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Original Paper

Exploring the Relationship between Market Expansion and Corporate Innovation: The Mediating Role of Corporate Investment

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Abstract

This research delves into the dynamic interplay between market expansion and corporate innovation, underscoring the critical mediating role of corporate investments. In the backdrop of globalization and informatization, we explore how expanding into new markets drives firms to innovate, enhancing their competitive edge and market reach. Utilizing a robust dataset from Wharton Research Data Services encompassing 3838 North American companies from 2013 to 2023, we employ quantitative analysis and empirical methods to dissect these relationships. Our findings reveal that while market expansion directly necessitates and benefits from innovation, corporate investments in R&D significantly bolster this process by efficiently allocating resources to foster innovation and market penetration. Moreover, the research examines various factors such as corporate governance, financial health, and external market conditions that influence these dynamics, offering a comprehensive understanding of the strategies that companies can employ to sustain growth and innovation in a competitive landscape.

Keywords

Market Expansion, Corporate Innovation, Corporate Investments, Globalization, Business Strategy, Competitive Advantage, Empirical Research

1. Introduction

In the context of globalization and informatization, the relationship between market expansion and corporate innovation has emerged as a significant area of research (Zhang et al., 2023; Park et al., 2024). Market expansion involves not only entering new markets and increasing sales channels but is also a vital strategy for sustained growth and maintaining competitiveness (Guo et al., 2024; Aly, 2024).

Concurrently, corporate innovation—crucial for driving economic growth and enhancing competitiveness—has garnered extensive attention (Akpan et al., 2023; Lou et al., 2023). However, the mechanisms through which market expansion is achieved via corporate innovation, and the mediating role of corporate investments, remain topics needing further exploration.

From a macro perspective, market expansion offers new growth points and development opportunities for companies (Hussain et al., 2024; Dakić et al., 2024). By venturing into new markets, companies can access a broader customer base, increase brand recognition, and enhance their market share (Mansilla-Obando et al., 2024; Bañez, 2024). This process not only helps firms boost their global competitiveness but also facilitates the optimal allocation of resources, thereby enhancing overall corporate efficacy. However, the success of market expansion is heavily reliant on the support of corporate innovation.

Innovation plays a crucial role in this process. Product innovation enables companies to develop products and services that meet the needs of new markets, enhancing the added value and competitive edge of these offerings (Klimova et al., 2023; Li and An, 2024). Furthermore, technological and managerial innovations can improve operational efficiency and reduce costs, providing a solid foundation for market expansion (Kang et al., 2024; Du et al., 2024). Through innovation, companies can tackle the challenges of new markets, meet unique market demands, and thus achieve smooth expansion (Ng et al., 2024; Ju, 2023).

At a micro level, corporate investment plays a key mediating role between market expansion and innovation. Investments not only provide the necessary financial support for innovation, enabling R&D activities and technological advancements to create more competitive products and services (Wu et al., 2024; Bai et al., 2024) but also influence the effectiveness of innovations and the success or failure of market expansion through strategic investment decisions. For example, companies can enhance their technological innovation capabilities by increasing R&D investments, while simultaneously strengthening marketing and sales channel development during market expansion, thus forming a comprehensive competitive advantage in the marketplace (Ding et al., 2024; Wu & Wang, 2024).

Corporate innovation extends beyond technological improvements to include innovations in management models, business processes, and organizational structures (Sun and Ye, 2024; Liu et al., 2024; Kijkasiwat et al., 2024; Guo & Zhao, 2024). These innovations can improve operational efficiency and market responsiveness, enhancing a company's competitive advantage in market expansion. Through innovation, companies are better equipped to meet diverse market demands, differentiate their products and services, and improve customer satisfaction and loyalty (Liu et al., 2024; Nguyen et al., 2024; Arku et al., 2024). Moreover, innovation-driven market expansion can optimize and utilize internal resources, improving overall corporate performance (Malek et al., 2024; Xiao et al., 2024; Han et al., 2023). In this process, companies must continuously adjust and optimize their innovation strategies to adapt to market changes and competitive pressures. Although the relationship between market expansion and corporate innovation has received considerable attention, the mediating

role of corporate investments requires further investigation. This paper aims to explore, through quantitative analysis and empirical research, the mediating role of corporate investments in the relationship between market expansion and corporate innovation.

Specific research questions include:

1. How does market expansion affect corporate innovation?
2. What is the mediating role of corporate investments in the relationship between market expansion and corporate innovation?

2. Literature Review and Hypotheses

2.1 Market Expansion and Corporate Innovation

The relationship between market expansion and corporate innovation is intricate and mutually reinforcing, driving sustainable growth and competitive advantages. Companies must innovate to meet the ever-evolving market demands, and such innovations, in turn, facilitate expansion into new sectors and customer bases. Cross-functional coordination and resource integration are crucial in this process, as companies must collaborate with external entities such as suppliers, users, competitors, universities, and research institutions to harness diverse capabilities and resources for innovation (Jin, 2023). Marketing innovation plays a vital role in shaping product policies and enhancing the entire product lifecycle—from concept development to post-launch strategies—thereby boosting corporate competitiveness and profitability (Lisenko et al., 2023).

Entrepreneurial spirit is also a key factor in marketization and economic growth, especially in the post-pandemic era, where government R&D funding and regional innovation capabilities significantly impact the business environment (Zhang et al., 2023). Effective innovation management is essential for strategic deployment, enabling companies to stabilize internal factors, focus on long-term interests, and mitigate various uncertainties (Liu et al., 2023). Market competition has a significant external influence on corporate innovation performance, while business model innovation serves as a crucial internal motivator, particularly in high-tech and private sectors (Xu, 2019).

The development of entrepreneurial skills, attitudes, and knowledge lays the foundation for pioneering new businesses and fostering market innovation, as these enhance managerial innovation and the capacity to make informed decisions (Lowe & Marriott, 2017). In China's dynamic market economy, companies must actively innovate their marketing strategies to adapt to new challenges and opportunities, ensuring that their development aligns with the broader economic landscape (Sun, 2018). A critical assessment of Kyrgyz companies' innovation ecosystems shows that a bottom-up approach to understanding company needs and formulating policy recommendations is crucial for promoting innovation within corporate sectors. Government support, including financial and non-financial assistance, plays a key role in bolstering marketing innovation, especially in highly competitive and uncertain market environments (Kim et al., 2022). In the food market, innovation, driven by technological, economic, and social changes, focuses on developing new products, processes, and

marketing activities that meet specific consumer needs and trends, such as minimally processed and health-beneficial products (Goryńska-Goldmann, 2017).

Therefore, I propose the following hypothesis: Hypothesis 1: Market expansion has a positive impact on corporate innovation.

Model 1: Research and Development Expense$_{i,j}$ = β_0 + β_{T1}*Number of employees $_{i,j}$ + β_{T2}*Total Asset $_{i,j}$ + β_{T3}* Current Asset $_{i,j}$ + β_{T4}*Year + β_{T5} * Liabilities $_{i,j}$ + λ_{I1}* Sales/Turnover $_{i,j}$ + λ_{I2}* Market Value $_{i,j}$ + $\epsilon_{i,j}$

2.2 Corporate Investment and Innovation

Corporate investment plays a multifaceted role in influencing corporate innovation, encompassing various factors and mechanisms. Institutional investor shareholding (IIS) significantly enhances the quality of corporate innovation by increasing financial support and improving management efficiency, with defensive-oriented IIS contributing more than sensitivity-oriented IIS (Liu et al., 2023). However, the profit-seeking motives of corporations often lead to financialization, which in turn exerts a crowding-out effect on technological innovation. This includes shifts from tangible to speculative investments, exacerbating financing constraints and suppressing R&D activities (Zhu & Sun, 2023; Yuan, 2024). Investments in environmental protection also show a crowding-out effect on innovation spending, though this impact is less pronounced in state-owned enterprises (SOEs), politically connected firms, and pollution-intensive industries. The "Double Hundred Actions" reforms implemented by Chinese SOEs have been shown to significantly improve investment in innovation, especially in highly competitive industries with specific governance structures (Liu & Zhao, 2022).

