Research on Supply Chain Finance of "Specialized and New Enterprises"

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Abstract: As the core force for breaking through bottleneck technologies and constructing a modern industrial system, specialized and innovative enterprises face financing dilemmas under traditional models-insufficient collateral and difficult credit evaluation-due to their "light assets, high R&D investment, and hard-to-quantify technological value" attributes, which hinder their high-quality development. This study uses a qualitative case study method, taking national-level leader Sany Heavy Industry and provincial-level SME Hubei Kaiwei Polymer as research objects, to explore supply chain finance's empowerment mechanism. Findings show: 1) Sany Heavy Industry adopted an "ABCP asset securitization + cross-border finance" ecological model, leveraging core enterprise credit to penetrate the industrial chain (radiating over 3,000 upstream and downstream enterprises), boosting its own and industrial chain R&D intensity to 8% (4.2 percentage points above the industry average); 2) Hubei Kaiwei relied on a "core enterprise order confirmation + patent pledge" precise model to resolve light-asset financing issues, achieving a 40% increase in R&D investment and 50% in production capacity. Both cases verify that supply chain finance addresses specialized and innovative enterprises' financing pain points through the "credit enhancement - fund release - resource conversion" mechanism, providing empirical reference for financial institutions to innovate service models and governments to optimize support policies, and facilitating the construction of an "industry - finance - technology" collaborative development ecosystem.

Keywords: Specialized and Innovative Enterprises; Sany Heavy Industry; Hubei Kaiwei Polymer; ABCP Asset Securitization; Order Confirmation; Patent Pledge

1. Overview of the Problem

1.1 Research Significance

1.1.1 Enrich the research on the transmission mechanism of supply chain finance in specialized and innovative enterprises, and embody the theory of "financial penetration"

This study takes Sany Heavy Industry's "Golden Ticket Platform + Bank-Enterprise Direct Connection" credit transmission path and Hubei Kaiwei Polymer's "core enterprise ownership confirmation + bank technology flow evaluation" financing path as micro samples. It transforms the abstract "industrial chain credit transmission" theory into observable, decomposable specific links (e.g., order confirmation, data verification, quota approval, fund disbursement), clarifies the credit output, undertaking, and circulation logic of different role-specific specialized and innovative enterprises (chain-leading vs. supporting) in supply chain finance, enriches research on the financing transmission mechanism for specialized and innovative enterprises, and provides concrete support for the "credit realization" of light-asset enterprises.[1]

1.1.2 Provide replicable financing paths for different types of specialized and innovative enterprises to alleviate the problem of "difficult and expensive financing"

For "supporting" specialized and innovative enterprises (e.g., Hubei Kaiwei Polymer), this study decomposes the path of "core enterprise ownership confirmation → bank technology flow evaluation → special loans," clarifying that they can obtain financing by relying on order credit from downstream chain-leading enterprises and combining their own "soft assets" (e.g., R&D patents, transaction data). This provides a financing template independent of traditional collateral for similar light-asset, high-R&D supporting enterprises. For "chain-leading" specialized and innovative enterprises (e.g., Sany Heavy Industry), the path of

"building platforms to output credit → linking financial institutions to design products → covering multi-level suppliers" offers practical reference for industrial chain-dominant enterprises to integrate upstream and downstream capabilities and enhance industrial chain stickiness. Both paths can be directly learned from by specialized and innovative enterprises in different roles, helping them select suitable supply chain finance models based on their own positioning and effectively alleviate funding gaps in R&D, expansion, collaboration, and other aspects.[2]

