Analysis of Management Innovation Factors of Telecom Carrier

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Received: December 30, 2024; Accepted: May 16, 2025; Available Online: June 30, 2025

Abstract

Adopting the perspective of dynamic capabilities theory, this study investigates management innovation practices within Chinese telecom carrier, with the objective of identifying the key drivers shaping such organizational innovations. Employing a systematic grounded theory methodology, this research conducts an in-depth analysis of management innovation practices at China's three major telecom carriers: China Telecom, China Mobile, and China Unicom. The study reveals that telecom carrier follow a 'contradiction-triggered - capability reconfiguration - value creation' transmission chain and constructed dynamic capabilities: Opportunity perception capability enables enterprises to keenly capture external environmental changes and internal innovation demands; integration and reconstruction capability redefines the combination of production factors through intelligent empowerment and resource reorganization; Value synergy capability drives the creation of an open ecosystem to achieve mutual benefits. This research enriches the study of management innovation from the dynamic capabilities perspective, providing a systematic guidance framework for telecom operators to enhance their competitiveness through management innovation.

Keywords: *Management innovation; dynamic capability; grounded theory; telecom carrier*

ISSN: 3067-7491 © 2025 INATGI (Institute of Advanced Technology and Green Innovation)
See: https://inatgi.in/index.php/jbgi/index for more information. https://doi.org/10.63646/NMIY3821

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1. Introduction

With the rapid development and popularization of technologies such as Big Data, Cloud Computing, 5G, Artificial Intelligence and Internet of Things, the external environment and internal operation mode of telecom carrier are undergoing profound changes. According to the Statistical Report on Internet Development in China, as of December 2024, China's internet user base reached 1.108 billion, with an internet penetration rate of 78.6%. This marks a 1.1 percentage point increase compared to December 2023. The high internet penetration rate coupled with slowing growth has intensified market competition for telecom carrier, gradually exposing the limitations of certain management models when confronted with rapid technological iterations and volatile market demands (Wang & Wu, 2018). These constraints have led to issues such as inefficient resource allocation, operational inefficiencies, and inadequate service capabilities. These issues not only impede the immediate enhancement of telecom carriers' competitive positioning but also pose sustained challenges to their long-term developmental viability. As a way for enterprises to cope with challenges, seize opportunities and gain competitive advantages, management innovation is often regarded as an important guarantee for enterprises to achieve long-term survival and development (Zhenpeng, 2021). Consequently, telecom carriers urgently need to establish a more agile, efficient, and adaptive organizational management framework through management innovation to break through their current operational predicaments.

This paper takes China's three major telecom carriers as the research object and uses the grounded theory to carry out three-level coding of their excellent cases of management innovation. Based on the perspective of dynamic capabilities, a three-dimensional dynamic capability model of " environmental perception-ability reconstruction-value synergy " is constructed, and the management innovation transmission chain from contradiction triggering to value spillover is deconstructed. By introducing the theoretical framework of dynamic capability, this paper develops the elements and evolution mechanism of dynamic capability suitable for the telecom carrier industry for the first time, which provides a new theoretical perspective for the management innovation of telecom carriers in the digital economy era. The research also breaks through the defects of single case study through the grounded theory analysis of multiple cases, refines the common law of management innovation in the telecom carrier industry, and establishes an explanation chain from phenomenon to theory (Yoo et al., 2012).

2. Literature Review

Since Schumpeter put forward the concept of innovation, the follow-up researchers divided management innovation into technological innovation and management innovation (Feng et al., 2021; Shi et al., 2022), but technological innovation has always dominated the field of innovation research (Kaše, 2016). By comparing the practice of Japanese enterprises with that of European and American enterprises, Stata proposed that ' the key to the success of Japanese enterprises lies in management innovation, not technological innovation ' (Stata, 1989). This view emphasizes the unique role of management innovation in enhancing the competitiveness of enterprises, which has led scholars and managers to think