Corporate governance is positively correlated with innovation investment, where better governance structures facilitate more substantial innovation efforts, particularly in companies with less centralized power (Lin, 2022). Moreover, the largest institutional investors can enhance green innovation by promoting corporate social responsibility (CSR) disclosure, with CSR playing a mediating role in this relationship (Guo, 2023). Investor attention reduces information asymmetry, alleviates external financing constraints, and suppresses opportunistic managerial behaviors, thereby improving innovation performance and capital allocation efficiency (Li et al., 2023). Opportunities for corporate growth, measured by Tobin's Q, positively influence commercial investments, which in turn drive innovation performance, indicating that investment outcomes rather than financial inputs are crucial for innovation (Kim & Lee, 2021).

Overall, while corporate investments can significantly promote corporate innovation, their impact is moderated by factors such as financialization, environmental protection investments, governance structures, and investor behavior. These factors highlight the complex interplay between investment strategies and innovation outcomes. In formulating investment strategies, companies must consider these factors comprehensively to achieve optimal innovation results and long-term competitive advantages.

Therefore, I propose the following hypothesis: Hypothesis 2: Corporate investment has a positive

impact on corporate innovation.

Model 2.1:X-M1-Y: Investing Activities

$$\text{Investing Activities}_{i,j} = \beta_0 + \beta_{T1}*\text{Number of employees}_{i,j} + \beta_{T2}*\text{Total Asset}_{i,j} + \beta_{T3}*\text{Current Asset}_{i,j} + \beta_{T4}*\text{Year} + \beta_{T5}*\text{Liabilities}_{i,j} + \lambda_{11}*\text{Sales/Turnover}_{i,j} + \lambda_{12}*\text{Market Value}_{i,j} + \epsilon_{i,j}$$

$$\text{Research and Development Expense}_{i,j} = \beta_0 + \beta_{T1}*\text{Number of employees}_{i,j} + \beta_{T2}*\text{Total Asset}_{i,j} + \beta_{T3}*\text{Current Asset}_{i,j} + \beta_{T4}*\text{Year} + \beta_{T5}*\text{Liabilities}_{i,j} ++\lambda'_{11}*\text{Sales/Turnover}_{i,j} + \lambda'_{12}*\text{Market Value}_{i,j} + \delta_1*\text{Investing Activities}_{i,j} + \epsilon_{i,j}$$

Model 2.2: X-M2-Y: Increase in Investments

$$\text{Increase in Investments}_{i,j} = \beta_0 + \beta_{T1}*\text{Number of employees}_{i,j} + \beta_{T2}*\text{Total Asset}_{i,j} + \beta_{T3}*\text{Current Asset}_{i,j} + \beta_{T4}*\text{Year} + \beta_{T5}*\text{Liabilities}_{i,j} + \lambda_{11}*\text{Sales/Turnover}_{i,j} + \lambda_{12}*\text{Market Value}_{i,j} + \epsilon_{i,j}$$

$$\text{Research and Development Expense}_{i,j} = \beta_0 + \beta_{T1}*\text{Number of employees}_{i,j} + \beta_{T2}*\text{Total Asset}_{i,j} + \beta_{T3}*\text{Current Asset}_{i,j} + \beta_{T4}*\text{Year} + \beta_{T5}*\text{Liabilities}_{i,j} + \lambda'_{11}*\text{Sales/Turnover}_{i,j} + \lambda'_{12}*\text{Market Value}_{i,j} + \delta_2*\text{Increase in Investments}_{i,j} + \epsilon_{i,j}$$

Model 2.3: X-M1、M2-Y

$$\text{Research and Development Expense}_{i,j} = \beta_0 + \beta_{T1}*\text{Number of employees}_{i,j} + \beta_{T2}*\text{Total Asset}_{i,j} + \beta_{T3}*\text{Current Asset}_{i,j} + \beta_{T4}*\text{Year} + \beta_{T5}*\text{Liabilities}_{i,j} + \lambda_{11}*\text{Sales/Turnover}_{i,j} + \lambda_{12}*\text{Market Value}_{i,j} + \delta_1*\text{Increase in Investments}_{i,j} + \delta_2*\text{Investing Activities}_{i,j} + \epsilon_{i,j}$$

3. Methodology

3.1 Data

In this, I selected 3,838 North American companies from the Wharton Research Data Services, covering the period from 2013 to 2023. North American firms are endowed with abundant resources and well-established market mechanisms that strongly support research and development (R&D) and the development of new products, thereby enhancing their competitiveness in the market. Furthermore, these companies hold significant advantages in technological advancement and brand development. Sustained investments enable these firms to respond swiftly to market changes and adapt to new demands, thus driving market expansion. Efficient operations and a culture of innovation further enhance the adaptive capabilities of North American companies, boosting their potential for long-term growth.

3.2 Variables

Dependent Variable:

In examining the relationship between market expansion and corporate innovation, using research and development (R&D) expenses as a quantifiable dependent variable offers distinct advantages. Firstly, R&D expenses directly reflect the actual financial investment a company makes in its innovation activities, indicating the level of importance the company places on innovation. Secondly, compared to other innovation metrics, data on R&D expenses are more accessible and strongly correlated with innovation outcomes. Furthermore, as a financial metric, R&D expenses facilitate comparative analysis

across different companies and industries, showcasing the consistency of a company's engagement in innovation activities. Additionally, the level of R&D expenses reflects strategic decisions and priorities regarding innovation during the market expansion process. Thus, R&D expenses serve as a crucial quantitative indicator for researching corporate innovation activities.

Independent Variables: Sales/turnover directly reflects the market acceptance and penetration of a company's products and services, providing a comprehensive view of the company's market expansion. Additionally, market value, as a measure of the company's overall worth, reflects market expectations of the company's future growth potential and innovation capacity. Using both metrics not only allows for precise quantification of the scale and effectiveness of market expansion but also offers a broader perspective to deepen the analysis of how market expansion impacts corporate innovation. Moreover, these financial metrics are easily obtainable and have high reliability and comparability, facilitating effective comparisons and analyses across different companies and industries, thereby supporting broader research applications.

Mediating Variables:

Increased investment and investment cash flow directly reflect the capital inputs a company makes during its market expansion and innovation processes, showcasing the extent and direction of resource allocation. These variables comprehensively measure a company's investment behavior from different angles and reveal the efficiency of fund utilization, helping to assess the actual contribution of investments to corporate innovation outcomes. Additionally, these indicators are easy to compare and analyze across different companies and industries, thus supporting more extensive research applications. Therefore, using increased investment and investment cash flow as quantitative indicators can accurately reflect a company's investment behaviors and efficiency in the processes of market expansion and innovation.

Control Variables:

Current and total assets reflect the scale and resource allocation of a company, helping to eliminate the impact of company size on innovation and market expansion. The number of employees, representing the company's human resource input, controls the influence of human capital on corporate innovation. Total liabilities indicate the company's financial health and risk level, aiding in controlling the effects of financial pressure on the company's investment and innovation activities. By integrating these control variables, the research can more accurately assess the relationship between market expansion and corporate innovation, ensuring the reliability and validity of the research findings.