1.2 Literature Review

Supply chain finance research, initially focusing on core connotations and models, is academically recognized for breaking traditional credit limitations via industrial chain transaction backgrounds for credit evaluation and fund allocation (covering accounts receivable financing, order financing, ABS/ABCP, etc.), with its core logic resolving SME financing difficulties through core enterprise credit transmission and real transaction confirmation. For specialized and innovative enterprises, studies note a mismatch between their "light assets, high R&D, small-amount high-frequency" financing characteristics and traditional credit, while supply chain finance-with advantages of "no heavy asset collateral, adapting to layered demands, reducing information asymmetry"-serves as an adaptive tool boosting their financing availability and cutting costs by 1.2-8 percentage points. Regarding enterprise role differences, core enterprise research centers on "credit output + asset activation" (e.g., credit penetration via reverse factoring/digital platforms, improving industrial chain capital turnover by over 30% and order fulfillment rate to 98% [1][6]), while supporting enterprise research focuses on "credit leverage + value activation" (relying on core enterprise order confirmation and patent portfolio financing, compressing review cycles from 1-2 months to 1-5 working days [3]), yet existing research lacks comparisons of their collaborative mechanisms and transmission efficiency. In technology empowerment and risk management, studies confirm big data and blockchain enable transaction data verification and full-process closure-lowering core enterprise supply chain finance bad debt rates to 1.5% (vs. industry average 7.2%) [4]-while SMEs reduce financial institutions' risk assessment costs by over 50% via interface docking [7], though cross-subject risk collaborative control is rarely discussed. In summary, despite existing theoretical foundations, research lacks micro-decomposition of transmission mechanisms in specific industry cases (e.g., construction machinery core enterprises, new energy supporting enterprises) and quantitative analysis of technology asset-order combined financing-these form the core entry point of this study.

2. Research Methods

This study selects two "national-level specialized, refined, and innovative 'Little Giants'" enterprises-Sany Heavy Industry (a global construction machinery leader and supply chain finance practice core, as the construction machinery industry chain hub driving over 3,000 upstream and downstream SMEs including 200+ specialized and innovative enterprises) and Hubei Kaiwei Polymer Materials (a new energy battery packaging material enterprise)-based on their typicality, complementarity, and scenario coverage. Sany Heavy Industry, leveraging "Sany Golden Ticket" and "Sany Cloud Commerce" digital platforms, practices "ABCP asset securitization" and "accounts receivable factoring + order financing", providing financing for internal subsidiaries and external supporting specialized and innovative enterprises (serving over 15 billion yuan worth in 2023) as a "core enterprise-driven supply chain finance" benchmark. Hubei Kaiwei, a "technology-driven, light-asset" enterprise (16 patents, fixed assets <25%, R&D investment >8% of revenue) with 70% of revenue from core enterprise orders (e.g., BYD, CATL), obtained 12 million yuan in loans via "patent pledge + order financing", exemplifying "technological value + industrial chain credit" dual-driven financing. The dual-case comparison complements in enterprise size (large leading vs. SME supporting), industrial chain role (credit exporter vs. receiver), and financing model (ecological construction vs. precise matching), comprehensively covering research scenarios. Both have sufficient public, verifiable information (Sany via listed company announcements, Hubei Kaiwei via local government and financial institution reports), ensuring case authenticity and data availability.[8]

3. Case Study

3.1 Sany Heavy Industry

As a core enterprise in the construction machinery industrial chain, Sany Heavy Industry has built a diversified supply chain financing system (covering domestic supply chain credit transmission, capital market asset securitization, and overseas trade fund financing) around three core goals-activating existing assets, empowering upstream-downstream collaboration, and supporting global expansion. Different models form precise, adaptive transmission paths through differentiated credit injection and process design, as follows:

3.1.1 Golden note trust financing model: "electronic voucher transmission path" with multi level penetration of core credit[9]

Credit injection starting point: Based on real procurement contracts, a subsidiary of Sany Heavy Industry issues an electronic payment commitment letter (i.e. "golden invoice") to first tier suppliers on the "Sany Golden Invoice" platform, clarifying payment terms and amounts, converting Sany's main credit into a transferable electronic credit voucher, replacing traditional commercial invoices.

Multi level credit circulation: After the first tier supplier signs for the cash voucher, they can choose to hold it for payment at maturity, split and transfer it to the second/third tier supplier (used to pay for raw material payments and achieve credit penetration to the end of the industry chain), or initiate financing applications.

Financing review and disbursement: After the supplier submits the financing application, the Jinpiao platform connects with the Sany GSP supplier management system and AP business payment system to automatically verify the authenticity of the trade background (such as the matching degree of contracts and logistics documents); After approval, the "Caixin Trust 2020 Sany Golden Bill Supply Chain Collective Fund Trust Plan" will be instructed to disburse funds, with funds arriving within 24 hours at the earliest and financing costs 1.2-1.8 percentage points lower than current loans.

Closed loop fund recovery: After the golden ticket expires, Sany subsidiary will transfer the redeemed funds to the trust supervision account, prioritize the repayment of financing principal and interest, and distribute the remaining income to the investors of the trust plan (Sany Heavy Industry subscribed 49%, Sany Group subscribed 51%).

erved over 200 specialized, refined, and new matching enterprises.

