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Strategic Resource Utilization for Enhancing Corporate Value: Dynamics of Exploration and Exploitation in Korea

Gee-Jung Kwon [1] and Won-Il Lee [2,*]

[1] Department of Accounting, Hanbat National University, Daejeon 34158, Republic of Korea
[2] Department of Business Administration, Hanbat National University, Daejeon 34158, Republic of Korea
* Correspondence: tech201@hanbat.ac.kr

Abstract: This study examines the impact of research and development (R&D) expenditures, training expenditures, and entertainment expenditures (business promotion expenditures) on firm value in the Korean electronics and metal industry. Extending the theoretical foundation of James March's exploration and exploitation theory, this study analyzes the impact of R&D and training investments on firm value to explore new capabilities from a long-term perspective, and the impact of entertainment costs on firm value to achieve short-term organizational goals. Using Tobin's Q methodology, which uses the ratio of a firm's market value to its asset replacement cost as a proxy for firm value, this study finds the relationship between these types of expenditures and firm value. The analysis finds that R&D expenditures and training expenditures are significantly correlated with increases in firm value, suggesting that these investments play an important role in enhancing a firm's competitiveness and performance. On the other hand, while we hypothesize that the balance of exploration and exploitation within an organization will affect firm value, we find that entertainment expenditures, which are business promotion expenditures, do not show a significant relationship with firm value. This suggests that these expenditures by companies in Korea's electronics and metals industry contribute to the achievement of the organization's short-term goals but do not have a significant impact on firm value. These findings suggest that resource allocation in the electronics and metal industries where technological innovation is important should be more heavily weighted toward investments in R&D and training for long-term exploration in order to increase firm value. To increase firm value, firms should prioritize investments that drive sustainable growth and enhance competitive advantage. This research allows for a deeper examination of how different types of costs contribute to firm value and underscores the need for strategic clarity in resource allocation decisions.

Keywords: exploration; exploitation; R&D expenses; training costs; entertainment expenses; business promotion expenses; enterprise value; value relevance

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1. Introduction

In today's fast-changing, hyper-competitive environment, it is very important for companies to create continuous innovation and competitiveness, not just one-off market wins [1]. Companies are making strategic efforts to improve business models for sustainable growth and are working to link sustainable growth through innovation [2]. Additionally, it is important to strike a delicate balance between long-term exploration and short-term exploitation to ensure the continued growth and development of an enterprise. This concept is highlighted in James March's exploration and exploitation theory [3], which describes exploration as the process by which organizations discover new knowledge and technologies and identify future opportunities, while exploitation is concerned with the flexible and rapid use of existing resources to maximize current performance.

Based on this theoretical background, organizations invest directly in research and development (R&D) expenditures and training costs to facilitate long-term exploration. This strategic allocation of an organization's resources is crucial at a time when technological

innovation, enhanced competitive advantage, and sustainable growth are of paramount importance in today's hyper-competitive environment. Developing disruptive new technologies and innovative new products through R&D investment and strengthening the technological innovation capabilities of the workforce through training programs play a key role in enhancing competitiveness. In the case of companies that need to explore a completely new future rather than relying on existing capabilities, it is necessary to move forward by accumulating new knowledge and capabilities within the organization through research and development and employee education and training. In order for a company to be able to pursue exploration in the long term, it is very important to invest in such R&D and in the training of human resources to carry out R&D and to adopt innovative behaviors.

In addition to investing in R&D and training for exploration from a long-term perspective, companies also need to be very agile from a short-term perspective. From a short-term perspective, companies need to optimize their resources and operate them to achieve organizational goals. Each department in a company has different goals that are aligned with the strategic direction of the organization. Aligned with these goals, work should be driven to maximize current resources and opportunities. This can be related to optimizing the use of company resources, or it can be a combination of flexibility and pushing through sometimes difficult tasks. All of this can be said to involve striving to achieve immediate benefits and goals in a time-constrained environment. Companies promote work to achieve their goals by using various business promotion expenses, called entertainment expenses. Work activities related to these goals through entertainment expenses may be related to the company's current performance.

Therefore, this paper analyzes how resource allocation is related to firm value in the Korean electronics and metal industry. This study aims to determine the relationship between R&D expenditures, education and training expenditures, and entertainment expenditures (business promotion expenditures) with firm value in the Korean electronics and metal industry. From the perspective of exploration and exploitation theory, a balanced pursuit of both exploration and exploitation is considered beneficial [3]. This study examines whether research and development, along with education and training, are effective in increasing firm value from an exploration perspective, and whether entertainment expenditures influence firm value from an exploitation perspective. What makes this paper different is that it provides a nuanced analysis of firm value through the lens of both the exploration and the exploitation perspectives.

This study focuses on industries with short innovation cycles and continuous technological innovation. The Korean electronics industry and the metal industry are very important industries that have been at the forefront of technological innovation in Korea; the electronics industry has a very fast wave of technological innovation, and the metal industry is also accelerating the application of new technological innovations. In these industries, many Korean companies have moved from being followers of advanced companies to leaders in technological innovation. Also, the electronics and metal industries account for a very high proportion of the Korean economy and a large share of both domestic consumption and exports. Therefore, this industry is in a situation where it has to compete endlessly not only with domestic companies, but also with the world's leading companies. In order to survive this competition, companies in the electronics and metal industries are significantly increasing their spending on research and development, training, and business promotion, and for this reason, they are the main subjects of analysis in this study.

Hypotheses are formulated to investigate the impact of R&D and training as exploration activities and entertainment expenditures as exploitation activities on firm value. To test these hypotheses, a statistical analysis is conducted using extensive data from the KIS-Value database. This study analyzes the impact of R&D and education and training on firm value as long-term exploration activities in the Korean electronics and metal industries, and the impact of entertainment expenditures (business promotion expenditures) on firm value as short-term exploitation of corporate resources to achieve goals. These analyses can pro-

vide insights into what companies in high-tech industries should focus on to increase firm value, as well as implications for investment decisions and organizational management.

2. Theoretical Background

2.1. Core Competencies and Research and Development, Training

Core competency theory emphasizes the essential capabilities and resources that an organization possesses to a gain competitive advantage and generate sustained performance [4,5]. It is argued that core competencies, which encompass differentiated innovation and operational capabilities that are difficult for other firms to imitate, shape a firm's market competitiveness and ability to sustain a competitive advantage [4,5]. Core competencies emphasize that a firm's core capabilities are rooted in its resources and capabilities [4,5]. Resources include not only physical assets, but also human resources, organizational culture, and technological capabilities [6], which, when combined, create core competencies that are distinctive and difficult for other firms to imitate [4,5]. The theory assumes that each firm possesses unique resources and capabilities that enable it to gain a competitive advantage in the marketplace; therefore, core competencies contribute to establishing a differentiated competitive advantage over other firms [4,5].

