

***Factors affecting SMEs' growth
: A comparative meta-analysis between Germany and South Korea***

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This study analyzed the effect size of predictors that affects the growth of SMEs in Germany and Korea using meta-analysis. A total of 34,154 studies from six databases in English and Korean were collected, and finally 38 studies were selected by sorting related empirical studies. A total of 288 effect sizes was used by classifying the predictors from these studies. The classification was conducted based on resource-based theory and innovation-based theory. As a result, the effect size and ranking of factor of predictors that lead SME growth in Germany and Korea were different. However, the key factors in both countries for firm growth was entrepreneurship and innovation. In Germany, investment in human capital and physical capital for R&D was the important factor that led a firm to grow with global competitiveness.

Keywords: SMEs' growth, innovation, entrepreneurship, mittelstand, meta-analysis

Introduction

After the global economic crisis, Germany experienced a rapid economic recovery based on strong and sustained growth in manufacturing. A report by the World Bank in 2018 said that the value added of Germany's manufacturing sector accounted for approximately 30% of EU total gross value added in manufacturing, while the total gross value added of Germany stood at 3.55 trillion euros. The driving force behind this economic resurgence is the achievement of Germany's "Mittelstands," which generally refers to the country's small-medium enterprises(SMEs), which account for approximately 98% of Germany's manufacturing sector and plays a pivotal role in increasing employment and exports. Among the Mittelstands, 1,307 companies in particular are classified as "hidden champions(HCs)", relatively small but global market leaders in niche products(BMWi, 2015). Most of the HCs produce unremarkable products, but they belong to the top three companies in the world or number 1 on their continent, with less than 5 billion dollars in revenue(Simon, 1990). Simon(1990) reported that the core competitiveness of HCs' continuous profitable growth came from exceptional management skills such as strong leadership, employing experts, sufficient fundraising, and constant innovation activities. As a role model for sustainable economic growth, other countries have considered the application of strategic insights of HCs to their manufacturing sectors. In 2011, the Korean government launched the "Global Strong and Small Enterprises Nurturing Policy" to turn promising small companies into successful HCs. Korean SMEs that are in similar size and high value-added range to German HCs have been classified as "High-Potential Enterprises(HPEs)". The selected companies have been supported by various subprograms to accelerate their performance in the global market. Despite the Korean government's efforts, however, the ranking of global manufacturing competitiveness of Korea has dropped from third in 2010 to sixth in 2016, while the ranking of Germany has risen from eighth in 2010 to third in 2016(Deloitte, 2016). These facts indicate that the Korean government needs to find new alternatives to enhance the competitive advantages of the manufacturing sector. Therefore, this study focuses

on the factors that affect the performances of German and Korean SMEs. This suggests that comparing the performance determinants of German and Korean SMEs may yield effective means to establish a new paradigm for nurturing policies for Korean HCs.

Conceptual Model and Research Question Development

There are two mainstream company growth theories: the resource-based theory, and the innovation-based theory, or so-called Schumpeterian model. According to the resource-based view, companies can create sustainable competitive advantages through core competencies (Prahalad & Hamel, 1990). Core competencies derived from the optimal combination of multiple given resources enable companies to possess inimitable capabilities and to achieve sustainable performances in the marketplace. These resources include not only tangible resources such as financial assets and human resources, but also intangible resources such as process of organization, capabilities, information, and knowledge controlled by a company (Barney, 1991).

Another view is the Schumpeterian model, an innovation-based endogenous growth model introduced in 1911 (Schumpeter, 2011). From this perspective, technological innovation and entrepreneurial activities are the main driving forces that transfer the productive resources of a static economy to dynamic innovations. It emphasizes the importance of innovations that can increase the productivity of production factors and develop differentiated products for long-run growth. It also explains that the success of innovations results from investments in R&D, knowledge, skills, and searching for new markets. These innovation-oriented activities, consequentially enable knowledge spillovers to occur in organizations and stimulate creative destruction.

Based on these classic theories, many previous studies have tended to analyze the relationship between a company's performances such as revenues, growth in sales, imports and exports, market shares, and innovations, and its resources or investments such as assets, human resources, capital investments, R&D intensity, etc (Block & Schwens, 2016; Capon et al., 1990; Crook et al., 2012). These empirical studies have focused on the factors that influence a company's growth according to Gibrat's rule of proportionate growth (Gibrat, 1931), but their results have been inconsistent due to differences between samples, time frames, and methodologies. Therefore, the large number of studies on firm growth with heterogeneous and sometimes even contradictory findings calls for studies to synthesize and generalize the evidence on key factors that determine growth.