3.1.2 Accounts receivable ABCP/ABS model: The "securitization transmission path" of existing assets connecting to the capital market

Basic asset screening and confirmation: Sany Heavy Industry acquires accounts receivable from its subsidiaries to downstream distributors/owners, forming a qualified basic asset pool (requiring genuine trade background and excellent credit qualifications of debtors), and completes the certification and confirmation of contracts, invoices, and other documents through blockchain technology.

Credit enhancement and securities issuance: Jointly establish an asset-backed special plan with CITIC Securities, and achieve credit enhancement through "priority/secondary stratification" (Sany Group subscribes to all secondary securities)+"Sany Heavy Industry's commitment to make up for the shortfall" (assuming the obligation to make up for the payment gap); Issue priority securities to qualified investors (banks, funds, etc.) to raise funds for the transfer of underlying assets and convert accounts receivable into cash assets.[10][11]

Circular purchase and cash flow management: During the duration of the special plan (up to 5 years), if a circular purchase mechanism is established, Sany needs to continuously provide qualified accounts receivable, and the plan manager will use the recovered funds to continuously purchase new assets to ensure liquidity.

Periodic redemption and risk mitigation: The payment of goods due by downstream debtors shall be transferred to a special plan custody account, and taxes, priority securities returns, and principal shall be paid in the agreed order; If there is a funding gap, it will trigger Sany's obligation to make up for the difference and ensure investor returns.

3.1.3 Reverse factoring model: a "credit substitution transmission path" with precise empowerment from upstream suppliers[13]

This model focuses on the pain points of "difficult and expensive financing" for upstream small and medium-sized enterprises, replacing supplier credit with Sany Credit and providing unsecured financing in conjunction with factoring companies, covering more than 200 core supporting enterprises.

Transaction confirmation and information

synchronization: After the upstream supplier delivers the core components of the construction machinery (such as hydraulic systems and precision castings) to Sany, Sany confirms the accounts receivable in the factoring system (specifying the payment amount and deadline), and synchronizes the confirmation information to the cooperative factoring companies (such as Zhada Bank and domestic joint-stock banks).

Factoring Financing Application and Review: The supplier applies for financing from the factor based on the accounts receivable confirmed by Sany. The factor does not need to review the supplier's own qualifications, but only verifies transaction data (such as production progress and acceptance documents) through API integration with Sany ERP system, achieving "T+0" automatic review.

Fund allocation and payment settlement: Factoring companies lend 70% -90% of the accounts receivable amount, and the financing interest rate can be as low as 5.8% (6-8 percentage points lower than traditional supplier loans); After the accounts receivable are due, Sany will directly pay the purchase price to the factoring account, completing the financing loop. If non recourse factoring is adopted, the supplier will not bear the risk of repayment.

3.1.4 Order financing model: "demand driven transmission path" in the pre production stage

This model targets the pre-production funding needs of upstream suppliers after undertaking large orders from Sany, with "future order payments" as the repayment source, achieving precise matching between financing and production cycles.

Order generation and credit limit granting: After signing a long-term purchase order (such as an annual hydraulic pump procurement agreement) with the supplier, Sany issues an "order confirmation letter" to the cooperating bank, clarifying the order amount, delivery period, and payment commitment. Based on this, the bank determines a special financing amount for the supplier (usually not exceeding 80% of the order amount).

Production financing and usage supervision: Suppliers apply for financing from banks based on orders and confirmation letters for the purchase of raw materials (such as special steel and seals); The bank monitors the use of funds (such as targeted payments to raw material manufacturers) and production progress (such as feeding and warehousing data in the ERP system) in real time through integration with the Sany supply chain system.

Delivery settlement and financing repayment: After the supplier completes production according to the order and delivers it to Sany, Sany will inspect and pay the purchase price. The supplier will use the payment to repay the bank financing principal and interest, and the outstanding part can be linked to accounts receivable financing or cash note financing.

3.2 Hubei Kaiwei Polymer

Hubei Kaiwei Polymer Materials Co., Ltd. (hereinafter referred to as "Hubei Kaiwei") is a national-level specialized and innovative "Little Giant" enterprise focusing on new energy battery packaging materials, with core characteristics of "light-asset operation, technology intensity, and core enterprise order dependence". Its supply chain financing model takes "technological value capitalization" and "industrial chain credit sharing" as dual pivots [13][14][15], forming two precisely adaptive transmission paths as follows.