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deeply about the importance of management innovation. Benghozi distinguished management innovation from technological innovation and market innovation, and pointed out that ' the problems that enterprises need to solve are not only technical problems and economic problems, but also management problems, such as internal collaboration processes, development cost control, personal management, etc. ' (Benghozi, 1990). He reiterated the importance of management innovation. Scholars have defined the concept of management innovation based on different research perspectives. Kimberly believed that management innovation is the process of forming creative ideas within the enterprise and transforming them into valuable products, services or business activities (Kimberly & Evanisko, 1981). Hamel believed that management innovation is a new management method that breaks away from the traditional management rules, processes and practices, which can improve the productivity and competitiveness of the organization (Hamel, 2006). Birkinshaw et al. believed that for the latest technology, management innovation is the generation and implementation of new management practices, processes, structures or technologies, aiming at achieving organizational goals (Birkinshaw et al., 2008). This study believes that management innovation is a systematic change process driven by internal and external environmental conflicts. Enterprises break the constraints of traditional management paradigms and achieve corporate goals through disruptive restructuring of production factors such as technology, resources, processes, and organizations (Yan, 2021).

Focusing on China’s telecommunications industry, the practice of management innovation is deeply influenced by major industry change events. In 2008, China’s telecommunications industry was reorganized, and the industry structure was profoundly changed, forming a market structure in which the three major operators of China Telecom, China Mobile and China Unicom coexist. Before the reorganization, the telecommunications industry was in a critical stage of market-oriented reform. The telecommunications business was gradually opening, but the management still emphasized the “natural monopoly” attribute. Management innovation mainly served the expansion of market share, which was embodied in the introduction of franchising mode (Mingfu et al., 2002) and the acceleration of infrastructure expansion (Daoqi, 2001). However, there were obvious shortcomings in management practice at this stage. For instance, product management was still dominated by a one-size-fits-all approach, service levels lagged behind customer expectations, cost management lacked transparency and efficiency, and organizational structures were rigid and hierarchical. These shortcomings became increasingly evident as customer demands diversified, and market competition intensified. It became urgent to improve the product management, service level, cost management and organizational structure (Warner & Wäger, 2019).

After the reorganization in 2008, the three major telecom carriers all obtained 3G licenses, officially ushering in the era of full-service operation. The differentiated competition strategy gradually emerged, and the focus of management shifted strategically (Vidani, 2021). Operators began to emphasize the upgrading of management informatization, the construction of personalized service systems, the improvement of organizational management efficiency, the expansion of new business areas, the deepening of government and enterprise customer markets, and the strengthening of business support systems. For example, China Mobile launched its “Big Cloud” strategy, aiming to leverage cloud

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computing to enhance operational efficiency and service innovation, while China Telecom established the "Smart City" initiative to integrate ICT capabilities into urban governance and public services. These initiatives marked a significant shift from network-centric to service-centric management paradigms. The internal organizational structures also evolved, with the establishment of dedicated customer-centric business units and the introduction of matrix management to enhance cross-departmental collaboration (Wang et al., 2023).

With the popularization of 3G networks and the application of 4G technology, the application of Over-The-Top (OTT) services represented by WeChat had a huge impact on traditional communication businesses (Shurong & Qinghua, 2013). OTT services disrupted traditional revenue models by offering free or low-cost messaging and voice services, leading to a sharp decline in SMS and voice revenues for telecom carriers. This disruption prompted the industry competition pattern to shift from intra-industry competition to cross-industry heterogeneous competition (Verhoef et al., 2021). Telecom carriers were no longer merely competing among themselves but were also facing challenges from internet giants and technology companies. In response, telecom operators accelerated the evolution of their management models towards refinement and agility. For instance, China Unicom initiated the "Internet Plus" transformation plan, which aimed to integrate internet thinking into its corporate strategy, operations, and culture. This plan emphasized user experience, rapid iteration, and open collaboration. The management innovation practices during this period focused on building agile organizations, developing digital channels, and fostering innovation ecosystems (Ochoa-Urrego & Peña-Reyes, 2021).

