

Research on Knowledge Management Implementation Path Based on Automotive R&D Center Practice

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Abstract

In the era of the knowledge economy, an increasing number of enterprises are implementing knowledge management to enhance their core competitiveness. However, identifying appropriate business entry points for knowledge management implementation and rapidly deploying it often constitute the primary concerns for enterprises. Therefore, based on core strategies for successful knowledge management implementation and the knowledge management practices of an automotive R&D center, this paper summarizes fifteen critical steps for knowledge management implementation across three phases—foundation building, promotion, and iteration—and analyzes them in conjunction with relevant methodologies and practical cases to guide enterprises in successfully implementing knowledge management from scratch.

Full Text

Research on the Implementation Path of Knowledge Management Based on Automotive R&D Center Practices

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Abstract

In the era of the knowledge economy, an increasing number of enterprises are implementing knowledge management to enhance their core competitiveness. However, identifying the appropriate business entry point for knowledge management implementation and rapidly introducing knowledge management often constitute the primary concerns for organizations. Therefore, based on core strategies for successful knowledge management implementation and practical

experience from an automotive R&D center, this paper identifies 15 critical steps for knowledge management implementation across three phases: foundation building, promotion, and iteration. These steps are analyzed in conjunction with relevant methods and practical cases to guide enterprises in successfully implementing knowledge management from the ground up.

Keywords: knowledge management; knowledge system; knowledge management framework; knowledge acquisition; knowledge management platform; knowledge management evaluation

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Introduction

Management guru Peter F. Drucker asserted: “The most valuable asset of a 21st-century institution will be its knowledge workers and their productivity.” Knowledge will replace land, labor, capital, and machinery as the most important factor of production.

Since its introduction to China in 1998, knowledge management was initially dominated by academic research. After 2003, knowledge management practices gradually began to take hold in domestic enterprises. With the development of the knowledge economy, knowledge management has evolved from the initial conceptual research stage, through an exploratory phase focused on knowledge base construction and knowledge management system development, to a practical stage centered on knowledge innovation and services.

Numerous successful practice cases and statistical data demonstrate that knowledge management is increasingly being implemented in governments, enterprises, and research institutions to enhance organizational efficiency, innovation capability, and performance.

1. Definition of Knowledge Management

The American Productivity & Quality Center (APQC) defines knowledge management as a conscious strategy adopted by organizations to ensure that the right knowledge is delivered to the right people at the right time.

Microsoft defines knowledge management as enabling people to access the information they need anytime and anywhere, and to use that information to evaluate problems and opportunities.

The Chinese Knowledge Management Standard [1] defines it as the activity of planning and managing knowledge, the knowledge creation process, and the application of knowledge.

From these definitions, it is evident that knowledge management, as a novel management approach and method, represents intangible asset management focused on knowledge. Through the management (generation, sharing, absorption, and application) of knowledge, enterprises achieve the goal of empowering their business operations.

2. Knowledge Management Implementation Path

In *Knowledge Management: A Handbook for Delivering Business Value* [2], six knowledge management implementation approaches are identified, as shown in Table 1 .

Table 1: Knowledge Management Implementation Approaches

Approach	Description
Bottom-up/Grassroots KM	Starts at a low level within the organization without management support
Roll out a pre-designed KM framework	Management mandates KM implementation
Introduce KM while seeking and addressing business opportunities one by one	
Design a KM framework, obtain senior management support, then roll it out across the entire organization	
Roll out individual KM processes or tools	Implement framework elements one by one, such as search engines, communities of practice, etc.
Pilot a minimum viable KM framework in one or more business areas, then inspect, adapt, expand, and repeat. This can be called an “agile” approach	

The core strategy for successful knowledge management implementation involves developing a long-term KM framework through “pilot” initiatives, combined with an “opportunity-driven” approach to achieve short-term results by addressing business needs. Once the KM framework proves viable, the “roll-out” implementation method can be further adopted.

Based on this, combined with knowledge management practices at an automotive R&D center and case studies from enterprises that have received the Global and China MIKE Awards (Most Admired Knowledge Enterprise), this

paper summarizes an enterprise knowledge management implementation path [3]. The path is divided into three major phases: foundation building, promotion, and iteration. Each phase contains key work items, totaling 15 steps, as illustrated in Figure 1 [Figure 1: see original paper].

Figure 1: Enterprise Knowledge Management Implementation Path Diagram

2.1 Foundation Building

Knowledge management initiatives in enterprises typically originate from management awareness and are implemented as a critical component of corporate strategic planning. However, they are difficult to define clearly by a single leader or within a short timeframe. Therefore, during the initiation phase, enterprises must focus on eight key activities: achieving consensus on knowledge management, conducting benchmarking studies, performing business research, establishing teams, launching pilot projects, evaluating business value, developing strategic plans, and building knowledge systems.