Emphasizing internal differentiating capabilities, core competencies are not fixed and can be enhanced through a firm's continuous learning and development efforts [4,5,7]. The theory emphasizes the importance of efficiently allocating and strategically aligning resources. Core competencies should be aligned with the company's vision and strategy so that the company can achieve sustained growth and performance [4,5,7]. They are described as unique capabilities that set a company apart from competitors, making it hard for others to replicate. Core competencies, which emphasize differentiated capabilities within an organization, can be strengthened through continuous learning and development efforts [4,5].

In today's rapidly evolving and highly competitive marketplace, differentiated capabilities are often derived from core technologies. This view of core capabilities is consistent with the strategic management of core technologies in technology management. Technology management involves developing and executing technology strategies by analyzing a company's technology environment along with its external and internal environments [8]. This includes strategic management of the company's core technology and the process of its technological innovation model [8]. In order to achieve step-by-step development and growth, companies must establish a technology management system centered on core technologies through not only internal technology development but also external technology cooperation [9]. Research and development to secure a company's core technologies and education and training of personnel to develop these core technologies are very important in the strategic technology management routine [8].

Therefore, investment in research and development (R&D) and training is crucial to strengthen core competencies. Cultivating technological innovation capabilities and developing technologies and products through R&D is the basis of core competencies to strengthen competitiveness in the long term. In addition, the education and training of human resources, who are the main actors in the development of technological innovation, is also very important. By forming and strengthening the core competencies of a company, R&D and human resource training contribute to securing a company's competitive advantage and promoting sustainable growth.

2.2. Long-Term Exploration and Short-Term Exploitation

James March introduced the concepts of "exploration" and "exploitation" in organizational theory [3]. Developed from organizational learning theory, exploration and exploitation emphasize that organizations should learn to explore new capabilities while strengthening existing ones [3]. These concepts of exploration and exploitation play an important role in understanding the conflicting factors that organizations face when they simultaneously pursue innovation to develop new capabilities and efficiency of existing

resources [10,11]. It is very difficult for companies to pursue exploration and exploitation in a dual-purpose manner, but in the current hyper-competitive environment, such a balance between exploration and exploitation is important [11–13].

Exploration refers to the pursuit of new capabilities that an organization does not have before [3]. It is primarily used to enhance a firm's ability to identify and capitalize on opportunities in a changing environment in preparation for future uncertainty. Exploration involves activities such as new experiments and activities with a focus on discovering new ideas and exploring new markets [3].

Exploitation involves the efficient use of existing knowledge, skills, and resources to maximize the current capabilities that an organization has [3]. It is primarily aimed at maintaining and enhancing current stability and effectiveness. Exploitation can be achieved through efficiency, optimization, and focusing on improving existing products or services and processes [3]. These two concepts play an important role in organizations seeking to balance innovation and efficiency [13]. Organizations that properly combine and balance exploration and exploitation are able to anticipate the future while ensuring stability and performance in the present [10].

2.3. Long-Term Exploration through Research and Development, Training

Investing in research and development (R&D) facilitates a firm's long-term navigation [14]. This is very important to enhance the competitiveness of the firm and to achieve sustained growth. The current business environment is entering an increasingly unstable, hyper-competitive environment [1], and the development and acquisition of new technologies and knowledge through R&D is crucial for companies to move forward as they explore new capabilities [14]. Developing a new company's core technologies and new products through R&D is critical to a company's competitive advantage, and enhancing the capabilities of the workforce through training is essential to drive technological innovation. Companies can continue to create sustainable competitive advantage based on their core competencies, which are built on these core technologies and the skills of their people [4]. If the concept of exploration is defined as trying new things and developing new capabilities in an uncertain external context [3], this exploration can be linked to the organization's R&D activities and training.

2.4. Short-Term Exploitation through Entertainment Expenses (Business Promotion Expenses)

From a short-term perspective, exploitation involves the efficient use of current resources and opportunities to meet current challenges and achieve goals [3]. Short-term exploitation is primarily focused on maximizing resource utilization to improve productivity and efficiency [3]. This concept of exploitation can be examined in the context of business promotion expenses incurred to achieve the company's goals. In practice, organizations incur expenses to drive business and can be linked to accounting activities to achieve short-term goals. Companies allocate a certain amount of entertainment expenses to facilitate business meetings and negotiations to support efficient business operations [15–17]. Since short-term exploitation is often performed under time constraints, companies need to make quick decisions to adapt to rapidly changing market conditions. Entertainment expenses support efficient business execution under time constraints [15–17]. Short-term exploitation focuses on maximizing short-term profits and achieving business goals and seeks immediate gains. Entertainment expenses directly contribute to maintaining and improving business relationships, successfully negotiating deals, and realizing immediate business results [15–17]. Entertainment expenses play an important role in securing a company's competitiveness and realizing immediate business results by efficiently utilizing resources and supporting quick decision-making [15–17]. Due to the nature of entertainment expenses, they can be linked to the concept of exploitation. The main contributions of the study are stated below.

The exploration and exploitation issue, which has been widely researched in the literature, concerns how organizations should balance their need for innovation and new

prospects with those for resource optimization and efficiency. Although the fundamental concepts of this paradox are applicable to a wide range of situations, the particular dynamics within a sample of Korean enterprises may emerge differently for a variety of reasons:

- Cultural Impacts: Collaboration, structure, and harmony are highly valued in Korean society. In order to preserve stability and uniformity within the organization, Korean businesses may choose to prioritize exploitation over exploration due to this cultural background.
- Specifics of the industry: The way Korean enterprises handle exploration and exploitation is influenced by the particular market dynamics, legal frameworks, and competitive pressures that apply to their particular sector. Due to their fast technical improvements, industries like technology may favor exploration more than older sectors, which may prioritize exploitation for stability.
- Historical Background: Korean businesses have evolved historically, and this has affected their contemporary perspectives on exploration and exploitation. These developments include changes in government regulations, economic trends, and industrial development. To increase operational efficiency, for example, businesses that have historically concentrated on catching up to international rivals may place a strong emphasis on exploitation.
- Administrative Structure and Leadership: The ability of Korean enterprises to achieve a balance between exploration and exploitation may be impacted by their administrative decision-making processes, the impact of economics, or large family-owned businesses. Businesses may have different strategic objectives and leadership philosophies, which might lead to different approaches to solving the problem.

A sample of Korean enterprises may exhibit notable variations in terms of exploration and exploitation due to a combination of several possible variances. It could be related to, among other things, the industry's focus on efficiency, cultural norms that maintain stability, historical contexts that shape strategic goals, and organizational structures that shape decision-making processes. Therefore, in order to identify any differences in how Korean enterprises approach the exploration–exploitation issue, it is critical to comprehend the unique context in which they operate.

