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Organizational Resilience and Firm Performance: Short- and Long-Term Effects

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Abstract

Integrating dynamic capability theory and social exchange theory, this study reveals the impact of organizational resilience (OR) on firm performance (FP) from both short-term and long-term perspectives. The mediating roles of R&D innovation (RD) and employee turnover (ET), as well as the moderating role of artificial intelligence (AI), are also explored. Using a sample of Chinese A-share listed companies in the manufacturing industry from 2009 to 2022, this study demonstrates that OR contributes to both short-term performance (SP) and long-term performance (LP). RD serves as a negative mediator between OR and SP, while it plays a positive mediating role between OR and LP. ET, in turn, acts as a positive mediator between OR and SP/LP. Our results also suggest that AI positively moderates the relationship between OR and SP/LP. Additionally, the heterogeneity results indicate that the promotion effect of OR on SP is more significant in larger enterprises and low-competition industries. In contrast, the impact of OR on LP is more significant in smaller enterprises and high-competition industries. This study comprehensively describes the effects of OR on FP and explains why there are contradictory findings on the relationship between the two. It also provides practical guidance for manufacturing companies to promote SP and LP through OR in the age of AI.

Keywords: organizational resilience; R&D innovation; employee turnover; artificial intelligence; firm performance

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1. Introduction

In recent years, manufacturing enterprises have faced mounting challenges from the compounded pressures of long-term structural shifts and acute short-term disruptions. The former includes the "dual-carbon" target, energy transition, rising labor costs, and the AI-driven technological revolution, while the latter encompasses frequent black-swan events, shrinking international orders, and supply chain insecurities exacerbated by anti-globalization. Facing these challenges, some manufacturing companies manage to thrive against the odds, while others stagnate or decline. The divergence largely stems from OR. According to Gartner, by 2025, nearly 70% of global CEOs will prioritize building a culture of resilience to counter threats such as pandemics, cybercrime, and extreme weather. About 80% of entrepreneurs believe that only resilient organizations can achieve long-term

success, and around 90% of business leaders view OR as a key future competitive advantage. However, emerging practical evidence reveals a paradox: the operational mechanisms and developmental logic of OR conflict with efficiency-driven principles, and overemphasizing resilience may undermine operational performance. Therefore, the key challenge lies in leveraging the strengths of operations research while mitigating its potential drawbacks.

Regarding the practical question of whether OR has an impact on FP, and if so, whether this impact is positive or negative, academic research has put forward several perspectives. First, the short-term positive perspective suggests that OR enhances firms' short-term profitability indicators, including financial performance [1], business development [2], and new product development performance [3]. Second, the long-term positive perspective indicates that OR contributes to sustained enterprise development, such as firm growth [4,5], innovation performance [6], and organizational sustainability [7–9]. Third, a critical perspective has emerged, in which scholars, based on deeper observations of industrial practices, challenge the assumption that OR is uniformly beneficial, positing instead that it may entail potential downsides [10,11]. Fourth, the nonlinear perspective argues that OR may exhibit diminishing or even adverse effects when taken to excess. For instance, Zighan [12] suggests that excessive OR could negatively affect enterprise development, while Liang et al. [13] demonstrate that OR may exert a dual-edged effect on corporate ESG performance. Overall, existing research has not reached a consensus on the relationship between OR and FP. A key underlying reason may be that manufacturing enterprises must balance both short-term responsiveness and long-term strategic adaptation when confronting crisis shocks. However, current academic inquiry remains limited in examining the impact of OR on FP through an integrated short-term and long-term lens.

The dynamic capabilities theory posits that firms achieve performance enhancement by integrating, building, and reconfiguring internal and external resources to respond to environmental changes [14]. As a crucial dynamic capability, OR helps firms drive innovation activities [15,16]. Particularly in today's rapidly changing market environment, RD has become a core driver for the sustainable development of manufacturing enterprises. However, as RD is a risky activity, it may negatively affect short-term returns. Therefore, this paper posits that OR may influence FP by promoting RD. In addition, from a human resource perspective, employees constitute essential human capital. High ET increases operational costs [17], disrupts workforce continuity [18], and erodes social capital [19], all of which negatively impact FP. Social exchange theory provides the theoretical foundation for understanding this mechanism: the interaction between organizations and employees is essentially one of reciprocal exchange [20]. When organizations provide support and care, employees are more likely to reciprocate through higher work engagement and reduced turnover intentions [21], thereby contributing to organizational objectives. Research indicates that resilient organizations can effectively enhance employee satisfaction by allocating adequate resources, alleviating psychological anxieties, and cultivating an empowering work climate [22,23], thereby reducing turnover rates. Therefore, this paper further infers that OR may indirectly improve FP by reducing ET. Finally, the effectiveness of OR is contingent on contextual factors. AI, as a catalyst for technological advancement and industrial transformation, demonstrates substantial potential to enhance productivity, reduce costs, and stimulate economic growth [24–26]. Particularly in volatile global environments, AI serves as a key enabler of OR [27]. These insights suggest that AI may moderate the impact of OR on both SP and LP. Nevertheless, these propositions warrant empirical validation.

In response to the above reality and theory gaps, this study aims to shed light on the following issues: (1) What impacts does OR have on SP and LP, respectively? (2) What are the mechanisms by which OR affects SP and LP? (3) How does AI affect the relationship between OR and short-term and LP? The main contributions of this paper are as follows:

First, this paper comprehensively portrays the impact of OR on FP from both short- and long-term integrated perspectives. Our work explains why the relationship between the two has contradictory conclusions of "positive impact" and "negative impact". Second, we find that RD negatively mediates the relationship between OR and SP, but positively mediates the relationship between OR and LP. Our work expands the intrinsic paths between OR and both SP and LP. It also responds to the call of previous scholars to strengthen the exploration of the influence paths of OR and its potential negative effects [28]. Third, we find that ET is an important path for OR to promote both SP and LP, providing new ideas and paths for understanding the link between the two. This work also expands the explanatory boundaries of social exchange theory. Fourth, by exploring the moderating effect of AI in the OR-SP/LP relationships, the boundary conditions of OR's effectiveness are expanded.

The rest of the paper is structured as follows: The Section 2 reviews the relevant literature and formulates the research hypotheses. The Section 3 describes the data sources, variable measurement and model construction. The Section 4 analyzes the results. The Section 5 is the conclusion and discussion.

2. Literature Review and Hypothesis Development

2.1. OR and FP

As summarized in Table 1, scholarly investigations into the impact of OR on FP can be categorized by the performance time horizon. Studies focusing on SP have yielded mixed results, identifying positive, weakly positive, and even negative effects. Similarly, research on LP primarily confirms a positive link but also reveals more complex, non-linear relationships. This lack of a unified conclusion underscores a significant gap: most extant research examines the impact from a singular temporal perspective, failing to bridge the short- and long-term needs of sustainable development. Our study addresses this gap by adopting an integrated temporal lens.

Table 1. Impact of OR on FP.

