

## Exploration of Innovations in Construction Technology and Discussion of Their Presentation in Academic Papers

**Authors:** Cui Lei

**Date:** 2026-02-03T21:56:35+00:00

### Abstract

This paper aims to explore how construction enterprises can effectively transform technological innovations arising from project practice into patent outputs and academic papers, in order to respond to the national innovation-driven development strategy and provide pathways for corporate knowledge accumulation and competitiveness enhancement. By reviewing theories related to innovation management and knowledge transformation, and combining them with the practical case of the Plot 40-04 Project in Jinhui Town, Fengxian District, Shanghai, it analyzes the management methods and implementation process of patent mining and paper output in this project. Through a systematic innovation guidance and paper management mechanism, this project has, as of February 2026, successfully applied for four patents and achieved multiple other innovation and publication outputs. The study shows that establishing a “micro-creation” model that takes project difficulties as the starting point for innovation and integrates external information tracking with internal capability enhancement, supplemented by a structured paper-writing framework and management process, can effectively promote the explicitness and knowledge accumulation of construction technology achievements. This research provides a practical and operable framework and reference example for the transformation of technological innovation achievements and academic output at the project department level of construction enterprises.

### Full Text

## Innovation Exploration and Paper Presentation of Construction Technology

**CUI Lei**

Shanghai Urban Construction Municipal Engineering (Group) Co., Ltd., Shang-

hai, 200065, China

## Abstract

This paper aims to explore how construction enterprises can effectively translate technological innovations from project practices into patent achievements and academic papers, in response to the national innovation-driven development strategy and to provide pathways for corporate knowledge accumulation and competitiveness enhancement. By reviewing relevant theories of innovation management and knowledge transformation, and combining the practical case of the 40-04 plot project in Jinhui Town, Fengxian District, Shanghai, this study analyzes the management methods and implementation processes for patent mining and paper publication. Through systematic innovation guidance and paper management mechanisms, the project has achieved multiple innovation outcomes, including the successful application for four patents, as well as numerous paper achievements by February 2026. The research demonstrates that establishing a “micro-innovation” model, which takes project challenges as the starting point for innovation and integrates external information tracking with internal capability enhancement, supplemented by a structured paper writing framework and management process, can effectively promote the explicit expression and knowledge accumulation of construction technology achievements. This study provides an operational practical framework and reference example for the transformation of technological innovation achievements and academic output at the project department level of construction enterprises.

**Keywords:** Construction Engineering; Innovation Management; Paper Publication; Patent Mining; Knowledge Transformation

## Introduction

The PMBOK Guide identifies expert judgment, information management, and interpersonal and team skills as key tools and techniques for project knowledge management. China’s 2023 Outline for the Long-Range Objectives Through the Year 2035 emphasizes innovation-driven development and enhancing enterprise technological innovation capabilities, asserting that innovation holds a central position in China’s modernization efforts. The outline calls for strengthening the principal role of enterprises in innovation, leveraging large companies’ leadership and support functions, and promoting integrated innovation across upstream, midstream, and downstream industry chains as well as among large, medium, and small enterprises [1]. These guidelines carry significant implications for businesses, particularly for construction enterprises at the project department level. This paper explores practical examples and provides actionable recommendations on how to convert innovation leadership into patented technologies and academic publications.

### 1.1 Project Overview

The 40-04 plot project in Jinhui Town, Fengxian District, Shanghai (excluding pile foundation work) commenced in October 2023 and is scheduled for completion in September 2026. As of February 2026, the project department has applied for four patents (one already granted), published (or had accepted) seven academic papers, and received two national-level association awards for innovative QC activities.

### 1.2 Related Innovation Management Research

Xing Wei and Zhou Xiao have discussed the transformation of state-owned enterprise reform and technological innovation models, examining the influence of government-enterprise linkages [2]. Zeng Xianju and colleagues have focused on the growth theory of “hidden champion” achievements in specialized and sophisticated enterprises [3]. Wang Rui and co-authors have analyzed how capital utilization rates ensure quality in enterprise technological innovation [4]. Yi Jingtao has investigated the impact of executive overconfidence on corporate innovation performance [5]. Beyond these macro-level studies, numerous innovations utilizing TRIZ theory have emerged, such as Ding Zhihui’s solutions for user involvement in new product development [6] and Li Suike’s research on knowledge innovation in project-based enterprises [7]. These studies discuss information differentiation, particularly the transfer of tacit knowledge, which offers valuable insights for large and medium-sized construction companies. Both Peter Drucker [8] and Jerry Porras [9] acknowledge the significant impact of organizational leadership on corporate performance and operations. Drucker further emphasizes that the purpose of a business is to solve societal pain points, while Porras urges managers to focus more on organizational design.