At present, with the in-depth application of new-generation information technologies such as the Internet of Things, big data, cloud computing, 5G, and artificial intelligence, the boundary of operator management innovation is undergoing reconstruction. These technologies have enabled telecom carriers to move beyond traditional connectivity provision towards becoming digital service providers and enablers (Li, 2020; MacKenzie et al., 2022). The management innovation model now requires cross-domain collaboration, involving partnerships with industries such as healthcare, transportation, manufacturing, and energy. For example, China Mobile has established the 5G Joint Innovation Center, collaborating with over 1,000 partners worldwide to develop 5G applications in areas like smart manufacturing, autonomous driving, and remote healthcare. Similarly, China Telecom has launched the "Tianyi Cloud" ecosystem, integrating cloud, network, and security capabilities to support digital transformation across various sectors. These initiatives highlight the shift from closed innovation to open innovation paradigms, where telecom carriers act as orchestrators of complex ecosystems rather than sole providers of services (Al-Debei & Avison, 2011).

Facing the increasingly complex external environment, the existing research on the management innovation of telecom carriers has double limitations. First, single case analysis is difficult to reveal the common law of industry management innovation (Zhang et al., 2015). Most studies have focused on isolated cases or specific initiatives without systematically comparing across different carriers or contexts. Second, static capability analysis cannot explain the dynamic adaptation mechanism. Traditional theories often view capabilities as static resources, failing to capture how telecom carriers continuously reconfigure their capabilities in response to technological disruptions and market changes.

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Therefore, it is urgent to break through the limitations of single case studies and deconstruct the management innovation of telecom carriers from the perspective of dynamic development (Hanelt et al., 2021; Li et al., 2018). This requires adopting longitudinal and comparative research designs that capture the evolutionary trajectories of management innovation across different carriers and contexts. Moreover, there is a need to integrate dynamic capability theory with other theoretical lenses, such as complexity theory and ecosystem theory, to provide a more holistic understanding of how telecom carriers navigate uncertainty and drive continuous innovation (Warner & Wäger, 2019).

3. Research Design

The data corpus is constituted by two complementary streams of evidence. The primary stream consists of the full set of "Innovation Achievements of Enterprise Management Modernization" released on the official portals of China Telecom, China Mobile and China Unicom from January 2023 to December 2024. These documents are neither promotional leaflets nor tentative pilots; they are post-implementation filings that have undergone a three-tier vetting process: first by the carriers' internal audit committees, second by external panels jointly staffed by the Ministry of Industry and Information Technology (MIIT) and the China Communications Standards Association, and third by independent industry experts convened by the Communication Industry Association. Each filing is required to disclose not only the managerial intervention itself but also baseline indicators, milestone targets, ex-post metrics and third-party validation statements, thereby furnishing the granular behavioral and performance data that grounded theory demands. The secondary stream is formed by the semi-annual industry monitoring reports issued by MIIT's Information and Communications Development Department and by thematic white papers commissioned by the Communication Industry Association (Gupta et al., 2020). These reports contextualize the 90 focal cases within broader market statistics, regulatory timelines and technology diffusion curves, ensuring that the embedded practices are not misread as idiosyncratic outliers (Du et al., 2018).

Taken together, the two streams yield 90 longitudinal cases whose median implementation duration exceeds eighteen months, comfortably surpassing the one-year threshold that mitigates honeymoon effects and short-term measurement noise. The cases span the full functional spectrum (network operations, customer service, digital platforms, government and enterprise solutions, and ecosystem orchestration), thus capturing the multidimensional character of management innovation in telecom carriers rather than a single silo. To preserve analytic rigour, the data set was frozen on 31 December 2024, after which no additional cases were sought, thereby preventing post-hoc selection bias (Escoz Barragan et al., 2025; Felicetti et al., 2024).

