

The Impact of Organizational Inertia on AI Implementation

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Abstract

When ChatGPT-3.5 entered the consumer-grade market, artificial intelligence (AI) technology has developed at a rapid pace and become an important driving force for the progress of human civilization. Up to now, the landscape of large AI models has gradually presented a situation of a hundred schools of thought contending, playing important roles in industries such as industry, healthcare, education, and finance. However, it is undeniable that there are structural resistances to the application of artificial intelligence technology in social, ethical, and other aspects. Therefore, this paper, from an organizational perspective, comprehensively analyzes existing literature on organizational inertia and its impact on the application of artificial intelligence, clarifying the definition and dimensions of organizational inertia as well as the impact of each dimension on the application of artificial intelligence technology. The study found that organizational inertia has six internal dimensions: structure, resources, cognition, path, routines, and culture. Moreover, through searching for studies on the impact of organizational inertia on the application of artificial intelligence, it was found that the number of relevant representative papers is relatively limited, and only the structural, resource, cognitive, and path dimensions of organizational inertia have been verified to hinder organizations' application of artificial intelligence technology, while there is a lack of research on the impact of the routines and cultural dimensions of organizational inertia on the application of artificial intelligence technology.

Keywords

Organizational Inertia, Artificial Intelligence Adoption, Resistance to Change

Introduction

Since the Dartmouth Conference first formally proposed the concept of "artificial intelligence" in 1956 (McCarthy et al., 2006), artificial intelligence technology has gone through more than 60 years of development. It was not until 2022, when ChatGPT-3.5 entered the consumer-grade market, that artificial intelligence officially entered a stage of rapid development. Today, the

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landscape of large AI models has gradually become highly competitive, especially with the release of DeepSeek-R1. Its characteristics of open-source, low training costs, and high performance have provided more possibilities for the research and development of large AI models. In addition, the application fields of artificial intelligence continue to expand, giving rise to many domain-specific large models that are deeply adapted to industries such as industry, healthcare, education, and finance, effectively promoting industry development (Chen et al., 2024). Humanity is accelerating its entry into the "artificial intelligence" era. However, the advancement of history is inevitably confronted with many obstacles. Through reviewing papers related to organizational inertia, it is found that the application of artificial intelligence technology can be regarded as an important link in enterprise innovation and reform, while the inherent organizational inertia of enterprises often hinders the process of their innovation and reform. Further review of empirical studies on organizational inertia and artificial intelligence applications reveals that research in this area is relatively limited. Therefore, this paper, from the perspective of organizational research, will focus on studying existing literature on organizational inertia and its impact on the application of artificial intelligence, aiming to clarify the definition and dimensions of organizational inertia, as well as the impact of each dimension on the application of artificial intelligence technology, so as to lay a certain theoretical foundation for subsequent exploration of the blocking mechanism of organizational inertia on the application of enterprise AI technology.

The development of organizational inertia theory

A preliminary analysis of organizational inertia theory reveals that its origin and subsequent development are mostly in Western academic circles. Therefore, for the classic literature on organizational inertia theory, the keyword "organizational inertia" will be searched through the Google Scholar platform. A preliminary screening will be conducted based on indicators such as download volume and citation count. Then, highly representative classic literature will be selected for review according to the different theoretical factions, research perspectives, and research directions within organizational inertia theory.

The embryonic form of organizational inertia theory can be traced back to 1958, when James March and Herbert Simon conducted research on organizational decision-making based on the bounded rationality theory in their work **Organization**. They proposed that "organizational decision-makers are constrained by factors such as incomplete information, limited cognitive abilities, and time pressure, and thus cannot propose optimal decisions. This leads to organizational decision-making relying on existing routines, forming path dependence" (March & Simon, 1958). This laid the cognitive foundation and analytical framework for subsequent research on organizational inertia, officially introducing the research direction of organizational inertia into the academic vision of scholars.

