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The Antecedents and Influence Mechanisms of Artificial Intelligence Technology Application on Responsible Innovation of Generation Z Employees

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Abstract: In the wave of digitalization, artificial intelligence (AI) technology has become the core driving force for corporate innovation, while Generation Z employees (born after 1990) are gradually becoming the mainstay of the workforce. Their pursuit of innovation and sense of responsibility have attracted significant attention. Based on journal studies from the past five years, this paper analyzes the antecedents and influence mechanisms of AI technology application on the responsible innovation of Generation Z employees, drawing on theories such as the social cognitive theory and technology acceptance model. At the organizational level, the depth of enterprise digital transformation strategies and innovation climate has significant impacts. At the individual level, digital literacy and creative self-efficacy play key roles. Existing research has deficiencies in theory, methodology, and practical application, calling for future studies to construct dynamic models, strengthen cross-industry research, and explore ethical collaboration mechanisms.

Keywords: Artificial intelligence technology application; Generation Z employees; Responsible innovation

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1. Introduction

In the current era when the digital wave is sweeping the world, artificial intelligence technology has been deeply integrated into all aspects of enterprise operations through technical forms such as machine learning and natural language processing, becoming the core driving force for organizational change and innovation. Meanwhile, the new generation of employees represented by those born in the 1990s and 2000s is gradually becoming the main body of the workplace. Their digital native traits, innovative thinking patterns, and awakened sense of responsibility have enabled them to occupy a key position in the organizational innovation ecosystem. To explore the antecedent variables and influencing mechanisms of the application of artificial intelligence technology on the responsible innovation of the new generation of employees, it is not only necessary to deconstruct the evolution logic of employees' innovation behavior under the interaction of technology empowerment and organizational

context based on multi-disciplinary theoretical frameworks such as social cognitive theory and technology acceptance model, but also to approach it from three dimensions: theoretical construction, method design, and practical application. Build a research system that combines academic rigor with practical guidance to provide theoretical support for enterprises to optimize their digital management strategies and stimulate organizational innovation efficiency. This review is based on core academic databases and systematically retrieves relevant journal literature in the past five years. By combining bibliometric analysis with qualitative research, it conducts a systematic review from dimensions such as theoretical basis, research status, and anion variables, aiming to reveal the theoretical disputes and methodological limitations of existing research and provide a clear academic context and expansion direction for subsequent research.

2. Main body of literature review

2.1. Theoretical foundations

Artificial intelligence technology encompasses a comprehensive set of theories, methodologies, and techniques designed to replicate human intelligence using computer systems [1]. At its core, it leverages complex algorithms and computational models to enable machines to learn, reason, and make decisions. This broad field includes prominent subdomains such as machine learning, where algorithms are trained on vast datasets to recognize patterns and make predictions, and natural language processing, which focuses on enabling computers to understand, interpret, and generate human language.

Generation Z employees, generally defined as individuals born after 1990, have distinct characteristics that set them apart in the workplace [2]. They exhibit a pronounced sense of self-awareness, valuing personal identity and self-expression both within and outside the professional realm [2]. This cohort is driven by the pursuit of high returns, not only in terms of financial compensation but also in aspects like career growth opportunities, work-life balance, and job satisfaction. Their loyalty to organizations tends to be relatively lower compared to previous generations, as they are more inclined to explore new opportunities that align better with their evolving values and career aspirations. In the workplace, Generation Z employees place significant emphasis on outperforming their colleagues to secure additional resources and recognition. When resources are abundant, they are less willing to tolerate subpar working conditions, whether it's an uninspiring work environment, a lack of work flexibility, or an absence of professional development support.

Responsible innovation is a concept centered around a transparent and interactive process [3]. It necessitates active engagement and mutual responsiveness between social participants and innovators. The primary goal is to ensure that the innovation process, as well as the products resulting from it, are ethically acceptable, sustainable, and socially desirable. This means taking into account various societal factors, such as ethical implications, environmental impact, and social equity, throughout the innovation lifecycle [3]. For example, in the development of AI-powered facial recognition technology, responsible innovation would involve considerations like potential biases in the algorithms that could lead to unfair treatment of certain groups, as well as ensuring that the technology is used in a way that respects individuals' privacy rights. By doing so, technological advancements can be seamlessly integrated into society, maximizing their benefits while minimizing potential negative consequences.

The social cognitive theory provides a foundation for analyzing employees' perception and behavior toward AI technology [4]. It posits that an individual's behavior is influenced by their cognitive processes, such as self-efficacy, which refers to one's belief in their ability to execute behaviors necessary to achieve specific performance

attainments. In the context of AI, employees' self-efficacy regarding their ability to use AI tools effectively can significantly impact their willingness to engage with and adopt these technologies. The technology acceptance model explains employees' acceptance level of new technologies, and the innovation diffusion theory reveals the process by which technology affects employees' innovative behavior [5–6]. It describes how innovations are communicated through various channels over time among members of a social system, highlighting different stages of adoption, from the initial awareness of the innovation to its widespread acceptance. Understanding this process can help organizations develop effective strategies to promote the adoption of AI technologies among their employees. These theories construct the theoretical framework of the study from different levels, helping to understand the functional relationships between variables.