The methodological choice of procedural grounded theory is justified on epistemic and pragmatic grounds. First, the domain remains theoretically under-populated: systematic explanations of how telecom carriers convert managerial novelty into sustained performance are scarce, and extant studies are either single-case narratives or large-sample surveys that sacrifice process depth for statistical breadth (Chawla & Goyal, 2022; Ciasullo et al., 2025). In such a context, hypothetico-deductive designs risk prematurely forcing phenomena into extant constructions and overlooking emergent mechanisms unique to the telecom ecosystem. Procedural grounded theory, by contrast, privileges inductive pattern

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recognition and iterative theoretical sampling, aligning naturally with the exploratory intent of the study. Second, the procedural variant of grounded theory offers a transparent, replicable sequence (open, axial and selective coding), whose disciplined steps counterbalance the interpretive flexibility often criticized in qualitative work. NVivo 12 was employed not merely as a storage repository but as an audit environment: every coding decision was date-stamped, linked to its source paragraph, and cross-referenced with analytic memos, creating an evidentiary chain that external reviewers can traverse. Finally, the method's sensitivity to temporal process is indispensable when the research question centers on how management innovation evolves from contradiction through capability reconfiguration to value realization. By tracing concepts across successive coding phases, the study reconstructs the causal choreography that links managerial action to systemic outcomes, thereby leveraging the procedural rigor of grounded theory to illuminate the dynamic capabilities of telecom carriers in real time (Cannas, 2023; Danielsen & Flak, 2022).

4. Data Coding Analysis

The programming grounded theory data coding includes open coding, spindle coding and core coding. This paper uses Nvivo12 to carry out three-level coding of management innovation achievement.

4.1 Open Coding

Open coding constitutes the initial analytical movement in which the research team engages in line-by-line immersion within the raw textual corpus, allowing every sentence and paragraph to disclose its immediate and latent significances. Each of the sixty management-innovation reports was decomposed into 2,347 meaning units that were first tagged with low-inference labels faithful to the original language, then progressively abstracted through iterative comparison until 525 concepts emerged that retained contextual richness while transcending idiosyncratic expression. Concepts were subsequently shifted and re-sifted until 87 sub-categories crystallized, articulating the granular tensions, aspirations and practices that permeate telecom carriers' innovation efforts. Throughout this process, NVivo's bidirectional linking ensured that every conceptual step remained tethered to its evidentiary source, thus preserving an auditable trail from empirical fragment to analytical category.

4.2 Spindle Coding

Spindle coding elevates the analysis from the horizontal dispersion of sub-categories to the vertical integration of generative relationships, interrogating how the 87 sub-categories coalesce into higher-order categories and how these categories relate to one another along the axial dimensions of context, conditions, actions and outcomes. Through sustained dialogical engagement, pairs of researchers negotiated the placement and linkage of each sub-category until theoretical sufficiency rather than statistical closure was achieved, yielding twenty main categories that jointly portray telecom management innovation as a temporally unfolding sequence in which external pressures and internal rigidities evoke perceptual shifts, resource recombination and collaborative orchestrations whose cumulative effect is the reconfiguration of technological, financial and social value. Table 1 presents spindle Coding Results.

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Table 1. Spindle Coding Results

Paradigm	Main Categories
Context	Lack of financial resilience; Disconnection between service value and customer needs; Lag in technological enablement; External market pressures; Operational process complexity; Inefficient resource allocation; Complexity of organization
Conditions	External technological advancements; Internal technological Accumulation; Human-institutional Fit; Market opportunities
Actions and interactions	Opportunity perception; Integration and reconstruction; Value synergy
Consequences or Outcomes	Increased financial resilience; Technology-enabled transition; Customer relationship value reconstruction; Social value co-creation; Operation process is optimized; Organizational structure remodeling

4.3 Core Coding

Core coding distils the full analytical corpus into a single, integrative storyline by selecting one core category that can orchestrate all remaining categories and sub-categories into a coherent, parsimonious explanation of how telecom carriers innovate in response to mounting contradictions. The core category that emerged, dynamic capability reconfiguration, captures the continuous, tension-driven metamorphosis through which carriers convert external market pressure and internal structural frictions into renewed competitive advantage. Market pressure operates as the distal trigger, manifesting as tightening regulatory regimes, accelerating technological substitution, and heterogeneous customer demands that erode traditional revenue streams and expose the brittleness of legacy business models. These external forces converge with internal pathologies: technological lag, tangled processes, and layered organizational architectures that jointly obstruct timely sensing and agile responding. The resulting misalignment between generic offerings and contextualized needs, alongside the disjunction between protracted procedures and instantaneous service expectations, culminates in deteriorating financial resilience.