In 1976, Weick proposed the concept of the "Enactment-Selection-Retention Cycle". By focusing on universities as organizations, he elaborated on the sources of organizational inertia at the micro level. Specifically, he explained "how universities maintain stability through simplified information processing, leading to organizational inertia. Even when the environment changes, organizational members tend to repeat historical behaviors." He also proposed that this inertia stems from three factors: the lack of a unified coordination mechanism in universities, which

makes it difficult to promote systematic changes; the local goals of departments potentially replacing the overall goals of the university; and the self-reinforcement of existing structures through institutionalized procedures, which suppresses innovation (Weick, 1976). This revelation uncovered the structural roots of organizational inertia.

In 1984, Michael T. Hannan and John Freeman's paper is regarded as a foundational work in the field of organizational ecology. Focusing on the structural dimension of organizational inertia, the paper proposes that the solidification of core attributes such as organizational goals, forms of authority, core technologies, and marketing strategies is the main source of inertia. When facing environmental changes, organizations tend to maintain existing structures and behavioral patterns. This structural inertia serves as an adaptive strategy for organizational survival, but it may also hinder change through mechanisms such as hierarchical solidification, cost locking, and legitimacy risks (Hannan & Freeman, 1984). It is noteworthy that they went beyond the traditional rational adaptation theory and introduced the "selection perspective" of ecology into organizational research, emphasizing that organizational evolution is the result of environmental screening rather than the product of active individual adaptation. Therefore, some scholars believe that this overemphasizes the external environment while ignoring the possibility of proactive internal change within organizations.

Different from Michael T. Hannan & John Freeman's view that organizational inertia is an external factor caused by the environment and almost unchangeable, Dorothy Leonard-Barton argued in her 1992 paper mentioned that "the organizational core capabilities formed at the levels of employee knowledge and skills, technical systems, management systems, values and behavioral norms will gradually solidify due to path dependence, cognitive lock-in, resource stickiness, and cultural inertia, leading to the formation of core rigidities. When the environment changes drastically, the solidified characteristics of core capabilities will hinder organizations from adapting to new needs, resulting in innovation stagnation and strategic rigidity. She also emphasized that organizations can address their core rigidities through approaches such as dynamic balance between existing capabilities and exploration of new capabilities, organizational learning, structural separation, and value reconstruction" (Leonard-Barton, 1992). Complementing this, in 1992, Miller pointed out in that "the outstanding achievements of enterprises often become the seeds of self-destruction, essentially characterized by the rigidity of advantages and the loss of environmental adaptability, specifically manifested as institutionalized path dependence, cognitive defects of management, and resource allocation inertia" (Miller, 1992).

Building on the aforementioned research, David Teece, Gary Pisano, and Amy Shuen highlighted resources as a dynamically reconfigurable set and proposes the dynamic capabilities theory to break through organizational core rigidities, achieving sustained innovation while maintaining stability. "Through empirical research, they explained how enterprises integrate, build, and reconfigure internal and external resources and capabilities to cope with rapidly changing environments and obtain sustained competitive advantages" (Teece et al., 1997).

In the 21st century, research on organizational inertia theory has exhibited a trend of theoretical integration and interdisciplinary convergence. Wang Longwei, Li Yuan, and Wang Kanliang "analyzed the generation mechanism of organizational inertia from four dimensions—organizational resources, organizational structure, enterprise employees, and corporate culture—

based on the bounded rationality perspective of enterprise employees' cognition and the transition cost perspective in the process of organizational change and proposed corresponding management countermeasures to overcome organizational inertia" (Wang et al., 2004). By integrating the "environmental selection" logic of organizational ecology, the "historical lock-in" effect of path dependence theory, and the "resource heterogeneity" theory of the resource-based view, Heine & Rindfleisch constructed an analytical framework for organizational decline, pointing out that "organizational inertia leads enterprises into dilemmas through the interaction of three dimensions: structural inertia, path lock-in, and VRIN resources" (Heine & Rindfleisch, 2013). Building on this framework, Nedzinskas et al. "categorized organizational inertia into three dimensions—resource inertia, routine inertia, and path inertia—and developed a three-dimensional scale to quantify organizational inertia" (Nedzinskas et al., 2013). Dang Xinghua, Wei Long, and Yan Hai explored the differential impacts of organizational inertia on incremental innovation and breakthrough innovation from the two dimensions of structural inertia and cognitive inertia (Dang et al., 2016).