This study integrates SMEs' growth factors based on two theories for a comparative analysis between Germany and Korea. These predictors are classified into firm characteristics, CEO characteristics, and innovation characteristics (Table 1). Furthermore, a meta-analysis is conducted to obtain generalized results of previous empirical studies and a better understanding of how different effect sizes of determinants are. The research questions are as follows.

Research Question 1. Which factors among firm characteristics, CEO characteristics, and innovation characteristics that affect SME growth have larger effect sizes on firm growth?

Research Question 2. Is there any different factor that affects SMEs growth between Germany and Korea?

Materials and Methods

Database development and coding

The data for meta-analysis were collected from studies on German Mittelstand and Korean SMEs. Studies on Mittelstand were collected from Proquest, EBSCO, and ScienceDirect by the following process. 1) The database was searched using the terms “Mittelstand,” “Hidden champion,” “Germany,” “SME,” “Innovation,” and “Success”. 2) The articles retained were screened by articles including “Scholarly Journal,” “Studies,” and “English,” until 3,227 articles remained. 3) Studies that repeated were excluded, and 139 articles were selected. 4) Finally, 18 articles were selected for analysis by thoroughly checking the analysis model and variables. Studies on Korean SMEs were collected from “KISS,” “KCI,” and “DBpia” by the following process. 1) The data base was searched using the terms “SME,” “Innovation,” and “Success.” 2) From 30,927 articles, repeated studies were excluded and 323 articles were selected by checking abstracts. 3) And from the 323 articles, empirical studies on “Innovation type SMEs,” “Innobiz SMEs,” and “Korean global hidden champions” were selected. “Innovation type SMEs,” “Innobiz SMEs,” and “Korean global hidden champions” means companies with innovative competitiveness and global competitiveness that are similar to hidden champions. 4) Finally, 20 articles on Korean SMEs were selected for the analysis. In all, 38 articles were used for the empirical analysis in this study.

Variable classification

Firm Characteristics The resource-based view is a perspective where the firm historically determines the collection of assets or resources that are tied “semi-permanently” to the firm(Caves, 1980). A firm’s resources are classified into static and dynamic resources. Static resources infer a stock of assets that are appropriate semi-permanently, while dynamic resources infer capabilities, including an organization’s learning capacity, which generate additional opportunities over time(Barney, 1991; Peteraf, 2003; Rumelt, 1984). By possessing resources which other company cannot imitate, firms can lead with a competitive advantage which consequently enables the sustainable growth of firms.

CEO Characteristics Entrepreneurship has emerged as an important concept on both the individual and corporate level(Miller, 1983). An entrepreneur is someone who destroys the existing economic order by introducing new products and services, exploiting new raw materials, creating new forms of organizations, and founding new businesses and markets(Schumpeter, 1934). Entrepreneurship is described as “innovativeness,” “risk-taking,” and “proactiveness.” Firms with a high degree of entrepreneurial management tend to exploit promising opportunities more frequently than more conservative firms. Therefore, the relationship between entrepreneurial management and the growth of firms can be expected to be more positive.

Innovation Characteristics Innovation is a key factor in creating economic performance. The innovation capability of a firm refers to the ability to utilize technology for competitive product development, technology commercialization or related internal resources. This can be measured by various factors of the input and output of innovation activities. From the perspective of input, R&D, represented by innovation, is an indispensable strategy to improve the added value of products and services through product and process innovation and cost reduction (Kim & Kim, 2014). Many studies have shown the positive influence of innovation on rapid growth firms (Brüderl & Preisendörfer, 2000). And the relationship between innovation and firm performance verified by empirical studies might be influenced by firm size, age, and industry affiliation (Bausch & Rosenbusch, 2005). In this study, product, process, marketing, and organizational innovation, innovation intensity, R&D intensity, and R&D employees have been categorized by subfactors of innovation characteristics. In particular, product, process, marketing, and organizational innovation is defined by the OECD (OECD, 2005).

