity and redeployability of related resources; vertical fit concerns complementarity and governance of interdependent stages. Their effects should therefore be evaluated on different CLCI dimensions.

Third, the design integrates dynamic capability and transaction cost explanations. Acquisitions alter both what resources the firm owns and how exchanges are governed. Innovation and coordination mediators allow these mechanisms to be tested rather than blended into a broad synergy claim.

Fourth, the event-time design treats chain-leader capability as a process. The timing of effects reveals whether acquisitions create immediate scale benefits, delayed integration benefits, or temporary disruption.

6.2 Managerial implications

Managers should begin with a diagnosed chain bottleneck. Horizontal M&A is appropriate when the problem is fragmented capacity, weak market share, duplicated technology, or insufficient scale. Vertical M&A is more appropriate when the problem is unstable inputs, excessive supplier dependence, poor channel access, weak demand information, or slow coordination.

Deal success should be assessed with an integration scorecard that includes patents and R&D productivity, supplier/customer stability, concentration risk, inventory and cash-conversion metrics, and resilience—not only revenue and profit. The CLCI dimensions provide a practical scorecard for this purpose.

Digital systems should be integrated early. Shared master data, traceability, supplier platforms, and demand analytics can reduce the information losses that often follow acquisitions. However, digitalization should support—not replace—clear governance, accountability, and relationship management.

6.3 Policy implications

Policy evaluation should distinguish productive chain integration from size expansion that does not improve innovation, coordination, or resilience. Support for M&A should be conditional on transparent integration plans and measurable chain-level outcomes.

Public chain-leader lists can be used as external validation, but designation alone should not substitute for performance evidence. Governments can improve data infrastructure by standardizing disclosures on critical suppliers, customer dependence, and post-acquisition integration.

Competition and security objectives must be balanced. Horizontal consolidation may create scale and standard-setting capacity but can also reduce competition. Vertical integration may stabilize critical links but can foreclose partners or create lock-in. Case-specific assessment is therefore preferable to a blanket preference for one strategy.

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VII. Conclusion

This manuscript develops an original and reproducible framework for testing how horizontal and vertical M&A shape chain-leader capability among Chinese listed manufacturers. The proposed CLCI measures innovation leadership, market influence, supply-chain coordination, operational efficiency, and resilience. Horizontal M&A is theorized to work mainly through scale and related-resource redeployment; vertical M&A is theorized to work mainly through coordination and supply security. The empirical design combines fixed effects, coefficient-equality tests, mechanism analysis, balancing, staggered DID, event studies, placebo exercises, and heterogeneous-effect analysis. The framework advances beyond the reference study by changing the research outcome, sample structure, mechanisms, classification protocol, and identification strategy while preserving a clear scientific sequence. No empirical conclusion is stated in the absence of data. Once verified firm-level observations and regression outputs are inserted, the manuscript can be converted from an analysis-ready draft into a defensible empirical article.

7.1 Limitations to disclose after estimation

- Industry input-output tables may not capture firm-specific relationships; manual validation reduces but does not eliminate classification error.
- Top-five supplier and customer disclosures can be incomplete or anonymized, producing non-random missingness.
- Official chain-leader recognition differs across provinces and may reflect policy selection as well as capability.
- Even modern DID and balancing methods cannot remove all unobserved selection if firms anticipate acquisitions far in advance.
- The analysis concerns listed manufacturing firms and may not generalize to private SMEs, finance, or service industries.

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Appendix A. Minimum data dictionary

Table A1. Recommended raw-data columns

Block	Field examples	Format / validation
Identifiers	stock_code, firm_name, fiscal_year, industry_2d, industry_4d, province	One row per firm-year; preserve leading zeros
M&A	deal_id, completion_date, target_name, target_industry, deal_value, ownership_pct, payment_method	One row per deal before aggregation; archive announcement link
Classification	horizontal, vertical, backward, forward, unrelated, coder_1, coder_2, resolution_note	Mutually consistent dummies; report agreement
Financial	assets, liabilities, revenue, net_income, operating_cashflow, inventory, receivables, payables	Use consolidated statements; consistent currency units
Innovation	rd_expense, invention_apps, invention_grants, patent_citations	Record missing versus zero separately
Supply chain	top5_supplier_share, top5_customer_share, partner_ids, retained_partner_count	Document anonymized disclosures and missingness
Governance	ultimate_owner, largest_shareholder, board_size, independent_ratio	Measure at fiscal-year end
Policy / recognition	chain_leader_dummy, single_champion_dummy, recognition_year, source_document	Archive official list and publication date

Appendix B. Reproducibility checklist

- Archive the unmodified raw exports and create a read-only source folder.
- Maintain a sample-flow log with observation counts after every filter.
- Keep a deal-classification file with source excerpts and coder decisions.
- Generate tables and figures directly from code; do not type estimates manually into Word.
- Store the random seed for matching, bootstrap, and placebo tests.
- Cross-check every coefficient, standard error, observation count, and significance symbol against software output.
- Ensure every table and figure is cited in the text and uses consistent variable names.
- Remove the research-integrity note and reporting-shell language only after verified results have been inserted.
- Run plagiarism/similarity checks and revise any phrase that remains too close to the reference paper.
- Create a blind manuscript without author-identifying acknowledgements when required by the target journal.