3. Hypothesis and Empirical Model

3.1. Hypothesis

Understanding the impact of research and development (R&D) expenses, training costs, and entertainment expenses (business promotion expenses) on corporate value is paramount in corporate management. In this paper, a research model with Tobin's Q [18] as the dependent variable to evaluate the impact of various factors on corporate value is proposed. This study employs Tobin's Q methodology as a proxy for corporate value in corporate valuation research. Tobin's Q is calculated by dividing the market value of a company by the replacement cost of assets. The ideal calculation involves using the sum of the market value of equity and debt in the numerator. However, due to the limited availability of market value data for debt, this study substitutes the book value of debt instead. Additionally, while the replacement cost of assets is theoretically preferred, it is challenging to measure accurately. Hence, the study uses the book value of total assets as a practical alternative. This approach, informed by Desai and Dharmapala [19] and De Simone and Stomberg [20], provides a robust framework for assessing corporate value.

Building upon this theoretical foundation of exploration and exploration, our study endeavors to dissect the effects of current R&D expenses, training costs, and entertainment expenses (business promotion expenses) on corporate value. Based on this premise, we formulate the following hypotheses:

H1. *As a long-term exploration to develop new capabilities, R&D expenditure exhibits a significant relationship with corporate value in companies within the Korean electronics and metals industry.*

H2. *As a long-term exploration to develop new capabilities, education and training expenses demonstrate a significant relationship with corporate value in companies within the Korean electronics and metals industry.*

H3. *As a short-term exploitation aimed at achieving objectives and utilizing existing capabilities, entertainment expenses (business promotion expenses) manifest a significant relationship with corporate value in companies within the Korean electronics and metals industry.*

From the perspective of exploration and exploitation theory, this paper analyzes the impact of research and development expenses, training expenses, and entertainment expenses on firm value in the highly competitive landscape of Korea's electronics and metal industries.

3.2. Empirical Model

(a) Research Model

To verify the impact of research and development expenses, education and training expenses, and entertainment (corporate business promotion) expenses on corporate value, this study sets up a research model with Tobin's Q [18] as the dependent variable as follows.

<Research Model>

$$TOBINQ_{i,t} = \alpha_0 + \alpha_1 ERND_{i,t} + \alpha_2 TRA_{i,t} + \alpha_3 ENT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 GRW_{i,t} + \alpha_8 DON_{i,t} + \alpha_9 OCF_{i,t} + \alpha_{10} INT_{i,t} + \alpha_{11} PPE_{i,t} + \alpha_{12} AGE_{i,t} + \sum YEAR + \varepsilon_{i,t}$$

Here, TOBINQ (corporate value): (Market value of capital at the end of period t + Book value of liabilities at the end of period t)/Book value of total assets at the end of period t

ERND (total current research and development expenses): Research expenses as shown in the income statement for period t + current research and development expenses + current development expenses as shown in the statement of manufacturing costs for period t

TRA (total training expenses): education and training expenses in the income statement for period t + education and training cost in the manufacturing cost statement for period t

ENT (Total entertainment expenses): Entertainment expenses on the income statement for period t + Entertainment cost on the manufacturing cost statement for period t

SIZE (firm size): natural logarithm of total assets at the end of period t

LEV (debt ratio): Liabilities at the end of period t/Assets at the end of period t

ROA (return on assets): Net profit in period t/Total assets at the end of t − 1

GRW (sales growth rate): (sales in period t − sales in period t − 1)/sales in period t − 1

DON (donation): donation in period t/sales in period t

OCF (Operating Cash Flow): Cash flow from operating activities in the cash flow statement for period t/total assets at the end of period t

INT (intangible asset ratio): Total intangible assets at the end of the period t/total assets at the beginning of the period t

PPE (capital intensity): (Tangible assets at the end of period t − Land at the end of period t − Assets under construction at the end of period t)/Total assets at the beginning of period t

AGE (Enterprise Age): Natural logarithm of firm age

∑YEAR: Year dummy

This study conducts the first regression analysis using the above research model and removes extreme values by excluding all sample companies whose Cook's Distance is greater than 1 and the absolute value of Studentized residual is greater than 3. Next, a secondary regression analysis is conducted to verify the impact of research and development costs, education and training costs, and entertainment costs on corporate value.

(b) Variables Definition

(i). Corporate value (TOBINQ)

Tobin's Q, a proxy for corporate value in corporate valuation studies, is calculated by dividing a company's market value by the cost of replacing its assets. The most precise method of calculating Tobin's Q is to utilize the market value of debt and equity added together in the numerator. Market value information for debt is, however, not widely available. Because of this, the book value of debt is used in this analysis rather than the market value of debt. Furthermore, the replacement cost of assets ought to be employed; nevertheless, in practice, this is not easy to quantify, thus the book value of all assets is utilized in its place [19,20].

(ii). Total research and development expenses (ERND)

A company's research and development activities can have a significant impact on increasing corporate value in the long term. This is because research and development expenses increase a company's productivity and sales, which leads to an increase in corporate value. A few studies in the past have reported that research and development costs have no relationship with corporate value or that they actually reduce corporate value, but most other studies report that research and development expenses increase corporate value in the long term [21–27]. These research results are also reflected in the revision of generally accepted corporate accounting standards (GAAP), and, in the case of research and development expenses that meet certain standards, they are expected to provide the company's ability to generate future cash flows and are recorded in the statement of financial position as an asset item. However, in this study, in addition to capitalized R&D investment, expensed R&D investment is also expected to have a significant relationship with corporate value, and to verify this, total R&D expenses are included as a key independent variable.

(iii). Total education and training expenses (TRA)

The significance of developing human assets through education and training is covered in research pertaining to endogenous growth theory [28–32]. They contend that internal technology or information developed within the company may foster long-term, steady growth without the need for outside technology or knowledge. In general, spending money on education and training has an uncertain probability of success, and it is impossible to estimate when the effect will appear. However, many study reports that education and training costs are significantly related to the increase in corporate value [33,34]. Therefore, in this study, education and training expenses are included as a key independent variable to verify whether education and training activities for personnel affect corporate value in the electronics and metal industries, which are likely to be affected by the skill and knowledge level of the workforce.

(iv). Total entertainment expenses (ENT)

Entertainment expenses (corporate business promotion expenses) are expected to increase corporate value by contributing to increasing a company's sales by spending it on a specific target for business purposes [15,17]. However, while such entertainment expenses may increase corporate value in certain industries, they may not be related to increasing corporate value in other industries or may result in a decrease in corporate value [16]. Therefore, this study includes it as a key independent variable to verify whether entertainment expenses can contribute to increasing corporate value in companies belonging to the electronics and metal industries.