In summary, organizational inertia is like two sides of a coin. On one hand, it can effectively promote organizational development in the early stages of an organization's growth. On the other hand, when the organization faces changes in the external environment, it will hinder organizational innovation and transformation. Further systematic research on literature related to organizational inertia theory reveals that the formation of organizational inertia theory has gone through stages such as phenomenon description, mechanism explanation, and countermeasure research. From the early focus on the inevitability and negative impacts of organizational inertia, to the middle stage of revealing the multi-dimensional causes and core rigidity of organizational inertia, and then to the recent integration of disciplinary theories to deeply explore anti-organizational inertia mechanisms such as dynamic capabilities, emphasizing the dialectical relationship between organizational inertia and change. A comparison of research results from classic literature in the formation process of organizational inertia theory is shown in Table 1. Based on the above content and Table 1, we can find that although the definition of organizational inertia has expanded from "decision-making routines" to "multi-dimensional solidification", it lacks a unified core connotation. By sorting out classic literature on organizational inertia theory, the definition of organizational inertia can be summarized as: an inherent characteristic of an organization formed in the long-term development process, influenced by the solidification of internal factors such as cognition, structure, resources, and behavioral patterns, as well as the screening of the external environment. It tends to maintain the existing state (such as stable structure, decision-making routines, core capabilities, and resource allocation methods) and is difficult to quickly respond to environmental changes (such as technological innovation, changes in market demand, and policy adjustments).

Table 1. A Comparative Analysis of Research Findings on Classic Literatures of Organizational Inertia Theory

Representative Figures and Time	Research Source	Key Findings
March & Simon (1958)	Organization	The study of organizational decision-making based on the bounded rationality theory has laid the cognitive foundation and analytical framework

		for the research on organizational inertia.
Weick (1976)	Educational organizational as loosely coupled systems	Focusing on the micro-level, it is proposed that the organizational inertia of universities originates from decentralized resistance to change, ambiguity of goals, and solidification of path dependence, revealing the structural roots of organizational inertia.
Michael & Freeman (1984)	Structural Inertia and Organizational Change	Introducing the "selection perspective" of ecology into organizational research, it put forward subversive views on the relationship between organizational change and survival, and systematically expounded structural inertia.
Leonard-Barton (1992)	Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development	By proposing the core capability-core rigidity paradox, it reveals the deep logic of organizational inertia, which not only deepens the understanding of the dilemmas in organizational change but also provides profound insights into how to break through organizational inertia.
Miller (1992)	The Icarus paradox: How exceptional companies bring about their own downfall	It expands the research on organizational inertia from the static structural level to the dynamic strategic and cognitive levels.
Teece et al. (1997)	Dynamic Capabilities and Strategic Management	By proposing the dynamic capabilities theory, it has pioneered a dynamic, proactive, and systematic perspective for the theory of organizational inertia, promoting a paradigm shift in organizational management research from static analysis to dynamic evolution.
Wang et al. (2004)	Studies on the Reasons and Solutions of Organizational Inertia	This paper analyzes the generation mechanism of organizational inertia from four dimensions: organizational resources, organizational structure, enterprise employees, and corporate culture, and proposes corresponding

Heine & Rindfleisch (2013)	Organizational decline: A synthesis of insights from organizational ecology, path dependence and the resource-based view	management countermeasures to overcome organizational inertia. By integrating disciplinary theories, it is pointed out that organizational inertia interacts through three dimensions: structural inertia, path lock-in, and VRIN (Valuable, Rare, Inimitable, Non-substitutable) resources.
Nedzinskas et al. (2013)	The impact of dynamic capabilities on SME performance in a volatile environment as moderated by organizational inertia	Organizational inertia is subdivided into three dimensions: resource inertia, routine inertia, and path inertia, and a three-dimensional scale is developed to quantify organizational inertia.
Dang et al. (2016)	Study on the organizational inertia of technological innovation network and effect on ambidexterity innovation	Through empirical research, the differential impacts of structural inertia and cognitive inertia on incremental innovation and breakthrough innovation were verified.

