Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5, 947-959
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i5.7043

Impact of technological innovation and executive incentives on corporate financial performance in Western China

Xiaona Li[1]*, Filzah Md Isa[1], Ryan Ho Ming Kang[2], Peng Cheng[3]
[1]School of Business and Law, Taylor's University, Subang Jaya 47500, Selangor, Malaysia; xiaona202503@163.com (X.L.) Filzah.MdIsa@taylors.edu.my (F.M.I.)
[2]Graduate School of Business and School of Mathematics, Quantitative and Actuarial Science, Asia Pacific University of Technology & Innovation, Bukit Jalil 57000, Kuala Lumpur, Malaysia; mingkang.ho@apu.edu.my (R.H.M.K.).
[3]School of Hospital, Tourism and Events, Taylor's University, Subang Jaya 47500, Selangor, Malaysia; chengpeng890821@163.com (P.C.).

Abstract: This study aims to explore the impact of technological innovation and executive incentives on corporate financial performance, with a particular focus on enterprises in Western China, an area often overlooked in existing research. It also addresses the lack of investigation into the interactive effects between these two factors. Using data from enterprises in Western China, Pearson correlation analysis is first conducted to examine preliminary correlations among variables. Subsequently, a multi-path structural equation modeling (SEM) is built to test both direct and moderating effects. Results indicate that technological innovation and salary-based incentives significantly enhance corporate financial performance, while equity incentives show insignificant or even negative moderating effects. Moreover, the effectiveness of executive incentives varies regionally, reflecting unique contextual characteristics of Western Chinese enterprises. These findings contribute to a deeper understanding of how innovation and incentive mechanisms function in underdeveloped regions. Practically, they provide insights for enterprises and policymakers seeking to design effective incentive structures and promote sustainable economic growth in Western China.

Keywords: *Corporate financial performance, Enterprises in Western China, Executive incentives, Structural equation modeling, Technological innovation.*

1. Introduction

In the strategic context of China's high-quality economic development, Western China, as a crucial part of the regionally coordinated development strategy, faces dual challenges of industrial transformation and intensified market competition. Technological innovation (TI) is seen as a key factor in improving enterprise core competitiveness [1, 2] while executive incentives are considered an important means to optimize decision-making quality and improve management efficiency [3, 4]. However, existing research has mostly focused on economically developed eastern coastal regions [5, 6] with less attention paid to enterprises in Western China. For example, Tien, et al. [7] and Adamkaite, et al. [8] explored the relationship between sustainable development and corporate financial performance (CFP) in Vietnam and Lithuania, respectively. However, regional research on Western China remains limited. At the same time, existing literature mostly analyzes TI or executive incentives from a single perspective [9, 10] and how the two jointly affect CFP through interactive effects has not yet formed a systematic analytical framework [11]. The current research gap not only restricts the precise formulation of regional economic policies but also limits strategic optimization in corporate practice.

This study proposes the following hypotheses: TI (research&development investment ratio and number of patents) has a significant positive impact on CFP (return on equity, return on total assets,

History: Received: 14 February 2025; Revised: 16 April 2025; Accepted: 21 April 2025; Published: 10 May 2025
* Correspondence: xiaona202503@163.com

and earnings per share); the impact of executive incentives on CFP varies by type, among which explicit incentives (compensation) have a positive effect, while implicit incentives (equity) have a negative effect; executive incentives play a moderating role between TI and CFP, among which explicit incentives (compensation) show positive regulation, and implicit incentives (equity) show negative regulation.

Focusing on enterprises in Western China, this study explores the independent impact and synergy mechanism of TI and executive incentives on CFP. A-share listed enterprises in Western China from 2015 to 2023 are selected as samples, covering multiple industries such as manufacturing, information technology, and energy. The structural equation modeling (SEM) method is employed to construct a multi-path analysis framework. SEM is widely used in corporate performance research because it can simultaneously model latent and observed variables and test complex path hypotheses [12].

This paper's innovation is mainly reflected in three aspects: first, it focuses on western enterprises to make up for the lack of regional research and provide empirical evidence for the high-quality development of the western economy; second, it breaks through the single perspective and reveals the synergistic impact path of TI and executive incentives on CFP from the perspective of interaction; third, it combines the differentiated regulatory effects of explicit incentives (compensation) and implicit incentives (equity) to deepen the understanding of the dynamic role of executive incentive mechanisms. Through quantitative analysis, this study verifies the direct impact of TI and executive incentives and reveals the complementarity of the two in improving CFP.

2. Related Work

This study explores the relationship between corporate financial performance (CFP) and technological innovation (TI). Earlier studies have indicated that corporate governance and social responsibility may have a positive, neutral, or negative impact on CFP. For example, good corporate governance has been shown to influence the financial performance of non-financial enterprises in the UK [13]. Similarly, the relationship between social responsibility and CFP has been found to be mixed, with both positive and negative effects reported [14]. Additionally, lean practices and innovation have been linked to improvements in environmental sustainability and CFP [15]. Other studies have highlighted the role of financial indicators such as profit margin and return on assets as determinants of CFP [16]. Governance activities have also been associated with CFP outcomes [17] while analytical models have been proposed to enhance transparency in CFP reporting [18].

Further research suggests that corporate governance practices can improve CFP [19] although corporate disputes may negatively affect it, emphasizing the need for conflict resolution mechanisms [20]. Sustainable practices have been found to influence the financial performance of the Nordic financial industry [21] and competitive strategy has been identified as a moderator in the link between environmental sustainability orientation and CFP [22]. Racial diversity within organizational hierarchies has also been linked to financial performance asymmetries [23]. Conversely, green accounting has shown a negative correlation with CFP [24]. Research on SMEs highlights themes such as innovation, governance, and green management in sustainability-CPA relationships [25] while knowledge capital has been tied to banking sector CFP [26]. National culture has emerged as a moderating factor in the ESG-performance nexus [27] and leverage effects on Nigerian enterprises' CFP have been analyzed [28].

