

Research on the Adoption Obstacles and Transformation Path of Disruptive Innovation in Traditional Manufacturing Enterprises

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Abstract: Confronted with the challenges of a new technological revolution and industrial transformation, disruptive innovation has become a critical pathway for traditional manufacturing enterprises to achieve transformation and upgrading. However, enterprises generally face multiple obstacles during adoption, including organizational inertia, resource bottlenecks, technological and market uncertainties, and external environmental constraints. This study systematically analyzes these core barriers and constructs a transformation path based on strategic guidance and phased implementation, proposing three contextualized options: incremental, radical, and hybrid approaches. To ensure successful transformation, the research further designs four safeguard mechanisms covering organizational change, resource integration, technological market breakthroughs, and policy-ecosystem synergy. The findings demonstrate that disruptive innovation transformation for traditional manufacturing enterprises is a complex systemic project. Only through internal and external improvements coupled with dynamic adjustments can enterprises effectively overcome obstacles and achieve value reshaping and sustainable development. The conclusions of this study provide theoretical references and practical guidance for relevant enterprises.

Keywords: disruptive innovation; traditional manufacturing enterprises; transformation path

DOI: 10.69979/3041-0843.26.01.024

Foreword

In the face of technological revolution and industrial transformation, traditional manufacturing enterprises urgently need to achieve transformation and upgrading through disruptive innovation. However, they generally face multiple obstacles in practice, such as organizational, resource, and technological barriers. This study aims to systematically identify these core obstacles, construct feasible transformation paths and safeguard mechanisms, and provide theoretical references and practical guidance for enterprises to successfully transform.

1 Analysis of the Main Obstacles to the Adoption of Disruptive Innovation in Traditional Manufacturing Enterprises

1.1 organizational barriers

Traditional manufacturing enterprises face deep-seated internal resistance when adopting disruptive innovation. Long-established mental frameworks and path dependence have conditioned managers and employees to favor incremental innovation models, fostering inherent skepticism toward disruptive innovations that challenge existing technologies and business paradigms. This creates strategic consensus difficulties. The rigid bureaucratic organizational structures and processes, designed for efficiency and stability, fail to meet the agility, flexibility, and cross-departmental collaboration required for disruptive innovation, resulting in sluggish decision-making and ineffective execution. Moreover, existing core competencies often become entrenched in mainstream products and technologies, forming an "innovation rigidity" that hinders breakthroughs when new capabilities are needed. Finally, traditional manufacturing industries generally lack an innovation culture that encourages risk-taking and tolerates failure. Excessive focus on short-term financial metrics further prevents sustained support for long-term, uncertain disruptive innovation projects, creating systemic innovation suppression within organizations.

1.2 obstacles at the resource level

Resource constraints remain a critical bottleneck for traditional manufacturing enterprises pursuing disruptive innovation. Firstly, such innovations typically require substantial upfront investments in R&D, market validation, and team development. However, these enterprises often grapple with shrinking profit margins and cash flow pressures, leading them to prioritize existing businesses with clear returns. This results in financing difficulties for innovation projects and restricted access to high-risk external funding. Secondly, the shortage of core competencies in key technologies and innovative talent poses a fundamental challenge. Disruptive innovation demands interdisciplinary professionals with forward-thinking vision and entrepreneurial spirit, yet traditional manufacturers predominantly rely on production managers and engineering specialists, making it hard to attract and retain top-tier innovators. Thirdly, long-term accumulated knowledge and patents are predominantly concentrated in traditional sectors, creating knowledge gaps and insufficient core technology reserves when facing emerging technologies. Finally, the weak capacity to integrate external innovation resources (such as universities, research institutions, and startups) prevents effective establishment of open innovation networks to compensate for resource deficiencies.