2.1.1 Consensus Building For knowledge management implementation to proceed on the right track, enterprise leaders and employees must reach a unified consensus, resolving issues of unified understanding and consistent terminology.

As the first critical step in knowledge management implementation, consensus building can be achieved through training sessions or workshops conducted by domestic and international knowledge management experts and practice consultants for personnel at different levels. These initiatives introduce correct knowledge management concepts, methods, and practical cases into the organization.

From the perspective of knowledge management concepts, the approach typically begins with work closely related to employees, combining the characteristics of knowledge workers, environmental changes, and development trends to clarify that knowledge management is one of every employee's job responsibilities.

From the perspective of knowledge management methods, it is essential to start from the actual problems of the enterprise and its employees, adopting a "problem-solving for employees and business-serving" orientation to identify the optimal path and methods for implementing knowledge management.

2.1.2 Benchmarking Studies Traditional understanding of knowledge management primarily focuses on the unified management of explicit and tacit knowledge, with practical implementation often limited to corporate document management and expert experience management. Consequently, the results typically reduce knowledge repositories to document libraries and render expert databases superficial.

When launching knowledge management initiatives, enterprises should identify and study best-in-class peer practices through benchmarking. This approach fundamentally prevents repeating the same mistakes and, under unified consensus, enables rapid identification of suitable directions for knowledge management implementation. Enterprises that have received the MIKE Award each year, such as Google, Amazon, IBM, Siemens, NetEase Games, China Merchants Securities, COFCO, New Oriental, and SAIC-GM, can serve as benchmarking targets.

2.1.3 Business Research As an indispensable core step in knowledge management implementation, business research determines the direction of knowledge management implementation at each stage. Business research can be categorized into three types during the knowledge management implementation process:

(1) Knowledge Management Status and Needs Research

Knowledge management status and needs research is typically conducted during the initial phase of implementation to prepare for pilot projects and strategic planning. It primarily covers five dimensions: knowledge management awareness, content, systems, organization, and policies. Through user interviews and surveys, this research identifies and uncovers current user needs, problems, and pain points, enabling the development of targeted solutions and strategies. This ensures that knowledge management genuinely aligns with actual work and business operations, delivering real value to employees and the enterprise rather than becoming a burden.

(2) Knowledge Management Framework Research

Knowledge management framework research is usually conducted after pilot implementation to serve as strategic guidance for full-scale rollout. It requires a series of interviews and workshops to clarify the knowledge management framework. These interviews and workshops focus on knowledge management vision and value, key knowledge domains of the organization, business benefits and stakeholders, processes and activities supported by knowledge management, knowledge output and application, and knowledge lifecycle activities. The outcome is a comprehensive knowledge management framework.

(3) Knowledge Management Assessment Research

Knowledge management assessment research can be conducted at the beginning of the initiative or after full-scale rollout. Comprehensive assessment research aims to clarify the current status and maturity of enterprise knowledge management. Through reflection and industry benchmarking, it enables timely improvement and optimization of knowledge management-related practices. Conducted through interviews and questionnaires, the assessment focuses on knowledge management cognition, key knowledge, knowledge acquisition, knowledge creation, knowledge storage, knowledge sharing, knowledge application, and knowledge platforms.

2.1.4 Team Building A complete knowledge management team typically comprises four roles: leaders, guides, promoters, and business practitioners.

(1) Knowledge Management Leaders

Composed of senior enterprise executives, leaders primarily set the direction for knowledge management, establish work objectives, and provide resource guarantees.

(2) Knowledge Management Guides

As the most critical role in knowledge management, guides are typically comprised of the Chief Knowledge Officer (CKO) and technical experts. They oversee enterprise knowledge management efforts, guide the development of strategic plans, design knowledge management frameworks, define key knowledge domains, and issue knowledge management policies.

(3) Knowledge Management Promoters

As important drivers of knowledge management implementation, promoters are generally full-time personnel such as knowledge managers or knowledge supervisors. They are responsible for implementing the knowledge management framework, promoting and publicizing knowledge management concepts, and making knowledge management “part of employees’ work style.”

(4) Knowledge Management Business Practitioners

Composed of knowledge management engineers from various business areas or departments, practitioners are responsible for implementing specific knowledge management activities and organizing employees in their respective areas to participate in all knowledge activities, including knowledge generation, storage, sharing, and application.