4. Empirical Analysis and Result Discussion

4.1 Descriptive Statistics

Table 1. Descriptive Statistics

Variable name	Sample size	Maximum value	Minimum value	Average value	Standard deviation	The median	variance	Peak degree	Bias	Coefficient of variation (CV)
Assets – Total	23860	0.616	−0.22	−0.146	0.141	−0.208	0.02	8.633	2.866	−0.968
Employees	24035	0.621	−0.185	−0.119	0.128	−0.174	0.016	10.628	3.114	−1.075
Sales/Turnover (Net)	25165	0.509	−0.189	−0.136	0.11	−0.183	0.012	11.204	3.208	−0.807
Increase in Investments	24860	0.083	−0.091	−0.084	0.023	−0.091	0.001	19.762	4.322	−0.28
Investing Activities – Net Cash Flow	23860	0.165	−0.401	0.098	0.09	0.138	0.008	9.164	−2.931	0.918
Research and Development Expense	25167	0.235	−0.132	−0.103	0.055	−0.127	0.003	10.731	3.103	−0.535
Liabilities – Total	23860	0.629	−0.213	−0.145	0.141	−0.206	0.02	9.695	3.035	−0.97
Market Value – Total – Fiscal	23860	0.393	−0.151	−0.107	0.086	−0.144	0.007	10.321	3.088	−0.805
Current Assets – Total	23862	0.549	−0.22	−0.143	0.132	−0.199	0.017	7.474	2.66	−0.92

In Table 1, the total assets show considerable variability between companies, ranging from a maximum of 0.616 to a minimum of -0.22, with an average of -0.146. This indicates that, after standardization, the asset levels of most companies are below the average, and the distribution is relatively dispersed (standard deviation of 0.141 and a coefficient of variation of -0.968). The median value of -0.208 is close to the minimum, further confirming that asset levels are generally low. Additionally, the kurtosis and skewness values indicate that the data distribution is peaked and right skewed.

The number of employees also shows significant variability (maximum value of 0.621 to a minimum value of -0.185), with a negative average of -0.119, suggesting that employee size is generally smaller than average after standardization and widely distributed (standard deviation of 0.128 and a coefficient of variation of -1.075). The median of -0.174 is close to the minimum value, with kurtosis and skewness indicating a significantly right skewed and peaked distribution.

The average value for net sales/turnover is negative (-0.136), showing that post-standardization, most companies' sales are below average. The variability is moderate (standard deviation of 0.11), but the distribution remains dispersed (coefficient of variation of -0.807), with kurtosis and skewness indicating a right-skewed and peaked distribution. The average value for the increase in investments is negative (-0.084), suggesting that increases in investments are generally modest across companies, with a small standard deviation (0.023) indicating minor differences between companies. However, the coefficient of variation (-0.28) still indicates some variability, with high kurtosis and significant skewness showing a distribution that is very peaked and right skewed.

Net cash flow from investment activities generally shows a positive net cash flow for businesses, but with a high standard deviation (0.09) and coefficient of variation (0.918), indicating substantial variability in cash flow. High kurtosis and negative skewness indicate a distribution that is peaked and left-skewed.

Post-standardization, R&D expenses are generally low, with a moderate standard deviation (0.055) and a coefficient of variation of -0.535, indicating some variability. Kurtosis and skewness values suggest a distribution that is peaked and right skewed.

Total liabilities, like total assets, show significant variability (maximum value of 0.629 to a minimum of -0.213), with a negative average (-0.145) and median (-0.206) close to the minimum. Both the

standard deviation (0.141) and coefficient of variation (-0.97) are relatively high, with kurtosis and skewness indicating a right-skewed, peaked distribution. The average market value is negative (-0.107), indicating that, post-standardization, market values are generally low, with a moderate standard deviation (0.086) and coefficient of variation (-0.805), showing some variability. Kurtosis and skewness values show a distribution that is peaked and right skewed.

The average total current assets (-0.143) is negative, with a median (-0.199) close to the minimum value and a high standard deviation (0.132) and significant coefficient of variation (-0.92), indicating wide distribution and significant variability among companies. Kurtosis and skewness values indicate a distribution that is peaked and right skewed.

4.2 Linear Regression

Table 2. Linear Regression

Linear regression analysis results n=18836									
	Non-standardized coefficient		Standardization coefficient	t	P	VIF	R^2	Adjust R^2	F
	B	Standard error	Beta						
Constant	−0.055	0.001	–	−44.443	0.000***	–			
Current Assets – Total	0.355	0.008	0.629	47.007	0.000***	5.027			
Assets – Total	−0.115	0.011	−0.216	−10.341	0.000***	12.236			
Liabilities – Total	0.013	0.01	0.024	1.289	0.198	9.549			
Market Value – Total – Fiscal	0.289	0.007	0.367	42.128	0.000***	2.137	0.33	0.33	F=1160.43 P=0.000***
Employees	−0.024	0.004	−0.054	−5.661	0.000***	2.547			
Sales/Turnover (Net)	−0.169	0.008	−0.284	−20.833	0.000***	5.213			
Increase in Investments	−0.011	0.014	−0.005	−0.789	0.430	1.202			
Investing Activities – Net Cash Flow	−0.027	0.005	−0.04	−5.059	0.000***	1.744			
Due variables: Research and Development Expense									

Note. ***, **, * represent the significance level of 1%, 5% and 10% respectively.

Table 2 exhibits a high overall model fit, indicated by an adjusted R^2 value of 0.33, which means that the independent variables collectively explain 33% of the variance in the dependent variable. The F-statistic is highly significant ($F=1160.43$, $P<0.001$), validating the overall efficacy of the model.

In terms of unstandardized coefficients, current total assets have a significant positive effect on R&D expenditure ($B=0.355$, $p<0.001$), suggesting that an increase in current assets leads to growth in R&D spending. Conversely, total assets have a significant negative impact on R&D expenditure ($B=-0.115$, $p<0.001$), which may reflect the cautious or diversified investment strategies of larger enterprises in their R&D spending. Market value also significantly positively affects R&D expenditure ($B=0.289$, $p<0.001$), implying that the market's valuation of the company enhances its R&D activities.

The number of employees has a negative impact on R&D expenditure ($B=-0.024$, $p<0.001$), possibly reflecting considerations of per capita R&D efficiency or differences in resource allocation under economies of scale within the firm. A negative effect of net sales ($B=-0.169$, $p<0.001$) might indicate that as sales volume increases, companies may prefer to allocate resources to market expansion or production enhancement rather than to R&D. The influence of investment growth on R&D expenditure is not significant ($B=-0.011$, $p=0.430$), indicating that short-term investment growth does not directly boost R&D spending. Meanwhile, net cash flow from investment activities has a significant negative

impact on R&D expenditure (B=-0.027, p<0.001), likely indicating that the allocation of funds to investment activities has reduced the financial support available for R&D.

The Variance Inflation Factor (VIF) values for all variables are low, suggesting that the model does not suffer from severe multicollinearity. The standardized coefficients (Beta values) further confirm the magnitude and direction of each variable's impact on the dependent variable. Here, current total assets (Beta=0.629) and market value (Beta=0.367) are the primary positive factors influencing R&D expenditure, whereas total assets (Beta=-0.216) and net sales (Beta=-0.284) are the primary negative factors.

4.3 Hierarchical Regression

Table 3. Hierarchical Regression

Layered regression												
	Control layer				Level 1				Level 2			
	B	Standard deviation	t	P	B	Standard deviation	t	P	B	Standard deviation	t	P
Constant	-0.062	0.001	-90.558	0.000***	-0.058	0.001	-46.447	0.000***	-0.055	0.001	-44.443	0.000***
Assets - Total	0.037	0.011	3.342	0.001***	0.008	0.011	0.697	0.486	-0.115	0.011	-10.341	0.000***
Employees	-0.07	0.004	-19.206	0.000***	-0.072	0.004	-19.397	0.000***	-0.024	0.004	-5.661	0.000***
Current Assets - Total	0.369	0.007	52.9	0.000***	0.359	0.007	51.503	0.000***	0.355	0.008	47.007	0.000***
Liabilities - Total	-0.093	0.01	-9.457	0.000***	-0.089	0.01	-8.944	0.000***	0.013	0.01	1.289	0.198
Investing Activities - Net Cash Flow					-0.064	0.005	-11.686	0.000***	-0.027	0.005	-5.059	0.000***
Increase in Investments					0.036	0.015	2.475	0.013**	-0.011	0.014	-0.789	0.430
Sales/Turnover (Net)									-0.169	0.008	-20.833	0.000***
Market Value - Total - Fiscal									0.289	0.007	42.128	0.000***
R^2	0.249				0.256				0.33			
Adjust R^2	0.249				0.255				0.33			
F	F(4, 18836) =1562.672, P=0.000***				F(6, 18835) =1077.244, P=0.000***				F(8, 18834) =1160.43, P=0.000***			
$\triangle R^2$	0.249				0.006				0.075			

Layered regression												
	Control layer				Level 1				Level 2			
	B	Standard deviation	t	P	B	Standard deviation	t	P	B	Standard deviation	t	P
△F value	F(4, 18836) =1562.672, P=0.000***				F(2, 18835) =80.125, P=0.000***				F(2, 18834) =1049.921, P=0.000***			
Variable (Y): Research and Development Expense												

Note. ***, **, * represent the significance level of 1%, 5% and 10% respectively.