(v). Company size (SIZE)

A larger company can have a positive impact on corporate value due to economies of scale, but it can also have a negative impact on corporate value due to increased agency costs due to information asymmetry and rigidity of the company's internal decision-making structure [35]. This study measures company size by taking the natural logarithm of total assets, which has been used in many previous studies, and includes it as a control variable to control the effect of company size.

(vi). Debt ratio (LEV)

There are also research results showing that an increase in debt has a negative effect on corporate value [36]. Therefore, to control the impact of this debt ratio (LEV) on the company's value, it is measured as total liabilities divided by total assets and included as a control variable.

(vii). Return on assets (ROA)

Companies with a high return on assets (ROA) have greater capacity for investment, and as investment capacity increases, corporate value is likely to increase as well. Therefore, this study includes return on assets (ROA) as a control variable.

(viii). Sales growth rate (GRW)

It can be said that the greater the sales growth rate (GRW), the greater the company's future growth opportunities [19,37], and, therefore, an increase in sales growth rate means there is a high possibility that the company's value will increase.

(ix). Donation (DON)

The influence of companies with the image of contributing to society through donations also affects consumer satisfaction. Accordingly, donations can increase corporate profits and have a positive impact on corporate value [38], so they are used as control variables.

(x). Operating Cash Flow (OCF)

Operating cash flow refers to the net amount of cash flowing into a company due to operating activities. In general, it can be said that operating cash flow increases as business activities improve, so it is used as a control variable in this study.

(xi). Intangible asset ratio (INT)

Intangible assets include patents, know-how, trademarks, brands, licenses, goodwill, etc. Intangible Asset Intensity (INT) is an indicator of the proportion of intangible assets among a company's total assets and indicates the potential for value that a company cannot create other than tangible assets. Therefore, it is unclear whether the intangible asset ratio has a direct effect on the increase in corporate value in the short term, but it can be considered an important asset that can increase corporate value potential from a long-term perspective [39–42]. Include it as a variable.

(xii). Capital intensity (PPE)

The higher the capital intensity (PPE), the higher the growth potential, and as a result, it is expected to have a positive effect on corporate value. Therefore, this study adds capital intensity (PPE) to control the impact on corporate value.

(xiii). Company age

The older the enterprise age (AGE), the longer the company has survived. Therefore, it can be said that the higher the enterprise age (AGE), the more likely it is to have a positive impact on corporate value. Therefore, this study expects that enterprise age (AGE) can affect corporate value and includes it as a control variable to control this influence. Company age is calculated by quantifying the year, month, and day and taking the natural logarithm of the value calculated by subtracting the year, month, and day of establishment from the end of the relevant year.

4. Empirical Analysis

4.1. Sample Selection

The value relevance of current R&D, education and training costs, as well as entertainment costs, is confirmed by this analysis for electronics and metal industry companies listed between 2000 and 2021 on the Korean capital market. For this purpose, all variables used in the empirical analysis of this study are extracted from the KIS-VALUE database. All of the following variables are excluded from the empirical analysis data of this study.

I. Corporations other than those whose accounts are settled at the end of December;
II. Corporations included in issues for administration;
III. KONEX Market Listed Companies;
IV. Companies that do not have at least one numerical value for the variables required for the empirical analysis of this study or have capital erosion.

The empirical analysis of this study targeted companies in the electronics and metal industries classified as medium categories in the Korean Standard Industrial Classification (KSIC-9), including 'primary metal manufacturing (C24000)'; 'metal processing product manufacturing, excluding 'machinery and furniture (C25000)'; 'Manufacturing of electronic components, computers, video, sound, and communication equipment (C26000)'; 'Manufacturing of medical, precision, optical devices, and watches (C27000)'; and 'Manufacturing of electrical equipment (C28000)' companies.

Table 1 shows sample selection procedure of this paper.

Table 1. Sample Selection Procedure.

Number of companies in the electronics and metal industry extracted from KIS-VALUE DB from 2000 to 2021 (firm-year)			13,046
Number of companies excluded	Corporations other than those whose accounts are settled at the end of December	198	
	Corporations included in issues for administration	440	
	KONEX Market Listed Companies	770	
	Companies that do not have at least one numerical value for the variables required for the empirical analysis of this study or have capital erosion	8875	10,283
Number of companies subject to analysis (firm-year)			2763

Among the sample data, companies other than those whose accounts are closed at the end of December are excluded due to seasonal characteristics and the likelihood that comparability will be reduced as many companies belong to specific industries. In addition, court receivership companies and capital erosion companies are excluded because they often have extreme values, and companies that do not have numerical values for the variables required for the empirical analysis of this study are excluded to ensure the robustness of the empirical analysis results.

4.2. Empirical Analysis

4.2.1. Descriptive Statistics

The results of the descriptive statistics for each variable employed in the empirical analysis of this study are displayed in Table 2. With a minimum value of 1.0450 and a maximum value of 14.6040, the dependent variable, TOBINQ, has a mean of 1.2749 and a standard deviation of 0.8525. Research and development expenses (ERND) have a mean of 0.0371, a standard deviation of 0.0604, a median of 0.0181, and a maximum of 1.2467, among other independent variables. The distribution of education and training expenses (TRA) is as follows: the median is 0.0003, the maximum is 0.0122, the standard deviation is 0.0009, and the average is 0.0006. The entertainment expenses (ENT) range from a maximum of 0.0399 to a mean of 0.0030, with a standard deviation of 0.0033 and a median of 0.0020.

The company size (SIZE) average is 25.5432, the standard deviation is 1.1244, the minimum is 22.9560, and the maximum is 31.6143 among the control variables. The debt ratio (LEV) ranges from 0.0080 at the least to 2.8871 at the maximum, with a mean of 0.3796 and a standard deviation of 0.2100. The ROA (return on assets) ranges from a minimum of −1.0255 to a maximum of 1.4627, with an average of 0.0365 and a standard deviation of 0.1188. The standard deviation is 0.6547, the median is 0.0594, the maximum is 17.3463, and the average sales growth rate (GRW) is 0.1452. Donations (DONs) have the following values: 0.0009 for the mean, 0.0021 for the standard deviation, 0.0003 for the median, and 0.0484 for the maximum. Operational cash flow (OCF) is 0.0547 on average, 0.0935 on standard, 0.0547 on the median, and 0.4516 on the maximum. The values of intangible assets (INT) are as follows: 0.0341, 0.0566 for the standard deviation, 0.0129 for the median, and 0.7154 for the maximum. The capital intensity (PPE) has a maximum of 1.7279, a median of 0.1735, a standard deviation of 0.1446, and an average of 0.1990. The enterprise age (AGE) ranges from 9.2230 to 13.6655, with an average of 12.2039, a standard deviation of 0.6749, and a maximum of 13.6655.