Category	Outcome Variable	Impact Effect	Representative Literature
Short-term performance	Procurement performance	Positive	Appiah et al. (2023) [29]
	Business performance	Positive	Beuren et al. (2022) [30]; Ferron-Vilchez & Leyva-De La Hiz (2023) [2]; Tagliazucchi et al. (2023) [31]
	New product development performance	Positive	Zhao et al. (2021) [3]
	Financial performance	Weaker positive	Iftikhar et al. (2021) [32]
	Efficiency	Negative	Chaigneau et al. (2022) [10]; Zighan (2023) [12]
	Well-being	Negative	Markolf et al. (2022) [11]
Long-term performance	Firm growth	Positive	Liang & Li (2024b) [4]; Zhang & Qi (2021) [33]
	Competitive advantage	Positive	Ingram & Bratnicka-Mysliwiec (2019) [34]; Pratono (2022) [35]
	Sustainability	Positive	Corrales-Estrada et al. (2021) [36]; Hu et al. (2022) [37]; Kiraci et al. (2022) [38]; Sobaih et al. (2021) [39]; Wided (2022) [40]
	Innovation performance	Positive	Akgun et al. (2023) [6]; Zhao et al. (2020) [41]
	Enterprise high-quality development	U-shaped relationship	Liang et al. (2024) [42]

Table 1. *Cont.*

Category	Outcome Variable	Impact Effect	Representative Literature
Long-term performance	ESG performance	Double-edged sword effect	Liang et al. (2023) [13]
	Product cost advantage	Inverted U-shaped relationship	Liang & Li (2024) [43]

2.2. The Impact of OR on FP

Dynamic capability theory states that enterprises integrate, build and reconfigure internal and external resources to cope with changes in the external environment, thus improving enterprise performance and competitive advantage [14]. According to this theory, OR, as a special dynamic capability enabling firms to respond to external shocks [16,44,45], facilitates timely resource accumulation and rapid resource integration, allowing organizations to navigate crises and ensure operational continuity. This capability contributes to mitigating the adverse effects of environmental disruptions on SP and LP. Therefore, dynamic capability theory provides a theoretical foundation for explaining the relationship between OR and SP/LP.

The impact of OR on SP and LP is primarily manifested in the following three aspects. First, OR, as a capability to withstand risks, mitigates the adverse effects of external shocks on firms [46,47]. Resilient organizations possess substantial resource reserves and robust risk preparedness foundations [48], enabling them to promptly detect changes in the external environment when disruptions occur. Thus, it is conducive for enterprises to mobilize their own resources in a timely manner and take preventive measures to avoid the disruption of external shocks to various aspects of their business, thus achieving SP improvement. In addition, resilient organizations are capable of identifying valuable opportunities embedded in environmental change signals [49], and effectively transforming these insights into market-competitive products or services. In this way, enterprises can enhance their market competitiveness [50], and maintain business continuity.

Second, OR, as a capacity for adaptation and adjustment, can effectively optimize the flexible allocation of internal resources and reduce the idleness and inefficiency in resource utilization, thereby lowering operational costs. For example, Rai et al. [51] pointed out that resilient organizations are capable of reducing material waste and production costs, thus improving corporate profitability. Furthermore, OR enhances the efficiency of enterprise resource utilization, supports continuous product improvement and optimization [15], and facilitates the timely updating of processes and equipment. These capabilities enable firms to respond more swiftly to crises and support sustainable long-term growth [52].

Third, OR, as a recovery and rebound capability, not only enables firms to recover quickly from crises [53,54], but also allows them to achieve counter-trend growth after the crisis [46]. Resilient organizations internalize their crisis response experiences as part of an OR "gene" following disruptive events. By reflecting and summarizing the deficiencies in business processes, they continuously refine and enhance their operations [55], thus supporting both short-term survival and long-term development. At the operational level, OR promotes efficient cooperation and collaboration among employees and encourages active knowledge sharing. As a result, during emergencies, team members can collaborate, jointly formulate strategies, and explore innovative solutions, enabling the organization to seize opportunities and achieve growth against the trend [56].

Based on the above discussion, we propose the following hypothesis:

H1a. *OR has a positive impact on SP.*

H1b. *OR has a positive impact on LP.*

2.3. The Mediating Role of RD

Dynamic capabilities enable firms to transform market-generated knowledge into resources, skills and activities that meet customer needs. They facilitate the continuous renewal of existing resource base, configure new knowledge required for diverse forms of innovation, and support enterprises in conducting R&D activities [57]. Research has also demonstrated that dynamic capabilities drive the creation of new knowledge and promote various types of innovation, including technological, service, process and market innovation [58]. Eisenhardt & Martin [59] argue that dynamic capabilities are embedded within the new product development process. OR refers to an organization's ability to withstand, adapt and counteract external shocks. Resilient organizations possess substantial resource reserves and can promptly adjust existing resources as well as create new ones, which may facilitate the generation of R&D activities and thereby influence SP and LP. Therefore, grounded in dynamic capability theory, this paper further explores the relationship between "OR-RD-SP/LP".

Resilient organizations possess substantial resource reserves, which provide a solid foundation for enterprise innovation. It has been shown that organizational slack resources facilitate the effective execution of innovative initiatives and enhance innovation vitality [48]. Moreover, resilient organizations typically maintain a robust capital structure. This enables them to rapidly mobilize resources during crises and allows strategic allocation of resources to innovation projects aligned with prevailing environmental conditions, thereby supporting continuous innovation. Second, resilient organizations can actively adjust and effectively coordinate internal and external resources in a crisis, thus generating new ideas and acquiring more new external knowledge. Through creative resource integration, these organizations advance their innovation efforts. Third, resilient organizations excel in identifying emerging new innovation opportunities [43], thereby strengthening the alignment between available resources and timely opportunities, driving resource enhancement, and supporting the development of R&D activities. Additionally, resilient organizations often exhibit workforce diversity, which contributes to a broader pool of knowledge resources. The integration and accumulation of diverse knowledge enable organizations to challenge established business models and successfully introduce competitive products and services to the market [48].

Scholars have also cautioned that dynamic capabilities can be a double-edged sword. As Zahra et al. [60] observed, the misapplication of dynamic capabilities may lead to adverse consequences for firm development. The above discussion indicates that OR, as a dynamic capability, can promote RD. However, RD is an investment activity with high uncertainty and risk [61]. In the short term, the RD process entails significant unpredictability, and excessive investment in this domain may strain corporate resources, potentially undermining profitability. Existing studies have shown that RD input may negatively affect operational efficiency, resulting in a temporary decline in firm performance [62]. In addition, the commercialization of R&D does not occur instantaneously. It requires navigating a series of complex stages, including market research, product design, marketing, and promotion [63]. Even after a product successfully enters the market, achieving market acceptance necessitates a prolonged sales and adoption process [64]. Throughout the entire process of RD activities, every stage is fraught with risks and challenges. Therefore, RD may yield limited tangible outcomes in the short run.

In the long run, increased RD investment by manufacturing firms contributes to sustained long-term growth. At the firm level, RD is recognized as a resource-acquisition behavior that enables organizations to maintain competitive advantage and thrive in dynamic markets [65]. Through R&D initiatives, enterprises can not only improve production efficiency [66] but also achieve product differentiation, thereby mitigating intense price com-

petition from rivals [67], and establishing distinctive competitive advantages. In addition, heightened RD investment allows firms to develop proprietary technologies within specific technological domains, effectively raising entry barriers for potential competitors [68]. This not only helps enterprises to have a stable customer base in the market, but also brings sustainable and predictable revenue streams. Finally, RD significantly improves product and service quality [69], fostering long-term, trust-based relationships with customers and ultimately facilitating the realization of enduring firm growth.

Taken together, we propose:

H2a. *OR suppresses SP by promoting RD.*

H2b. *OR enhances LP by promoting RD.*

2.4. The Mediating Role of ET

Social exchange theory emphasizes the reciprocal relationship between individuals and organizations, grounded in the principle of mutual obligation and exchange [20]. Within this framework, when employees perceive that the rewards they receive from the organization are commensurate with or exceed their contributions, they develop a sense of obligation to reciprocate, leading them to remain with the organization. Conversely, when employees perceive a discrepancy between their efforts and organizational returns, particularly when such inputs are underappreciated or fall short of expectations, they are more likely to consider voluntary departure. ET refers to the process by which an employee who has benefited from organizational resources voluntarily terminates their employment relationship. According to social exchange theory, resilient organizations are better equipped to provide employees with abundant resources, attend to their emotional and psychological needs, and enhance their overall life satisfaction. When employees perceive strong organizational support and genuine care, they are more inclined to proactively contribute to organizational goals [21], thus reducing turnover behavior. This may have an impact on SP and LP. Therefore, this paper argues that OR may affect SP and LP by influencing ET behavior.