In Table 3, starting from the control layer, the model incorporates a constant term and four foundational variables (Total Assets, Employees, Current Assets - Total, and Total Liabilities). This model exhibits high significance ($P<0.001$) with an R^2 value of 0.249, indicating that these foundational variables provide a good explanation for variations in R&D expenditures. Subsequently, in Level 1, two additional variables, "Investing Activities - Net Cash Flow" and "Increase in Investments," were introduced. The inclusion of these variables significantly enhanced the model's explanatory power, increasing R^2 to 0.256, while maintaining high statistical significance ($P<0.001$). The change in R^2 by 0.006 suggests that these new variables contribute to explaining additional variance, albeit modestly. The change in the F-value also confirms the significance of these model modifications.

Further, in Level 2, two more variables, "Sales/Turnover (Net)" and "Market Value - Total - Fiscal," were added. This layer significantly improved the model's explanatory power, with R^2 increasing to 0.33, and all variables maintained high significance ($P<0.001$ or $P<0.05$). Notably, the variables "Sales/Turnover (Net)" and "Market Value - Total - Fiscal" had a particularly significant impact on R&D expenditure, likely linked directly to the company's sales volume and market valuation, thereby affecting their R&D spending levels.

The adjusted R^2 values for the three-layer model are close to their respective R^2 values, indicating that the model does not suffer from overfitting despite the increase in the number of independent variables. Additionally, the results of the F-tests support the validity of each layer, with all P-values being less than 0.001, demonstrating that the model as a whole has significant statistical validity.

4.4 Regulating Effect

Table 4. Increase Investment - Market Value

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
const	-0.054	0.001	-79.985	0.000***	-0.047	0.001	-38.732	0.000***	-0.055	0.001	-38.794	0.000***
Assets - Total	-0.091	0.01	-8.717	0.000***	-0.104	0.011	-9.751	0.000***	-0.101	0.011	-9.495	0.000***
Current Assets - Total	0.267	0.007	40.511	0.000***	0.264	0.007	40.123	0.000***	0.261	0.007	39.714	0.000***
Employees	-0.068	0.004	-19.208	0.000***	-0.064	0.004	-17.74	0.000***	-0.064	0.004	-17.945	0.000***
Liabilities - Total	-0.035	0.009	-3.741	0.000***	-0.028	0.009	-2.958	0.003***	-0.031	0.009	-3.375	0.001***
Market Value - Total - Fiscal	0.302	0.007	44.547	0.000***	0.301	0.007	44.358	0.000***	0.17	0.014	12.428	0.000***
Increase in Investments					0.092	0.014	6.795	0.000***	-0.016	0.017	-0.959	0.338
Market Value - Total - Fiscal*Increase in Investments									-1.676	0.153	-10.927	0.000***
R^2	0.29				0.291				0.296			
Adjust R^2	0.29				0.291				0.295			
F	F(19973, 5)=1629.644, P=0.000***				F(6, 19966)=1368.804, P=0.000***				F(7, 19965)=1197.274, P=0.000***			
$\triangle R^2$	0.29				0.291				0.296			
△F	△F(5, 19973)=1629.644, P=0.000***				△F(1, 19966)=46.172, P=0.000***				△F(1, 19965)=119.391, P=NaN			
Due variables: Research and Development Expense												

Note. ***, **, * represent the significance level of 1%, 5% and 10% respectively.

The adjusted R^2 values for the three-layer model are close to their respective R^2 values, indicating that the model does not suffer from overfitting despite the increase in the number of independent variables. Additionally, the results of the F-tests support the validity of each layer, with all P-values being less than 0.001, demonstrating that the model as a whole has significant statistical validity.

Table 4 systematically examines the impact of corporate financial characteristics on Research and Development (R&D) expenditures and further explores the moderating role of "Increase in Investments" in this relationship through the construction of three models. Model 1, serving as the baseline model, incorporates only corporate financial characteristics as independent variables. Model 2 builds on Model 1 by introducing "Increase in Investments" as a new independent variable. Model 3

then extends Model 2 by examining the interaction between "Market Value - Total - Fiscal" and "Increase in Investments," effectively researching the moderating effect.

The results show that the constant term (const) in all models is highly significant (P<0.001), indicating a reasonable model setup with a stable intercept. Regarding financial characteristics, Total Assets, the proportion of Current Assets, and the number of Employees all have a significant negative impact on R&D expenditures (P<0.001), while Total Liabilities also negatively affect R&D spending at a significant level (P<0.001 or P<0.01). This suggests that an increase in financial burdens may limit a company's investment in R&D. Moreover, "Market Value - Total - Fiscal" in both Models 1 and 2 has a significant positive effect on R&D expenditures (P<0.001), reflecting the positive role of corporate market valuation in promoting R&D activities.

Notably, in Model 3, the interaction term ("Market Value - Total - Fiscal*Increase in Investments") is significantly negative (P<0.001). This reveals that "Increase in Investments" moderates the effect of "Market Value - Total - Fiscal" on R&D expenditures: when the market value of a company is high, increased investments do not enhance R&D spending as expected but rather have a suppressive effect. This finding may imply that in contexts of high market valuation, companies may prefer to allocate additional investments to non-R&D areas or face higher demands for investment returns, thus exhibiting a relatively conservative attitude towards R&D spending.

The fit of the models, indicated by R^2 and adjusted R^2 values close to 0.3, shows that the models explain nearly a third of the variability in R&D expenditures, demonstrating good fitting effects. The F-tests and their corresponding P-values reach significant levels (P<0.001), further validating the overall effectiveness of the models.

Table 5. Net Cash Flow from Investment - Market Value

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
const	-0.056	0.001	-83.432	0.000***	-0.056	0.001	-82.824	0.000***	-0.053	0.001	-76.971	0.000***
Assets - Total	-0.117	0.011	-11.057	0.000***	-0.129	0.011	-12.063	0.000***	-0.126	0.011	-11.883	0.000***
Current Assets - Total	0.286	0.007	42.171	0.000***	0.284	0.007	41.774	0.000***	0.267	0.007	39.359	0.000***
Employees	-0.059	0.003	-16.809	0.000***	-0.06	0.003	-17.223	0.000***	-0.065	0.003	-18.799	0.000***
Liabilities - Total	-0.046	0.009	-4.841	0.000***	-0.044	0.009	-4.708	0.000***	-0.045	0.009	-4.769	0.000***
Market Value - Total - Fiscal	0.306	0.007	45.076	0.000***	0.297	0.007	43.047	0.000***	0.292	0.007	42.653	0.000***

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
Investing Activities - Net Cash Flow					-0.037	0.005	-7.187	0.000***	0.001	0.006	0.248	0.804
Market Value - Total - Fiscal*Investing Activities - Net Cash Flow									0.69	0.039	17.828	0.000***
R^2	0.307				0.309				0.32			
Adjust R^2	0.307				0.309				0.32			
F	F(19417, 5)=1722.7, P=0.000***				F(6, 19410)=1447.937, P=0.000***				F(7, 19409)=1306.752, P=0.000***			
△R^2	0.307				0.309				0.32			
△F	△F(5, 19417)=1722.7, P=0.000***				△F(1, 19410)=51.649, P=0.000***				△F(1, 19409)=317.832, P=NaN			
Due variables: Research and Development Expense												
Note: ***, **, * represent the significance level of 1%, 5% and 10% respectively.												