Table 2. Descriptive statistics.

Number	Variable	Mean	Standard Deviation	Median	Minimum	Maximum
2763	TOBINQ	1.2749	0.8525	1.0450	0.3131	14.6040
	ERND	0.0371	0.0604	0.0181	0.0000	1.2467
	TRA	0.0006	0.0009	0.0003	0.0000	0.0122
	ENT	0.0030	0.0033	0.0020	0.0000	0.0399
	SIZE	25.5432	1.1244	25.3252	22.9560	31.6143
	LEV	0.3796	0.2100	0.3801	0.0080	2.8871
	ROA	0.0365	0.1188	0.0357	−1.0255	1.4627
	GRW	0.1452	0.6547	0.0594	−0.8389	17.3463
	DON	0.0009	0.0021	0.0003	0.0000	0.0484
	OCF	0.0547	0.0935	0.0547	−0.7843	0.4516
	INT	0.0341	0.0566	0.0129	0.0000	0.7154
	PPE	0.1990	0.1446	0.1735	0.0000	1.7279
	AGE	12.2039	0.6749	12.2602	9.2230	13.6655

Variable definition: TOBINQ—(Market value of capital at the end of period t + Book value of liabilities at the end of period t)/Book value of total assets at the end of period t; ERND—Research expenses as shown in the income statement for period t + current research and development expenses + current development expenses as shown in the statement of manufacturing costs for period t; TRA—Education and training expenses in the income statement for period t + education and training cost in the manufacturing cost statement for period t; ENT—Entertainment expenses on the income statement for period t + Entertainment cost on the manufacturing cost statement for period t; SIZE—natural logarithm of total assets at the end of period t; LEV—Liabilities at the end of period t/Assets at the end of period t; ROA—Net profit in period t/Total assets at the end of t − 1; GRW—(sales in period t − sales in period t − 1)/sales in period t − 1; DON—donation in period t/sales in period t; OCF—Cash flow from operating activities in the cash flow statement for period t/total assets at the end of period t; INT—Total intangible assets at the end of the period t/total assets at the beginning of the period t; PPE—(Tangible assets at the end of period t − Land at the end of period t − Assets under construction at the end of period t)/Total assets at the beginning of period t; AGE—Natural logarithm of firm age.

4.2.2. Correlation Analysis

Table 3 shows the results of analyzing the correlation between the main variables used in the empirical analysis of this study. In Table 3, below (above) the diagonal line represents the correlation coefficient of Pearson (Spearman) analysis. Spearman correlation analysis is a number that represents the correlation between two variables, but unlike the Pearson correlation coefficient, it treats the two variables as ordinal variables, so it makes more relaxed assumptions than those of the Pearson correlation. The Pearson correlation coefficient represents a linear correlation, but the Spearman correlation coefficient represents a value for correlation and has the advantage of being able to analyze even when two variables have a non-linear relationship.

Tobin's Q(TOBINQ), the main dependent variable, has a statistically significant correlation at the 1% or 5% level with all independent variables except entertainment expenses (ENT), donations (DONs), debt ratio (LEV), and capital intensity (PPE). TOBINQ shows a negative (−) correlation with entertainment expenses (ENT), company size (SIZE), debt ratio (LEV), and company age (AGE), but a positive (+) correlation with all other variables. In addition, as a result of measuring the variance inflation factor (VIF) for each regression analysis model, the highest value of all variance inflation factors is found to be less than 2.0, so the possibility of multicollinearity is very low.

Table 3. Correlation Analysis.

Variables	TOBINQ	ERND	TRA	ENT	SIZE	LEV	ROA	GRW	DON	OCF	INT	PPE	AGE
TOBINQ	1	0.3194	0.0816	−0.026	−0.1142	−0.0168	0.205	0.1944	0.0335	0.1071	0.2461	0.0108	−0.2723
		<0.0001	<0.0001	0.1723	<0.0001	0.3782	<0.0001	<0.0001	0.0782	<0.0001	<0.0001	0.5716	<0.0001
ERND	0.3194	1	0.2215	0.2382	−0.2288	−0.3063	0.0812	−0.0284	0.1653	0.0555	−0.332	−0.2537	−0.4181
	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.136	<0.0001	0.0035	<0.0001	<0.0001	<0.0001
TRA	0.0816	0.2215	1	0.1812	−0.0879	−0.0244	0.0903	0.0003	0.1651	0.0932	0.1842	0.0438	−0.086
	<0.0001	<0.0001		<0.0001	<0.0001	0.2008	<0.0001	0.9859	<0.0001	<0.0001	<0.0001	0.0213	<0.0001
ENT	−0.026	0.2382	0.1812	1	−0.4961	−0.0969	−0.1016	−0.0864	0.2224	−0.1422	−0.2575	−0.2007	−0.1729
	0.1723	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
SIZE	−0.1142	−0.2288	−0.0879	−0.4961	1	0.1843	−0.069	−0.0164	−0.1351	0.0221	−0.2181	0.2214	0.4184
	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	0.0003	0.3883	<0.0001	0.2459	<0.0001	<0.0001	<0.0001
LEV	−0.0168	−0.3063	−0.0244	−0.0969	0.1843	1	−0.3975	−0.0097	−0.1827	−0.2227	−0.0499	0.4087	0.125
	0.3782	<0.0001	0.2008	<0.0001	<0.0001		<0.0001	0.612	<0.0001	<0.0001	0.0087	<0.0001	<0.0001
ROA	0.205	0.0812	0.0903	−0.1016	−0.069	−0.3975	1	0.4039	0.126	0.5069	−0.0079	−0.0266	−0.1617
	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0001		<0.0001	<0.0001	<0.0001	0.6778	0.1626	<0.0001
GRW	0.1944	−0.0284	0.0003	−0.0864	−0.0164	−0.0097	0.4039	1	−0.0088	0.1581	0.0819	0.1277	−0.1072
	<0.0001	0.136	0.9859	<0.0001	0.3883	0.612	<0.0001		0.644	<0.0001	<0.0001	<0.0001	<0.0001
DON	0.0335	0.1653	0.1651	0.2224	−0.1351	−0.1827	0.126	−0.0088	1	0.0611	−0.1545	−0.0541	−0.1026
	0.0782	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.644		0.0013	<0.0001	0.0044	<0.0001
OCF	0.1071	0.0555	0.0932	−0.1422	0.0221	−0.2227	0.5069	0.1581	0.0611	1	0.0036	0.0904	−0.0835
	<0.0001	0.0035	<0.0001	<0.0001	0.2459	<0.0001	<0.0001	<0.0001	0.0013		0.8508	<0.0001	<0.0001
INT	0.2461	−0.332	0.1842	−0.2575	−0.2181	−0.0499	−0.0079	0.0819	−0.1545	0.0036	1	−0.1148	−0.3028
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0087	0.6778	<0.0001	<0.0001	0.8508		<0.0001	<0.0001
PPE	0.0108	−0.2537	0.0438	−0.2007	0.2214	0.4087	−0.0266	0.1277	−0.0541	0.0904	−0.1148	1	0.0161
	0.5716	<0.0001	0.0213	<0.0001	<0.0001	<0.0001	0.1626	<0.0001	0.0044	<0.0001	<0.0001		<0.0001
AGE	−0.2723	−0.4181	−0.086	−0.1729	0.4184	0.125	−0.1617	−0.1072	−0.1026	−0.0835	−0.3028	0.0161	1
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	

(1) Variable Definitions: see Table 2, two-sided test. (2) Above the diagonal line is the Spearman correlation analysis result, and below the diagonal line is the Pearson correlation analysis result in this table.

