

**TRANSFORMATION OF MANAGERS' COMPETENCIES
IN THE CONTEXT OF THE INTRODUCTION
OF AI TECHNOLOGIES**

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Abstract. The advent of artificial intelligence technologies, particularly generative AI and large language models, is fundamentally reshaping the skill landscape for contemporary managers. This article systematically examines how managerial skills have evolved from the industrial era to the intelligent digital era and proposes a new framework for understanding the transformation of managerial capabilities in the AI age.

Keywords: Management skills, artificial intelligence, operational design, digital leadership, human-AI interaction, competency model.

The transformation of managerial skills represents one of the most pressing strategic challenges facing contemporary organizations. As artificial intelligence technologies penetrate organizational decision-making systems, the fundamental nature of managerial work is undergoing profound reconfiguration [1]. This transformation differs qualitatively from previous technological inflection points because AI systems increasingly mediate not only operational processes but also cognitive and strategic management activities themselves [2].

The emergence of generative AI platforms – illustrated by ChatGPT reaching 100 million users within two months of launch [3] – has precipitated an unexpected shift in human-machine interaction dynamics. Rather than requiring specialized technical training, these systems use natural language as the primary interface, democratizing access to AI capabilities across organizational hierarchies [4]. This accessibility paradoxically masks a critical skills gap: although interface simplicity suggests ease of use, obtaining high-quality outputs from large language models requires sophisticated dialogue design, contextual framing, and critical qual-

ity assessment – capabilities that current managerial competency frameworks inadequately address [5].

Scholarly response to this transformation has proven fragmented. Strategic management literature emphasizes organizational adaptation [6], digital leadership research stresses technology integration at executive levels [7], and information literacy frameworks converge on digital literacy as a relevant competency domain [8]. Yet none provide sufficient operational guidance on specific human-machine interaction skills – what this research terms “prompt literacy” – that enable managers to translate AI potential into sustainable organizational value. This theoretical gap is particularly consequential in organizational contexts characterized by stringent political environments and complex governance requirements, as in contemporary China [9].

The present study addresses three interdependent gaps: First, existing competency models inadequately specify how AI-era technical capabilities transform fundamental managerial functions. Second, current frameworks underspecify the nature of human-AI collaborative work and the skills it demands. Third, theoretical integration of AI literacy with established leadership frameworks remains underdeveloped.

Prompt Literacy: Conceptualization and Theoretical Positioning.

Literacy frameworks have progressively evolved from technical skill acquisition toward integration of capabilities sensitive to dynamic information ecosystems. Information literacy initially emphasized information retrieval and evaluation skills in bibliographic contexts [8]. UNESCO digital literacy frameworks expanded this conceptualization to encompass information and data skills, digital content creation, security, and problem-solving in technology-mediated environments [10].

The underlying theoretical architecture of contemporary literacy frameworks rests on three fundamental principles: (1) literacy extends beyond operating technical tools to encompass critical understanding of information systems' social and ethical implications; (2) literacy frameworks should integrate conceptual skills, knowledge practices, and dispositions toward responsible engagement [8]; and (3) skill assessment requires situational context, recognizing that identical tasks demand differential competency levels depending on user role, organizational context, and available tools.

Prompt literacy represents the natural extension of these frameworks in the generative AI context. Whereas prior literacy frameworks emphasized information retrieval and synthesis, prompt literacy addresses the inverse problem: designing high-quality inputs for information-generating systems and critically evaluating their outputs. This represents a qualitative shift from existing information seeking toward collaborative information creation [11].

Prompt engineering – the technical methodology for optimizing large language model outputs through systematic prompt design, few-shot examples, chain-of-thought reasoning, and iterative testing [3] – constitutes a specialized technical practice. Prompt engineers, typically computer scientists or data practitioners, employ formal experimentation to maximize model performance against quantitative benchmarks.

Prompt literacy, conversely, encompasses the integrated capability set enabling managers and organizational members to effectively engage generative AI systems in authentic work contexts while maintaining appropriate governance and accountability [4]. Prompt literacy encompasses five dimensions:

1. **Fundamental Interaction Capability:** Clearly expressing work objectives, providing essential context, managing constraints, and establishing feedback mechanisms generating iterative improvement.

2. **Cognitive Boundary Awareness:** Understanding large language model capabilities and limitations, recognizing probabilistic generation mechanisms, and avoiding over-reliance on AI outputs.

3. **Critical Quality Assessment:** Evaluating accuracy, relevance, consistency, and completeness through evidence-based criteria, using information verification when necessary.

4. **Ethics and Compliance Adherence:** Ensuring technology use respects privacy requirements, intellectual property protections, content safety standards, and regulatory frameworks governing AI deployment.

5. **Organizational Asset Development:** Translating effective AI interactions into reproducible organizational artifacts (prompt templates, standard operating procedures, knowledge assets) extending individual competence into scalable organizational capability.