Regarding TI, artificial intelligence has been shown to drive technological innovation in China's manufacturing sectors [29]. Digital finance has been linked to green TI and improved energy performance in China, particularly in underdeveloped regions [30, 31]. Spatial effects of financial development and TI on green growth have also been examined [32] while voluntary environmental regulation has been found to promote corporate TI [33]. TI and human capital have been identified as contributors to financial development [34].

Recent studies highlight the complex relationship between executive incentives and corporate financial performance, particularly in different institutional and regional contexts. While executive remuneration is often assumed to align managerial interests with enterprise performance [35] its effectiveness may depend on governance structures and industry-specific pressures [36]. In regulated or socially sensitive sectors, non-financial performance indicators such as environmental sustainability are increasingly linked to executive compensation, reflecting broader ESG (Environmental, Social, and Governance) trends [37, 38]. Moreover, evidence suggests that the integration of ESG into executive incentive schemes can have both direct and indirect impacts on financial outcomes, especially in industries where reputational and regulatory risks are high [39]. These findings underscore the importance of contextual factors, such as institutional pressure, industry norms, and regional development levels, in shaping the effectiveness of executive incentive mechanisms.

3. Materials and Methods

3.1. Data Collection and Indicator Definition

The SEM is used to analyze the interactive effects of TI and executive incentives on CFP in Western China. The research data covers the period from 2015 to 2023, and the research subjects are A-share listed enterprises in Western China. The data mainly comes from the database of the China Securities Regulatory Commission, corporate annual reports, and related industry reports.

As shown in Table 1, TI is measured by two indicators: the proportion of research and development (R&D) investment (weight 0.6) and patent output (weight 0.4), highlighting the importance of R&D investment as an innovation driver. At the same time, by logarithmically normalizing the number of patents, the impact of extreme values is balanced to ensure a comprehensive evaluation of TI.

Executive incentives are divided into explicit and implicit incentives, among which the weight of salary incentives is 0.7 and the weight of equity incentives is 0.3, indicating that explicit incentives, dominated by cash compensation in enterprises in Western China, are dominant, while equity incentives, as a supplement to implicit incentives, are relatively weak.

CFP is measured by three indicators: return on equity (ROE, weight 0.4), return on assets (ROA, weight 0.3), and earnings per share (EPS, weight 0.3). ROE is given the highest weight, highlighting its core position in measuring the profitability of an enterprise's own capital, while ROA and EPS reflect the enterprise's overall asset utilization efficiency and shareholder return level, respectively.

Table 1.
Definition of key indicators and weights.

Variable Category	Indicator Name	Definition	Weight
Technological Innovation	R&D Investment Ratio	R&D expenses as a percentage of total operating revenue	0.6
	Patent Output	Natural logarithm of the number of patents (logarithm of patent count plus 1)	0.4
Executive Incentives	Salary Incentive	Total executive compensation as a percentage of total corporate salary expenditure	0.7
	Equity Incentive	Ratio of executive shareholdings to total corporate equity	0.3
Corporate financial performance	ROE	Ratio of net profit to average net assets, reflecting the profitability of equity capital	0.4
	ROA	Ratio of net profit to average total assets, reflecting the profitability of all assets	0.3
	EPS	Ratio of net profit to total equity, reflecting earnings per share	0.3

The definition of investment ratio is:

$$\xi = \frac{\text{Research and development expenditure}}{\text{Operating income}} \times 100\% \qquad (1)$$

Patent output needs to be logarithmically standardized, and its definition is:

$$\text{Patent} = \ln(\text{Number of patent applications} + 1) \qquad (2)$$

The definition of salary incentive is:

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 947-959, 2025
DOI: 10.55214/25768484.v9i5.7043

$$Salary = \frac{\text{Total executive compensation}}{\text{Total assets}} \times 100\% \quad (3)$$

The definition of equity incentive is:

$$Stock = \frac{\text{Number of shares held by senior executives}}{\text{Total share capital}} \times 100\% \quad (4)$$

The definition of ROE is:

$$ROE = \frac{\text{Net profit}}{\text{Average shareholders equity}} \times 100\% \quad (5)$$

The ROA is:

$$ROA = \frac{\text{Net profit}}{\text{Average total assets}} \times 100\% \quad (6)$$

The EPS is:

$$EPS = \frac{\text{Net profit}}{\text{Total outstanding shares}} \quad (7)$$

3.2. Experimental Model Construction

The study conducts reliability tests to verify the scale's internal consistency to ensure that the R&D investment ratio and the number of patents can stably and consistently reflect the latent variables. The equation is:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2}\right) \quad (8)$$

Among them, k is the number of scale items; σ_i^2 is the variance of each item; σ_T^2 is the variance of the total score. Subsequently, a Pearson correlation analysis is conducted:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \quad (9)$$

Among them, r ranges from [-1,1]. Then, a structural equation measurement model is constructed to describe the relationship between latent and observed variables (X) and to verify whether R&D investment and patents can effectively measure TI. The equation is:

$$X = \lambda_x \xi + \delta \quad (10)$$

Among them, λ_x is the factor load, which reflects the explanatory power of the observed variable on the latent variable; δ is the measurement error, which is minimized through model optimization. The structural equation path model is reconstructed to test the impact of TI (ξ) and executive incentives (η) on FP (ζ). The equation is:

$$\zeta = \gamma_1 \xi + \gamma_2 \eta + \gamma_3 (\xi \times \eta) + \zeta \quad (11)$$