1.3 Technical and market barriers

The inherent high-risk nature of disruptive innovation, characterized by technological and market uncertainties, poses direct challenges

to traditional manufacturing enterprises. Technologically, disruptive innovations often originate from cutting-edge or cross-disciplinary technologies with immature development paths and rapid iteration cycles, carrying significant risks of R&D failure and technological lock-in. Companies must not only overcome key technical hurdles but also address the risk of sunk costs from rapid technological shifts. Market-wise, disruptive innovations typically target niche or emerging markets with ambiguous demand patterns and unclear user profiles. Traditional manufacturing enterprises' reliance on conventional market research methods and empirical models struggles to effectively identify and evaluate their true potential, leading to substantial difficulties in market expansion. Moreover, disruptive innovation projects may directly conflict with existing core businesses in resource allocation, target customer demographics, and profit models, triggering internal resource competition and strategic vacillation. Compounding these challenges, early-stage products often underperform mature alternatives, face low consumer awareness, and require prolonged market education and cultivation processes – all of which significantly increase the complexity and uncertainty of innovation adoption.

1.4 obstacles at the level of external environment

Traditional manufacturing enterprises adopting disruptive innovation face profound constraints from external macro-environmental factors. Firstly, the imperfections in industrial policies and support systems pose significant barriers. Although governments encourage innovation, specialized support policies, tax incentives, and risk compensation mechanisms for disruptive innovation remain underdeveloped, making it difficult for enterprises to secure stable external support. Secondly, inadequate intellectual property protection creates an environment where new technologies and business models developed through substantial R&D investments are easily imitated and copied, severely undermining corporate motivation for disruptive innovation and leading to a vicious cycle where "copying becomes the new normal". Thirdly, insufficient collaboration across supply chain segments and the absence of an innovation ecosystem also constitute critical constraints. The success of disruptive innovation often requires coordinated upgrades across the entire supply chain and collaborative responses from partners. However, traditional supply chain systems exhibit delayed reactions and lack open, shared innovation platforms and ecosystems, leaving enterprises isolated and unable to form synergies. Finally, relatively conservative consumer attitudes and limited acceptance of new concepts within social culture may further delay the market penetration of disruptive innovation products, increasing enterprises' market education costs.

2 The Construction of the Transformation Path of the Adopting of Disruptive Innovation in Traditional Manufacturing Enterprises

2.1 The General Idea and Principle of Transition Path Construction

The transformation path of disruptive innovation in traditional manufacturing enterprises must be guided by systematic thinking, with its overall approach centered on "value creation as the core and capability restructuring as the foundation." This means the fundamental purpose of transformation is no longer merely producing goods, but creating new and higher value for customers, society, and the enterprise itself through disruptive innovation. To achieve this, companies must undergo complete capability restructuring, shifting from traditional manufacturing capabilities dependent on scale and cost to new innovation capabilities driven by data, technological integration, and ecosystem collaboration. In the specific implementation process, four fundamental principles must be followed: First, the strategic alignment principle – transformation must deeply align with the enterprise's long-term development strategy, led by senior management to ensure correct direction and resource focus. Second, the problem-oriented principle – starting from the core pain points and market opportunities faced by the enterprise, accurately identify breakthroughs for disruptive innovation while avoiding blind following trends. Third, the phased implementation principle – fully recognizing the complexity and long-term nature of transformation, design progressive steps from pilot projects to widespread adoption, take small but rapid steps, conduct timely reviews, and reduce overall risks. Fourth, the dynamic adjustment principle – the transformation path is not fixed. Enterprises must establish a sensitive perception mechanism to continuously optimize and adjust the path based on changes in internal and external environments, technological evolution, and market feedback, maintaining strategic flexibility and adaptability.