During the initial stages of knowledge management implementation, most enterprises only establish a dedicated knowledge management guide role, such as a knowledge management manager or CKO, responsible for designing the knowledge management framework and introducing it into business operations. As knowledge management practices deepen, enterprises typically gradually add dedicated or part-time knowledge management promoters and business practitioners to ensure successful implementation.

2.1.5 Pilot Projects Knowledge management pilots typically introduce knowledge management processes or technologies by addressing a specific practical problem within the enterprise, such as “using knowledge management to accelerate new employee onboarding” or “using knowledge management to reduce development costs.” This approach demonstrates the value of knowledge management in a short timeframe, laying the foundation for subsequent full-scale rollout.

During knowledge management needs research at an automotive R&D center, it was discovered that in an R&D center with a high proportion of new employees and significant project pressure, the lack of experience summarization and accu-

mulation often led new employees to repeat mistakes, severely impacting work efficiency. Therefore, preventing repeated mistakes became the entry point for the pilot project.

The project selected the Body Engineering Department, which had a high proportion of new employees, and established a project team comprising business experts, knowledge supervisors, and regional knowledge management coordinators. Team members conducted scenario analyses on common mistake-prone issues and, under the guidance of business experts, developed methods for “preventing repeated mistakes.” These methods were introduced through training sessions in the pilot department. Simultaneously, team members compiled a list of mistake-prone issues from historical projects, and regional knowledge management coordinators organized employees to summarize experiences related to these issues. This process yielded highly valuable knowledge, which was disseminated through a series of sharing sessions and training programs, enabling employees to avoid repeating mistakes in their actual work and improving efficiency.

2.1.6 Business Value Assessment Before developing a comprehensive knowledge management strategic plan, completing a business value assessment is a critical step for securing leadership support and initial funding.

Value assessment draws from both internal and external sources. Internally, research can be conducted to identify time- and quality-cost-related information based on specific projects. For example, the following insights were gathered from the automotive R&D center:

- “If we had a reference database, our work would be 10 times faster.”
- “Due to rework, the testing cycle requires 2-3 months. If issues could be fed back and tracked more effectively, testing could be completed in one week.”
- “If new employees had systematic best practices, their efficiency could improve by 20%-30%.”

By calculating return on investment, enterprises can estimate the total benefits and potential value derived from different levels of knowledge management investment, such as labor cost savings, shortened development cycles, and reduced after-sales costs.

Similarly, pilot project results can serve as evidence of knowledge management value. External value justification can be based on case studies from other companies [4]: for instance, Shell’s online knowledge community generates \$200 million in annual benefits with only \$5 million in annual investment, representing a 40-fold return on investment; in 2001, Siemens’ ShareNet knowledge management system created \$122 million in sales for the company with an investment of only \$7.8 million, representing a 15-fold return on investment.

2.1.7 Knowledge Management Strategic Planning The knowledge management strategy determines the success or failure of knowledge management implementation. Before full-scale rollout, enterprises must develop a comprehensive knowledge management strategic plan based on principles such as business-centricity, introduction of a complete knowledge management framework, pilot-first approach, and phased implementation [5]. The plan primarily includes five components: analysis of current knowledge management status, strategic objectives, implementation methods, institutional systems, and risk mitigation, as illustrated in Figure 2 [Figure 2: see original paper].

Figure 2: Knowledge Management Strategic Planning Content Framework

2.1.8 Knowledge System Construction Effective knowledge management is critical to an organization's success and sustainable development. Enterprises must conduct knowledge inventories to classify and define knowledge resources, establishing a unified internal understanding and common language for knowledge transfer. This provides the foundation and methodology for subsequent knowledge storage, sharing, communication, and evaluation.

Knowledge classification should adhere to five principles: scientific rigor, business relevance, practicality, compatibility, and extensibility. Classification dimensions are diverse and generally include type, concept, business, professional, organizational, product, value, customer, and industry dimensions. However, enterprises are advised to limit their knowledge classification framework to no more than three commonly used dimensions.

During the knowledge system construction process at an automotive R&D center, business experts led multiple discussions and analyses of the center's knowledge resources to confirm key knowledge definitions and classifications, with continuous refinement and optimization during application. Figure 3 [Figure 3: see original paper] illustrates the knowledge classification for this automotive R&D center.

Figure 3: Knowledge Classification for an Automotive R&D Center

2.2 Promotion

During the knowledge management foundation building phase, enterprises have completed pilot projects, value justification, and developed preliminary knowledge management strategic plans and knowledge systems. In the promotion phase, in addition to continuously refining foundational work, enterprises must focus on designing a complete knowledge management framework, promoting knowledge flow, building a knowledge management platform, and conducting comprehensive implementation and operations.