OR may inhibit ET behavior. First, resilient organizations not only encourage employees to express diverse viewpoints actively, but also provide them with autonomy for learning and experimentation, and offer performance-based rewards for proactive innovation behaviors [70]. When employees perceive that their efforts and contributions are recognized and reciprocated by the organization, they become more engaged in their work [71], thus reducing ET behavior. Second, resilient organizations are capable of providing abundant resources to employees, alleviating work-related anxieties, and fostering a sense of inspiration and support, which strengthens their organizational identification and sense of belonging [22]. According to social exchange theory, such perceived organizational support enhances employee loyalty, leading to reduced turnover intentions. Third, resilient organizations contribute to cultivating a positive organizational climate and enhancing employee well-being [22,30,72]. This results in greater employee satisfaction with their work environment and increased appreciation for their current job opportunities, ultimately reducing ET.

Regarding the relationship between ET and SP/LP, existing literature generally maintains that ET is functionally disruptive to firm, which can have a significant negative impact on FP [73,74]. Scholars have primarily elaborated on this argument from three perspectives: cost [17], human capital [18], and social capital [19]. From a cost perspective, when an employee voluntarily leaves an organization, the firm must incur additional expenditures related to recruitment, onboarding, and training to sustain normal operations. These include advertising for vacancies, conducting interviews, and providing induction programs, all of which increase operational expenses, thereby negatively affecting short-term prof-

itability and competitive positioning [75]. From a human capital perspective, ET entails not only the loss of personnel but, more critically, the erosion of organizational knowledge and specialized skills [76,77]. The specialized skills, experience, and tacit knowledge possessed by departing employees often represent valuable intangible assets accumulated over time. Their departure results in the dissipation of these critical resources, posing a substantial threat to both current earnings and long-term strategic development. From a social capital perspective, ET involves not merely individual attrition but also the disruption of internal and external relational networks. Such networks, developed through prolonged organizational interactions, play a vital role in information sharing, resource access, collaboration, and innovation. However, these connections often suffer immediate and irreversible damage upon employee exit, imposing significant intangible costs on the organization and adversely affecting SP and LP. Some studies have also pointed out that ET will significantly reduce firms' sales performance [78], cost efficiency [79] and productivity [80,81], and damage the quality of customer service [82]. This further adversely affects SP and LP.

Consequently, we propose the following two hypotheses:

H3a. *OR enhances SP by reducing ET.*

H3b. *OR enhances LP by reducing ET.*

2.5. The Moderating Role of AI

AI not only exerts a significant influence on enterprise performance but also serves as a critical enabler of OR. We therefore posit that the application level of AI moderates the relationship between OR and FP.

First, AI enhances an organization's predictive foresight and decision-making precision. AI technologies offer advanced data analytics and pattern recognition capabilities [83]. Resilient organizations with a high level of AI adoption can more effectively extract and analyze vast amounts of historical and real-time data to identify market trends, shifts in consumer demand, and competitor dynamics. This enhanced environmental scanning enables such organizations not only to respond to disruptions but also to anticipate them, thereby deploying their resilience capabilities more strategically to seize emerging opportunities and mitigate potential threats. As a result, these organizations can make strategic adjustments timely, such as proactively optimizing supply chains or entering emerging market niches, leading to more direct improvements in both short-term profitability and long-term competitive advantage.

Second, AI optimizes the process of resource reconfiguration, accelerating the efficiency with which OR translates into performance outcomes. A key manifestation of OR is the capacity to flexibly reconfigure resources [4]. AI applications, such as intelligent scheduling systems and automated workflow management tools, are deeply integrated into design, production, management, and service processes [84], enabling highly efficient and dynamic resource allocation. When empowered by AI, resilient organizations can implement strategic changes and reallocate resources with greater speed and precision. This helps reduce operational friction and decision-making delays, enabling cost reduction and efficiency gains for short-term benefits, while simultaneously freeing up and directing resources towards new business development for long-term growth.

Third, AI accelerates knowledge automation and innovation, enhancing an organization's long-term adaptability and renewal. It automates explicit knowledge processing and supports tacit knowledge codification [85]. For instance, natural language processing analyzes customer feedback and scientific literature to generate product ideas, while machine learning shortens R&D cycles, reducing innovation time and cost. Thus, AI lowers the barriers to exploration and experimentation for resilient organizations. It enables them

to more effectively leverage their resilience to challenge existing business models and successfully launch competitive products or services, thereby achieving SP and LP.

Conversely, when the application level of AI is low, organizations lack enhanced capabilities in insight, agility, and innovation. OR effectiveness may be limited by slow, poorly informed decisions and inefficient resource mobilization, weakening its impact on SP and LP.

In summary, this paper proposes the following hypothesis:

H4a. *As the level of AI application increases, the enhancement effect of OR on SP becomes stronger.*

H4b. *As the level of AI application increases, the enhancement effect of OR on LP becomes stronger.*

In conclusion, drawing on dynamic capabilities theory and social exchange theory, this paper elucidates two distinct mediating pathways. The former clarifies how OR drives RD through resource reallocation, while the latter explains how OR reduces ET by enhancing employee belonging and satisfaction. The parallel operation of the two theories helps to understand the intrinsic mechanism between OR and SP/LP from organizational and individual levels. Figure 1 presents the theoretical model of this paper.

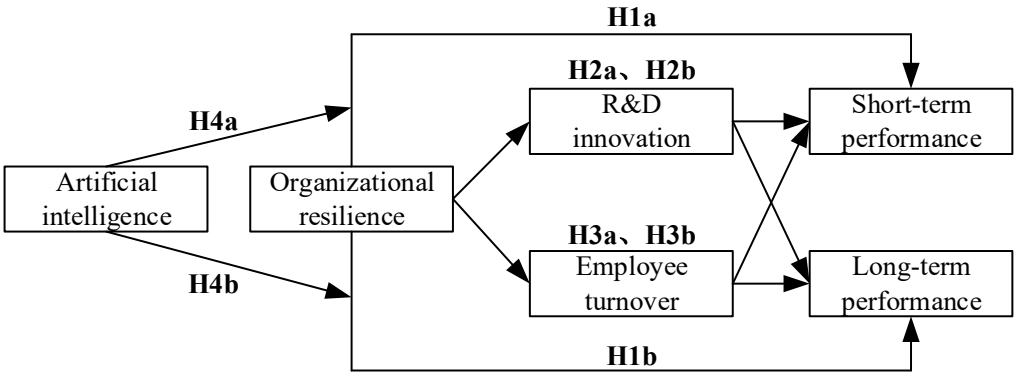


Figure 1. Theoretical model.

3. Method

3.1. Sample and Data Collection

The sample in this study comprises manufacturing listed companies in China's Shanghai and Shenzhen A-share markets from 2009 to 2022. The year 2009 was selected as the starting point to mitigate potential distortions caused by the 2008 global financial crisis, which may have significantly affected financial and economic indicators in that year. The following data processing procedures were applied: (1) ST and *ST firms, as well as observations with missing key variables, were excluded from the analysis. (2) To minimize the influence of extreme values, all continuous variables were winsorized at the 1% level. The raw financial data were obtained from the CSMAR database, AI patent data from the China Research Data Service Platform (CNRDS), and regional GDP per capita from the China Statistical Yearbook. The data analysis software we used was Stata 16.

3.2. Measure

3.2.1. Dependent Variable: FP

This paper divides enterprise performance into SP and LP.

SP refers to the operating efficiency and profitability of an enterprise during a specific period. Existing scholars mainly use both single and multidimensional indicators to measure corporate short-term profitability. For example, Yang & Zhou [86] used enterprise value as a proxy for operational performance, while Zhang et al. [87] used return on total

assets to assess profitability. Li [88] measured corporate performance using a composite index comprising return on net assets, return on total assets, and net profit growth rate. Building on these prior approaches and informed by previous case studies conducted by this research group on the impact of OR in manufacturing firms, this paper measures SP from two aspects of cost and profitability. It includes three indicators: cost-expense profit rate, return on total assets and return on net assets. The comprehensive short-term performance score is calculated using the entropy weight method.