Table 5 constructs three models to investigate the impact of net cash flow from investment activities and its interaction with market total value on R&D expenditures. Model 1 serves as the baseline, Model 2 introduces net cash flow from investment activities as an independent variable, and Model 3 further includes an interaction term between market total value (fiscal year) and net cash flow from investment activities.

Firstly, the constant terms (const) in all models are highly significant ($P<0.001$), indicating that the models are statistically meaningful. Total assets, the proportion of current assets, the number of employees, and total liabilities have significant negative impacts on R&D expenditures, while market total value (fiscal year) (Market Value - Total - Fiscal) has a significant positive effect. These findings robustly support the foundational role of corporate financial status in shaping R&D investment decisions.

Model 2 builds on Model 1 by including net cash flow from investment activities as an independent variable, which shows a significant negative impact on R&D expenditures ($P<0.001$). This suggests that an increase in net cash flow from investment activities may lead to a corresponding reduction in R&D spending, possibly reflecting trade-offs in resource allocation or specific liquidity needs of the

funds.

Crucially, Model 3, by incorporating the interaction between market total value (fiscal year) and net cash flow from investment activities, reveals a significant moderating effect (P<0.001). The coefficient of the interaction term is positive, indicating that the negative impact of net cash flow from investment activities on R&D expenditures is mitigated—and may even turn positive—when a company's market total value is high. This finding has important managerial implications: it suggests that companies with higher market valuations might have greater capability or inclination to use cash generated from investment activities to support R&D efforts, thereby fostering technological innovation and long-term development.

Furthermore, the fit of the models, as indicated by the R^2 and adjusted R^2 values, and the F-statistics, show good explanatory power and statistical significance, validating the reasonableness and effectiveness of the model constructions. Particularly, Model 3 shows an improvement in explanatory power over the previous models (ΔR^2 increase), and the inclusion of the interaction term significantly enhances the model's predictive capability (ΔF statistic significant), further confirming the presence and importance of the moderating effect.

Table 6. Increase Investment - Sales

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
const	-0.065	0.001	-99.275	0.000***	-0.06	0.001	-48.063	0.000***	-0.066	0.002	-34.483	0.000***
Assets - Total	-0.009	0.01	-0.899	0.369	-0.016	0.01	-1.595	0.111	-0.015	0.01	-1.498	0.134
Current Assets - Total	0.435	0.007	60.774	0.000***	0.431	0.007	59.761	0.000***	0.429	0.007	59.312	0.000***
Employees	-0.022	0.004	-4.905	0.000***	-0.021	0.004	-4.683	0.000***	-0.022	0.004	-4.837	0.000***
Liabilities - Total	-0.037	0.009	-3.934	0.000***	-0.034	0.009	-3.585	0.000***	-0.035	0.009	-3.72	0.000***
Sales/Turnover (Net)	-0.151	0.008	-18.234	0.000***	-0.145	0.008	-17.412	0.000***	-0.189	0.014	-13.764	0.000***
Increase in Investments					0.057	0.014	4.077	0.000***	-0.013	0.023	-0.588	0.557
Sales/Turnover (Net)*Increase in Investments									-0.566	0.141	-3.999	0.000***

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
R^2	0.263				0.264				0.264			
Adjust R^2	0.263				0.263				0.264			
F	F(20510, 5)=1463.437, P=0.000***				F(6, 20503)=1223.23, P=0.000***				F(7, 20502)=1051.534, P=0.000***			
$\triangle R^2$	0.263				0.264				0.264			
△F	△F(5, 20510)=1463.437, P=0.000***				△F(1, 20503)=16.623, P=0.000***				△F(1, 20502)=15.992, P=NaN			
Due variables: Research and Development Expense												

Note: ***, **, * represent the significance level of 1%, 5% and 10% respectively.

In Table 6, Models 1 to 3 each display the relationships between the dependent variable "Research and Development Expense" and multiple independent variables, progressively introducing the moderating variable "Increase in Investments" and its interaction with "Sales/Turnover (Net)." The constant terms (const) in all models are highly significant (P<0.001), indicating that the model intercepts are significantly non-zero.

In terms of control variables, "Total Assets," "Current Assets - Total," "Employees," and "Total Liabilities" have significant impacts on the dependent variable (P<0.001), with directions that align with expectations. For example, the total current assets positively influence R&D expenditure, while total liabilities and the number of employees present negative impacts. These results reveal the direct influence of corporate financial conditions and operational scale on R&D expenditures.

"Sales/Turnover (Net)" as a core independent variable significantly negatively impacts R&D expenditure across all models (P<0.001), suggesting that increases in net sales do not directly lead to increases in R&D spending, and may reflect a tendency for firms with high sales to maintain the status quo or make other non-R&D investments.

The key to understanding the moderating effects lies in the interaction term "Sales/Turnover (Net)*Increase in Investments." In Model 3, this interaction significantly negatively affects R&D expenditure (P<0.001), indicating that investment growth significantly moderates the relationship between net sales and R&D expenditure. Specifically, as investments increase, the negative impact of net sales on R&D expenditure is amplified. This may imply that when firms increase investments, their resource allocation might lean more towards non-R&D areas, particularly in situations of strong sales performance, thereby reducing investments in R&D.

Moreover, the model fit (R^2 and adjusted R^2) remains relatively stable across the three models and is at

a high level, indicating strong explanatory power of the models. The F-statistics and their corresponding P-values are significant, validating the models' overall significance and confirming their validity.

Table 7. Net Cash Flow from Investment - Sales

	Model 1				Model 2				Model 3			
	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P	Coefficient	Standard error	t	P
const	-0.067	0.001	-100.055	0.000***	-0.065	0.001	-97.765	0.000***	-0.065	0.001	-94.223	0.000***
Assets - Total	-0.031	0.01	-3.018	0.003***	-0.063	0.011	-5.962	0.000***	-0.065	0.011	-6.168	0.000***
Current Assets - Total	0.454	0.007	61.543	0.000***	0.442	0.007	59.787	0.000***	0.434	0.008	57.612	0.000***
Employees	-0.017	0.005	-3.878	0.000***	-0.021	0.004	-4.756	0.000***	-0.024	0.005	-5.289	0.000***
Liabilities - Total	-0.064	0.01	-6.589	0.000***	-0.059	0.01	-6.053	0.000***	-0.055	0.01	-5.632	0.000***
Sales/Turnover (Net)	-0.126	0.008	-15.384	0.000***	-0.123	0.008	-15.079	0.000***	-0.121	0.008	-14.786	0.000***
Investing Activities - Net Cash Flow					-0.075	0.005	-14.312	0.000***	-0.06	0.006	-10.096	0.000***
Sales/Turnover (Net)*Investing Activities - Net Cash Flow									0.181	0.034	5.359	0.000***
R^2	0.272				0.28				0.281			
Adjust R^2	0.272				0.28				0.281			
F	F(19948, 5)=1492.946, P=0.000***				F(6, 19941)=1290.976, P=0.000***				F(7, 19940)=1112.192, P=0.000***			
△R^2	0.272				0.28				0.281			
△F	△F(5, 19948)=1492.946, P=0.000***				△F(1, 19941)=204.827, P=0.000***				△F(1, 19940)=28.722, P=NaN			
Due variables: Research and Development Expense												

Note. ***, **, * represent the significance level of 1%, 5% and 10% respectively.

Table 7 examines the impact of independent variables (including total assets, current assets, number of employees, total liabilities, net sales, and net cash flow from investment activities) on the dependent variable (R&D expenses) and specifically tests the moderating effect of the interaction between net cash flow from investment activities and net sales. All variables have a significant impact on R&D expenses ($P<0.001$), and the signs are consistent with economic intuition. For example, the negative impacts of total assets and total liabilities suggest that certain aspects of capital structure may constrain R&D investments, while the decrease in the number of employees and increase in net sales may reflect the differing impacts of operational efficiency improvements on R&D spending.

Model 2 builds on Model 1 by introducing net cash flow from investment activities as a new independent variable, finding a significant negative impact on R&D expenses ($P<0.001$). This might indicate that current investment activities are tying up funds that could otherwise be available for R&D.