Among them, γ_1 is the direct effect of ξ on ζ; γ_2 is the direct effect of η on ζ; γ_3 is the interactive effect of ξ on η.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 947-959, 2025
DOI: 10.55214/25768484.v9i5.7043

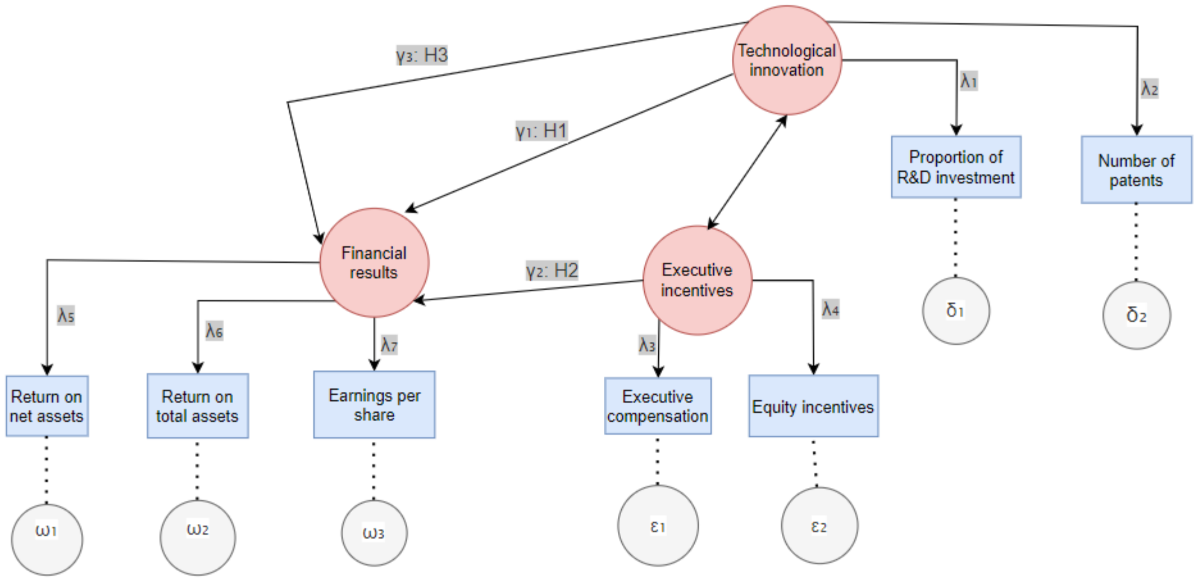

Figure 1.
SEM path construction.

In Figure 1, the model contains three latent variables: TI (ξ), measured by R&D investment and the number of patents; executive incentives (η), measured by salary incentives (Y_1) and equity incentives (Y_2); CFP (ζ), reflected by ROE, ROA, and EPS. Three core paths are hypothesized: the direct effect of TI on CFP (H1, γ_1), the overall effect of executive incentives on CFP (H2, γ_2), and the interactive effect of TI and executive incentives (H3, γ_3). The observed variables are connected to the latent variables through factor loadings (λ_1-λ_7), and independent error terms are set.

Figure 2 shows the extended model. Based on retaining the original main effect path, two new moderating paths are added: the interaction between TI and salary incentives and the interaction between TI and equity incentives. In the model construction, all latent variables are centered, and the interaction terms between TI and the two types of executive incentives are calculated, which are then included in the SEM. By testing the significance and direction of the interaction coefficients γ_3 (compensation incentives) and γ_4 (equity incentives), the moderating role of executive incentives in the relationship between TI and CFP is verified. Subsequent analysis focuses on these two parameters to evaluate the differentiated moderating effects proposed in the H3 hypothesis.

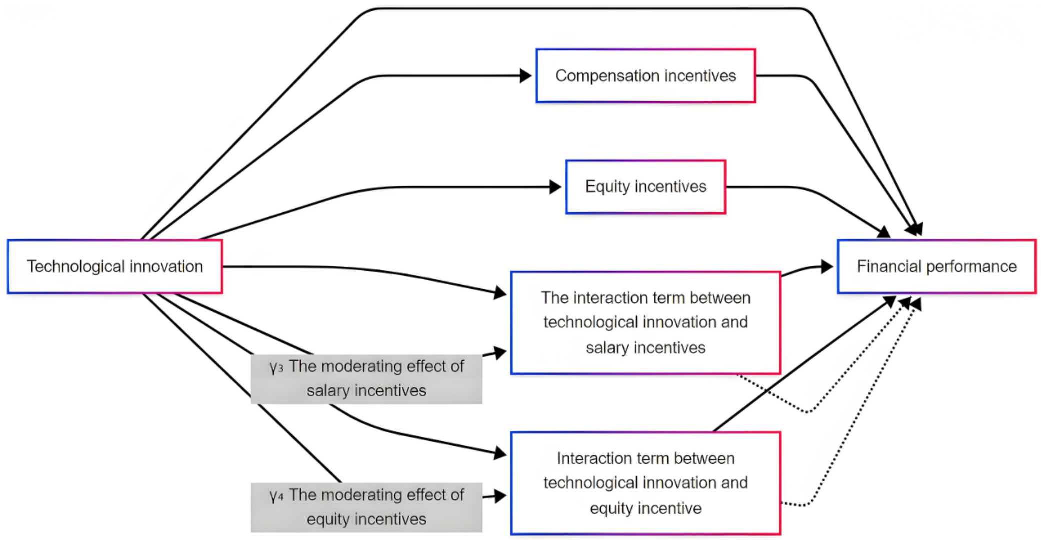

Figure 2.
Moderating effect path diagram.