LP primarily denotes the process by which a firm evolves from a relatively weak position to a stronger one, attaining a certain level of core competitiveness and market recognition. Existing research has predominantly employed indicators of scale expansion, reflecting quantitative firm changes, to measure LP. Some scholars have chosen single indicators, such as business income growth rate [89,90], sales growth rate [91], employment growth rate [92] and Tobin's Q [93], to measure LP. Others have adopted a multidimensional approach: for instance, Block & Fathollahi1 [94] measured LP using sales revenue and employment growth rate, while Anton [95] measured it across three dimensions: growth rate of number of employees, growth rate of sales revenue and growth rate of total assets. Building on these prior methodologies and informed by previous case studies conducted by this research group on the effects of OR in manufacturing firms, this study measures LP using four indicators: Tobin's Q, sales revenue growth rate, operating income growth rate, and total assets growth rate. The comprehensive LP score is calculated using the entropy weight method.

3.2.2. Independent Variable: OR

Existing approaches to measuring OR include questionnaire-based surveys and secondary data. Although survey scales are useful for capturing perceived organizational attributes, they are susceptible to subjective biases. In contrast, secondary data help mitigate common method bias and are particularly well-suited for large-sample studies of listed companies. Therefore, this study employs data from listed firms and measures OR through the construction of a comprehensive indicator system.

This study conceptualizes OR as a dynamic capability developed throughout the entire crisis management process, encompassing the pre-crisis, in-crisis, and post-crisis phases. Drawing on the previous research results of the research group [4,13], OR is measured along three dimensions: ability to resist risks, ability to adapt and adjust, and ability to recover and bounce back, as detailed in Table A1 in the Appendix A. The ability to resist risks primarily reflects an organization's ability to accumulate resources and implement effective risk prevention mechanisms. The capacity for adaptation and adjustment highlights the organization's flexibility in reallocating resources, personnel, and products in response to environmental changes. Recovery and transcendence capacity focus on the optimization of organizational components and the enhancement of overall performance. Finally, the composite score of OR is calculated using the entropy weight method. This approach is adopted because the entropy weight method is an objective weighting technique that assigns weights based on the variability of each indicator's data. Indicators with greater variation convey more information and are therefore assigned higher weights, thereby minimizing the influence of subjective researcher bias.

Since the definitions and calculation methods of the indicators for each dimension are consistent with those used in prior studies, they are not repeated in this section. The detailed computational procedure of the entropy weight method is presented in Appendix B.

3.2.3. Mediating Variable: RD and ET

RD refers to investment activities undertaken by firms to acquire new knowledge and develop novel products, services, or processes. Due to heterogeneity among manufacturing

enterprises, R&D activities vary significantly across firms. Following the approach of Hirshleifer et al. [96], this study measures R&D intensity using the ratio of R&D expenditure to operating income.

Turnover is a key indicator reflecting the dynamic changes in human resources within an enterprise. While much of the existing literature relies on survey data to explore employees' turnover intentions, this study draws on Qian et al. [97] and employs dummy variables as proxies for ET behavior. Specifically, ET is measured by comparing the current number of employees with that of the previous period. When the total number of employees in the current period is lower than in the previous period, the variable is coded as 1; otherwise, it is coded as 0.

3.2.4. Moderating Variable: AI

AI is an intelligent technology that enables computers to imitate human thinking and behavior through methods such as machine learning, deep learning and natural language processing [27]. Referring to Yao et al. [98], text analysis is used to extract the frequency of AI-related keywords from the annual reports of listed firms. Specifically, the construction of the AI keyword dictionary draws upon multiple authoritative sources: the Chinese translation of AI-related terminology provided by Chen & Srinivasan [99], AI research reports published by Ping An Securities, the China Business Industrial Research Institute, and the Shenzhen Foresight Industry Research Institute, as well as the AI glossary issued by the World Intellectual Property Organization. A preliminary set of 52 seed terms—including "artificial intelligence," "machine learning," "Internet of Things," and "cloud computing"—is identified. Subsequently, using the Word2Vec framework with the Skip-gram model, word embeddings are trained on corporate annual reports and patent documents. For each seed term, the 10 most semantically similar words are retrieved based on cosine similarity. After removing duplicates, irrelevant terms, and low-frequency words, a refined list of 73 terms is ultimately compiled to constitute the AI keyword dictionary used in this study. Finally, one is added to the word frequency of AI-related terms, and a logarithmic transformation is applied to derive the measurement of artificial intelligence.

3.2.5. Control Variables

Referring to the existing literature [4,100], the following control variables are set: (1) Firm size, measured by the natural logarithm of total assets. (2) Duality of positions, a binary indicator that equals 1 if the chairman and general manager are held by the same individual, and 0 otherwise. (3) Number of board members, measured as the natural logarithm of the number of board members. (4) Proportion of independent directors, calculated as the ratio of independent directors to the total number of directors. (5) Proportion of the largest shareholder, determined by the ratio of shares held by the largest shareholder to the total number of shares. (6) Firm age, computed as the natural logarithm of one plus the difference between the year of observation and the firm's year of establishment. (7) Industry competition, quantified using the Herfindahl Index based on firms' total assets within the industry. (8) Level of economic development, assessed by the natural logarithm of regional gross domestic product per capita.

Table 2 presents the descriptive statistics of the variables.

Table 2. Variable descriptions.

Type	Variable Name	Symbol	N	Mean	SD	Min	Median	Max
Explained Variable	Short-term performance	SP	13,357	0.443	0.206	0.014	0.462	0.799
	Long-term performance	LP	13,357	0.012	0.013	0.000	0.008	0.067

Table 2. *Cont.*

Type	Variable Name	Symbol	N	Mean	SD	Min	Median	Max
Explanatory Variable	Organizational resilience	OR	13,357	0.088	0.060	0.021	0.067	0.277
Mediating Variable	R&D innovation	RD	13,357	0.076	0.084	0.001	0.053	0.616
	Employee turnover	ET	13,357	0.360	0.480	0	0	1
Moderating Variable	Artificial intelligence	AI	13,357	0.877	1.149	0	0	4.304
Control Variable	Firm size	Size	13,344	22.129	1.176	19.887	21.977	25.527
	Duality of positions	Dual	13,344	0.345	0.475	0.000	0.000	1.000
	Number of board members	Board	13,342	2.108	0.188	1.609	2.197	2.565
	Proportion of independent directors	Indep	13,342	0.376	0.053	0.333	0.357	0.571
	Proportion of the largest shareholder	Top1	13,344	0.329	0.140	0.009	0.307	0.721
	Firm age	FirmAge	13,344	2.885	0.344	1.792	2.944	3.526
	Industry competition	HHI	11,648	0.130	0.107	0.039	0.081	0.660
	Level of economic development	Pgdp	13,349	4.664	0.027	4.605	4.668	4.735

3.3. Model Building

To test the research hypothesis, the following econometric models are constructed based on the methodological framework proposed by Baron & Kenny [101]. Model (1) examines whether OR significantly affects FP. Model (2) investigates whether OR has a significant impact on RD and ET. Model (3) assesses whether RD and ET mediate the relationship between OR and FP. Models (4) and (5) test whether AI moderates the relationship between OR and FP.

$$firm\ performance_{it} = a_0 + a_1 Resi_{it} + a_z Z + \varphi_c + \delta_t + \varepsilon_{it} \quad (1)$$

$$M_{it} = C_1 + \eta Resi_{it} + \eta_1 Z + \varphi_c + \delta_t + \varepsilon_{it} \quad (2)$$

$$firm\ performance_{it} = C_2 + \theta Resi_{it} + \lambda M_{it} + \phi Z + \varphi_c + \delta_t + \varepsilon_{it} \quad (3)$$

$$firm\ performance_{it} = \beta_0 + \beta_1 Resi_{it} + \beta_2 AI_{it} + \phi Z + \varphi_c + \delta_t + \varepsilon_{it} \quad (4)$$

$$firm\ performance_{it} = \beta_0 + \beta_1 Resi_{it} + \beta_2 AI_{it} + \beta_3 Resi_{it} \times AI_{it} + \phi Z + \varphi_c + \delta_t + \varepsilon_{it} \quad (5)$$

where $firm\ performance_{it}$ represents SP and SP, respectively; $Resi_{it}$ represents OR; M_{it} represents RD and ET, respectively; AI_{it} represents AI; $Resi_{it} \times AI_{it}$ represents the interaction term between OR and AI; Z denotes a vector of control variables; a indicates the intercept term; φ indicates industry fixed effects; δ indicates year fixed effects, and ε_{it} indicates a random error term.