2.2.1 Knowledge Management Framework Design The APQC knowledge management model comprises two dimensions: knowledge management

processes (i.e., collection, organization, transformation, use, creation, identification, and sharing) and supporting factors (i.e., leadership, culture, technology, and measurement), as shown in Figure 4 [Figure 4: see original paper].

Figure 4: APQC Knowledge Management Model

The knowledge management conceptual model in the national knowledge management standard covers the entire lifecycle of knowledge management activities, including knowledge identification, creation, acquisition, storage, sharing, and use. Simultaneously, enterprises must implement knowledge management across three dimensions: organizational culture, technical infrastructure, and organizational structure and systems, as illustrated in Figure 5 [Figure 5: see original paper].

Figure 5: Knowledge Management Conceptual Model

It is evident that knowledge management implementation is a systematic engineering effort. Enterprises must ensure knowledge flow through people, processes, technology, and governance to achieve the goal of empowering business operations.

In a project collaboration with British knowledge management expert Nick Milton, an automotive R&D center conducted interviews and research based on the knowledge flow model (Figure 6 [Figure 6: see original paper]) and its 15 key elements composed of four driving factors. The center also performed benchmarking analysis and evaluation, ultimately developing an effective knowledge management framework to support product development work, as shown in Figure 7 [Figure 7: see original paper].

Figure 6: Knowledge Flow Model

Figure 7: Knowledge Management Framework for an Automotive R&D Center

2.2.2 Knowledge Acquisition As the core object of management, all knowledge management initiatives aim to provide guarantees for knowledge identification, acquisition, storage, sharing, and application. Knowledge acquisition, as a core element of the knowledge management framework, ensures that new knowledge can be continuously retained and applied.

The most common knowledge acquisition methods and models include the U.S. Army's After Action Review (AAR), Lenovo's Fupan (review and reflection), Huawei's knowledge harvesting, and Nonaka and Takeuchi's SECI model.

The After Action Review (AAR) is a post-action learning mechanism. The U.S. Army defines it as a professional discussion of an event that focuses on performance standards, enabling participants to discover what happened, why it happened, how to sustain strengths, and how to improve weaknesses. In many enterprises, AAR is conducted immediately after a short-term action worth

learning from, centered around four questions: What were the intended objectives? What actually happened? Why was there a difference? How can we do better next time? The 5W1H questioning technique (What, Why, Who, When, Where, How) is used to elicit deeper knowledge.

Fupan originally comes from the game of Go, referring to the process of replaying and analyzing a match. Applied to enterprises, Fupan involves learning from past experiences and actual work to help organizations effectively summarize lessons and enhance capabilities. Team Fupan generally follows four steps:

1. **Review and Evaluate:** Identify highlights and deficiencies worth learning from or improving
2. **Analyze and Reflect:** Identify root causes or key factors behind successes or failures
3. **Extract and Distill:** Draw inferences and identify lessons learned
4. **Refine and Apply:** Apply extracted lessons to subsequent work and propose innovation and improvement recommendations

2.2.3 Knowledge Management Platform Development The knowledge management platform is an important and indispensable tool for knowledge management. Many enterprises begin planning system construction during the initial phase of knowledge management implementation to support knowledge identification, acquisition, storage, sharing, and application, ensuring efficient knowledge flow and easy employee access.

COFCO Research Institute underwent two knowledge management platform construction phases, ultimately building the C3 platform with connection, communication, and collaboration as its core concepts. Based on business processes and work scenarios, the platform features knowledge portals, expert networks, knowledge communities, knowledge topics, knowledge wikis, and “Xi-aotao Youyue” (a communication function). It also integrates enterprise R&D project management systems, intellectual property management systems, and human resource management systems, forming a comprehensive platform for employees to collaborate anytime and anywhere.

Huawei’s knowledge management platform, 3MS (Make Me More Successful), has evolved over several years from a marketing materials management system into a company-wide knowledge sharing platform featuring knowledge assets, market intelligence, documents, cases, terminology, topics, microblogs, expert directories, Q&A, team spaces, and forums. Deeply integrated with business operations, it helps users...

From the development practices of most enterprise knowledge management platforms, it is evident that platform construction must be strongly associated with business operations, employee-centric, content-driven, experience-focused, and promote the connection between knowledge, employees, and business. A reference functional framework for knowledge management platforms is shown in Figure 8 [Figure 8: see original paper].

