Knowledge Management System Construction and Practice for Power Grid Learning Organizations (Postprint)

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Abstract

[Purpose/Significance] Knowledge management is poised to become the primary driver of enterprise development, playing an increasingly vital role in enhancing enterprise core competitiveness. [Method/Process] The Management Science Research Institute of Guangdong Power Grid Company introduced "knowledge management" tools to construct and implement a knowledge management system aligned with enterprise realities and closely integrated with business operations. By building a knowledge management platform, the institute accomplished knowledge creation, capture, codification, application, and sharing during platform operation, thereby enhancing its core competitiveness and building a learning organization. [Results/Conclusion] The construction and operation of the knowledge management platform provided enterprise personnel with an integrated platform for knowledge sharing, facilitated the internal sharing and dissemination of knowledge achievements, drove knowledge management to empower business development, cultivated a cultural atmosphere of knowledge sharing, and vigorously promoted the construction of a learning organization within the power grid enterprise.

Full Text

Research on the Construction and Practice of Knowledge Management Systems for Power Grid Learning Organizations

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Abstract

[**Purpose/Significance**] Knowledge management is becoming the primary driver of enterprise development and plays an increasingly vital role in enhancing core competitiveness. [**Method/Process**] The Management Science Research Institute of Guangdong Power Grid Corporation introduced knowledge management tools to build and implement a knowledge management system aligned with enterprise realities and closely integrated with business operations. Through the construction and operation of a knowledge management platform, the Institute facilitates knowledge creation, capture, precipitation, application, and sharing to strengthen its core competitiveness and foster a learning organization. [**Result/Conclusion**] The platform provides an integrated knowledge-sharing environment, promotes the internal dissemination of knowledge achievements, enables knowledge-driven business development, cultivates a knowledge-sharing culture, and effectively advances learning organization construction within the power grid sector.

Keywords: Knowledge Management Platform, Learning Organization, Project Management

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Against the backdrop of economic globalization and informatization, knowledge and information have gradually replaced capital and energy as enterprises' most valuable intangible assets [1]. The Fourth Plenary Session of the 19th Central Committee of the Communist Party of China identified "knowledge" as one of the seven major production factors. Consequently, knowledge management has increasingly become the primary driver of enterprise development, playing a vital role in enhancing core competitiveness. Knowledge management facilitates knowledge sharing, creation, and application among personnel within enterprise think tanks, stimulating innovation momentum and vitality, making it an essential choice for improving the core capabilities of enterprise think tanks.

Knowledge management must be integrated into specific business processes, using concrete business activities as the implementation platform [2]. In power grid enterprises, knowledge management practices have been implemented in business areas such as marketing, customer service, material procurement, and knowledge discovery [3-7]. The Management Science Research Institute of Guangdong Power Grid Corporation (hereinafter referred to as "the Institute"), as a knowledge-intensive enterprise think tank, has adopted knowledge management as a necessary strategy for developing a learning organization, committed to sharing and transforming internal knowledge and experience. However, certain deficiencies exist in knowledge coordination, universality, standardization,

systematicity, and knowledge transformation, mainly manifested in four aspects: (1) As a technology-intensive enterprise, power companies struggle to externalize large amounts of tacit knowledge, making knowledge conversion and sharing difficult; (2) Research projects lack effective coordination with business development, resulting in insufficient integration between knowledge management and business operations and limiting the decision-support value of research outcomes; (3) As an emerging think tank in the power industry, the Institute has not yet established a sound and effective knowledge management system and collaborative mechanism, affecting the effectiveness of knowledge creation and dissemination; and (4) Knowledge flow and interaction channels are inadequate, necessitating the urgent construction of an effective knowledge management platform.

Therefore, to build a learning organization, address these problems, start from business scenarios, use knowledge as the connecting point, and highlight the value of projects, achievements, and talent, the Institute urgently needs to create an enterprise knowledge management platform that integrates knowledge, project, and talent management, and explore the establishment of a knowledge management system and model suited to the realities of power enterprises.