4. Results

4.1. Baseline Regression Results

Table 3 reports the regression results examining the impact of OR on SP and LP. As shown in column (1), the regression coefficient of OR on SP is 0.984, significant at the 1% level, indicating that a one-unit increase in OR is associated with a 0.984-unit increase in SP. This provides preliminary evidence that OR has a positive and statistically significant effect on SP, thereby supporting H1a. In column (2), the regression coefficient of OR on LP is 0.311, significant at the 10% level, suggesting that a one-unit increase in OR is associated with a 0.311-unit increase in LP, thereby supporting H1b. Columns (3) and (4) include additional control variables to enhance model specification. In column (3), after controlling for firm-level covariates, the coefficient on OR remains positive and significant at 0.719 (5% significance level), reinforcing the conclusion that higher OR contributes to better SP and further validating H1a. Similarly, in column (4), the coefficient on OR increases slightly

to 0.337 and remains significant at the 5% level, indicating that enhanced OR positively influences LP, thus providing additional empirical support for H1b.

Table 3. Results of baseline regression.

Variables	(1) SP	(2) Growth	(3) SP	(4) Growth
OR	0.984 ***	0.311 *	0.719 **	0.337 **
	(0.367)	(0.182)	(0.328)	(0.145)
Size			−0.047 **	−0.134 ***
			(0.021)	(0.009)
Dual			0.165 ***	0.093 ***
			(0.045)	(0.020)
Board			0.033	0.050
			(0.171)	(0.065)
Indep			−0.010 *	−0.000
			(0.005)	(0.002)
TOP1			0.012 ***	0.002 ***
			(0.002)	(0.001)
FirmAge			−0.267 ***	−0.194 ***
			(0.090)	(0.034)
HHI			−0.507 **	−0.426 ***
			(0.230)	(0.077)
Pgdp			−1.163	−0.089
			(1.966)	0.544
Constant	44.187 ***	1.193 ***	49.505 ***	4.809 *
	(0.043)	(0.019)	(9.325)	(2.540)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	13,357	13,357	11,630	11,630
R^2	0.991	0.609	0.994	0.675

Notes: The values in parentheses are standard error. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. FE, fixed effects.

4.2. Robustness Test

Table 4 presents the robustness test results. We mainly used the following ways to carry out the robustness tests. First, the measurement of OR was replaced. Referring to the practices of existing scholars [4], this paper adopted the proportion of employees with bachelor's degrees and above to measure OR, denoted as Resil. The findings are listed in columns (1)–(2). Second, observations from Beijing, Shanghai, Tianjin, and Chongqing were excluded to mitigate potential regional bias arising from the unique administrative and economic characteristics of these cities. The re-estimated results are displayed in columns (3)–(4). Third, all explanatory and control variables were lagged by one period to account for potential temporal dynamics and to better capture causal relationships. The regression models were re-estimated using lagged variables, with results presented in columns (5)–(6). Overall, the results show that although the estimated coefficients of OR on SP and LP vary slightly in magnitude across specifications, their signs remain consistently positive and statistically significant at least at the 10% level. These findings indicate that the main conclusions of this paper are robust to alternative model specifications and data treatments.

Table 4. Robustness test results.

Variables	(1) SP	(2) Growth	(3) SP	(4) Growth	(5) SP	(6) Growth
Resi1	0.992 ***	1.002 ***				
	(0.205)	(0.107)				

Table 4. *Cont.*

Variables	(1) SP	(2) Growth	(3) SP	(4) Growth	(5) SP	(6) Growth
OR			1.166 ***	0.337 **		
			(0.345)	(0.155)		
l.OR					0.779 **	0.641 ***
					(0.375)	(0.182)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	10,618	10,618	9848	9848	10,482	10,482
R^2	0.995	0.676	0.994	0.685	0.992	0.620

Notes: *** $p < 0.01$, ** $p < 0.05$.

4.3. Endogeneity Test

Given the potential for reverse causality between OR and SP/LP, this study employed an instrumental variables approach to further address potential endogeneity concerns.

First, this paper employed the share-shift instrumental variable method, which constructed instrumental variables from the product of the initial share of the analysis unit and the overall growth rate [102]. The specific steps are as follows: (1) The annual growth rate of the mean value of OR of all firms from 2009 to 2022 was calculated and used as the overall growth rate. (2) The mean value of OR of other enterprises in the industry to which each enterprise belongs (that is, excluding the industry in which the enterprise belongs) in the previous year was calculated and used as the initial share of the analysis unit. (3) The product of these two components was used as an instrumental variable for OR, named IV1. Specifically, on one hand, the level of OR is closely related to the industry-level OR, satisfying the relevance condition for valid instrumentation. On the other hand, by constructing the instrument using lagged industry averages and incorporating cross-sectional variation through the share-shift mechanism, this approach mitigates concerns about endogeneity that may arise when using contemporaneous "industry-year" means as instruments. The estimation results are presented in columns (1)–(3) of Table 5.

Table 5. Results of endogeneity analysis.

Variables	(1) OR	(2) SP	(3) LP	(4) OR	(5) SP	(6) LP
IV1	0.265 ***					
	(0.014)					
OR		2.001 ***	1.012 ***		0.744 *	0.720 ***
		(0.610)	(0.360)		(0.393)	(0.274)
IV2				53.415 ***		
				(2.806)		
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM statistic		492.590 ***	492.590 ***		180.765 ***	180.765 ***
Cragg-Donald Wald F statistic		1663.825	1663.825		13,000	13,000
		[16.38]	[16.38]		[16.38]	[16.38]
Kleibergen-Paap rk Wald F statistic		376.963	376.963		362.309	362.309
		[16.38]	[16.38]		[16.38]	[16.38]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	11,630	11,630	11,630	11,630	11,630	11,630
R^2	0.223	0.017	0.070	0.575	0.019	0.072

Notes: *** $p < 0.01$, * $p < 0.1$.

Second, following Lewbel [103], this study constructs an instrumental variable as the cube of the difference between a firm's OR and the annual industry mean of OR, denoted as

IV2. This approach is distinctive in that it generates a valid instrumental variable without relying on external instruments. It not only helps mitigate measurement error bias but also enhances estimation efficiency, thereby satisfying the key requirements for instrumental variable validity. The results are reported in columns (4)–(6) of Table 5.

As shown in columns (1)–(4) of Table 5, the regression coefficients of IV1 and IV2 on OR are significantly positive at the 1% level, indicating a strong positive correlation between the instrumental variables and OR. Columns (2)–(5) show that the coefficients of OR on SP are statistically significant and positive at least at the 10% level, suggesting a positive effect of OR on SP. Similarly, as presented in columns (3)–(6), the estimated coefficients of OR on LP are all significantly positive at the 10% level or higher, supporting a beneficial impact of OR on LP. Furthermore, the Kleibergen-Paap rk LM statistic is significant at the 1% level, and the Cragg-Donald Wald F statistic exceeds 16.38, indicating that the model passes the tests for underidentification and weak identification. These results validate the validity and appropriateness of the selected instrumental variables and suggest that potential endogeneity issues are unlikely to substantially bias the main findings of this study.