1. **Service Functions:** Functional modules for user interaction and communication on the platform
2. **General Functions:** Basic management modules for platform users and documents
3. **Basic Functions:** Global platform functions that aggregate and display platform information and content
4. **Knowledge Repository:** Multi-dimensional management and storage of knowledge content for easy user access and application
5. **Knowledge Map:** An integrated presentation of knowledge that enables one-stop access to position- and project-related knowledge
6. **Knowledge Learning:** Creates learning courses from a learning application perspective, tracking learning status, quiz results, or exam performance
7. **Knowledge Tools:** Integrates functions for knowledge sharing, communication, and collaboration, including communities, Q&A, and expert networks
8. **Operational Tools:** Integrates operation-related functions, including statistical reports, points-based reward systems, and operation reports
9. **Business Tools:** Integrates with employees' commonly used work tools to enhance platform business stickiness, including address books, task management, meeting management, and activity management

Figure 8: Knowledge Management Platform Functional Framework

2.2.4 Knowledge Management Operations Enterprise knowledge management operations primarily encompass two complementary aspects: business operations and platform operations.

Business Operations typically involve knowledge activities based on project or business knowledge management needs. For example, to advance project knowledge harvesting, knowledge managers and project managers can plan and conduct activities such as knowledge gap analysis, peer assistance, and project reviews to collect and distill project experiences. They can also regularly evaluate and report on knowledge management implementation, reward outstanding departments or individuals, and conduct training for knowledge management promoters and new employees' knowledge management capabilities.

Platform Operations leverages internet thinking to operate users, content, and activities through the enterprise knowledge management platform. For instance, leadership can be engaged using a VIP approach, experts using a PGC (Professionally Generated Content) approach, and employees using a UGC (User Generated Content) approach. The platform can feature business or project knowledge topics, invite domain experts to conduct online Q&A sessions with newcomers, mine expert experiences, and publish "New Employee FAQ" knowledge collections.

Through a dual-track operational model of "online promotion and offline ac-

tivities” that integrates and supports both dimensions, enterprises can create strong linkages between business and platform, foster a positive sharing culture, and motivate employees to actively participate in knowledge generation, sharing, application, and innovation, thereby realizing knowledge value and improving efficiency.

2.2.5 Institutional Development A key factor for knowledge management success is integration with business operations. Developing comprehensive knowledge management process policies ensures successful implementation and effective business empowerment.

During the initial foundation building phase, enterprises must formulate and publish foundational knowledge management system definitions, establishing basic concepts such as enterprise knowledge, knowledge management, and organizational functions to create unified understanding.

To ensure efficient knowledge flow, enterprises need to develop business-integrated knowledge generation processes, such as problem experience summarization, After Action Review (AAR), and project knowledge harvesting. Incorporating knowledge content into project or business delivery checklists can more effectively promote the integration of knowledge management processes into business operations, and optimizing project or business management processes is also an important consideration. Additionally, knowledge publication management processes can control knowledge content quality, while knowledge gap analysis and peer assistance processes ensure effective knowledge transfer.

Based on the knowledge management platform, enterprises must establish reliable platform operation mechanisms and evaluation incentives to ensure continuous platform operation and active employee participation.

2.2.6 Knowledge Management Assessment Knowledge management assessment can analyze enterprise knowledge management maturity using the Knowledge Management Maturity Model (KMMM) [6] (Figure 9 [Figure 9: see original paper]) and related evaluation tools and methods. This enables reflection, industry benchmarking, and continuous improvement.

Figure 9: Knowledge Management Maturity Model (KMMM)

Knowledge management assessment focuses on six key knowledge operation processes: knowledge identification, acquisition, creation, storage, sharing, and application, as well as important management support elements including KM strategy, organizational support, technical support, process support, personnel support, cultural support, and KM measurement. Information is collected through face-to-face interviews and questionnaires, culminating in a comprehensive evaluation and diagnostic analysis of the enterprise’ s current knowledge management status to identify next-step improvement measures.

Figure 10 [Figure 10: see original paper] illustrates the assessment results and improvement strategies for an automotive R&D center.

Figure 10: Knowledge Management Assessment Results and Improvement Strategies for an Automotive R&D Center

2.3 Iteration

Knowledge management is a continuous foundational effort that is grounded in enterprise development strategy while simultaneously serving business operations. Therefore, enterprises must focus on each step of knowledge management implementation, conduct research and assessments at appropriate times, and pursue continuous improvement and optimization.

Knowledge management is a top-management initiative that requires a considerable period for exploration and validation, with continuous adjustment and refinement. Its success depends largely on leadership support. Based on knowledge management practices at an automotive R&D center, this paper constructs a knowledge management implementation path map, focusing on analysis of knowledge management organizational development, strategic planning, knowledge system construction, framework design, platform development, and knowledge management assessment, providing a valuable guide for enterprise knowledge management implementation.

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

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