Construction Approach and Principles for Power Grid Learning Organization Knowledge Management Systems

Centering on the strategic transformation goals of power grid enterprises and addressing the practical needs of supporting business, serving customers, and cultivating talent, the Institute created application scenarios of "Knowledge + Project" and "Knowledge + Learning." This approach completes knowledge creation, capture, precipitation, application, and sharing within business and learning processes, achieving coordinated development of knowledge, business, and talent. By building a knowledge management platform and supporting mechanisms, the Institute provides digital support for implementing the knowledge management system and promotes its long-term operation. Through the construction and implementation of this system, the Institute enhances its business support capabilities and research capacity, fully leveraging knowledge management to support enterprise management research and facilitating the entire knowledge flow process.

The Institute established a knowledge management system that originates from business, integrates with business, and serves business. By creating core application scenarios such as "Knowledge + Project" and "Knowledge + Learning," and achieving online-offline collaborative linkage, the Institute facilitates the entire process of knowledge creation—storage—dissemination—application within business and learning activities. While empowering business with knowledge, this approach consolidates collective wisdom, stimulates innovation, and promotes the joint growth of employees and the organization (see Figure 1 [Figure 1: see original paper]).

Based on business requirements, the Institute constructed a knowledge management platform to collect and organize internal and external information and materials, building talent and project outcome databases that provide "one-stop" support for project management, including material reserves, process management, and personnel allocation. By exploring project management and talent development models that integrate knowledge creation, acquisition, application, and management throughout the entire project management and learning process, the Institute ensures that project processes simultaneously become processes for knowledge precipitation and talent development. This ultimately achieves an organic unity and mutual promotion of knowledge serving business, business cultivating talent, talent supporting business, and business precipitating knowledge (see Figure 2 [Figure 2: see original paper]), thereby promoting the sustainable development of the organization.

Starting from business and combining it with practical realities, the Institute systematically planned a knowledge management system that highly integrates and synergistically develops with business. The system focuses on core business scenarios, uses platforms and mechanisms as safeguards, and aims to enhance overall business support capabilities and management research capacity, helping to achieve value improvement at three levels: organization, business, and employees (see Figure 3 [Figure 3: see original paper]).

Core Application Scenarios

Starting from the three key elements of "knowledge," "business," and "talent," and based on classified knowledge asset management, the Institute created application scenarios of "Knowledge + Project" and "Knowledge + Learning" to promote the integration of knowledge with business and knowledge with talent development.

3.2.1 Building a Hierarchical and Classified Knowledge Taxonomy to Consolidate the Foundation The Institute systematically organized knowledge across all business lines, establishing a hierarchical and classified knowledge taxonomy that categorizes all knowledge into four types: (1) Basic Management, emphasizing broad collection of general knowledge assets related to industry development trends and reform hotspots to provide foundational support for research; (2) Professional Management, focusing on thematic collection of specialized knowledge "clusters" highly relevant to company business to provide specialized support for research; (3) Value Enhancement, emphasizing summarization and refinement of knowledge to form high-quality specialized research products; and (4) Promotion and Application, emphasizing external promotion of achievements and products to enhance think tank brand influence.

3.2.2 Constructing "Knowledge + Project" Scenarios to Create a New Project Management Model Selecting the most common business types, the Institute constructed a project management model of "pre-project learn-

ing and reference—mid-project learning exchange and interaction—post-project learning summarization and refinement" within the "Knowledge + Project" application scenario (see Figure 4 [Figure 4: see original paper]). This model emphasizes knowledge serving project management and project management precipitating knowledge, thereby improving the reusability of research outcomes and maximizing collective wisdom.

Before projects, the Institute fully utilizes existing knowledge assets such as material reserves, excellent cases, expert experience, and learning courseware to ensure effective accumulation of skills, experience, and expertise among project teams and stakeholders, thereby improving research efficiency and quality. During projects, the Institute accumulates key knowledge and outcomes, using training, discussion, exchange, and experience sharing to achieve the externalization of tacit knowledge. After projects, building upon traditional document archiving, the Institute adds outcome summarization and refinement, as well as experience sharing and exchange sessions, to maximize the precipitation of collective wisdom.