In terms of the dimensions of organizational inertia, after more than 60 years of development, the division of dimensions of organizational inertia has shown an evolutionary trend from a single dimension to multiple dimensions and from local focus to systematic integration, but there is a lack of a unified core dimension framework. Therefore, based on the above text and Table 1, we can divide the core dimensions of organizational inertia into: structural inertia, resource inertia, cognitive inertia, path inertia, routine inertia, and cultural inertia. These dimensions work together to hinder organizational innovation and change (The dimensional division and mechanism of action of organizational inertia are shown in Figure 1.).

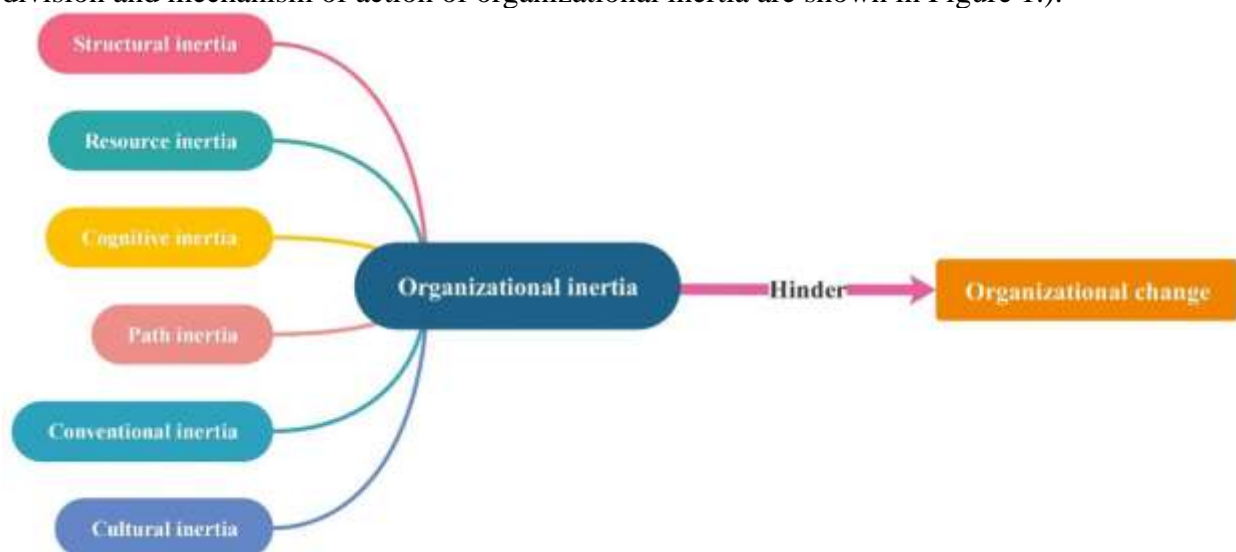


Figure 1. Dimension division and role of organizational inertia

The impact of organizational inertia on the application of artificial intelligence

Since 2022, after ChatGPT-3.5 entered the consumer market, artificial intelligence technology has developed rapidly. In 2025, after the launch of DeepSeek - R1, due to its characteristics such as open source, low cost, and high performance, it quickly "took root and sprouted" in China. Many large and medium-sized enterprises have successively accessed the DeepSeek - R1 large model, and the quantity and quality of applications of artificial intelligence technology have shown rapid growth and improvement. At the academic research level, Professor Karim Lakhani from Harvard University conducted an in-depth analysis of the application degree of artificial intelligence in academic research in various fields through systematic analysis in his paper "Oil & water? Diffusion of AI within and across scientific fields". The study stated, "From 1985 to 2022, the application rate of AI in papers in many different disciplines has basically multiplied several times or even dozens of times (the changes in the AI application rate in different disciplines are shown in Figure 2" (Duede et al., 2024). Through in-depth review of literature related to the application of artificial intelligence, it is found that the potential resistance for organizations to apply artificial intelligence technology mainly focuses on technology, organization, data, ethics, culture, talent, and other aspects. According to the research focus, this paper will focus on the research on the impact of organizational inertia on the application of artificial intelligence technology. Through Google Scholar and CNKI academic platforms, the keywords of organizational inertia and artificial intelligence will be searched, initially screened according to relevance indicators, and then further screened through extensive reading to review the relevant literature on the impact of organizational inertia on the application of artificial intelligence.