2.2 Transformation Path Selection Based on Different Situations

Traditional manufacturing enterprises face no universal template when selecting disruptive innovation transformation paths. They must make context-specific decisions based on their resource endowments, industry characteristics, market position, and risk appetite. Three primary approaches emerge: 1. The incremental transformation path: Suitable for companies with established market positions, substantial resources, and strong risk aversion. This approach advocates establishing independent innovation units within core operations or peripheral areas, leveraging existing resources to develop disruptive innovation projects related to core business. These projects are then gradually integrated or developed independently upon maturity, ensuring a smooth transition. 2. The radical transformation path: Ideal for enterprises facing existential crises or demonstrating strong decision-making capabilities. This requires sweeping strategic restructuring, decisively divesting or scaling back declining traditional businesses while fully committing core resources to new disruptive innovation fields. Through "second entrepreneurship," companies achieve complete self-disruption. 3. The hybrid transformation path: The practical choice for most large enterprise groups. While maintaining stable operations of existing advantageous businesses to generate cash flow, they actively develop multiple disruptive innovation ventures through strategic investments, internal incubation, or mergers and acquisitions. This creates a dual-driven framework of "stable foundation + innovative growth points," enabling risk hedging while securing future competitive advantages.

2.3 The Key Stage and Core Task of Transition Path

The disruptive innovation transformation for traditional manufacturing enterprises is a systematic project, divided into five interconnected key stages, each with its core tasks. The first stage is cognitive awakening and strategic positioning, where the core task is for senior management to deeply understand the necessity and urgency of disruptive innovation. Through market insights and technology scanning, they identify potential opportunities, form a clear strategic intent for transformation, and achieve broad consensus within the organization. The second stage involves resource integration and capability preparation, focusing on adaptive organizational restructuring (such as establishing innovation zones) around strategic positioning, initiating recruitment and cultivation of key talents, and designing diversified financing solutions to allocate sufficient resources for innovation projects. The third stage is pilot innovation and model validation, requiring selecting appropriate entry points for small-scale MVP (Minimum Viable Product) testing and business model verification. Through rapid iteration and user feedback, product directions and market strategies are refined to control trial-and-error costs. The fourth stage is scale expansion and ecosystem building, aiming to scale and commercialize successful innovation projects while actively integrating upstream and downstream resources in the industrial chain. This establishes an open, collaborative innovation ecosystem to consolidate first-mover advantages. The fifth stage is continuous iteration and value reshaping, establishing mechanisms for sustained innovation to optimize products and services, lead industry standards, and ultimately achieve fundamental value transformation from traditional manufacturers to innovation-driven solution providers or platform enterprises.

3 Design of Guarantee Mechanism for Disruptive Innovation Adoption in Traditional Manufacturing Enterprises

3.1 Organizational change and mechanism innovation guarantee

To ensure the successful adoption of disruptive innovations, traditional manufacturing enterprises must undergo profound organizational reforms and institutional innovations, creating an "innovation-friendly soft environment" internally. First, they should break free from rigid bureaucratic constraints by establishing flatter, agile organizational structures. This includes setting up independent innovation labs, cross-functional project teams, or internal startup incubators, granting these units high autonomy and decision-making power to rapidly respond to market changes. Second, market-oriented decision-making mechanisms and error-tolerance systems must be established. Evaluation criteria for innovation projects should shift from single-dimensional short-term financial returns to multi-dimensional metrics including market potential, technological leadership, and strategic value. A culture that "allows failure and encourages exploration" should be clearly defined to eliminate innovators' concerns. Third, innovation incentive mechanisms and performance evaluation systems need improvement. Long-term incentives such as equity, stock options, and project profit-sharing should deeply align core innovators' interests with project outcomes, stimulating their entrepreneurial spirit. Meanwhile, innovation assessments should focus on process evaluation and learning growth rather than mere result-oriented metrics. This fosters an organizational atmosphere that encourages experimentation and tolerates failures, systematically unleashing the organization's innovative vitality.