For the model fit test, this paper uses three core indicators: χ^2 test, CFI (Comparative Fit Index), and RMSEA (Root Mean Square Error of Approximation) to assess, which respectively reflect the overall deviation between the model and the data, the degree of improvement between the hypothesized model and the benchmark model, and the average value of the model error.
a) The equation of the χ^2 test is:

$$\chi^2 = (n-1)F_{\min} \quad (12)$$

When χ^2 is less than 3, it indicates a good fit. When the value of χ^2 is between [3,5], it indicates an acceptable degree.
b) The equation of CFI is:

$$CFI = 1 - \frac{\max(\chi^2_{model} - df_{model}, 0)}{\max(\chi^2_{null} - df_{null}, 0)} \quad (13)$$

When CFI is greater than or equal to 0.95, the fit is excellent. When the value of CFI is between [0.90,0.95), it indicates an acceptable degree.
c) The equation of RMSEA is:

$$RMSEA = \sqrt{\frac{\chi^2 - df}{df(n-1)}} \quad (14)$$

4. Experiments

4.1. Reliability Test

This paper uses spsspro software to perform reliability analysis and selects indicators under the same latent variable. Cronbach's α coefficient is used by default.

ISSN: 2576-8484
Vol. 9, No. 5: 947-959, 2025
DOI: 10.55214/25768484.v9i5.7043

Table 2.
Reliability analysis results.

Latent Variable	Measurement Indicators	Number of Items	Cronbach's α Coefficient	Standardized α Coefficient	Mean	Std. Dev.	α if Item Deleted
Technological Innovation	R&D Investment Ratio	2	0.94	0.938	0.15	0.04	0.925
	Patent Output	-	-	-	3.2	0.67	0.93
Executive Incentives	Salary Incentive	2	0.895	0.89	0.45	0.12	0.88
	Equity Incentive	-	-	-	0.12	0.03	0.875
Corporate Financial Performance	ROE	3	0.916	0.912	12.5	2.45	0.905
	ROA	-	-	-	5.3	1.15	0.91
	EPS	-	-	-	0.85	0.25	0.908

As shown in Table 2, the Cronbach's α coefficient of TI is 0.94, and the measurement indicators include the proportion of R&D investment and patent output. The standardized α coefficient is 0.938, indicating that the two indicators have extremely high internal consistency; even if one of them is deleted, the α coefficient remains at a high level of 0.925 and 0.93, verifying the reliability of the data. The Cronbach's α coefficient of executive incentives is 0.895, and the measurement indicators include salary and equity incentives. The standardized α coefficient is 0.89, showing good internal consistency. After deleting one of them, the α coefficients drop to 0.88 and 0.875, respectively, indicating that both indicators have significant contributions to the overall reliability. The Cronbach's α coefficient of CFP is 0.916; the measurement indicators include ROE, ROA, and EPS; the standardized α coefficient is 0.912. All three indicators show excellent consistency. After deleting any indicator, the α coefficient remains between 0.905 and 0.91, demonstrating that there is a strong correlation between the indicators.

4.2. Pearson Correlation Analysis

This paper uses spsspro to conduct a Pearson correlation analysis test. δ_1 is used to replace the proportion of R&D investment; δ_2 is used to replace the number of patents; ε_1 is utilized to replace salary incentives; ε_2 is used to replace equity incentives; ω_1 is used to replace ROE; ω_2 is used to replace ROA; ω_3 is used to replace EPS. Among them, the results in brackets are significant.

Table 3.
Correlation and significant results.

	δ_1	δ_2	ε_1	ε_2	ω_1	ω_2	ω_3
δ_1	1 (0.000)	0.887 (0.000)	0.315 (0.002)	0.437 (0.000)	0.362 (0.044)	0.291 (0.049)	0.283 (0.007)
δ_2	0.887 (0.000)	1 (0.000)	0.26 (0.013)	0.54 (0.000)	0.213 (0.043)	0.195 (0.035)	0.365 (0.000)
ε_1	0.315 (0.002)	0.26 (0.013)	1 (0.000)	0.81 (0.000)	0.406 (0.000)	0.405 (0.000)	0.361 (0.000)
ε_2	0.437 (0.000)	0.54 (0.000)	0.81 (0.000)	1 (0.000)	-0.026 (0.048)	-0.01 (0.047)	-0.518 (0.045)
ω_1	0.362 (0.044)	0.213 (0.043)	0.406 (0.000)	-0.026 (0.048)	1 (0.000)	0.998 (0.000)	0.695 (0.000)
ω_2	0.291 (0.049)	0.195 (0.035)	0.405 (0.000)	-0.01 (0.047)	0.998 (0.000)	1 (0.000)	0.658 (0.000)
ω_3	0.283 (0.007)	0.365 (0.000)	0.361 (0.000)	-0.518 (0.045)	0.695 (0.000)	0.658 (0.000)	1 (0.000)

In Table 3, as proxy variables for TI, δ_1 and δ_2 are highly positively correlated ($r=0.887$, $p<0.001$), indicating that R&D investment is significantly converted into patent output; at the same time, they are positively correlated with salary incentives (ε_1) (δ_1-ε_1: r=0.315, p=0.002; δ_2-ε_1: r=0.26, p=0.013), indicating that salary incentives can effectively promote TI activities. However, equity incentives (ε_2) are significantly negatively correlated with FP indicators (ω_1, ω_2, and ω_3), indicating that the applicability of equity incentives in Western China is limited, and its incentive effect is weakened due to the low degree of regional marketization. A significant positive correlation between TI and CFP (δ_1-ω_1: r=0.362, p=0.044; δ_2-ω_3: r=0.365, p<0.001) is also existed, which further verifies the positive role of TI in improving CFP.