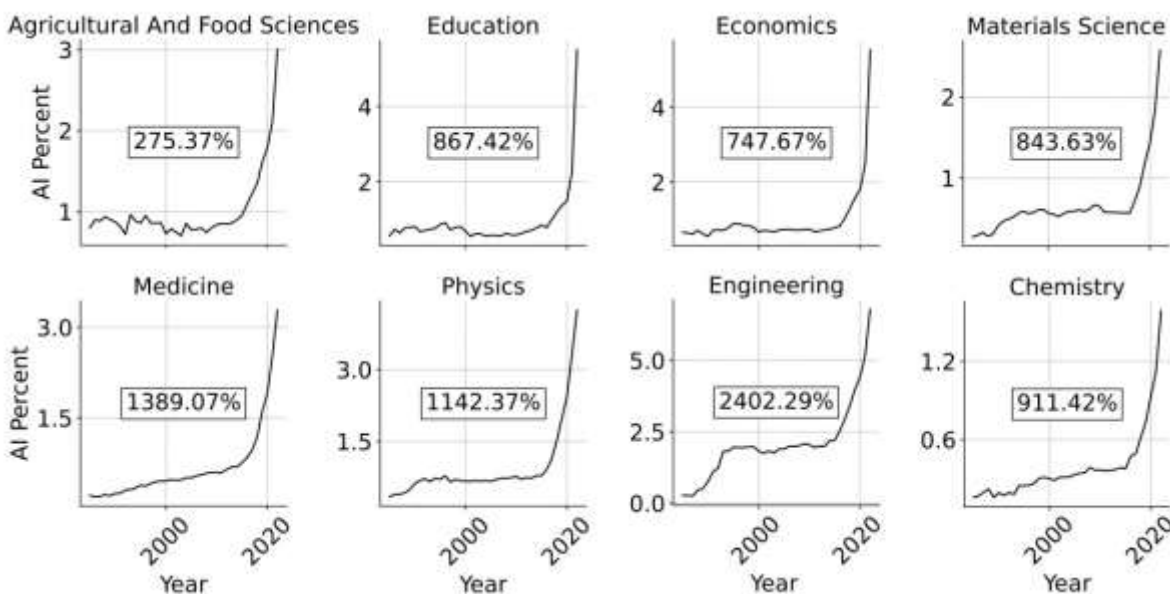


Figure 2. The AI application rate of papers in various disciplines

Research on the impact of organizational inertia on the application of artificial intelligence technology has found that the number of relevant studies on this topic is currently relatively limited. After screening, the following 4 documents are highly relevant to the research topic of this paper and have profound research significance for this paper. The paper published by Rudko et al.,

2021: "Organizational structure and artificial intelligence. Modeling the intraorganizational response to the AI contingency" verified through the application of Multiple Correspondence Analysis (MCA) that cognitive inertia and path inertia significantly inhibit the adaptation of AI to organizational structure. Specifically, the inhibitory mechanism of cognitive inertia is mainly reflected in the inherent cognition of employees at the individual level regarding their work content, and this inherent cognition often leads employees to resist AI-driven organizational changes. The inhibitory mechanism of path inertia mainly stems from the path dependence of employees at the individual level on traditional work patterns, making them resist innovative changes that are inconsistent with the existing state (Rudko et al., 2021). In 2023, Wei Li, Wei Chen, Qingdan Pang & Jianmin Song, through the application of multiple linear regression and fuzzy-set Qualitative Comparative Analysis (fsQCA), found that cognitive inertia has an inhibitory effect on enterprises' digital entrepreneurship. Specifically, due to the existence of cognitive inertia in enterprises, it leads to a lag in their perception of the environment and an unwillingness to respond to changes in the environment by making transformations. In addition, the psychological resistance of individual employees to change together forms a resistance to enterprises' digital entrepreneurship (Li et al., 2023). Chhatre & Singh (2024) mentioned in their article "AI and organizational change: Dynamics and management strategies" that structural inertia and resource inertia are important challenges faced in the process of AI-driven organizational change (Leong, 2025a, 2025b). On the one hand, due to structural solidification, organizations have complex and lengthy decision-making and approval processes for AI projects (Leong, 2024). On the other hand, small and medium-sized enterprises have relatively limited budgets, and their financial budgets need to be tilted towards traditional businesses, resulting in resource dilemmas for AI-driven organizational changes. In response to this, the study proposed that organizations can simplify the decision-making and approval processes by establishing AI special teams, and small and medium-sized enterprises can alleviate resource dilemmas by joining industry AI alliances and sharing AI resources (Chhatre & Singh, 2024). Shen (2024) in a study on the application of AI technology in schools to reform students' ideological and political education, which explored and constructed a basic model of integrating ideological and political education in primary, middle, and high schools empowered by large artificial intelligence models based on the TOE theory, proposed that the cognitive inertia of educational subjects and objects may hinder this reform (Shen, 2024). The research results of the above documents are shown in Table 2.