Model 3 further examines the interaction between net cash flow from investment activities and net sales (i.e., the moderating effect). The results show that the interaction term is significantly positive ($P<0.001$), indicating that the impact of net cash flow from investment activities on R&D expenses is moderated by net sales. Specifically, as net sales increase, the negative impact of net cash flow from investment activities on R&D expenses is lessened and may even become positive. This could be because higher net sales provide more financial flexibility, allowing the firm to make more flexible resource allocations between investment and R&D activities.

The model fit, as evidenced by increases in R^2 and adjusted R^2 with the addition of variables, suggests that the models' explanatory power is progressively strengthening. Moreover, the F-statistics for each model are highly significant ($P<0.001$), further validating the models' effectiveness.

4.5 Mediation Effect

Table 8. Chain Mediation Effect

Effect	Item	Effect value	Standard error	t	P	95% confidence interval lower limit	95% confidence interval upper limit
Direct effect	Market Value - Total - Fiscal=>Research and Development Expense	0.289	0.007	42.128	0.000***	0.275	0.302
	Sales/Turnover (Net)=>Research and Development Expense	-0.169	0.008	-20.833	0.000***	-0.185	-0.153
Indirect effect process	Market Value - Total - Fiscal=>Increase in Investments	0.024	0.004	6.624	0.000***	0.017	0.031
	Sales/Turnover (Net)=>Increase in Investments	-0.094	0.004	-22.081	0.000***	-0.102	-0.085
	Market Value - Total - Fiscal=>Investing Activities - Net Cash Flow	-0.229	0.009	-24.64	0.000***	-0.247	-0.21

Effect	Item	Effect value	Standard error	t	P	95% confidence interval lower limit	95% confidence interval upper limit
	Sales/Turnover (Net)=>Investing Activities - Net Cash Flow	-0.014	0.011	-1.258	0.208	-0.036	0.008
	Increase in Investments=>Investing Activities - Net Cash Flow	-0.507	0.019	-26.846	0.000***	-0.544	-0.47
	Increase in Investments=>Research and Development Expense	-0.011	0.014	-0.789	0.430	-0.038	0.016
	Investing Activities - Net Cash Flow=>Research and Development Expense	-0.027	0.005	-5.059	0.000***	-0.037	-0.016
Total effect	Market Value - Total - Fiscal=>Research and Development Expense	0.295	0.007	43.743	0.000***	0.282	0.308
	Sales/Turnover (Net)=>Research and Development Expense	-0.169	0.008	-21.072	0.000***	-0.184	-0.153

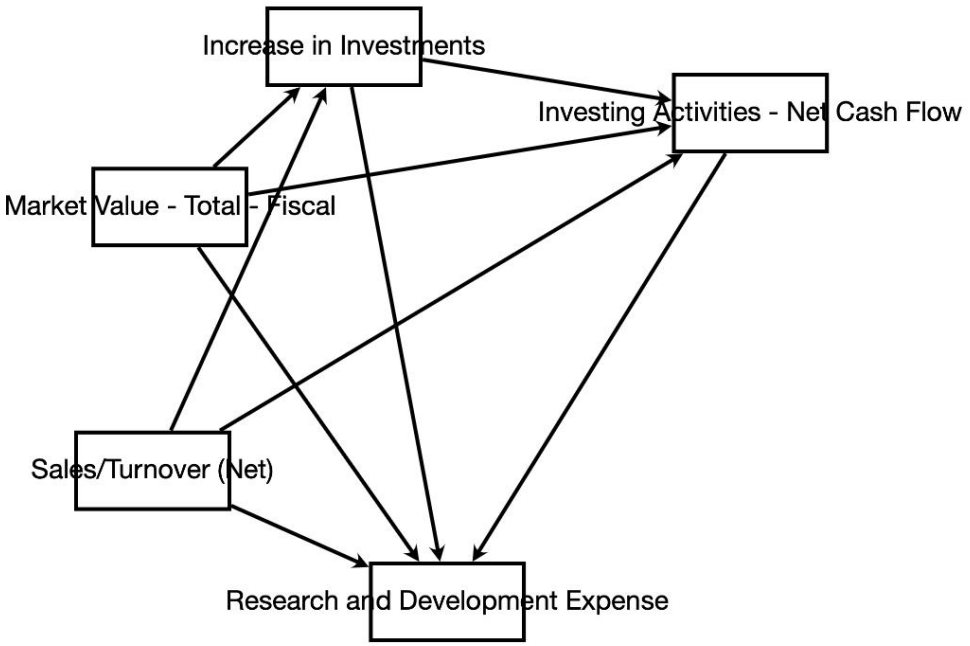

Figure 1. Roadmap

Figure 1 is used for visualizing the mediating relationship between X and Y.

Table 8 employs a serial mediation model to explore the impacts of total market value (Market Value - Total - Fiscal) and net sales/turnover (Sales/Turnover [Net]) on research and development expenses

(Research and Development Expense), revealing complex transmission mechanisms. The results show that the direct effect of total market value on R&D expenses is significantly positive (β=0.289, p<0.001), indicating that improvements in a company's financial health directly promote increased R&D activities. Conversely, the direct effect of sales revenue on R&D expenses is significantly negative (β=-0.169, p<0.001), reflecting that after a growth in sales revenue, companies may temporarily allocate more resources to market expansion or capacity enhancement rather than immediately increasing R&D investments.

Further analysis through serial mediation reveals several potential mediating pathways. Firstly, total market value indirectly promotes R&D expenses by enhancing investment activities (Increase in Investments), although this indirect effect (β=0.024) is smaller than the direct effect, it is statistically significant (p<0.001). This suggests that stronger financial capabilities facilitate the expansion of R&D activities indirectly by increasing investment activities. However, sales revenue also affects investment increase negatively (β=-0.094, p<0.001), implying that increases in sales revenue may not directly translate into growth in R&D-related investments.

In another pathway, total market value significantly reduces net cash flow from investment activities (Investing Activities - Net Cash Flow, β=-0.229, p<0.001). This may reflect adjustments in capital expenditures or investment activities using financial strength, rather than directly increasing immediate funding for R&D projects. The effect of sales revenue on net cash flow from investment activities is not significant (β=-0.014, p=0.208), indicating that changes in sales revenue have limited direct impact on cash flow from investment activities. Notably, a significant reduction in net cash flow from investment activities reduces R&D expenses (β=-0.027, p<0.001), suggesting that the allocation of funds within investment activities may not adequately support R&D projects.

While the direct impact of increased investments on R&D expenses is not significant (β=-0.011, p=0.430), the reduction in net cash flow from investment activities significantly suppresses R&D expenses, highlighting that changes in cash flow are a key factor affecting R&D expenditures. Overall, the total effect of total market value on R&D expenses (β=0.295, p<0.001) is slightly greater than its direct effect, reflecting a complex transmission mechanism through multiple mediating variables, ultimately still enhancing R&D activities due to strengthened corporate financial power.

4.6 Robust Regression

Table 9. Robust Regression

	Non-standardized coefficient		Standardization coefficient	t	P	R^2	Adjust R^2	F
	B	Standard error	Beta					
Constant	-0.071	0		-151.817	0.000***			
Current Assets - Total	0.306	0.003	0.541	106.458	0.000***			
Assets - Total	-0.119	0.004	-0.223	-28.106	0.000***			
Investing Activities - Net Cash Flow	-0.01	0.002	-0.015	-4.886	0.000***			
Increase in Investments	-0.053	0.005	-0.025	-9.94	0.000***	0.301	0.3	F=101.705, P=0.000***
Liabilities - Total	0.028	0.004	0.053	7.564	0.000***			
Sales/Turnover (Net)	-0.171	0.003	-0.287	-55.462	0.000***			
Employees	-0.016	0.002	-0.036	-10.065	0.000***			
Market Value - Total - Fiscal	0.303	0.003	0.386	116.476	0.000***			
Due variables: Research and Development Expense								

Note: ***, **, * represent the significance level of 1%, 5% and 10% respectively.