Within this crucible of contradictions, carriers mobilize opportunity perception to scan and interpret weak signals across policy, technology, and demand arenas, translating uncertainty into discernible value spaces. Integration and reconstruction then enact a recursive sequence in which resources are disassembled and reassembled, capabilities are iteratively shaped through intelligent empowerment and knowledge recombination and ultimately delivered as novel service configurations that dissolve prior bottlenecks. Value synergy extends the transformation beyond organizational boundaries by forging multi-actor ecosystems in which customers, partners, regulators and society at large co-create and appropriate value, thereby converting isolated innovations into sustained relational

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rents. The intertwined trajectories of technological enablement, process optimization and structural redesign reveal a technology-process-organization co-evolutionary dynamic that simultaneously elevates economic performance and societal digitization. Financial resilience, observable through margin recovery and diversified revenue profiles, emerges as the tangible confirmation that the dynamic capability system has successfully transmuted contradiction into sustainable value.

4.4 Theoretical Saturation Test

Theoretical saturation was pursued by withholding thirty management-innovation cases during the initial coding phases and subsequently subjecting them to identical open, axial and selective coding procedures. Continuous comparison within and across these reserved cases yielded no emergent concepts, categories or relationships beyond those already integrated into the theoretical framework. Repetitive encounters with the data produced only confirmatory instances, signaling that the conceptual architecture was sufficiently dense and inclusive. Consequently, the study concludes that saturation has been achieved and further data collection would not substantively extend or refine the grounded theory of dynamic capability reconfiguration in telecom management innovation.

5. Construction of Telecom Carrier Management Innovation Model

5.1 The 'Contradiction-Ability-Value' Transmission Chain of Innovation Path

Telecom carriers confront an environment in which regulatory shocks, technological discontinuities and demand heterogeneity compound one another, producing an external field of forces that collides with ossified resource configurations, rule-bound processes and layered authority structures. The resultant tension is not episodic but chronic, constituting a standing invitation for organizational reconfiguration. Following the transmission chain of “contradiction trigger ability reconstruction value spillover”, the carriers translate this tension into a generative process: contradictions expose capability gaps, dynamic capabilities close those gaps through iterative sensing, seizing and transforming, and the reconfigured capabilities then radiate multi-dimensional value that feeds back into the next cycle of contradiction detection. The contradiction itself is experienced as a threefold pressure exerted by the systemic-institutional order, competitive dynamics and emergent user demands upon an internal architecture whose rigidity is simultaneously technological, procedural and cognitive. Once the contradiction is perceived as intolerable, it becomes the catalyst for embedding new technologies, reallocating decision rights and redesigning workflows, thereby constituting a dynamic capability system whose outputs are measured not only in immediate performance gains but also in the long-term repositioning of the firm within its ecosystem. Value spillover is thus inherently three-dimensional: economic value manifests as a reshaped cost curve and diversified revenue architecture; social value appears in accelerated industry digitization and inclusive access; strategic value is realised when the carrier’s proprietary practices are elevated to industry standards, locking in architectural advantage for subsequent competitive rounds.

5.2 Construction of Three-Dimensional Factors of Management Innovation Dynamic Capability

Opportunity perception operates as a forward-looking radar that continuously sweeps policy documents, market signals and behavioral traces to locate latent value spaces before

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they become visible to competitors, thereby converting environmental volatility from a liability into a navigational resource. By translating weak signals into probabilistic scenarios, the carrier moves resource allocation from reactive buffering to proactive positioning, ensuring that capital, knowledge and attention are pre-deployed at the inflection points where technological trajectories and regulatory windows intersect. Integration and reconstruction orchestrate five mutually reinforcing levers (intelligent empowerment, knowledge topology, resource decomposition, process compression and organizational plasticity) that jointly dissolve the constraints of legacy factor proportions and reassemble them into a socio-technical ensemble capable of rapid recombination. This orchestration is neither linear nor one-off; it unfolds as a recursive cycle in which each lever simultaneously conditions and is conditioned by the others, producing a self-reinforcing capability architecture that can absorb shocks while retaining strategic coherence. Value synergy extends the locus of value creation beyond the legal boundary of the firm, embedding the carrier within a polycentric network of customers, complementors, regulators and civil society actors whose iterative interactions co-produce both economic surplus and public goods. Through open interfaces, shared governance protocols and risk-pooling arrangements, the carrier transforms potential rivalry into relational rent, ensuring that innovations diffuse rapidly across the ecosystem while proprietary advantage is preserved through architectural control points. Opportunity perception, integration reconstruction and value synergy thus constitute an ascending spiral in which each phase supplies the informational, material and relational inputs required by the next, yielding a continuously deepening capability trajectory that aligns micro-level adaptability with macro-level institutional evolution.