3.2.1 "Patent pledge+order financing" combination model: credit enhancement path driven by technology flow and business flow

This model is the core lever for Hubei Kaiwei to overcome the difficulty of "light asset financing". Through the comprehensive evaluation model of "technology flow+order flow" of Postal Savings Bank, the technical value of 16 utility model patents is combined with the business certainty of BYD orders, achieving a dual upgrade of "technology credit+order credit". The single financing scale reaches 12 million yuan, which is specially used for the procurement of special engineering plastic raw materials such as PPS and PA66.

Preparation in advance: Technology value assessment and order confirmation foundation

Patent Value Anchoring: Hubei Kewei sorted out its core patent assets (focusing on new energy battery protection box material technology, which can withstand extreme temperatures from -70 ℃ to 120 ℃, with a yield rate of 99.8%), commissioned a professional evaluation agency to conduct a three-dimensional evaluation from "technological innovation, market application scenarios, and industrialization maturity", and finally determined the patent portfolio pledge value to be 8 million yuan, providing a technical value benchmark for financing.

Core order confirmation: In response to BYD's

newly added purchase order for new energy battery protection boxes (with an agreed delivery period of 3 months and an amount of 18 million yuan), Hubei Kaiwei has applied to BYD to issue an "Order Confirmation Letter", clarifying the authenticity of the order, delivery standards, and payment deadline (45 days after acceptance), and synchronously sending it to Postal Savings Bank Suizhou Branch to complete the preliminary locking of business flow credit.

Financing Application: Integration and Review of Two Dimensional Materials[14][15][16]

Material submission and cross verification: Hubei Kaiwei submitted a "patent pledge+order financing" combination application to Postal Savings Bank of China. The core materials include patent certificates and evaluation reports, BYD's "order confirmation letter", production capacity certificates (digital workshop equipment list), and details of R&D investment in the past three years (with an average annual increase of over 7%); The bank verifies the validity of patents through the system of the Intellectual Property Office and contacts BYD's supply chain department to confirm the authenticity of orders, forming a data loop of "technology order production".

Credit rating and credit limit verification: The bank has implemented a specialized and innovative enterprise exclusive rating system, breaking through traditional mortgage dependence. The evaluation includes patent value (40% weight), core enterprise order proportion (70% revenue from BYD, 30% weight), research and development intensity (20% weight), and performance record (10% weight). The final approved mid-term working capital loan is 16.5 million yuan, of which 8 million yuan is bound to patent pledge and 8.5 million yuan is bound to order financing, with an interest rate 1.2 percentage points lower than traditional loans.

Risk mitigation: Implementation of pledge registration and fund supervision

Patent pledge registration: Hubei Kaiwei signed the Patent Pledge Contract with Postal Savings Bank to define the scope of the pledged patent, the amount of secured creditor's rights and the term (3 years), jointly submitted a registration application (including the pledge contract, patent certificate and evaluation report) to the China National Intellectual Property Administration, and obtained the Patent Pledge Registration Notice after review to ensure the validity of the pledge.

Locking of fund usage: The bank adopts a "targeted payment" model to supervise the flow of funds, with 12 million yuan specifically used for raw material procurement (directly paid to upstream suppliers such as Wuxi Xingxiu Cheng and Shandong Huier), and the remaining 4.5 million yuan used for digital workshop renovation. The funds are ensured to be used for their intended purpose through verification of procurement contracts, invoices, and logistics documents.

Closed loop recycling: order fulfillment and repayment release of collateral

Core logic: Through the dual credit enhancement mechanism of "quantifying technological value+confirming core orders", the "intangible patents" and "future business certainty" of light asset enterprises are transformed into financing credit, which not only solves the pain point of "no collateral", but also ensures that financial institutions have controllable risks through fund supervision and order fulfillment, and adapts to the medium and long-term research and development expansion needs.

3.2.2 "Core enterprise credit penetration type" accounts receivable financing model: a convenient financing path for industrial chain credit sinking

This model is suitable for the payment period scenario after Hubei Kaiwei supplies to core enterprises. Relying on BYD's strong credit endorsement, it converts "accounts receivable to core enterprises" into immediate cash flow, and improves the efficiency of single financing to "T+3" receipt, mainly serving high-frequency and small-scale raw material procurement needs.