3.2.3 Constructing "Knowledge + Learning"Scenarios to Create a New Talent Development Model The Institute treats learning as a two-way process of knowledge input and output, transforming individual knowledge into organizational knowledge assets through knowledge sharing. By innovating the talent development model with "Knowledge + Learning,"the Institute accelerates the growth of new employees and cultivates business backbones (see Figure 5 [Figure 5: see original paper]).

Specific measures include: First, systematically planning learning and training in alignment with business and talent development goals to construct a learning model covering general foundations, business capabilities, and job skills. Second, on the knowledge input side, building a curriculum system based on the learning model that includes various forms such as self-directed learning, instructor-led learning, and on-the-job practice (see Figure 6 [Figure 6: see original paper]). Among these, instructor-led courses excavate and solidify experts' tacit knowledge and experience, transforming individual experience into organizational knowledge. On-the-job practice primarily integrates with project management, enabling "learning by doing and doing by learning" through completing project management tasks, forming a closed loop of "knowledge input—knowledge application—knowledge innovation—capability enhancement." Third, on the knowledge output side, all input knowledge is required to be output in forms such as reading reports, reflections, and work reports to ensure effective knowledge transfer and transformation.

Digital Platform and Mechanism Construction for System Safeguarding

3.3.1 Building a "Trinity"Knowledge Management Platform for Digital Integration To promote the integration and solidification of the knowledge

management system and improve its efficiency, the Institute built a knowledge management platform integrating a Knowledge Center, Project Center, and Talent Center (see Figure 7 [Figure 7: see original paper]), supporting the operation of knowledge asset management and application, project management, and talent development models (see Figure 8 [Figure 8: see original paper]).

The Knowledge Center aggregates internal and external knowledge, creating a multi-domain, highly effective knowledge repository and an easily searchable internal management outcomes database. Using various technical means such as web crawlers, it tracks and collects massive amounts of external information, papers, industry research reports, as well as internal management outcomes and institutional standards. The platform establishes interconnection channels with other systems to provide one-stop solutions for diverse user needs.

The Project Center provides full-process online management for various types of projects, including management consulting and independent research topics. It achieves complete process control from project application, approval, progress monitoring, change requests, to outcome management and evaluation. The platform establishes a comprehensive project evaluation mechanism to enhance overall project management and control. Using a multi-dimensional tagging system, it associates projects, knowledge, and personnel attributes, enabling simultaneous knowledge precipitation and talent development during project execution. This achieves centralized management, accumulation, application, and sharing of relevant knowledge, integrates knowledge management with business processes, and improves the efficiency and depth of management research projects [8].

The Talent Center builds an internal instructor and management talent database integrated with daily management research operations, collecting self-developed courses and course reflection shares. While providing expert resources and online learning courses for the talent development model, it timely precipitates and solidifies collective wisdom. The platform extracts tacit knowledge from experts and talents, excavates experience from both internal and external sources, absorbs it as enterprise knowledge, and transforms it into employees' knowledge and capabilities, thereby supporting the organization' s intellectual capital.

3.3.2 Establishing a Sound Knowledge Management Work Mechanism to Promote Long-term Operation By establishing a knowledge management organizational structure and clarifying job responsibilities (see Figure 9 [Figure 9: see original paper]), the Institute addresses the question of "who manages." Through the establishment of operational and incentive mechanisms for knowledge management, and by solidifying these into a "Knowledge Management Manual," the Institute addresses the question of "how to manage," promoting the standardization and normalization of knowledge management and enhancing its sustainability.

The operational mechanisms include: (1) Content operation—dynamically

launching thematic columns based on business needs, using product-oriented operational thinking to continuously optimize and integrate knowledge and increase premium resources; (2) User operation—managing and training knowledge administrators, enhancing expert influence and branding, and focusing on core user needs; and (3) Activity operation—using online and offline thematic activities as vehicles to promote researchers' participation in knowledge sharing, knowledge refinement, and thematic discussions.