4.4. Mediating Effect Test

Table 6 presents the mediating effects of RD and ET. Column (1) shows that OR significantly promotes RD ($\beta = 0.046$, $p < 0.05$). However, a key divergence emerged when examining its subsequent impact on performance. Column (2) indicates that, after controlling for OR, RD has a significant negative impact on SP ($\beta = -1.614$, $p < 0.01$). This finding suggests that organizations with higher OR may suppress short-term financial returns by promoting RD, thereby verifying H2a. Column (3) indicates that RD has a significantly positive impact on the LP ($\beta = 0.588$, $p < 0.01$), indicating that RD driven by OR ultimately serves as an engine for building sustainable competitive advantage and long-term growth, confirming H2b. The possible explanation is that resilient organizations are more inclined to allocate resources to innovation activities, exhibit greater tolerance for innovation failure, and prioritize long-term strategic goals. As a result, they are more likely to increase RD despite uncertain short-term outcomes. However, given that RD is inherently risky and characterized by long payback periods, its immediate financial returns may be limited, which could negatively affect SP.

Table 6. Results of the mediating role of RD and ET.

Variables	(1) RD	(2) SP	(3) LP	(4) Leave	(5) SP	(6) LP
OR	0.046 **	0.793 **	0.310 **	−0.261 ***	0.545 *	0.270 *
	(0.022)	(0.328)	(0.142)	(0.089)	(0.312)	(0.141)
RD		−1.614 ***	0.588 ***			
		(0.328)	(0.119)			
ET					−0.666 ***	−0.256 ***
					(0.039)	(0.013)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	11,630	11,630	11,630	11,630	11,630	11,630
R^2	0.131	0.994	0.676	0.030	0.994	0.685

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Column (4) shows that OR significantly reduces ET ($\beta = -0.261$, $p < 0.01$). This provides empirical support for the theoretical reasoning based on social exchange theory: by offering strong support, psychological safety, and an empowering work environment, resilient organizations foster a heightened sense of employee commitment and belonging,

which in turn suppresses ET. As shown in columns (5) and (6), a lower ET rate is associated with improved SP ($\beta = -0.666$, $p < 0.01$) and LP ($\beta = -0.256$, $p < 0.01$). Therefore, H3a and H3b are fully supported. The significance of this mediation pathway lies in extending the benefits of OR beyond the reallocation of material resources to the preservation of human and social capital. Reducing employee turnover not only directly lowers recruitment, hiring, and training costs, thereby enhancing short-term profitability, but also helps retain valuable tacit knowledge, professional expertise, and internal and external social networks. This ensures organizational continuity and stability, providing a solid foundation for effective crisis response and sustained strategic development.

To further validate the robustness of the mediating effects, we conducted additional analyses using the Bootstrap method with 5000 resamples. The results, presented in Table 7, confirm the significance of all hypothesized indirect paths. Specifically, the indirect effect of OR on SP through RD is significantly negative (Estimate = −0.082, 95% CI [−0.139, −0.024]), whereas the indirect effect on LP via the same mediator is positive and statistically significant (Estimate = 0.0002, 95% CI [0.00004, 0.0004]). In contrast, the indirect effects through reduced ET are significantly positive for both SP (Estimate = 0.156, 95% CI [0.059, 0.252]) and LP (Estimate = 0.060, 95% CI [0.024, 0.097]). In conclusion, the Bootstrap analysis robustly supports our proposed dual-mediation model, affirming that RD and ET are distinct yet parallel mechanisms through which OR differentially influences FP across time horizons.

Table 7. Results of Bootstrap analysis of RD and ET.

Indirect Path	Estimate	BootSE	Bootstrapped 95% CI	
			Lower	Higher
H2a: OR → RD → SP	−0.082	0.029	−0.139	−0.024
H2b: OR → RD → LP	0.0002	0.0001	0.00004	0.0004
H3a: OR → ET → SP	0.156	0.049	0.059	0.252
H3b: OR → ET→ LP	0.060	0.018	0.024	0.097

Note: 5000 bootstrap samples.

4.5. Moderating Effect Test

Table 8 presents the results of the moderating effect of AI. The results show that the interaction term between OR and AI is positively and significantly related to both SP ($\beta = 0.673$, $p < 0.01$) and LP ($\beta = 0.417$, $p < 0.01$), thus supporting H4a and H4b. This possible explanation is that AI enhances the effectiveness of OR across three key aspects. First, it enhances predictive foresight through advanced data analysis, enabling more proactive responses to potential threats. Second, it accelerates resource reallocation via intelligent automation, achieving faster and more efficient strategic adjustments. Third, it promotes organizational learning by structuring knowledge and optimizing the innovation cycle. As illustrated in Figures 2 and 3, the slopes for firms with high levels of AI adoption are steeper, providing visual confirmation of this "amplifying" effect. Fundamentally, AI provides the technological infrastructure that enables resilient organizations to execute their capabilities more rapidly, accurately, and intelligently, thus reinforcing the pathway from OR to performance excellence in both the short and long term.

Table 8. Results of the moderating role of AI.

Variables	(1) SP	(2) SP	(3) LP	(4) LP
OR	0.787 **	0.712 **	0.279 **	0.232 *
	(0.327)	(0.326)	(0.142)	(0.137)
AI	−0.039 **	−0.039 **	0.033 ***	0.032 ***
	(0.019)	(0.019)	(0.010)	(0.009)

Table 8. *Cont.*

Variables	(1) SP	(2) SP	(3) LP	(4) LP
OR*AI		0.673 ***		0.417 ***
		(0.239)		(0.123)
Control variables	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	11,630	11,630	11,630	11,630
R^2	0.994	0.994	0.675	0.676

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

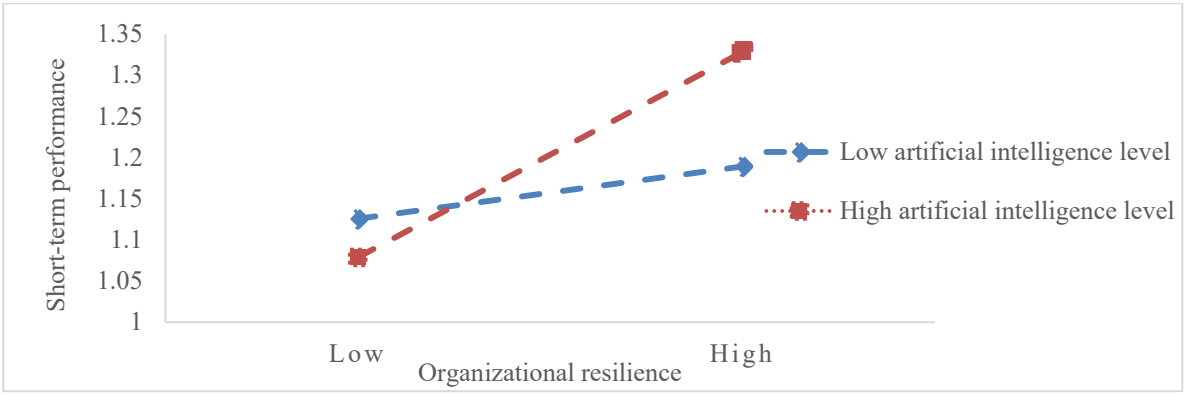


Figure 2. The moderating role of AI in the "OR-SP" relationship.