6. Research Enlightenment and Prospect

Based on the dynamic capability theory, this study adopts the procedural grounded theory method to distil the principal factors that impel management innovation within Chinese telecom carriers and, from that foundation, articulates a coherent path through which these carriers convert innovation into sustained enterprise growth. The empirical process reveals that management innovation is not an ancillary adjustment but a wholesale reconfiguration of the elemental base (talent, knowledge, technology and data) in which each element is dis-embedded from legacy arrangements and re-embedded into architectures that magnify combinatorial possibilities. External environmental pressure and internal capability rigidity do not merely coexist; they amplify one another in a recursive loop that renders traditional factor dependencies obsolete and makes disruptive re-organization an existential imperative rather than a strategic option. The ternary dynamic capability system (opportunity perception, integration and reconstruction, value synergy) operates as a nested hierarchy in which each layer both enables and is enabled by the others, producing a self-accelerating engine for innovative resource allocation whose outputs exceed the sum of its parts. Integration and reconstruction, in particular, weave technology, knowledge, resources, processes and organization into a seamless five-dimensional fabric; intelligent empowerment endows human actors with augmented decision heuristics, knowledge topology maps and remaps intellectual assets as problems evolve, resource decomposition dissolves fixed factor proportions, process compression collapses temporal and cognitive slack, and flexible organization institutionalizes the capacity for continual metamorphosis. Value synergy translates these internal reconfigurations into external relational rents by

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orchestrating multi-stakeholder ecosystems in which customers, partners and regulators co-create value under governance mechanisms that align heterogeneous interests and distribute risk. The resulting closed-loop interaction (environmental scanning begets capability reconstruction, which begets value creation, whose experiential feedback refines subsequent scanning) transforms the enterprise into a living sensor that perpetually rewrites its own source code in real time.

By tracing how management innovation liberates latent technological potential and re-allocates resources along trajectories that were previously invisible or infeasible, the study extends dynamic capability theory into the empirical terrain of telecom carriers and demonstrates that the locus of competitive advantage has migrated from the possession of superior assets to the orchestration of superior recombination routines. The articulated path is deliberately operational, offering managers a systemic remedy for entrenched dysfunctions such as technology transformation bottlenecks and chronic resource inefficiency by prescribing precise intervention points within the contradiction-ability-value chain.

The study's limitations are rooted in the specific institutional soil from which the data were harvested. The focal firms are all state-owned carriers whose strategic latitude is shaped by policy orchestration and resource endowments that are neither replicable nor portable to private, multinational or small-to-medium communication service providers; hence the generalizability of the findings awaits comparative replication across ownership forms and competitive contexts. Furthermore, the cross-sectional character of the data set constrains insight into the durability of innovation outcomes and into the evolutionary tempo at which dynamic capabilities must be recalibrated across successive technological epochs; longitudinal tracking is therefore required to illuminate the long-wave rhythms through which management innovation ebbs, flows and mutates as external discontinuities and internal learning curves co-evolve.

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Acknowledgement

The authors thank the anonymous reviewers for their constructive comments and suggestions that have significantly improved the quality of this manuscript.

Author Contributions

X.Z.: Conceptualization, Methodology, Formal Analysis, Writing (Original Draft), Supervision. N.W.: Data Curation, Coding and Analysis, Validation, Writing (Review and Editing). Y.L.P.: Data Collection, Coding and Analysis, Visualization, Writing (Review and Editing). All authors have read and agreed to the submitted version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Generative AI Statement

Generative artificial intelligence was used to write language and drafting.

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