3.2 Resource integration and capability enhancement are essential for ensuring effective performance.

Resources and capabilities form the bedrock of disruptive innovation implementation. Companies must establish robust safeguard mechanisms to ensure sufficient resources for innovation initiatives. Financially, they should diversify funding channels beyond internal budget allocations by actively seeking external capital from government innovation funds, venture capital, and strategic investments. Establishing independent innovation investment funds with risk-return evaluation models distinct from core operations will optimize capital allocation efficiency. Talent-wise, a multi-tiered recruitment and development system should be built through global hiring, industry-academia partnerships, and flexible talent acquisition to attract top-tier technical experts and product managers. Simultaneously, systematic innovation training and cross-functional rotation mechanisms should be implemented to cultivate employees' interdisciplinary thinking and entrepreneurial capabilities. Regarding knowledge and skills, strengthening internal and external knowledge management through corporate knowledge bases, encouraging technology sharing and post-implementation reviews, and leveraging industry-academia collaborations, technology acquisitions, and open-source community participation will enable rapid acquisition of cutting-edge external knowledge and technology to address organizational gaps. The ultimate goal is to create an open, dynamic resource integration platform that efficiently allocates critical elements like capital, talent, and technology to high-potential innovation projects, continuously enhancing the company's overall innovation capacity.

3.3 Technological breakthroughs and market expansion are essential for ensuring success.

Technology and market are two sides of the same coin in disruptive innovation, requiring synchronized advancement and a dual safeguard mechanism. For technological breakthroughs, companies must establish forward-looking R&D systems, increase investment in both fundamental and applied research, focus on core technology breakthroughs, and adopt modern methodologies like agile development and lean startup practices to shorten R&D cycles and accelerate technological iteration. Establishing internal technology incubation platforms encourages bottom-up technical proposals and innovative experiments, creating fertile ground for disruptive technologies. In market expansion, companies should develop sharp market insights and user demand analysis mechanisms, utilizing big data analytics, user interviews, and scenario simulations to accurately identify emerging market pain points and latent needs. Building on this foundation, they should vigorously promote business model innovation, transitioning from pure product sales to providing "products + services + solutions," while exploring new revenue models like subscription systems and platform-based operations. Simultaneously, innovative marketing strategies should leverage digital tools for precision marketing and community management, expanding market influence through early adopter word-of-mouth to effectively cross the "valley of death" in innovation adoption, achieving seamless integration between technology and market.

3.4 Policy support and ecological coordination

The transformation of any enterprise hinges on external environmental support, with proactive establishment of policy and ecosystem safeguard mechanisms being crucial. In terms of policy support, companies should form dedicated government relations and policy research teams to closely monitor and thoroughly interpret national and local policies supporting technological innovation, industrial upgrading, and green manufacturing. They should actively apply for major special projects, tax incentives, and fiscal subsidies, transforming policy dividends into innovation momentum. Simultaneously, enterprises should participate in industry associations and standard-setting processes, offering suggestions for industrial development to foster a favorable policy environment. Regarding ecosystem collaboration, companies must abandon the mindset of going it alone and embrace an open, win-win philosophy by actively building or integrating into innovation ecosystems. This includes establishing strategic partnerships with upstream and downstream suppliers and clients for joint R&D and risk-sharing; collaborating with universities and research institutes to establish joint laboratories or technology transfer centers to accelerate the commercialization of scientific achievements; and engaging in cross-industry collaborations with startups and internet platforms to achieve complementary advantages. By creating a collaborative innovation network featuring multi-party participation, resource sharing, and risk-sharing, enterprises can effectively compensate for their shortcomings in technology, market access, and talent, forming a powerful developmental synergy to collectively withstand external uncertainties and enhance the competitiveness of the entire industrial chain.

4 Conclusion

This study systematically examines the barriers and viable transformation pathways for traditional manufacturing enterprises adopting disruptive innovation. The research reveals that corporate transformation is impeded by multiple obstacles including organizational inertia, resource constraints, technological and market uncertainties, and external environmental limitations. To address these challenges, enterprises should establish a transformation path guided by strategic principles and phased implementation, selecting either gradual, radical, or hybrid models based on their specific contexts. Ensuring successful transformation requires synchronized advancement of four key mechanisms: organizational reform, resource integration, technological and market breakthroughs, and policy-ecosystem synergy. In essence, the disruptive innovation transformation for traditional manufacturing enterprises constitutes a complex systemic endeavor. Only through comprehensive internal and external improvements coupled with dynamic adjustments can enterprises effectively overcome obstacles, achieve value repositioning, and secure sustainable development in the new era of competition.

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