Table 4.
Analysis results of SEM.

Path	Path coefficient	p-value
H1	0.423	0.014
H2a	0.902	0.000
H2b	-0.604	0.005
H3	-0.105	0.007

4.3. SEM

As shown in Table 4: the path coefficients of H1, H2a, H2b, and H3 are 0.423 (p=0.014), 0.902 (p=0.000), -0.604 (p=0.005), and -0.105 (p=0.007), respectively. These results verify H1, H2a, H2b, and H3 and further reveal the dynamic moderating role of executive incentives in the relationship between TI and FP. Figure 3 shows the trend of the impact of TI intensity on CFP under different incentive combinations.

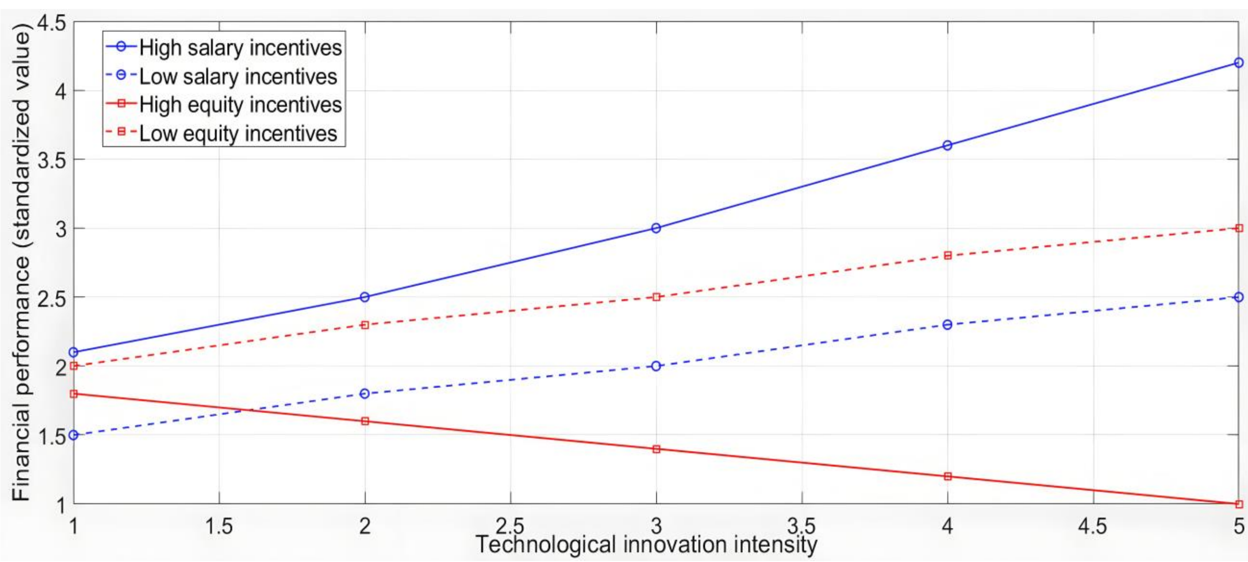

Figure 3.
The moderating effect of executive incentives on the relationship between TI and CFP.

As displayed in Figure 3, when the compensation incentive is high (blue solid line), the effect of TI on CFP is significantly enhanced (from 2.1 to 4.2). In contrast, the moderating effect of equity incentives shows significant heterogeneity. Under high equity incentives (red solid line), the CFP of TI decreases instead of increases (from 1.8 to 1.0), which may be due to the fact that western enterprises mostly use equity incentives for crisis management rather than long-term innovation goals; low equity incentives (red dotted line) alleviate this negative effect (from 2.0 to 3.0). This result supports the negative moderating effect hypothesis of H3, and at the same time reveals the differentiated applicability of executive incentive types in the western institutional environment. The study suggests that enterprises

ISSN: 2576-8484
Vol. 9, No. 5: 947-959, 2025
DOI: 10.55214/25768484.v9i5.7043

should give priority to using salary incentives to support TI. If equity incentives are to be implemented, long-term performance unlocking conditions, such as patent conversion rate, should be added to avoid rising agency costs and distorted resource allocation.

The fit of the SEM model is further tested. The measured values of indicators such as χ^2, CFI, and RMSEA are compared with the judgment criteria to judge the degree of fit between the model's path relationship and the data.

Table 5.
Fit test of the model.

Indicator	Actual measurement value	Judgment standards	Conclusion
χ^2	2.8	< 3	Well
CFI	0.93	[0.90,0.95)	Acceptable
RMSEA	0.04	< 0.05	Well

According to Table 5, the value of χ^2 is 2.8, which is less than 3, indicating a good fit. The CFI value is equal to 0.93, within the interval of [0.90, 0.95), which is acceptable. RMSEA is equal to 0.04, which is less than 0.05, indicating a good fit. This shows that the model's overall fitness is high and can effectively explain the complex relationship between variables.

5. Discussion

5.1. Core Findings of Results

5.1.1. Significant Positive Impact of TI on CFP

The SEM verifies the direct impact of TI (R&D investment ratio, patent output) on CFP and its significance. Combined with the enterprises' data in Western China, the potential moderating role of regional characteristics such as policy support and resource endowment is explored. The explanatory power and model stability of R&D investment and patent output as TI observation variables are evaluated through factor loading analysis.

Table 6.
Path effect of TI on CFP and its stability analysis.