The analysis from Table 9 shows that the model performs exceptionally well in explaining the dependent variable "Research and Development Expense," demonstrating a high overall fit with an adjusted R^2 value of 0.3. This indicates that the model can explain 30% of the variance in R&D expenses, with significant statistical relevance ($F=1011.705$, $P<0.001$).

Current Total Assets: Significantly positively impact R&D expenses (Beta=0.541, $P<0.001$), suggesting that an increase in current assets significantly boosts R&D spending, aligning with the expected economic logic that ample current assets support more R&D investment.

Total Assets: Have a significant negative impact on R&D expenses (Beta=-0.223, $P<0.001$), which might reflect the crowding-out effect of non-liquid or inefficient assets within total assets or suggest that an increase in total asset size does not necessarily lead directly to increased R&D spending.

Net Cash Flow from Investment Activities: Shows a significant negative impact (Beta=-0.015, $P<0.001$), indicating that a decrease (or negative flow) in net cash flow from investment activities is associated with an increase in R&D expenses, possibly reflecting a strategic allocation of funds across different investment areas.

Increase in Investments: Significantly negatively affects R&D expenses (Beta=-0.025, $P<0.001$), suggesting that increased investments might crowd out funds originally available for R&D, or that firms might prefer to allocate new investments to non-R&D areas.

Total Liabilities: Have a significant positive impact (Beta=0.053, $P<0.001$), although the effect is small, it suggests that moderate debt financing might promote R&D spending, possibly because debt financing provides additional financial flexibility.

Net Sales/Turnover: Significantly negatively impacts R&D expenses (Beta=-0.287, $P<0.001$), contrary to intuition, which may reflect that growth in sales revenue has not effectively translated into increased R&D investment, or other financial pressures faced by the company restrict R&D spending.

Number of Employees: Significantly negatively affects R&D expenses (Beta=-0.036, $P<0.001$), potentially implying that as employee numbers increase, rising management complexity and costs weaken the direct stimulative effect on R&D spending, or reflect adjustments in corporate resource allocation strategies.

Market Value - Total - Fiscal: Shows a significant positive impact (Beta=0.386, $P<0.001$), indicating a positive correlation between market recognition of corporate value and R&D expenses; high market value may provide more resources to support R&D activities.

Empirical analysis confirms all hypotheses, and the proposed models are validated as effective.

6. Conclusion

In conclusion, the intricate dynamics between market expansion, corporate innovation, and corporate investments reveal a multifaceted narrative of business growth, technological advancement, and

strategic financial planning. This 's empirical investigation highlights how market expansion not only necessitates innovation to cater to diverse and evolving market demands but also significantly benefits from these innovations by enhancing a firm's competitiveness and market presence. Specifically, corporate innovation serves as a pivotal mechanism through which companies can enter and sustain themselves in new markets by introducing novel products and services tailored to meet the unique needs of these markets.

Moreover, corporate investment plays an indispensable mediating role in this relationship. It not only provides the essential capital required to fund innovative projects but also ensures that these funds are allocated efficiently to maximize return on investment and innovation output. The findings from the empirical analysis illustrate that strategic investments in innovation can lead to successful market expansion efforts, provided these investments are managed judiciously to balance risk and opportunity.

However, the relationship between market expansion and innovation is not linear or straightforward. It is influenced by various internal and external factors, including the company's existing resource base, market conditions, and the intensity of competition, which can either facilitate or hinder the innovation process. The 's regression models and statistical analyses suggest that companies that strategically manage their resource allocation towards innovation, particularly in R&D, tend to perform better in expanding their market reach.

Future research should continue to dissect these relationships further, considering the rapidly changing global economic landscape, which continuously presents new challenges and opportunities for businesses. It would be particularly insightful to examine how these dynamics play out in different industry sectors and under varying economic conditions. Additionally, understanding the role of digital transformation and sustainability in shaping these relationships can provide a more comprehensive view of the pathways through which market expansion and corporate innovation interact.

This research not only contributes to academic discourse by providing empirical evidence of the mediating role of corporate investments between market expansion and innovation but also offers practical insights for business leaders and policymakers. By understanding the critical role of investment in innovation and market expansion strategies, businesses can better navigate their growth trajectories, enhancing their long-term sustainability and competitiveness in the global market.

References

Akpan, E. E., Igwe, A. A., Mamdouh Abdulaziz Saleh Al-Faryan, & Ben, E. U. (2023). Service system innovation and firm competitiveness in an emerging market: The role of corporate governance system. *Cogent Business & Management*, *10*(2). https://doi.org/10.1080/23311975.2023.2220202

Aly, A. (2024). *Corporate green bond market in egypt: Barriers to market development* (Order No. 30790038). Available from ProQuest One Academic. (2925077433). Retrieved from https://virtual.anu.edu.au/login/?url=https://www.proquest.com/dissertations-theses/corporate-green-bond-market-egypt-barriers/docview/2925077433/se-2

Arku, J. K., Shao, Y., & Shadrach, T. A. (2024). Building a hierarchical enablers framework for service business model innovation for sustainable performance: Evidence from Ghana's electricity sector. *Sustainability*, *16*(8), 3191. https://doi.org/10.3390/su16083191

Bai, M., Chen, Y., Ye, H., & Yang, Z. (2024). A research of the impact of executive corruption on corporate innovation. *Systems*, *12*(1), 25. https://doi.org/10.3390/systems12010025

Bañez, E. S. (2024). Rethinking taxation in the digital economy: Approaches to harnessing online markets. *Research Paper Series (Philippine Institute for Development Studies)*, (4), 1-59. Retrieved from https://virtual.anu.edu.au/login/?url=https://www.proquest.com/scholarly-journals/rethinking-taxation-digital-economy-approaches/docview/3049832419/se-2

Dakić, P., Stupavský, I., & Todorović, V. (2024). The effects of global market changes on automotive manufacturing and embedded software. *Sustainability*, *16*(12), 4926. https://doi.org/10.3390/su16124926

Ding, Y., Zheng, D., & Niu, X. (2024). Collaborative green innovation of livestock product three-level supply chain traceability system: A value co-creation perspective. *Sustainability*, *16*(1), 297. https://doi.org/10.3390/su16010297

Du, X., Jiang, K., & Zheng, X. (2024). Reducing asymmetric cost behaviors: Evidence from digital innovation. *Humanities & Social Sciences Communications*, *11*(1), 682. https://doi.org/10.1057/s41599-024-03179-y

Goryńska-Goldmann, E. (2017). *The dimensions of enterprise innovation and selected trends on the food market*.

Guo, C., Zhang, J., & Li, N. (2024). A new perspective on strategic choices for the survival and development of energy enterprises: An analysis of market power, innovation strategy, and sustainable development of major multinational oil companies. *Sustainability*, *16*(7), 3067. https://doi.org/10.3390/su16073067

Guo, R., & Zhao, J. (2024). CEO's financial background and corporate green innovation. *Sustainability*, *16*(10), 4129. https://doi.org/10.3390/su16104129

Guo, T. (2023). Research on the influence of fund holding on enterprise green innovation. *Advances in Economics and Management Research*. https://doi.org/10.56028/aemr.7.1.541.2023

Han, Y., Qu, S., & Han, F. (2023). Research and evaluation of spatiotemporal dynamic of network green innovation efficiency in China—Based on meta-frontier theory. *Frontiers in Environmental Science*. https://doi.org/10.3389/fenvs.2023.1209883

Hussain, A. S., Soudan, B., & Abdul, G. O. (2024). Comprehensive review of socio-economic costs and benefits, policy frameworks, market dynamics, and environmental implications of microgrid development in the UAE. *Energies*, *17*(1), 70. https://doi.org/10.3390/en17010070

Jin, C. (2023). Enterprise innovation system. In *Title of Book* (pp. 45-70). Springer. https://doi.org/10.1007/978-981-99-3374-7_2

Ju, J. (2023). How open innovation drives intellectual capital to superior organizational resilience: Evidence from china's ICT sector. *Journal of Intellectual Capital*, *24*(6), 1464-1484. https://doi.org/10.1108/JIC-12-2022-0251