Table 2. A Comparative Analysis of Research Findings on the Hindrance of Organizational Inertia to the Application of Artificial Intelligence Technology

Representative Figures and Time	Research Source	Key Findings
Rudko et al. (2021)	Organizational structure and artificial intelligence. Modeling the intraorganizational response to the AI contingency	It is verified that cognitive inertia and path inertia significantly inhibit the adaptation of AI to organizational structures.
Li et al. (2023)	How to mitigate the inhibitory effect of organizational inertia on corporate digital entrepreneurship?	It is found that cognitive inertia has an inhibitory effect on the digital entrepreneurship of enterprises.

Chhatre, & Singh (2024)	AI and organizational change: Dynamics and management strategies	It is proposed that structural inertia and resource inertia are important challenges in the process of AI- driven organizational change, and corresponding coping strategies are put forward.
Shen (2024)	Exploration of the Integrated Construction of Ideological and Political Education in Primary, Secondary and Tertiary Schools Empowered by Large Artificial Intelligence Models: Based on TOE Framework	It is proposed that the cognitive inertia of educational subjects and objects will hinder AI-driven educational reforms.

In summary, current research on the impact of organizational inertia on the application of artificial intelligence technology is relatively limited. On the one hand, the number of relevant studies is small; considering the relevance of such studies to this paper, only 4 related literatures have high research value for this paper. On the other hand, existing studies on the impact of organizational inertia on the application of artificial intelligence technology have only verified that cognitive inertia, path inertia, structural inertia, and resource inertia hinder organizations' application of artificial intelligence technology, but have not analyzed and verified the impact of the routine inertia dimension and cultural inertia dimension of organizational inertia on organizations' application of artificial intelligence technology. There is a lack of independent variable dimensions in the research on the impact of organizational inertia on organizations' application of artificial intelligence technology.

Results and Discussion

A review of organizational inertia theory and its impact on the application of artificial intelligence reveals that organizational inertia theory has developed through multiple stages and formed six core dimensions: structure, resources, cognition, path, routines, and culture. However, existing studies have only verified that the first four types of inertia hinder the application of artificial intelligence and have not yet addressed the impact of routine and cultural inertia. In addition, the limited number of relevant literatures has led this specific research field to be still in the initial stage of development.

An in-depth analysis of the two types of literature reveals that the existing research findings on the impact of organizational inertia on the application of artificial intelligence can find their source support in the literature on organizational inertia theory, and they mutually corroborate each other. First, Rudko et al. (2021) found that "employees' cognitive resistance to artificial intelligence inhibits the adaptation of organizational structure" is highly consistent with the theoretical viewpoints of March & Simon (1958) that "bounded rationality leads to cognitive solidification" and Dang et al. (2016) that "cognitive inertia hinders breakthrough innovation"; Shen (2024) proposed that "the cognitive inertia of educational subjects hinders AI ideological and

political education", which further verifies the universality of cognitive inertia in non-enterprise scenarios (education) and echoes the conclusion of "the organizational universality of cognitive inertia" put forward by Weick (1976).