4.2.3. Regression Results: Total Samples

Table 4 shows the results of a regression analysis of the impact of current research and development expenses, education and training expenses, and entertainment expenses on corporate value for companies in Korea's electronics and metal industries. The adjusted R-squared value, which indicates how much the independent variables explain the dependent variable, is 0.2367, and the F-value, which indicates the goodness of fit of the analysis model, is 26.51, which is statistically significant at the 1% level. In addition, the maximum value of VIF (Variance Inflation Factor), which indicates the possibility of multicollinearity, is 1.6544, so, the possibility of multicollinearity is very low. Looking at the coefficients of the independent variables that affect the dependent variable, they are as follows.

- Among the main independent variables, current research and development expenses (ERND) are 1.8428, and education and training expenses (TRA) are 36.5784, which all show statistically significant positive (+) coefficient values at the 1% level. However, the entertainment cost (ENT) is −4.7127, which is a statistically insignificant coefficient.
- Among the control variables, donations (DONs) and operating cash flow (OCF) are statistically insignificant, but all other control variables show significant positive (+) coefficient values at the 1% level.

These results confirm that in the electronics and metal industries, the highest contribution to increasing corporate value is employee education and training activities, followed by ordinary R&D activities, and entertainment activities actually play a role in reducing corporate value.

Table 4. Comparative value relevance of R&D, training, and entertainment expenses: Total samples.

$$TOBINQ_{i,t} = \alpha_0 + \alpha_1 ERND_{i,t} + \alpha_2 TRA_{i,t} + \alpha_3 ENT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 GRW_{i,t} + \alpha_8 DON_{i,t} + \alpha_9 OCF_{i,t} + \alpha_{10} INT_{i,t} + \alpha_{11} PPE_{i,t} + \alpha_{12} AGE_{i,t} + \sum YEAR + \varepsilon_{i,t}$$

Variable	Parameter Estimate	*t* Value	Pr > |*t*|	Variance Inflation
Intercept	3.9906	13.54	<0.0001	0.0000
ERND	1.8428	9.63	<0.0001	1.3667
TRA	36.5784	3.16	0.0016	1.1910
ENT	−4.7127	−1.39	0.1661	1.3351
SIZE	−0.0473	−4.51	<0.0001	1.4384
LEV	0.2981	5.24	<0.0001	1.4629
ROA	0.9139	8.36	<0.0001	1.6544
GRW	0.0530	3.42	0.0006	1.0711
DON	1.7002	0.36	0.7192	1.0567
OCF	0.2103	1.65	0.0984	1.4273
INT	1.2239	6.62	<0.0001	1.1263
PPE	0.2389	3.08	0.0021	1.2993
AGE	−0.1228	−7.25	<0.0001	1.3439
∑YEAR	Included			
Adj-R^2	0.2367			
F-value	26.51 ***			
Number of Sample data after deleting outliers	2716			

(1) Total number of sample data used in the analysis is calculated by excluding sample data that have an absolute value of studentized residuals greater than 3, and a Cook's Distance of greater than 1. (2) ***: $p < 0.01$.

4.2.4. Regression Results: KOSPI and KODSAQ

Table 5 shows the results of a regression analysis of the impact of current research and development expenses, education and training expenses, and entertainment expenses on corporate value by dividing the analyzed companies into samples listed on the KOSPI market and samples listed on the KOSDAQ market. The adjusted R-squared value, which indicates how much the independent variables explain the dependent variable, is 0.2939 and 0.2067 for KOSPI and KOSDAQ, respectively, and the F-value, which indicates the suitability of the analysis model, is 10.52 and 16.51, respectively, which are all statistically significant at the 1% level.

In addition, the maximum value of VIF (Variance Inflation Factor), which indicates the possibility of multicollinearity, is 1.7536, so the possibility of multicollinearity is very low in the regression analysis for both sample groups. The coefficients of the independent variables that affect the dependent variable are examined by group analysis as follows. In the analysis results of the KOSPI sample, among the main independent variables, current research and development expenses (ERND) are 4.2211, and education and training expenses (TRA) are 31.9849, both of which show statistically significant positive (+) coefficient values at the 1% and 5% level, respectively. However, the entertainment cost (ENT) is −3.8851, which is a statistically insignificant coefficient. Among the control variables, sales growth rate (GRW), donations (DONs), capital intensity (PPE), and operating cash flow (OCF) are statistically non-significant, but all other control variables are statistically insignificant at the 1% or 5% level. This indicates a significant positive (+) coefficient value. In the analysis results of the KOSAQ sample, among the main independent variables, current research and development expenses (ERND) are 1.8315, which shows statistically significant positive (+) coefficient values at the 1% level. However, the entertainment cost (ENT) is −5.8722, and

education and training expenses (TRA) are 26.7826, which are both statistically insignificant coefficients. Among the control variables, company size (SIZE), donation (DON), and operating cash flow (OCF) are statistically insignificant. However, all other control variables show statistically significant positive (+) coefficient values at the 1% or 5% level. The results in Table 5 show that for electronics and metal industry companies listed on the KOSPI markets, the highest contribution to increase corporate value is education and training activities for employees, followed by research and development activities. It also shows that entertainment activities in electronics and metal industry companies are not associated with corporate value. Table 6 shows whether there is a statistical difference in the results of the analysis of the impact of current research and development expenses, education and training expenses, and entertainment expenses on corporate value by dividing them into KOSPI and KOSDAQ companies. For this purpose, the Chow test [41] is conducted. The Chow test is commonly used to test whether the coefficients of two different regression models on different data sets are the same. As a result of the analysis, the F-value is 1.77, which is statistically significant at the 1% level. This means that the difference in the size of the coefficient values between the KOSPI group and the KOSDAQ group is statistically significant.