Latent Variable	Observed Variable	Factor Loading (λ)	Path Coefficient (γ_1)	p-value	Explained Variance (%)
TI	Investment Ratio	0.85	0.423	0.014	72.3
TI	Patent Output	0.78	0.361	0.021	68.9
CFP	ROE	-	0.512	0.008	-
CFP	ROA	-	0.485	0.012	-
CFP	EPS	-	0.437	0.015	-

The data in Table 6 depicts that the factor loading of R&D investment ratio is 0.85, and that of patent output is 0.78. Meanwhile, the path coefficient of TI to CFP (γ_1=0.423, p=0.014) is significantly positive, further verifying hypothesis H1. The explanatory power of TI in the model is as high as 72.3%, highlighting its core position in enterprises in Western China.

5.1.2. Differentiated Effect of Executive Incentive Types

The SEM path coefficient is used to test the positive mechanism of salary incentives (explicit incentives) on FP, focusing on analyzing how its interest-binding effect improves management efficiency. By comparing the negative path effect of equity incentives (implicit incentives), combined with the sample data of western enterprises, the possible reasons and applicability differences are explored.

Table 7.
Differentiated effect of executive incentive types on CFP.

Incentive Type	Corporate Financial Performance Indicator	Path Coefficient (γ_2)	p-value	Industry Group Regression Coefficient	Size Group Regression Coefficient
Salary Incentive	ROE	0.902	0	0.875 (Manufacturing)	0.892 (Large Enterprises)
Salary Incentive	ROA	0.856	0.001	0.823 (IT Sector)	0.834 (Medium Enterprises)
Equity Incentive	ROE	-0.604	0.005	-0.587 (Energy Sector)	-0.612 (Small Enterprises)
Equity Incentive	ROA	-0.578	0.006	-0.556 (Manufacturing)	-0.589 (Large Enterprises)

The data in Table 7 displays that the path coefficient of salary incentives on ROE is 0.902 (p=0.000), and the path coefficient on ROA is 0.856 (p=0.001), both of which are significantly positive, supporting the establishment of hypothesis H2a. In contrast, the path coefficient of equity incentives on ROE is -0.604 (p=0.005), and the path coefficient on ROA is -0.578 (p=0.006), showing a significant negative effect, and verifying hypothesis H2b. Group regression analysis further reveals the impact of industry differences. For example, the path coefficient of salary incentives in the manufacturing industry is 0.875, while the path coefficient of equity incentives is -0.556. The results show that in enterprises in Western China, salary incentives can more effectively bind the management interests, while equity incentives may lead to distorted resource allocation or aggravated short-term behavior due to improper design.

5.1.3. Heterogeneity of the Moderating Effect of Executive Incentives

The moderating effect of compensation incentives and equity incentives on the impact of TI on CFP is evaluated through SEM with interaction terms. Table 8 depicts that the path coefficient of compensation incentives is 0.354 (p=0.002), demonstrating a positive moderating effect, while the path coefficient of equity incentives is -0.287 (p=0.004), indicating a negative moderating effect. The simulation results show that after adding the long-term unlocking condition, the improvement effect of equity incentives on FP can increase by 8.7%. The research results emphasize the importance of designing executive incentive mechanisms, especially in the institutional context of Western China.

Table 8.
Heterogeneity analysis of the moderating effect of executive incentives.

Moderation Term	Moderation Path Coefficient (γ_3/γ_4)	p-value	High Equity Incentive Effect	Low Equity Incentive Effect	Long-Term Unlocking Improvement Effect
Salary Incentive × Technological Innovation	0.354	0.002	0.312	0.396	12.50%
Equity Incentive × Technological Innovation	-0.287	0.004	-0.356	-0.218	8.70%

5.2. Practical Inspiration and Policy Recommendations

5.2.1. Inspiration for Corporate Managers

It is recommended that enterprises in Western China give priority to adopting explicit incentive mechanisms with salary as the core to support TI activities. By linking executive compensation with TI indicators such as R&D investment and patent output, the management's attention to and execution of innovation strategies can be enhanced. When designing equity incentive plans, more caution should be exercised to avoid distortion of resource allocation due to short-term behavior or excessive risk-taking strategies. Long-term performance indicators, such as patent conversion rate and technology commercialization income ratio, should be used as a prerequisite for equity incentives to promote the commercialization of innovative achievements, reduce agency costs, and be consistent with the enterprise's long-term goals. Enterprises can also adopt diversified incentive methods to realize employees' different needs and further stimulate innovation.

5.2.2. Suggestions for the Government and Policymakers

Enterprises in Western China face problems such as insufficient resource endowments and immature capital markets, which restrict the implementation of TI and executive incentives. Government support is crucial: R&D subsidies and tax incentives can reduce the R&D pressure of enterprises and improve the capital market infrastructure to create a mature environment for equity incentives. Relevant laws and regulations should be optimized; incentive plan design and implementation should be standardized; institutional risks should be reduced. The establishment of a special fund for SMEs and the promotion of industry-university-research cooperation can further promote innovation. Policymakers should explore diversified incentive forms, combine non-material incentives to improve corporate performance, and inject new impetus into the high-quality development.