### 1.3 Related Paper Management Research

Academic consensus holds that paper writing facilitates professional title evaluation, personal and corporate technical accumulation and inheritance, demonstration of capabilities, knowledge base organization, and establishment of professional influence. Typical academic tracking focuses on: technologies and related hierarchies within one’s specialty; leading companies and universities in the field along with their strengths; major contributors and representative papers; patented technologies; and important social media accounts, Zhihu profiles, WeChat official accounts, Bilibili channels, ResearchGate pages, and university websites. Commonly used academic platforms include Wanwei Journal Network (eshukan.com), ORCID (orcid.org), ResearchGate (researchgate.net), and CNKI (cnki.net). Academic writing directions generally include: (1) exploring conflicts or extensions between phenomena, theory, and empirical evidence (e.g., difficulties in BIM implementation); (2) replicating others’ research to build mainstream consensus (e.g., AI applications in plan preparation); and (3) sharing personal insights (e.g., effective waterproofing construction), technological innovations, and computational comparisons.

Figure 1

Figure 1: Figure 1

## 2.1 Innovation Leadership

Peter Drucker emphasizes the critical importance of organizational leadership, and an outstanding lead creator serves as a crucial factor in elevating the technical team. An effective micro-innovation model requires collective wisdom from technical personnel, with the exceptional creator acting as the team's soul. Under an appropriate organizational structure, this model can effectively mobilize subjective initiative to propose new solutions and approaches. The project's lead creator subscribed to a professional intellectual property service that regularly pushes patent information from designated companies (set as competitors). This service broadened the team's perspective and enhanced understanding of market trends and demands. Additionally, from 2019 to 2025, the team continuously attended professional training sessions, including lectures by Shanghai expert pool member Zhou Yushi on new retaining systems and training on formwork and scaffolding calculation and construction by Pinming Company. Listening to frontline experts' experience sharing through videos significantly expanded technical thinking.

During this period, the team studied numerous patents, including CN113187256B (lifeline fixing device and method), CN117571830A (non-contact detection method for existing glass curtain wall firmness using low-frequency noise sources outside and acoustic cameras inside), and CN117988546A (clamping device for disc-buckle scaffolding pipe cleaning equipment). These patents provided substantial inspiration for the project's patent and QC research and development. The branch company upholds a philosophy: all construction challenges represent patent inspiration points. Consequently, the project team can implement management measures such as quality reviews, QC 攻关, and patent research targeting these difficulties. Notably, many small innovations may not qualify for QC or patent applications but prove highly effective for solving on-site problems, as illustrated by the pipe surface cleaning plier set model.

Through brainstorming and theoretical updates, the project recognized that the micro-innovation model emphasizes technical problem-solving regarding engineering quality factors, including environment, willingness, professional skills, and inspiration. By enhancing organizational technical capabilities, the model ultimately improves quality management levels. The micro-innovation model diagram features one ring with three supporting points.

[FIGURE:2]

## 2.2 Paper Presentation

**2.2.1 Paper Idea Discovery** Some papers leave lasting impressions through their creative presentations. This project employs several methods for cultivating creativity: (1) Providing suggestions to WeChat, Huawei, and government agencies (e.g., noting that secondary construction practitioner standards date from 2007 and water supply regulations from 2002 require revision), which develops reflective capacity on commonly overlooked issues; (2) Reading extensively and quality books, regularly browsing patents and technical websites; (3) Learning to perceive significant trends from subtle clues (e.g., discerning project management trends from the division of responsibilities among three deputy managers: R resources, 3C control-quality-schedule-safety, and S technology), which demonstrates the ability to grasp deep trends; and (4) Learning from innovative adaptations (e.g., applying gyroscope-based gravity display technology from mobile phones to vertical measurement machinery in patent planning).