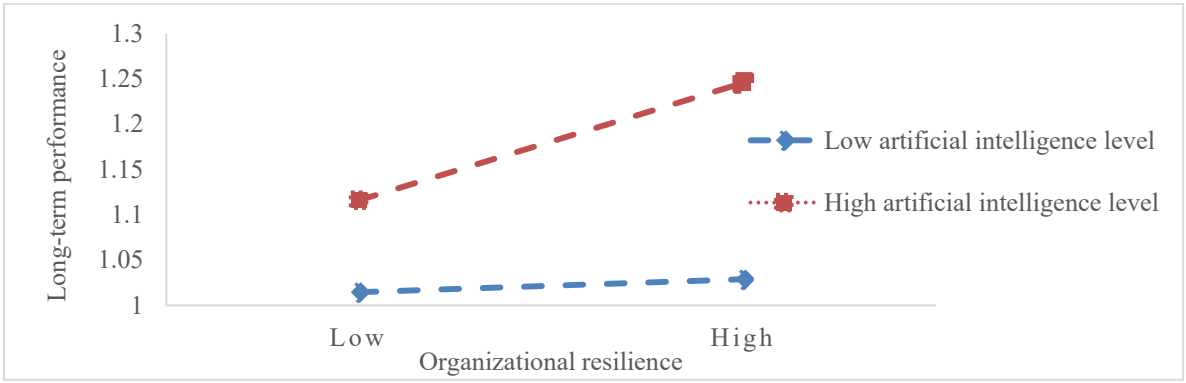


Figure 3. The moderating role of AI in the "OR-LP" relationship.

4.6. Heterogeneity Analysis

4.6.1. Firm Size Heterogeneity

Based on the median asset size of firms, this study categorizes firms into large and small groups to examine the differential effects of OR on SP and LP across firm size. The results are presented in Table 9.

As shown in columns (1)–(2), the positive effect of OR on SP is more pronounced for larger firms. A plausible explanation is that, despite their resource advantages, larger firms often face structural inertia, which hampers their responsiveness to external disruptions. OR enhances their capacity to rapidly reconfigure existing resources and streamline complex processes, thereby generating substantial marginal improvements in immediate operational efficiency and profitability. In contrast, small firms are inherently more agile, which diminishes the relative short-term value added by OR. Consequently, the impact of OR on SP is stronger in larger enterprises.

As shown in columns (3)–(4), OR has a more pronounced effect on LP of smaller firms. A plausible explanation is that larger firms typically possess stronger innovation capabilities and greater access to financing, which enhances their adaptability to external environmental changes. As a result, the incremental contribution of OR to the long-term growth of large firms may be relatively limited. In contrast, although small enterprises are inherently more agile in making short-term adjustments, they face significant challenges to sustained growth and survival, including resource constraints and market entry barriers. In this context, OR acts as a vital foundation for long-term strategic activities like RD and talent retention, which are essential for breaking growth ceilings and achieving market consolidation. Thus, while OR helps large firms optimize in the short run, it enables small firms to transform and endure for the long run.

Table 9. Results of firm size heterogeneity.

Variables	Larger Enterprises	Smaller Enterprises	Larger Enterprises	Smaller Enterprises
	(1) SP	(2) SP	(3) LP	(4) LP
OR	1.093 **	0.403	0.315	0.447 **
	(0.435)	(0.479)	(0.209)	(0.173)
Control variables	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	5646	5984	5646	5984
R^2	0.995	0.993	0.604	0.755

Notes: ** $p < 0.05$.

4.6.2. Heterogeneity of Industry Competition

The sample is categorized into high-competition and low-competition industries based on the level of industry competition. Following standard practice, this study computes the annual Herfindahl–Hirschman Index (HHI) for each firm's industry using total assets as a proxy for market concentration, which reflects the degree of industry competition. The median value of the annual HHI is used as the threshold to classify industries into high- and low-competition groups. The results are presented in Table 10.

Table 10. Results of heterogeneity analysis of industry competition.

Variables	High-Competition Industries	Low-Competition Industries	High-Competition Industries	Low-Competition Industries
	(1) SP	(2) SP	(3) LP	(4) LP
OR	0.659	1.043 ***	0.904 ***	−0.205
	(0.496)	(0.391)	(0.241)	(0.139)
Control variables	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	5818	5812	5818	5812
R^2	0.994	0.995	0.643	0.732

Notes: *** $p < 0.01$.

As shown in columns (1)–(2), the positive effect of OR on SP is significantly more pronounced in low-competition industries ($\beta = 1.043$, $p < 0.01$) than in high-competition industries ($\beta = 0.659$, $p > 0.1$). A plausible explanation is that firms in low-competition environments, such as regulated or monopolistic industries, typically possess pricing power and stable revenue streams. For these firms, OR primarily functions as an "efficiency

optimizer and stability enhancer." It supports the maintenance of smooth operations, cost reduction, and protection of existing profit margins against external disruptions, thereby directly and substantially enhancing short-term financial performance without the immediate need for radical innovation.

As shown in columns (3)–(4), OR exerts a strong and positive effect on LP in high-competition industries ($\beta = 0.904$, $p < 0.01$), whereas its effect in low-competition industries is statistically insignificant and slightly negative ($\beta = -0.205$, $p > 0.1$). A plausible explanation is that, in highly competitive markets, OR serves as a critical capability that allows firms to pursue risky, long-term initiatives such as RD and strategic repositioning without operational collapse. It constitutes a foundational element for survival and eventual outperformance in dynamic and uncertain environments. In contrast, the long-term growth prospects of firms in low-competition industries may be constrained by external factors such as regulatory limitations or the absence of competitive incentives, thereby limiting the transformative potential of OR.

5. Discussion and Conclusions

Drawing on dynamic capabilities theory and social exchange theory, this study examines the impact of OR on FP from both short-term and long-term perspectives. Using a sample of manufacturing firms listed on the Shanghai and Shenzhen A-share markets, the following results are obtained: (1) OR has a positive impact on both SP and LP. While existing studies have demonstrated that OR significantly enhances either SP [30,104] or LP [105,106], this study extends prior research by examining the relationship between OR and FP from a comprehensive perspective that integrates both temporal dimensions. In addition, the heterogeneity analysis indicates that the effect of OR on SP is more significant in larger firms and low-competition industries, whereas its effect on LP is stronger in smaller firms and high-competition industries. These findings offer valuable insights for policymakers in designing targeted and evidence-based policies. (2) RD negatively mediates the relationship between OR and SP, but positively mediates the relationship between OR and LP. This result partially supports the idea that OR facilitates innovation [107,108], and also provides partial evidence for the view that RD has a negative effect on SP [109], while exerting a positive effect on LP [110]. Our findings also indicate that OR promotes SP/LP by inhibiting ET. This result partially aligns with previous research suggesting that ET negatively impacts FP [111,112]. By integrating social exchange theory, this study establishes a behavioral micro-foundation for understanding how OR protects human capital. This connection has not been fully explored in previous elastic literature. (3) We find that AI positively moderates the relationship between OR and SP/LP. This result broadens the boundary conditions between OR and FP. (4) In addition to economic achievements, this study also holds significant importance for societal sustainable development. By reducing ET, resilient organizations can not only protect human capital but also enhance job stability and benefits, which are key components of social sustainability. Furthermore, by promoting RD, these companies contribute to social progress through technological advancements and more environmentally friendly products. This research responds to the call for exploring the impact of strategic capabilities on sustainable social development across different contexts [113].

5.1. Theoretical Contributions

First, the relationship between OR and FP is comprehensively portrayed from both short-term and long-term perspectives, explaining the contradictory findings of "positive influence" and "negative influence" in the relationship between the two. Previous studies have primarily investigated the OR-FP relationship from either a short-term or long-

term standpoint [4,10,29,42], leading to inconsistent conclusions that have not yet reached a consensus. This study addresses this gap by analyzing the relationship through an integrated short- and long-term framework. Furthermore, by incorporating RD and ET as mediating mechanisms, we provide a robust theoretical pathway to reconcile conflicting findings regarding the impact of OR on FP. Our work responds to the call of Liu et al. [114] to consider the effects and influence paths of OR from temporal dimensions.

Second, by exploring the mediating role of RD, this study not only confirms the negative effect of OR on SP but also expands the transmission path between OR and LP. Existing scholars have primarily explored the positive impact of OR on FP from the innovation [15,115], organizational learning [7] and strategic change [4] perspectives. This study reveals that OR negatively affects SP by promoting RD, while exerting a positive impact on LP. This result provides a dialectical perspective on the relationship between OR on SP, thereby responding to calls in the literature to examine the potential "dark side" of OR [10,12]. Our work also provides empirical evidence for further exploring the pathways through which OR enhances LP.