2.2. Categorical elaboration of research status

From the organizational perspective, the depth and breadth of an enterprise's digital transformation strategy affect the application level of AI technology, thereby determining its incentive effect on the responsible innovation of Generation Z employees [7]. For example, enterprises that actively promote intelligent transformation can provide employees with more innovative practice scenarios, enhancing employees' sense of identity with innovation responsibility. From the individual perspective, the digital literacy and creative self-efficacy of Generation Z employees play important moderating roles between technology application and responsible innovation [8]. Employees with high digital literacy are more likely to collaborate with AI, thereby stimulating innovative inspiration.

Empirical studies mostly use the questionnaire survey method, collecting data from enterprise employees and establishing structural equation models to analyze variable relationships; case studies select typical enterprises, such as technology giants or innovative start-ups, to deeply analyze the specific practice process of responsible innovation by Generation Z employees in the context of AI technology application. The combination of the two not only verifies theoretical hypotheses but also provides practical experience.

2.3. Research on antecedent variables

Antecedent variables at the organizational level are reflected in the implementation depth of the enterprise's digital transformation strategy. Enterprises that actively promote intelligent transformation can provide employees with more innovative practice scenarios, thereby enhancing employees' sense of identity with innovation responsibility [9]. Meanwhile, the organizational innovation climate and cultural support indirectly become antecedents of responsible innovation by buffering the psychological pressure brought by technology application [10].

Antecedent variables at the individual level focus on digital literacy and creative self-efficacy. The digital literacy of Generation Z employees determines their ability to collaborate with AI technology [11]. Employees with high digital literacy are more likely to use machine learning tools and natural language processing technology to improve work efficiency, thereby stimulating innovative inspiration [12]. Creative self-efficacy affects employees' willingness to apply AI technology. Employees with high self-efficacy are more inclined to use AI as an innovative enabling tool to break through task bottlenecks. In addition, factors such as the perception of work autonomy and the reduction of innovation trial-and-error costs in technology application scenarios also constitute the antecedent correlations of responsible innovation by affecting employees' cognition and motivation.

2.4. Research controversies and deficiencies

Current research has multiple controversies and limitations in theoretical construction and methodological design.

Theoretically, scholars differ on the causal mechanism between AI and responsible innovation. Some scholars, from the perspective of technological empowerment, believe that AI technology can directly promote innovation [13]. Meanwhile, although psychological mechanism research involves variables such as work autonomy, it lacks the deconstruction of the complete path of "technology perception-cognitive evaluation-behavioral intention" [14]. Methodologically, cross-sectional studies account for more than 80%, lacking long-term tracking data. Samples are concentrated in technology-intensive industries, with insufficient research on traditional industries and low-skilled positions. The measurement of responsible innovation mostly relies on self-report scales, lacking cross-validation of objective indicators. In practice, there is also insufficient attention to real-world contradictions such as the conflict between algorithmic goals and responsible innovation goals, and the allocation of decision-making power in human-machine collaboration.

3. Summary and outlook

Previous studies have systematically deconstructed the antecedent variables and the causal paths of the impact of artificial intelligence technology application on the responsible innovation of the new generation of employees from the dual perspectives of organizational context and individual characteristics, and identified the core influencing factors such as the implementation depth of the enterprise's digital transformation strategy, the organizational innovation culture atmosphere, the digital literacy level of employees, and the innovation self-efficacy. However, at the theoretical construction level, there is no unified understanding of the causal transmission mechanism between artificial intelligence technology and responsible innovation, and the complete psychological path of employees' "technology perception-cognitive evaluation-behavioral intention" still lacks systematic deconstruction. At the research method level, the research design dominated by cross-sectional data is difficult to capture the dynamic evolution process, and the sample distribution is overly concentrated in technology-intensive industries. Moreover, the measurement system of responsible innovation lacks cross-validation with multi-source data. At the practical application level, the potential conflicts between the algorithm goals and the responsible innovation goals, as well as the distribution of decision-making power in human-machine collaboration, have not received sufficient attention.

Future research can focus on three aspects for breakthroughs: First, construct a dynamic interaction model of "technology-organization-individual" integrating the time dimension, integrate cross-disciplinary theories such as technology philosophy and ethical psychology, and analyze the evolution laws of employees' responsible innovation behaviors in the iterative cycle of artificial intelligence technology. Second, adopt a mixed methodology combining longitudinal tracking research and multi-source data collection, expand the sample coverage in low-technology-density fields such as traditional manufacturing and services, and introduce objective measurement methods such as neuroscience monitoring to optimize the evaluation system. Third, explore the collaborative governance mechanism of artificial intelligence ethics norms and responsible innovation, formulate differentiated management strategies based on industry characteristics, establish a maturity assessment framework covering dimensions such as technology ethics compliance and employee participation, and at the same time pay attention to the generational value differences of the new generation of employees, the stage of career development, and cognitive and behavioral differences in cross-cultural contexts, providing academic guidance with both theoretical depth and practical value for organizational innovation management in digital transformation.

Disclosure statement

The author declares no conflict of interest.

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