This case study aims to build a management research think tank by introducing knowledge management methods and tools, constructing a new knowledge management system integrating platform, mechanism, and culture, and establishing the Institute' s knowledge management platform (Figure 10 [Figure 10: see original paper]). Since its launch at the end of 2018, the platform has been open to all employees of Guangdong Power Grid Corporation, reaching 92,000 users and accumulating over 9,300 documents. Related achievements have won the 2021 Knowledge Management Demonstration Project award from the China Electric Power Technology Market Association and the company' s management innovation award.

Accessed through the company's intranet, the platform features a clear interface, rich resources, and stable operation, receiving widespread acclaim and achieving the following results:

(1) **Enhanced Business Support Capability.** The knowledge management platform effectively boosts project control and outcome promotion through digital means. First, full-process online management improves project management quality and efficiency. By implementing full-process control over all management consulting projects and adding functions such as review, duplication checking, and data collection, the platform achieves project traceability and queryability, effectively enhancing project management control and standardization levels (see Figure 11 [Figure 11: see original paper]). Second, it promotes knowledge sharing and outcome promotion. The platform' s collection of knowledge documents, management innovations, lean results, and other management achievements are conveniently accessible to users across the province, achieving comprehensive sharing of knowledge and project outcomes throughout the company. Third, it supports knowledge management initiatives at municipal power supply bureaus. The Institute collaborated with Shantou Power Supply Bureau to systematically organize business guidelines across all business lines, establishing a Shantou Power Supply Bureau institutional repository on the platform with over 300 shared business guidelines (see Figure 12 [Figure 12: see original paper]).

(2) **Enhanced Organizational Research Capability.** The implementation of knowledge management has effectively improved the Institute' s research capabilities, with abundant research achievements enhancing the power grid think tank brand. Since the platform' s launch, the Institute has independently completed over 100 research projects, including

performance incentives for station chiefs, optimization of power supply business expansion investment interfaces, and group benchmarking; supported more than 20 major initiatives such as Guangdong Power Grid Corporation' s 14th Five-Year Development Plan and "Four Unifications" ; won over 30 awards at or above the Guangdong Power Grid Corporation level; applied for 4 invention patents; and published over 50 papers in Peking University core journals, SCI/EI/ISTP indexed journals, and national-level conference proceedings.

(3) **Enhanced Talent Team Competency.** By implementing project research and talent development models, encouraging knowledge sharing, and fostering a learning organization culture, the Institute has effectively improved employee competency. Over three years, it has cultivated 29 star-rated employees, 1 professor-level senior engineer, 15 senior engineers and senior economists, 12 corporate trainers, and 9 Lean Six Sigma Black Belt Masters. Additionally, three employees have obtained legal professional qualifications.

(4) **Providing Pilot Experience for Knowledge Management in Power Enterprises.** The effective operation of the knowledge management system has strongly supported the Institute' s talent development and business operations, earning recognition from China Southern Power Grid and providing pilot experience for promoting knowledge management across the entire network. Furthermore, it has attracted organizations such as Inner Mongolia Power (Group) Company, State Grid Zhejiang Electric Power Co., Ltd. Economic and Technical Research Institute, and China Southern Power Grid Energy Development Research Institute for investigation and exchange, establishing itself as a benchmark for knowledge management in power enterprises.

Practice has proven that by relying on the knowledge management platform to uniformly manage knowledge documents, management innovations, lean results, and other achievements, the Institute has achieved comprehensive sharing and promotion of knowledge outcomes, enhanced the organization' s business support value, strengthened talent team competency, and established a benchmark for knowledge management in power enterprises. The operation of the knowledge management platform plays an irreplaceable role in improving organizational research capabilities, business support capabilities, and talent team competency for power grid enterprise think tanks. Moving forward, the Institute will strengthen platform operation, adhering to the equal importance of "management + technology + operation," and drive knowledge management through a three-wheel approach [9] to support the construction of power grid learning organizations.

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Author Contributions

Shi Yadong: Responsible for proposing the framework, designing and implementing the solution;
Tan Rongyin: Responsible for data collection and article writing;
Duan Fang' e: Responsible for final version revision.

Note: Figure translations are in progress. See original paper for figures.