**2.2.2 Paper Framework Example** The project follows a structured framework: (1) Conducting a literature review of approximately 1,000 words (Article Part II) by screening journals, dissertations, or download categories using search terms “(KY=construction engineering OR KY=building engineering) AND (KY=schedule management OR KY=schedule control)” ; (2) Extracting content from PMBOK, first-class constructor textbooks, the 20th Party Congress report, and the 2035 Outline for the preface and writing purpose (Article Part I); (3) Presenting project overview as Part III (200-300 words); (4) Using research foundation (1,000 words) and original insights (3,000 words) as Part IV with approximately three figures; and (5) Utilizing relevant software for polishing and deepening into article abstracts and other content.

**2.2.3 Paper Format Essentials** Key formatting requirements include: (1) Titles should be specific and searchable, such as “Weeping Willow Schedule Model” rather than just “Weeping Willow Model,” with titles not exceeding 20 characters; (2) Abstracts should follow a five-paragraph format; (3) Keywords should begin with a secondary discipline, with 4-6 terms being appropriate; (4) Introductions should state writing and research purposes in 2-3 concise paragraphs; (5) Figures and tables require specific formatting, with figure captions below and table titles above; (6) Downloading recent articles from CNKI helps understand journal styles; (7) Articles need at least two highlight points (referencing SSCIP’s six models and Xu Fang’s works); (8) Core ideas must be original, as plagiarism offers no benefits and poses significant risks; and (9) Strictly follow editorial board and reviewer comments, regularly checking submission websites and email (and possibly phone).

## Conclusion

This paper explores how construction enterprises can discover, refine, and translate technological innovations from project execution into patented technologies

and academic papers. Combining theoretical review with the Shanghai Fengxian project case, the study demonstrates that actively tracking industry developments, focusing on construction challenges for problem-solving, building a “micro-innovation” organizational model, and following systematic paper writing frameworks can effectively promote the explicitization of technical achievements and knowledge asset accumulation. The case shows that conscious innovation and paper management not only directly produce patents and papers but also enhance project teams’ technical capabilities and quality management levels. This research provides concrete and actionable insights for construction enterprises, particularly frontline project departments, to implement innovation-driven development, achieve technical accumulation, talent cultivation, and brand enhancement. Future integration of digital technology and intelligent construction will present new opportunities and challenges for innovation discovery and knowledge presentation mechanisms in construction technology, requiring continuous exploration and improvement.

## References

- [1] State Council of the People’ s Republic of China. Outline of the 14th Five-Year Plan for National Economic and Social Development of the People’ s Republic of China and Long-Range Objectives Through the Year 2035[M]. 1st ed. Beijing: People’ s Publishing House, 2021.
- [2] Xing W, Zhou X. State-owned enterprise reform and transformation of technological innovation models[J]. Industrial Economics Research, 2016(06):22-33.
- [3] Zeng X, Zeng K, Ren H, et al. Research on the growth of specialized and sophisticated enterprises: Review and prospects[J]. Foreign Economics and Management, 2024,46(01):62-76.
- [4] Wang R, Qi L, Wang L. Influencing factors and complex configuration analysis of technological innovation in Chinese enterprises[J]. Science Research Management, 2024,45(03):42-52.
- [5] Yi J, Zhang X, Wang H. Enterprise heterogeneity, executive overconfidence, and corporate innovation performance[J]. Nankai Business Review, 2015,18(06):101-112.
- [6] Ding Z, Liu W, Ai Q. Research on user involvement in enterprise new product development based on TRIZ[J]. Science and Technology Management Research, 2018,38(05):7-13.
- [7] Li S, Bai S, Huang Y, et al. Research on knowledge innovation in project-based enterprises based on TRIZ theory[J]. Science and Technology Management Research, 2014,34(01):151-154.
- [8] Drucker P. The Effective Executive[M]. 55th Anniversary New Translation. Beijing: China Machine Press, 2022.
- [9] Porras J, Collins J. Built to Last[M]. 2nd ed. Beijing: CITIC Press, 2019.
- [10] Boddie D, Goldenberg J, Zhong L. Micro-Innovation[M]. 1st ed. Beijing: CITIC Press, 2014.

**Corresponding Author:** CUI Lei, Email: cuilei@alumni.sjtu.edu.cn

**Author Contributions Statement:**

CUI Lei: Proposed research ideas, drafted and revised the final manuscript.

*Source: ChinaXiv – Machine translation. Verify with original.*