Second, Rudko et al. (2021) found that the theoretical logic of "dependence on traditional work models resists AI changes" is consistent with that of March & Simon (1958) who proposed "path dependence stems from decision-making routines" and Heine & Rindfleisch (2013) who put forward "path lock-in exacerbates organizational decline". Moreover, "path inertia inhibits innovation" verified by Li et al. (2023) in their research on digital entrepreneurship further confirms the universal hindering effect of path inertia on technology application.

Thirdly, Chhatre & Singh (2024) pointed out that "structural solidification delays AI project approval and insufficient resources restrict the implementation of artificial intelligence" is highly consistent with the theoretical mechanisms of Hannan & Freeman (1984) that "structural inertia hinders change through hierarchical solidification" and Leonard-Barton (1992) that "resource stickiness inhibits the application of new technologies". Moreover, the countermeasures they proposed, such as the "artificial intelligence special task force" and "resource alliance", are exactly the specific implementation of Teece et al. (1997)'s dynamic capability theory in artificial intelligence scenarios.

Furthermore, the dynamic capability theory serves as a key bridge connecting organizational inertia theory and the practical application of artificial intelligence. Firstly, in response to employees' "cognitive resistance" and "dependence on traditional work patterns" (Rudko et al., 2021), the "construction of learning capabilities" in dynamic capabilities can be applied, such as organizing employees to receive artificial intelligence skills training to update their cognitive frameworks, and breaking path dependence through "trial-and-error mechanisms" like artificial intelligence sandbox experiments. This is highly consistent with the theoretical logic of March & Simon (1958) that "organizational learning under bounded rationality alleviates path dependence" and Weick (1976) that "breaking cognitive solidification through innovation in information processing modes". Moreover, Li et al. (2023) verified in their research on digital entrepreneurship that "cognitive updating has a mitigating effect on inertia", and this conclusion can be transferred to the application scenarios of artificial intelligence.

Second, regarding the issue of "complex approval hierarchies" in artificial intelligence projects (Chhatre & Singh, 2024), we can establish an inter-departmental artificial intelligence team and simplify decision-making processes (such as the dual-signature approval system for artificial intelligence projects) by applying the "structural restructuring capability" within dynamic capabilities, thereby eliminating the "solidification of core structures" emphasized by Hannan & Freeman (1984). This logic theoretically echoes the countermeasure proposed by Wang Longwei et al. (2004) of "overcoming inertia through organizational structure flexibility" and has been verified in the research by Chhatre & Singh (2024).

Third, regarding the dilemma in artificial intelligence applications where "resources are skewed toward traditional businesses" (Chhatre & Singh, 2024), we can break the path dependence of resource allocation by applying the "resource restructuring capability" in dynamic capabilities to establish special resource pools for artificial intelligence and cross-organizational resource

alliances (such as small and medium-sized enterprises joining industry artificial intelligence sharing platforms). This is precisely in line with Leonard-Barton's (1992) view that "core rigidity is resolved through dynamic resource balance." The "artificial intelligence alliance shared resources" scheme proposed by Chhatre & Singh (2024) in their research is essentially a practical manifestation of "external resource integration" in dynamic capabilities.

Conclusions

In summary, this study clarifies the theoretical connection and empirical gaps between organizational inertia theory and its impact on artificial intelligence applications by reviewing relevant literature, laying a certain theoretical foundation for subsequent exploration of the impact mechanism of organizational inertia on artificial intelligence applications and corresponding strategies. However, this study found that the number of relevant literatures on the impact of organizational inertia on artificial intelligence applications is limited, and only involves some dimensions of organizational inertia. The analysis of the impact of routine inertia and cultural inertia on artificial intelligence applications is missing, so it is impossible to fully present the overall picture of the impact of organizational inertia on artificial intelligence applications. Therefore, future research will design questionnaires based on routine inertia and cultural inertia and test their impact mechanisms on artificial intelligence applications through empirical research. On this basis, strategy analysis will be conducted based on the dynamic capability theory to provide certain practical references for enterprises.

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