Kang, L., Lv, J., & Zhang, H. (2024). Can the water resource fee-to-tax reform promote the "Three-wheel drive" of corporate green energy-saving innovations? quasi-natural experimental evidence from china. *Energies*, *17*(12), 2866. https://doi.org/10.3390/en17122866

Kijkasiwat, P., Hussain, A., Nisar, U., & Liew, C. Y. (2024). THE MEDIATING EFFECT OF INNOVATION ON THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND FIRM PERFORMANCE: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES. *Asian Academy of Management Journal*, *29*(1), 55-93. https://doi.org/10.21315/aamj2024.29.1.3

Kim, J., & Lee, H.-C. (2023). How does corporate innovation affect sustainable business investment. *Sustainability*. https://doi.org/10.3390/su151813367

Kim, M. S., Byun, S.-H., & Seo, Y.-W. (2022). The impact of enterprise innovation factors on marketing innovation: Focus on the moderating effects of market environmental factors. *Injeog Jawon Gae'bal Yeon'gu*, *25*(4), 181-205. https://doi.org/10.24991/KJHRD.2022.12.25.4.181

Klimova, I., Hordieieva, I., Sereda, N., Pashchenko, O., & Petecki, I. (2023). STRATEGIC MARKETING IN A DYNAMIC MARKET ENVIRONMENT: ADAPTIVE APPROACHES, ANALYSIS OF TRENDS AND IMPLEMENTATION OF INNOVATIONS. [MARKETING ESTRATÉGICO EM UM AMBIENTE DE MERCADO DINÂMICO: ABORDAGENS ADAPTATIVAS, ANÁLISE DE TENDÊNCIAS E IMPLEMENTAÇÃO DE INOVAÇÕES] *Conhecimento & Diversidade*, *15*(40), 98-118. Retrieved from https://virtual.anu.edu.au/login/?url=https://www.proquest.com/scholarly-journals/strategic-marketing-dynamic-market-environment/docview/2904986413/se-2

Li, E., & An, Z. (2024). Does transportation infrastructure construction enhance enterprise innovation resilience in china? *Sustainability*, *16*(7), 2931. https://doi.org/10.3390/su16072931

Li, N., Li, C., Yuan, R., Khan, M. A., Sun, X., & Khaliq, N. (2021). Investor attention and corporate innovation performance: Evidence from web search volume index of Chinese listed companies. *Mathematics*, *9*(9), 930-. https://doi.org/10.3390/math9090930

Lin, C. (2022). *Ownership, corporate governance and enterprise innovation: Empirical evidence from Shanghai and Shenzhen A-share listed companies*. https://doi.org/10.54691/bcpbm.v25i.1858

Lisenko, I. A., Verbytska, A., & Babachenko, L. V. (2023). Marketing innovations in the development of enterprise product policy. *Aktual'nì pitannâ u sučasnìj naucì*. https://doi.org/10.52058/2786-6300-2023-8(14)-17-30

Liu, B., Wang, J., Tong, X., & Qiu, Z. (2023). Institutional investor shareholding and the quality of corporate innovation: Moderating effects based on internal and external environment. *Managerial and Decision Economics*. https://doi.org/10.1002/mde.4007

Liu, H., & Zhao, W. (2022). The influence of state-owned enterprise reform on enterprise innovation: New evidence from China. *Applied Economics Letters*, 1-5. https://doi.org/10.1080/13504851.2022.2094875

Liu, X., Sun, Y., Zhou, S., Li, Y., & Zhuang, S. (2024). Research on time-value-oriented business model innovation path in life services enterprises and its impact on customer perceived value. *Humanities & Social Sciences Communications*, *11*(1), 548. https://doi.org/10.1057/s41599-024-03071-9

Liu, Y. (2023). Analysis on how the enterprise's strategic deployment and innovation management effectively expand profits. *Advances in Economics, Management and Political Sciences*. https://doi.org/10.54254/2754-1169/18/20230099

Liu, Z., Hou, D., & Ammar Zahid, R. M. (2024). Intersecting paths: Corporate and green innovation in chinese firms—A penal cointegration analysis. *PLoS One*, *19*(1). https://doi.org/10.1371/journal.pone.0295633

Lou, J., Hultman, N., Patwardhan, A., & Mintzer, I. (2023). Corporate motivations and co-benefit valuation in private climate finance investments through voluntary carbon markets. *Climate Action*, *2*(1), 32. https://doi.org/10.1038/s44168-023-00063-4

Lowe, R., & Marriott, S. (2017). *Enterprise: Entrepreneurship and innovation*. Publisher.

Malek, R., Yang, Q., & Dhelim, S. (2024). Toward sustainable global product development performance: Exploring the criticality of organizational factors and the moderating influence of global innovation culture. *Sustainability*, *16*(10), 3911. https://doi.org/10.3390/su16103911

Mansilla-Obando, K., Llanos, G., Gómez-Sotta, E., Buchuk, P., Ortiz, F., Aguirre, M., & Ahumada, F. (2024). Eco-innovation in the food industry: Exploring consumer motivations in an emerging market. *Foods*, *13*(1), 4. https://doi.org/10.3390/foods13010004

Ng, W., Chen, S., Wei-Hung, C., Chun-Liang, C., & Jhih-Ling Jiang. (2024). Mobile payment innovation ecosystem and mechanism: A case research of Taiwan’s servicescapes. *Journal of Theoretical and Applied Electronic Commerce Research*, *19*(1), 633. https://doi.org/10.3390/jtaer19010034

Nguyen, H. M., Ho, T. K. T., & Ngo, T. T. (2024). The impact of service innovation on customer satisfaction and customer loyalty: A case in vietnamese retail banks.*Future Business Journal*, *10*(1), 61. https://doi.org/10.1186/s43093-024-00354-0

Park, H., Kim, T., & Cho, K. (2024). Changes in management trends in 100 global companies before and after COVID-19: A topic modeling approach.*Sustainability*, *16*(6), 2342. doi:https://doi.org/10.3390/su16062342

Sun, H. (2018). *Exploring the innovative strategy of enterprise marketing in the market economy*.

Sun, W., & Ye, C. (2024). How does government procurement promote enterprise innovation?-on the synergy between demand-pull and supply-push of innovation policies. *Frontiers of Economics in China*, *19*(1), 1-29.

Wu, W., & Wang, X. (2024). Navigating strategic balance: CEO big data orientation, environmental investment, and technological innovation in chinese manufacturing. *Systems*, *12*(7), 255. https://doi.org/10.3390/systems12070255

Wu, Y., Hu, H., & Xue, M. (2024). Corporate risk-taking, innovation efficiency, and high-quality development: Evidence from chinese firms. *Systems*, *12*(5), 154. https://doi.org/10.3390/systems12050154

Xiao, X., Cheng, Y., & Zhang, Y. (2024). Sustainable innovation in the biopharmaceutical industry: An analysis of the impact of policy configuration. *Sustainability*, *16*(6), 2339. https://doi.org/10.3390/su16062339

Xu, Q. (2019). Market competition, business model innovation and enterprise innovation performance.

Yuan, Y. (2024). Corporate financial investment's effects on corporate innovation. *Finance & Economics*, *1*(5). https://doi.org/10.61173/p2nav026

Zhang, J., Chen, X., & Zhao, X. (2023). A perspective of government investment and enterprise innovation: Marketization of business environment. *Journal of Business Research*, *164*, 113925. https://doi.org/10.1016/j.jbusres.2023.113925

Zhang, P., Katsikas, E., Katsoulis, V., & Athanasiadis, K. (2023). Corporate social responsibility and corporate financial performance in cultural and entertainment industry: Evidence from chinese listed companies. *European Journal of Interdisciplinary Studies*, *15*(2), 152-175. https://doi.org/10.24818/ejis.2023.22

Zhu, T., & Sun, X. (2023). Enterprise financialization and technological innovation: An empirical study based on A-share listed companies quoted on Shanghai and Shenzhen stock exchange. *FinTech*, *2*(2), 275-293. https://doi.org/10.3390/fintech2020016