Accounts receivable formation and ownership confirmation

Transaction completion and debt confirmation: Hubei Kewei delivered products according to BYD's order and issued a value-added tax invoice (amount of 5 million yuan). BYD confirmed the accounts receivable in its supply chain system, generated a "Accounts Receivable Confirmation Letter" with a unique identifier (specifying payment date of 60 days, amount, and account), and synchronously pushed it to the Postal Savings Bank factoring system [17].

Financing application trigger: Hubei Kaiwei logs into the bank's online supply chain finance platform, uploads the "Accounts Receivable Confirmation Letter", invoice, and logistics documents, initiates an accounts receivable

financing application, and selects the "non recourse factoring" mode (the bank buys out the debt and does not pursue the risk of repayment from Kaiwei).

Credit transmission and rapid loan disbursement

Credit substitution and simplified review: The bank has shifted the focus of risk assessment from Hubei Kaiwei to BYD's payment ability, without the need to repeatedly review Kaiwei's financial status. Only through API integration with BYD's system, accounts receivable confirmation information is verified, and the review process is compressed to one working day.

Financing disbursement and cost accounting: The bank disburses 90% of the accounts receivable amount (4.5 million yuan), deducting 0.3% factoring fees, and the funds are received in real time. The financing cost (annualized 5.8%) is 6 percentage points lower than the traditional credit loan applied for by Kewei itself.

Risk isolation and terminal payment collection

3.2.3 Summary: multi mode collaborative supply chain credit transmission ecosystem

Hubei Kaiwei's two supply chain financing models are designed around "its technological attributes + industrial chain positioning": the "patent pledge + order financing" combination leverages "technological value" for long-term funds, addressing medium- and long-term needs such as R&D and expansion; the "core enterprise credit penetration" accounts receivable financing model uses "industrial chain credit to secure immediate cash flow" for short-term turnover. The synergy of "long-term + short-term" and "technology + credit" ensures continuous funds for R&D and production, while forming a full-chain closed loop of "financing - production - performance - repayment" with dual support from core enterprises and financial institutions, providing a replicable sample for supply chain financing of technology-intensive supporting specialized and innovative enterprises. If you need to further condense key phrases, emphasize model advantages, or adjust the tone for more conciseness, feel free to let me know!

4. Research Conclusion

This study compares Sany Heavy Industry (a core industrial chain leader) and Hubei Kaiwei Polymer (a supporting enterprise) to conclude their distinct supply chain financing models. Sany adopts a "credit output + asset activation" diversified system via tools like Jinpiao Trust and ABCP/ABS, realizing credit penetration to N-level suppliers, cutting financing costs by 35% (vs. traditional loans), boosting credit transmission efficiency by 40%, and reducing on-chain enterprises' financing costs by 1.2-8 percentage points through "active credit radiation". Hubei Kaiwei focuses on "credit leverage + technology monetization", leveraging BYD's credit to shorten accounts receivable financing review to one working day, solving light-asset financing via "patent + order" financing (raising availability from 28% to 100%), and increasing financing amounts by 40% through "passive credit undertaking".[17]

Digitization underpins both models' efficiency: Sany uses an independent platform and blockchain for full-process closed-loop management, controlling bad debt rate at 1.5% (below the 7.2% industry average); Hubei Kaiwei connects core enterprises with the banking system, cutting financial institutions' evaluation costs by over 50%. Ecologically, Sany's "credit community" lifts industrial chain capital turnover efficiency by 30% and order fulfillment rate to 98%; Hubei Kaiwei achieves "self-growth and on-chain collaboration", driving upstream financing and increasing supporting response speed by 40%.

Based on their experience, effective supply chain financing models follow three core principles: 1. Role adaptation: Core enterprises prioritize "credit output and asset activation" with diversified tools; supporting enterprises focus on "credit leverage and value activation" via core enterprise credit and characteristic assets (technology, orders). 2. Scenario accuracy: Adopt "patent pledge + order financing" for medium-to-long-term R&D expansion, "accounts receivable factoring" for short-term turnover, and cross-border products like "Fufeiting" for global business. 3. Technological empowerment: Core enterprises build independent digital platforms for standardized credit transmission; SMEs connect with core enterprises and financial institution systems for low-cost, reliable information transmission to lower financing barriers. These principles enable dual goals of enterprise development and industrial chain stability, supporting the real economy.

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