Table 5. Comparative value relevance of R&D, training, and entertainment expenses: KOSPI vs. KODSAQ.

$$TOBINQ_{i,t} = \alpha_0 + \alpha_1 ERND_{i,t} + \alpha_2 TRA_{i,t} + \alpha_3 ENT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 GRW_{i,t} + \alpha_8 DON_{i,t} + \alpha_9 OCF_{i,t} + \alpha_{10} INT_{i,t} + \alpha_{11} PPE_{i,t} + \alpha_{12} AGE_{i,t} + \sum YEAR + \varepsilon_{i,t}$$

Markets	**KOSPI**				**KOSDAQ**			
Variable	**Parameter Estimate**	***t* Value**	**Pr > |*t*|**	**Variance Inflation**	**Parameter Estimate**	***t* Value**	**Pr > |*t*|**	**Variance Inflation**
Intercept	1.9322	5.12	<0.0001	0	4.1200	7.23	<0.0001	0.0000
ERND	4.2211	8.06	<0.0001	1.28191	1.8315	7.99	<0.0001	1.3684
TRA	31.9849	2.06	0.0397	1.31031	26.7826	1.77	0.0776	1.2001
ENT	−3.8851	−0.69	0.493	1.41576	−5.8722	−1.38	0.1667	1.3095
SIZE	−0.0260	−2.33	0.0202	1.73621	−0.0379	−1.81	0.071	1.5366
LEV	0.5555	9.36	<0.0001	1.42574	0.2056	2.46	0.014	1.5298
ROA	0.6111	4.07	<0.0001	1.54025	1.0244	7.19	<0.0001	1.7536
GRW	0.0256	1.39	0.1645	1.08648	0.0604	2.87	0.0041	1.0864
DON	1.3985	0.23	0.8163	1.22391	−0.5652	−0.09	0.929	1.0537
OCF	0.8503	5.13	<0.0001	1.38334	−0.0387	−0.23	0.8174	1.4870
INT	1.4726	4.84	<0.0001	1.09364	1.1484	4.92	<0.0001	1.1397
PPE	−0.1350	−1.34	0.1791	1.48758	0.3792	3.66	0.0003	1.2920
AGE	−0.0290	−1.42	0.155	1.05806	−0.1442	−6.05	<0.0001	1.3344
∑YEAR	Included				Included			
Adj-R^2	0.2939				0.2067			
F-value	10.52 ***				16.51 ***			
Number of Sample data after deleting outliers	756				1965			

(1) Total number of sample data used in the analysis is calculated by excluding sample data that have an absolute value of studentized residuals greater than 3, and a Cook's Distance of greater than 1. (2) ***: $p < 0.01$.

In Table 5, the coefficient values of current research and development expenses (ERND) and education and training expenses (TRA) in the KOSPI group are larger than those in the KOSDAQ group. This means that the contribution of recurring research and development expenses (ERND) and education and training expenses (TRA) to corporate value in KOSPI

companies is greater than in KOSDAQ companies. Additionally, the coefficient value of entertainment expenses (ENT) is smaller for KOSDAQ companies than for KOSPI companies. This means that KOSDAQ companies have a greater impact on the decline in corporate value from entertainment expenses (ENT) than KOSPI companies.

Table 6. Chow Test Results: KOSPI vs. KODSAQ.

Break Point	Num DF	Den DF	F Value	Pr > F
2000	39	2685	1.77	0.0024

4.2.5. Regression Results: Big Firm and Small and Medium Firm

Table 7 shows the results of a regression analysis of the impact of current research and development expenses, education and training expenses, and entertainment expenses on corporate value by dividing the sample companies into large corporations and small- and medium-sized enterprises.

Table 7. Value relevance of R&D, training, and entertainment expenses: Large Corporations vs. Small- and Medium-sized Enterprises.

$$TOBINQ_{i,t} = \alpha_0 + \alpha_1 ERND_{i,t} + \alpha_2 TRA_{i,t} + \alpha_3 ENT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 GRW_{i,t} + \alpha_8 DON_{i,t} + \alpha_9 OCF_{i,t} + \alpha_{10} INT_{i,t} + \alpha_{11} PPE_{i,t} + \alpha_{12} AGE_{i,t} + \sum YEAR + \varepsilon_{i,t}$$

Markets	Large Corporations				Small- and Medium-Sized Enterprises			
Variable	**Parameter Estimate**	***t* Value**	**Pr > |*t*|**	**Variance Inflation**	**Parameter Estimate**	***t* Value**	**Pr > |*t*|**	**Variance Inflation**
Intercept	2.8424	9.69	<0.0001	0.0000	4.1484	4.71	<0.0001	0.0000
ERND	1.5372	6.05	<0.0001	1.2218	1.9950	6.96	<0.0001	1.4729
TRA	53.6514	4.33	<0.0001	1.1631	9.5396	0.49	0.6261	1.2921
ENT	−7.0719	−1.75	0.0806	1.3044	−7.4915	−1.39	0.1659	1.2998
SIZE	−0.0220	−2.27	0.0231	1.4579	−0.0449	−1.31	0.1913	1.3513
LEV	0.4550	7.42	<0.0001	1.5128	0.2969	3.05	0.0023	1.4351
ROA	1.3093	10.36	<0.0001	1.5141	0.7669	4.4	<0.0001	1.8480
GRW	0.0446	2.4	0.0165	1.1070	0.0507	2.13	0.0331	1.0716
DON	0.2896	0.06	0.9501	1.0953	−5.8662	−0.63	0.5262	1.0771
OCF	0.5940	4.48	<0.0001	1.3128	0.0665	0.3	0.7616	1.5948
INT	1.5295	7.85	<0.0001	1.0995	0.8316	2.6	0.0095	1.1846
PPE	0.0471	0.66	0.5068	1.3502	0.5232	3.21	0.0014	1.2326
AGE	−0.0973	−5.75	<0.0001	1.2789	−0.1317	−4.29	<0.0001	1.3281
∑YEAR	Included				Included			
Adj-R^2	0.2977				0.2242			
F-value	20.1 ***				11.65 ***			
Number of Sample data after deleting outliers	1488				1217			

(1) Total number of sample data used in the analysis is calculated by excluding sample data that have an absolute value of studentized residuals greater than 3, and a Cook's Distance of greater than 1. (2) ***: $p < 0.01$.