6. Conclusions

This study combines SEM to analyze the interactive effects and path mechanisms of TI and executive incentives on the CFP in Western China. The study shows that TI significantly promotes CFP, and salary and equity incentives have positive and negative effects, respectively, revealing the differentiated applicability of enterprises in Western China in executive incentive design. However, the sample in this paper is mainly concentrated on A-share listed enterprises, which may ignore the situation of SMEs and non-listed enterprises, and does not fully consider the impact of external factors such as regional culture and policy environment. Future research can be extended to a wider range of samples, and the applicability of TI and incentive mechanisms at different stages of the enterprise life cycle can be explored from a dynamic perspective. Meanwhile, the specific path to optimize the design of equity incentives can be explored to provide more comprehensive theoretical support and practical guidance for the high-quality economic development of Western China.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

References

[1] B. Kelly, D. Papanikolaou, A. Seru, and M. Taddy, "Measuring technological innovation over the long run," *American Economic Review: Insights*, vol. 3, no. 3, pp. 303-320, 2021. https://doi.org/10.1257/aeri.20200119

[2] J. Markard, "The life cycle of technological innovation systems," *Technological Forecasting and Social Change*, vol. 153, p. 119407, 2020. https://doi.org/10.1016/j.techfore.2020.119407

[3] C. Gartenberg, A. Prat, and G. Serafeim, "Corporate purpose and financial performance," *Organization Science*, vol. 30, no. 1, pp. 1-18, 2019. https://doi.org/10.1287/orsc.2018.1257

[4] P. Roffia, V. Simón-Moya, and J. Sendra García, "Board of director attributes: Effects on financial performance in SMEs," *International Entrepreneurship and Management Journal*, vol. 18, no. 3, pp. 1141-1172, 2022. https://doi.org/10.1007/s11301-022-00238-7

[5] H. Baker, T. A. Kaddumi, M. D. Nassar, and R. S. Muqattash, "Impact of financial technology on improvement of banks' financial performance," *Journal of Risk and Financial Management*, vol. 16, no. 4, p. 230, 2023. https://doi.org/10.3390/jrfm16040230

[6] W. Zhang, F. Chen, E. Liu, Y. Zhang, and F. Li, "How does digital inclusive finance promote the financial performance of Chinese cultural enterprises?," *Pacific-Basin Finance Journal*, vol. 82, p. 102146, 2023. https://doi.org/10.1016/j.pacfin.2023.102146

[7] N. H. Tien, D. B. H. Anh, and N. M. Ngoc, "Corporate financial performance due to sustainable development in Vietnam," *Corporate Social Responsibility and Environmental Management*, vol. 27, no. 2, pp. 694-705, 2020. https://doi.org/10.1002/csr.1849

[8] J. Adamkaite, D. Streimikiene, and K. Rudzioniene, "The impact of social responsibility on corporate financial performance in the energy sector: Evidence from Lithuania," *Corporate Social Responsibility and Environmental Management*, vol. 30, no. 1, pp. 91-104, 2023. https://doi.org/10.1002/csr.2358

[9] S. Chen, Y. Song, and P. Gao, "Environmental, social, and governance (ESG) performance and financial outcomes: Analyzing the impact of ESG on financial performance," *Journal of Environmental Management*, vol. 345, p. 118829, 2023. https://doi.org/10.1016/j.jenvman.2023.118829

[10] J. Xie, W. Nozawa, M. Yagi, H. Fujii, and S. Managi, "Do environmental, social, and governance activities improve corporate financial performance?," *Business Strategy and the Environment*, vol. 28, no. 2, pp. 286-300, 2019. https://doi.org/10.1002/bse.2210

[11] Y.-r. Yang, X.-l. Han, X. Wang, and J.-y. Yu, "Research on executive equity incentives and corporate innovation performance: the role of corporate social responsibility," *Chinese Management Studies*, vol. 17, no. 5, pp. 1014-1030, 2023. https://doi.org/10.1108/CMS-01-2023-0598

[12] Y. Zhang, U. Khan, S. Lee, and M. Salik, "The influence of management innovation and technological innovation on organization performance. A mediating role of sustainability," *Sustainability*, vol. 11, no. 2, p. 495, 2019. https://doi.org/10.3390/su11020495

[13] M. Kyere and M. Ausloos, "Corporate governance and firms financial performance in the United Kingdom," *International Journal of Finance & Economics*, vol. 26, no. 2, pp. 1871-1885, 2021. https://doi.org/10.1002/ijfe.1902

[14] G. Barauskaite and D. Streimikiene, "Corporate social responsibility and financial performance of companies: The puzzle of concepts, definitions and assessment methods," *Corporate Social Responsibility and Environmental Management*, vol. 28, no. 1, pp. 278-287, 2021. https://doi.org/10.1002/csr.2083

[15] P. Centobelli, R. Cerchione, and R. Singh, "The impact of leanness and innovativeness on environmental and financial performance: Insights from Indian SMEs," *International Journal of Production Economics*, vol. 212, pp. 111-124, 2019. https://doi.org/10.1016/j.ijpe.2019.01.023

[16] M. B. Tudose, V. D. Rusu, and S. Avasilcai, "Financial performance–determinants and interdependencies between measurement indicators," *Business, Management and Economics Engineering*, vol. 20, no. 1, pp. 119–138, 2022. https://doi.org/10.2478/bmee-2022-0010

[17] X. Xie, J. Huo, and H. Zou, "Green process innovation, green product innovation, and corporate financial performance: A content analysis method," *Journal of Business Research*, vol. 101, pp. 697-706, 2019. https://doi.org/10.1016/j.jbusres.2019.04.020

[18] S. Levytska, L. Akimova, O. Zaiachkivska, M. Karpa, and S. K. Gupta, "Modern analytical instruments for controlling the enterprise financial performance," *Financial and Credit Activity: Problems of Theory and Practice*, vol. 2, no. 33, pp. 314-323, 2020.