Third, ET is identified as a key mechanism through which OR enhances SP and LP, thereby extending the explanatory boundaries of social exchange theory. While only a limited number of scholars have examined the roles of leadership and managerial myopia in the relationship between OR and FP [4,116], others have explored the impact of OR on employee engagement based on social exchange theory [117]. Building on this theoretical foundation, this study constructs the mediating pathway "OR → ET → SP/LP", extending the influence of OR from individual employee behavior to organizational-level outcomes. The findings provide empirical support and novel insights into how OR affects SP and LP through employee behavioral mechanisms, bridging the micro–macro gap between individuals and organizations in achieving sustained performance.

Fourth, by exploring the moderating role of AI, this study enriches the contextual factors by which OR affects SP and LP. Prior studies have focused on environmental uncertainty [4,15], industry competition [13], and digital transformation [42] as moderators in the OR-FP relationship. This paper introduces AI as a contextual condition and finds that AI positively moderates the effects of OR on SP and LP. This result explains when OR can improve SP and LP, and responds to prior calls for exploring additional contextual determinants of OR effectiveness. It also provides practical guidance for using OR to better improve performance in the era of AI. Furthermore, the findings offer practical guidance for organizations seeking to leverage OR more effectively to improve performance in the AI era.

5.2. Managerial Implications

This study provides important managerial implications for manufacturing firms and policymakers. First, our results indicate that OR helps to enhance both SP and LP. Therefore, managers should adopt a phased strategic approach to enhance OR. Before a crisis, firms should build diversified resource bases and proactively monitor external threats and internal financial risks to strengthen resilience. They should also identify emerging opportunities and develop new products in a timely manner to anticipate future market demands. During a crisis, the primary focus shifts to adaptation, which requires rapid process adjustments, product optimization, and creative resource mobilization. Tying performance incentives to revenue outcomes during this phase can help motivate employees and secure external stakeholder support. In the post-crisis phase, the objective becomes recovery and transformation. Firms should implement dynamic employee incentive systems to boost morale and foster innovation by challenging conventional thinking and exploring novel strategies, technologies, and business models. This enables organizations to transform crisis experiences into strategic opportunities for long-term growth.

Second, the finding that RD serves as a negative mediator for SP but a positive mediator for LP, underscores the need for a more differentiated innovation management strategy. Rather than implementing blanket increases in R&D expenditure, firms should adopt a dual-track innovation governance framework. This approach requires a clear institutional distinction between long-cycle, exploratory R&D initiatives, and short-term, incremental innovation projects. Such structural differentiation not only protects the integrity of the long-term innovation pipeline, but also alleviates the downward pressure on near-term profitability commonly induced by substantial R&D investments.

Third, the significant mediating role of ET demonstrates that OR enhances FP, in part, through the preservation of human capital. Consequently, managers should intentionally design initiatives aimed at strengthening social exchange relationships. This includes fostering psychological safety to promote experiential learning, as well as implementing comprehensive vocational training programs closely aligned with defined career progression pathways. Moreover, managers must recognize that the embedded support mechanisms within resilient organizational systems, such as timely resource allocation during periods of crisis, tend to elicit reciprocal responses from employees. These responses ultimately manifest in reduced ET. In turn, this reciprocal dynamic helps safeguard critical intangible assets, including tacit knowledge and internal social networks, which are essential for ensuring immediate operational continuity and sustaining long-term adaptive capacity.

Fourth, our findings underscore that AI acts as a critical enabler of OR, amplifying its positive impacts on both SP and LP. These insights yield several critical implications. For public policymakers, fostering AI adoption through subsidies, tax incentives, and industry-academia collaborations becomes a strategic imperative for enhancing national economic resilience, particularly within the manufacturing sector. From a sustainability standpoint, AI-enhanced resilience directly contributes to the United Nations' Sustainable Development Goals by boosting innovative capacity and minimizing resource waste through intelligent systems. For corporate strategy, integrating AI with resilience mechanisms provides a decisive competitive advantage, enabling firms to navigate disruptions, capitalize on emergent opportunities, and secure sustained growth in an increasingly volatile global landscape.

5.3. Limitations and Future Research

Although this paper has important theoretical and practical significance, it also has some limitations. First, this paper only takes China's manufacturing as an example to discuss the relationship of OR and short-term and LP. To enhance external validity and causal inference, future research could validate this framework in cross-contextual settings, such as service industries or other national economies. Furthermore, leveraging quasi-experimental designs, for instance, exploiting exogenous policy shocks (AI subsidies, resilience mandates) or exogenous shocks (pandemics, extreme weather), would provide more robust evidence on the causal relationships uncovered in this study. Second, regarding model construction, future studies are encouraged to employ more advanced longitudinal SEM or partial least squares SEM to replicate and extend the present model when data conditions permit. Third, concerning variable measurement, alternative validation methods could be explored, such as using CFA to further validate the composite organizational resilience scores calculated via the entropy weight method. Furthermore, future research could focus on developing a more universally applicable AI measurement lexicon that integrates internationally recognized standards with China's local contextual characteristics. This would involve systematically collecting and comparing data from the Stanford AI Index, OECD.AI, and existing Chinese dictionaries to assess the differences and relative merits of various measurement approaches when interpreting the same economic phenomena.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Indicator system for measuring organizational resilience.

First-Level Indicators	Second-Level Indicators	Third-Level Indicators	Property
The ability to resist risks	Reserve diversified resources	Fixed assets	Positive
		Intangible assets	Positive
	Regular risk assessment	Debt to assets ratio	Negative
		Fixed assets turnover	Positive
		Current assets turnover	Positive
The ability to adapt and adjust	Flexible resource allocation	Coefficients of variation for the 3 main types of annual R&D, capital and advertising expenditures of the sample companies	Negative
		Amount of government subsidies	Positive
	Adjust and improve production management methods	Employee compensation incentives	Positive
		Product improvement	Positive
The ability to recover and surpass	Cohesion of talents	Educational level of employees	Positive
	Tapping into new potential for business	Explore new products	Positive

Appendix B

The calculation steps of the entropy weight method are as follows:

The first step is to standardize the selected indicators. In Table A1 of the Appendix A, for positive and negative indicators, the standardization methods are expressed in Equations (A1) and (A2), respectively, as follows:

$$x'_{ij} = \frac{x_{ij} - \min\{x_j\}}{\max\{x_j\} - \min\{x_j\}} \quad \text{(A1)}$$

$$x'_{ij} = \frac{\max\{x_j\} - x_{ij}}{\max\{x_j\} - \min\{x_j\}} \quad \text{(A2)}$$

where x_{ij} represents the value of the *jth* indicator of the *ith* enterprise; j indicates the indicator and i refers to the enterprise; x'_{ij} refers to the value of the *jth* indicator of *ith* enterprise after standardization.

The second step aims to calculate the ratio of the value of the *jth* indicator of *ith* enterprise to the value of the *jth* indicator of all enterprises as follows:

$$\omega_{ij} = \frac{x'_{ij}}{\sum_{j=1}^{m} x'_{ij}} \tag{A3}$$

The third step focuses on calculating the entropy value of the *jth* indicator, as follows:

$$e_j = -\frac{1}{\ln m} \sum_{j=1}^{m} \omega_{ij} \times \ln \omega_{ij} \tag{A4}$$

The fourth step calculates information entropy redundancy as follows:

$$d_j = 1 - e_j \tag{A5}$$

In the fifth step, the weight of each indicator is calculated as follows:

$$\varphi_j = \frac{d_j}{\sum_{j=1}^{m} d_j} \tag{A6}$$

Finally, we calculate the comprehensive index of organizational resilience (i.e., OR), as follows:

$$OR_i = \sum_{j=1}^{m} \varphi_j \times \omega_{ij} \tag{A7}$$

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