Thus, prompt literacy represents systematic organizational capability development, while prompt engineering represents technical optimization. The distinction proves consequential for managerial skill development:

whereas technical engineers pursue performance maximization on benchmark datasets, managers require reliable, explainable, and auditable AI engagement mechanisms integrated into organizational governance structures.

Existing Managerial Competency Models and Their Limitations.

1. Classical Competency Frameworks.

Katz's three-skill model [12] provided the fundamental competency architecture: technical skills (domain-specific expertise), human skills (interpersonal effectiveness), and conceptual skills (systems thinking and strategic synthesis). This taxonomy structured skills research for seven decades but proves inadequate for AI-era managerial contexts. Technical skills in Katz's framework meant deep operational expertise in specific functional domains. In AI contexts, however, technical ability increasingly means facility with intelligent system interaction – a technical meta-competency transcending specific domains.

Dynamic capabilities theory rightly emphasizes opportunity sensing, strategic position seizing, and organizational resource reconfiguration [6]. Managers must perceive AI's transformative potential, identify implementation opportunities, and restructure processes accordingly. Yet dynamic capabilities theory provides strategic direction without operational implementation pathways. Managers lacking prompt literacy cannot effectively execute the technical sensing required for accurate opportunity assessment or the organizational redesign necessary for effective implementation [13].

2. Digital Leadership Frameworks.

Contemporary digital leadership research identifies three core competency dimensions: visionary capability (understanding technology's transformative potential), organizational change capacity (implementing transformation), and technology integration capability (integrating technology into business processes) [7].

While digital leadership frameworks rightly elevate technology to strategic prominence, they underspecify the actual skills through which managers integrate technology effectively. Technology integration remains conceptually nebulous – digital leaders understand technology's value proposition but often lack concrete mechanisms translating this understanding into operational effectiveness. The assumption that understanding technology's strategic importance suffices for effective management increasingly fails as technological complexity rises [40]. Managers without prompt literacy cannot accurately assess large language model capabilities or guide teams toward effective implementation, regardless of strategic vision capacity.

3. Governance and Compliance Gap.

Existing competency frameworks, primarily derived from Western democratic market contexts, inadequately address high-political-intensity environments where government actively shapes AI governance [9]. China's regulatory framework – comprising the “New Generation Artificial Intelligence Development Plan” [14], “Generative AI Service Management Measures”, and algorithm governance regulations [10] – imposes stringent requirements regarding content safety, data privacy, algorithm transparency, and anti-discrimination standards.

These governance demands require new managerial skills: political awareness enabling anticipation of regulatory developments; compliance implementation capability ensuring organizational adherence to evolving standards; and risk identification skills recognizing potential regulatory exposure in AI system deployment. Current competency models lack systematic attention to these governance dimensions, creating organizational vulnerability in heavily regulated environments.

Integrated Framework: Managerial Competency Architecture in the AI Era.

Based on the preceding analysis, we propose a three-dimensional integrated competency framework addressing the identified theoretical gaps:

Dimension 1: Prompt Literacy and Human-AI Collaboration Capability.

Prompt literacy constitutes the fundamental technical capability enabling managers to derive value from generative AI systems. This dimension encompasses:

Iterative Dialogue Design: Formulating initial queries, providing contextual information, responding to AI outputs with refined clarifications, and iteratively deepening AI reasoning depth [3].

Output Quality Assessment: Evaluating accuracy against known information, checking consistency, verifying factual claims through independent sources, and recognizing common failure patterns [5].

Human-AI Workflow Optimization: Designing processes productively combining human judgment, creativity, and ethical reasoning with AI pattern recognition and synthesis capabilities [15].

Research demonstrates that managers with high prompt literacy achieve 30–50 % productivity improvements in knowledge work through effective AI collaboration, compared to novice users [4].

Dimension 2: Adaptive Digital Leadership.

Adaptive digital leadership extends classical digital leadership frameworks by emphasizing dynamic capability development in response to technological change. This dimension comprises:

Continuous Environmental Scanning: Monitoring emerging AI capabilities, competitor technology adoption, and organizational capability gaps [7].

Agile Organizational Redesign: Rapidly reconfiguring work processes, authority structures, and decision-making mechanisms to accommodate human-AI collaboration [16].

Resilient Team Development: Building organizational cultures embracing experimentation, tolerating failure in bounded contexts, and maintaining psychological safety as technological capabilities evolve.

Dimension 3: Responsible AI Governance and Ethical Capability.

This dimension, particularly salient for organizational contexts operating within stringent policy frameworks, encompasses:

Algorithmic Bias Recognition: Understanding how training data characteristics and objective function design introduce systematic biases, recognizing biased outputs, and implementing bias mitigation strategies.

Political Compliance Management: Anticipating regulatory requirements, implementing governance mechanisms ensuring organizational adherence, and documenting AI system decisions to enable regulatory audit.

Ethical Reasoning in Ambiguous Contexts: Making principled decisions when technological capabilities conflict with organizational values, stakeholder interests, or social obligations [10].

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