The adjusted R-squared value, which indicates how much the independent variables explain the dependent variable, is 0.2977 and 0.2242 for large corporations and small- and medium-sized enterprises, respectively, and the F-value, which indicates the goodness of fit of the analysis model, is 20.1 and 11.65, respectively, which are all statistically significant at the 1% level. In addition, the maximum value of VIF (Variance Inflation Factor), which

indicates the possibility of multicollinearity, is 1.8480, so the possibility of multicollinearity is very low in the regression analysis for the two sample groups. The coefficients of the independent variables that affect the dependent variable are examined by the sample group as follows. In the analysis results of the large corporation sample, among the main independent variables, current research and development expenses (ERND) are 1.5372, and education and training expenses (TRA) are 53.6514, both of which show statistically significant positive (+) coefficient values at the 1% level. However, the entertainment cost (ENT) is −7.0719, which is a statistically insignificant coefficient. Among the control variables, donations (DONs) and capital intensity (PPE) are statistically non-significant, but all other control variables show statistically significant positive (+) coefficient values at the 1% or 5% level. In the analysis results of the small- and medium-sized enterprises sample, among the main independent variables, current research and development expenses (ERND) are 1.9950, which shows statistically significant positive (+) coefficient values at the 1% level. However, the entertainment cost (ENT) is −7.4915, and education and training expenses (TRA) are 9.5396, which are both statistically insignificant coefficients.

Among the control variables, company size (SIZE), donation (DON), and operating cash flow (OCF) are statistically insignificant. However, all other control variables show statistically significant positive (+) coefficient values at the 1% or 5% level. The results in Table 7 show that in large corporations in the electronics and metal industries, the highest contribution to increase corporate value is education and training activities for employees, followed by general research and development activities. Additionally, it shows that entertainment activities in both large and small- and medium-sized enterprises in the electronics and metal industries are not related to corporate value.

Table 8 shows the results of a Chow test on the impact of current research and development expenses, education and training expenses, and entertainment expenses on corporate value, divided into large corporations and small- and medium-sized enterprises. As a result of the Chow test, the F-value is 2.43, which is statistically significant at the 1% level. This means that the difference in coefficient values between large corporations and small- and medium-sized enterprises is statistically significant. In Table 7, the coefficient values of recurring research and development expenses (ERND) and education and training expenses (TRA) of large enterprises appear to be larger than those of small- and medium-sized enterprises. This means that the contribution of recurring research and development expenses (ERND) and education and training expenses (TRA) to corporate value is greater in large corporations than in small- and medium-sized enterprises. Additionally, the coefficient value of entertainment expenses (ENT) is smaller for small- and medium-sized enterprises than for large corporations. This means that small- and medium-sized enterprises have a greater impact on the decline in corporate value from entertainment expenses (ENT) than large corporations.

Table 8. Chow Test Results: Large Corporations vs. Small- and Medium-sized Enterprises.

Break Point	Num DF	Den DF	F Value	Pr > F
1238	39	2685	2.43	<0.0001

5. Conclusions

The strategic allocation of resources and the pursuit of optimal firm value are essential foundations of modern corporate management. This study analyzes the impact of R&D and training investments on firm value to explore new capabilities from a long-term perspective, and the impact of entertainment costs (business promotion costs) on firm value to achieve short-term organizational goals. Using Tobin's Q methodology, this study examines the complex dynamics of resource utilization by focusing on companies in the electronics and metals industries listed on the Korean capital market between 2000 and 2021. This Tobin's Q methodology, which compares a company's market value to the replacement cost of its assets, has been adapted to suit available data, substituting the book value for debt and

total assets where necessary. This practical approach, based on previous research in the field, provides a reliable framework for assessing firm value. This research shows that the impact of research and development (R&D) expenditures and training expenditures on firm value is significant and beneficial. These expenditures are critical to fostering long-term corporate exploration for the development of new capabilities, which improves a firm's value. Investing in research and development (R&D) and training is currently essential for cultivating knowledge, skills, and core competencies necessary for sustainable growth and innovation. As discussed so far in this paper, in the full sample, this study finds that R&D expenditures and training expenditures have a positive impact on firm value, while entertainment expenditures have no significant impact. Notably, the coefficient on training expenditures is larger than that on R&D expenditures, suggesting that training expenditures may have a more substantial effect on firm value. Although both R&D and training expenditures are essential for enhancing a firm's ability to develop new capabilities and strengthen long-term competitiveness, this study highlights the paramount importance of human resource training and education in directly enhancing firm value. Contrary to initial expectations and existing hypotheses, the study finds that business promotion expenditures, called entertainment expenditures, have no significant relationship with firm value. This finding suggests that these expenditures are very necessary to drive the company's short-term goals and operations, but they do not correlate well with firm value.

Beyond the analysis of the full sample, this study also finds that when examining subgroups—specifically the Korea Composite Stock Price Index (KOSPI) and the Korean Securities Dealers Automated Quotations (KOSDAQ), as well as large companies and small- to medium-sized venture companies—R&D expenses consistently influence firm value. However, the impacts of education and training expenses, as well as entertainment expenses, varied across these groups. In the case of the KOSPI sample, the study finds that both R&D expenses and education and training expenses influence firm value, while entertainment expenses do not. Conversely, in the KOSDAQ sample, only R&D expenses had a significant impact on firm value, whereas both entertainment expenses and education and training expenses do not show a meaningful effect. In the case of large companies, both R&D expenses and education and training expenses have an impact on corporate value, while entertainment expenses do not have a significant effect. On the other hand, for small and medium enterprises, only R&D expenses influence corporate value, with neither education and training expenses nor entertainment expenses showing a significant impact.

In conclusion, this study suggests that firms should recalibrate their resource allocation strategies. Organizations must focus on strategic resource utilization practices that prioritize spending that is proven to drive value creation and sustainable growth. By applying the insights of Tobin's Q methodology, companies can examine the complexity of financial decision making, ensure that investments are aligned with broader strategic goals, and effectively gain a competitive advantage in the dynamic market environment of the electronics and metals industry in Korea. From the perspective of exploration and exploitation theory, it is beneficial for companies to pursue both strategies simultaneously [3,11]. However, in this study, which is related to corporate value, it is found that R&D and education and training are as important to increase corporate value as exploration, but entertainment expenses are not related to corporate value as much as exploitation. Evaluation using the Tobin Q model shows that a firm's exploratory activities have a positive impact on firm value, while exploitation of existing capabilities has no significant effect. Although there may be variation across industries due to different levels of technological maturity, the results of the study have important theoretical implications for resource allocation and strategic investment decisions aimed at enhancing firm value and future competitiveness. In particular, firms should focus more on areas such as R&D and training that have a clear and positive impact on firm value. These strategic changes are critical to navigating the evolving business environment and maintaining a competitive advantage in the highly competitive electronics and metals industry.

In addition, a limitation of this study is that exploration can be measured not only by research and development or training but also by other variables. Similarly, exploitation is not limited to entertainment expenses, but can include various variables aimed at achieving internal corporate objectives. Considering these aspects, research should be conducted across different industries in relation to firm value. It is recommended that further research be conducted based on the new variables in terms of exploring new capabilities and leveraging existing capabilities in organizations to increase corporate value.

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