[19] T.-C. Kuo, H.-M. Chen, and H.-M. Meng, "Do corporate social responsibility practices improve financial performance? A case study of airline companies," *Journal of Cleaner Production*, vol. 310, p. 127380, 2021. https://doi.org/10.1016/j.jclepro.2021.127380

[20] N. Nirino, G. Santoro, N. Miglietta, and R. Quaglia, "Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices," *Technological Forecasting and Social Change*, vol. 162, p. 120341, 2021. https://doi.org/10.1016/j.techfore.2020.120341

[21] A. F. Rahi, R. Akter, and J. Johansson, "Do sustainability practices influence financial performance? Evidence from the Nordic financial industry," *Accounting Research Journal*, vol. 35, no. 2, pp. 292-314, 2021. https://doi.org/10.1108/ARJ-11-2020-0335

[22] A. Danso, S. Adomako, J. Amankwah-Amoah, S. Owusu-Agyei, and R. Konadu, "Environmental sustainability orientation, competitive strategy and financial performance," *Business Strategy and the Environment*, vol. 28, no. 5, pp. 885-895, 2019. https://doi.org/10.1002/bse.2336

[23] S. Smulowitz, M. Becerra, and M. Mayo, "Racial diversity and its asymmetry within and across hierarchical levels: The effects on financial performance," *Human Relations*, vol. 72, no. 10, pp. 1671-1696, 2019. https://doi.org/10.1177/0018726719825952

[24] H. A. Riyadh, M. A. Al-Shmam, H. H. Huang, B. Gunawan, and S. A. Alfaiza, "The analysis of green accounting cost impact on corporations financial performance," *International Journal of Energy Economics and Policy*, vol. 10, no. 6, pp. 421-426, 2020. https://doi.org/10.32479/ijeep.9245

[25] F. Bartolacci, A. Caputo, and M. Soverchia, "Sustainability and financial performance of small and medium sized enterprises: A bibliometric and systematic literature review," *Business Strategy and the Environment*, vol. 29, no. 3, pp. 1297-1309, 2020. https://doi.org/10.1002/bse.2411

[26] N. Soewarno and B. Tjahjadi, "Measures that matter: an empirical investigation of intellectual capital and financial performance of banking firms in Indonesia," *Journal of Intellectual Capital*, vol. 21, no. 6, pp. 1085-1106, 2020. https://doi.org/10.1108/JIC-05-2019-0149

[27] J. Shin, J. J. Moon, and J. Kang, "Where does ESG pay? The role of national culture in moderating the relationship between ESG performance and financial performance," *International Business Review*, vol. 32, no. 3, p. 102071, 2023. https://doi.org/10.1016/j.ibusrev.2022.102071

[28] A. Afolabi, J. Olabisi, S. O. Kajola, and T. O. Asaolu, "Does leverage affect the financial performance of Nigerian firms?," *Journal of Economics and Management*, vol. 37, pp. 5-22, 2019.

[29] J. Liu, H. Chang, J. Y.-L. Forrest, and B. Yang, "Influence of artificial intelligence on technological innovation: Evidence from the panel data of china's manufacturing sectors," *Technological Forecasting and Social Change*, vol. 158, p. 120142, 2020. https://doi.org/10.1016/j.techfore.2020.120142

[30] S. Feng, R. Zhang, and G. Li, "Environmental decentralization, digital finance and green technology innovation," *Structural Change and Economic Dynamics*, vol. 61, pp. 70-83, 2022. https://doi.org/10.1016/j.strueco.2022.04.003

[31] S. Cao, L. Nie, H. Sun, W. Sun, and F. Taghizadeh-Hesary, "Digital finance, green technological innovation and energy-environmental performance: Evidence from China's regional economies," *Journal of Cleaner Production*, vol. 327, p. 129458, 2021. https://doi.org/10.1016/j.jclepro.2021.129458

[32] J. Cao, S. H. Law, A. R. B. A. Samad, W. N. B. W. Mohamad, J. Wang, and X. Yang, "Effect of financial development and technological innovation on green growth—analysis based on spatial Durbin model," *Journal of Cleaner Production*, vol. 365, p. 132865, 2022. https://doi.org/10.1016/j.jclepro.2022.132865

[33] Z. Jiang, Z. Wang, and Y. Zeng, "Can voluntary environmental regulation promote corporate technological innovation?," *Business Strategy and the Environment*, vol. 29, no. 2, pp. 390-406, 2020. https://doi.org/10.1002/bse.2429

[34] Z. Khan, M. Hussain, M. Shahbaz, S. Yang, and Z. Jiao, "Natural resource abundance, technological innovation, and human capital nexus with financial development: a case study of China," *Resources Policy*, vol. 65, p. 101585, 2020. https://doi.org/10.1016/j.resourpol.2019.101585

[35] T. O. Siwendu, M. J. Swanepoel, and O. Stumke, "Relationship between executive remuneration and performance of South African mining companies," *Journal of Economic and Financial Sciences*, vol. 17, no. 1, p. 888, 2024. https://doi.org/10.4102/jef.v17i1.888

[36] O. T. Hazzaa, D. F. Abdullah, and A. M. Sadaa, "Influence of CEO characteristics and audit committee on financial performance: Evidence from Iraq," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 10, no. 2, p. 100290, 2024. https://doi.org/10.3390/joitmc100200290

[37] Y. Shu, X. Zhuang, R. Ying, and G. Xu, "Formal institutional pressure and the integration of corporate environmental and financial performance: Empirical evidence from listed companies in heavily polluting industries in China," *Sustainability*, vol. 16, no. 6, p. 2471, 2024. https://doi.org/10.3390/su16062471

[38] M. Aldogan Eklund and P. Pinheiro, "The determinants of corporate social responsibility (CSR) committee: Executive compensation, CSR-based incentives and ESG performance," *Social Responsibility Journal*, vol. 20, no. 7, pp. 1240-1255, 2024. https://doi.org/10.1108/srj-07-2022-0303

[39] J. Lee, K. Koh, and E. D. Shim, "Managerial incentives for ESG in the financial services industry: direct and indirect association between ESG and executive compensation," *Managerial Finance*, vol. 50, no. 1, pp. 10-27, 2024. https://doi.org/10.1108/MF-09-2022-0372