Table 1. Determinant factor classification

<i>Factor</i>	<i>Subfactor</i>	<i>Definition</i>	<i>Reference</i>
<i>Firm Characteristics</i>	Size	Size of firm (no. of employees, turnover, sales, etc.)	Audretsch & Elston(2006), Beck et al.(2019), Classen et al.(2014), Gruenwald(2016), Harms(2010), Harms et al.(2010), Kim(2013), Lee et al.(2014), Steeger & Hoffmann(2016), Yoon(2015), Yoon & Seo(2014)
	Age	Age of firm	Almus & Czarnitzki(2003), Andries & Czarnitzki(2014), Audretsch & Elston(2006), Bartz & Winkler(2016), Calabrò et al.(2017), Classen et al.(2014), Czarnitzki & Dlanote(2015), Harms(2010), Rammer et al.(2009), Rammer & Schmieie(2008), Steeger & Hoffmann(2016)
	Finance	Index of financial situation (Cash flow, revenue, property, assets, etc.)	Almus & Czarnitzki(2003), Audretsch & Elston(2006), Czarnitzki & Dlanote(2015), Gruenwald(2016), Harms(2010), Kwak(2011), Park(2011), Rammer & Schmieie(2008), Schafer et al.(2017), Steeger & Hoffmann(2016)
	Subsidy	Whether public subsidies are received	Park(2011), Rammer et al.(2009), Schafer et al.(2017)
<i>CEO Characteristics</i>	Entrepreneurship	Degree of entrepreneurship: innovativeness, risk-taking, proactiveness	Bouncken et al.(2016), Harms(2010), Kim(2014), Lee(2016), Yoon & Seo(2011), Yoon & Seo(2014), Yu(2017),
<i>Innovation Characteristics</i>	Product Innovation	Introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses	Kim(2014), Rammer & Schmieie(2008), Rant & Cerne(2017), Yoon(2015)
	Process Innovation	Implementation of a new or significantly improved production or delivery method	Kim(2014), Rammer & Schmieie(2008), Yoon(2015)
	Marketing Innovation	Implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing	Rammer & Schmieie(2008), Rant & Cerne(2017), Steeger & Hoffmann(2016), Yoon & Kim(2010)
	Organizational Innovation	Implementation of a new organizational method in the firm's business practices, workplace organization or external relations. Searching for external sources or cooperation agreements with external partners	Andries & Czarnitzki(2014), Beck et al.(2019), Classen et al.(2014), Hertel & Menrad(2016), Hyun & Choi(2013), Kwak(2011), Lee et al.(2014), Rammer & Schmieie(2008), You(2018)
	Innovation Intensity	Degree of innovation activity (investment in current innovation expenditure, patent stock per employee, number of technology	Andries & Czarnitzki(2014), Beck et al.(2019), Classen et al.(2014), Czarnitzki & Dlanote(2015),

	alliances, etc.)	Harms(2010), Hertel & Menrad(2016), Hyun & Choi(2013), Kwak(2011), Lee et al.(2014), Lim & Peltner(2011), Park(2011), Rammer & Schmiele(2008), Steeger & Hoffmann(2016), Yoo(2016), You(2018)
R&D Intensity	The ratio of expenditures on R&D to a firm's sales	Almus M & Czarnitzki(2003), Gruenwald(2016), Han(2008), Harms(2009), Kim(2013), Kim(2016), Lee et al.(2014), Lee et al.(2014), Lim & Peltner(2011), Park(2011), Rammer et al.(2009), Schaffer et al.(2017), Steeger & Hoffmann(2016), Yoo(2009), Yu(2017)
R&D Employees	The number of R&D employees	Andries & Czarnitzki(2014), Kim(2013), Park(2011), Yoo(2009)

Firm Growth The results of innovation activities of a firm can be labor-saving progress, capital-saving progress, and neutral progress where capital and labor saves at the same ratio by technological progress(Harrod, 1939; Hicks, 1932; Solow, 1956). This is based on production function and highly related to financial performance such as efficiency and effectiveness. Furthermore, innovation can create and diffuse new knowledge that contributes to expand the economy's potential to promote the development of advanced products and processes(OECD, 2005). In this study, innovation performance is defined as financial performance in quantitative terms and innovation success, which is non-financial performance from a qualitative aspect. Financial performance includes labor productivity, efficiency (the average of cost saving, reduction of costs by progress innovations), and effectiveness (the average of competitive position, growth, reduction of costs by process innovations). And innovation success includes new product development, process and market development, and product quality improvement.

Meta-Analysis Procedures

To answer these questions, this study engaged in an assessment by establishing a metricized baseline based on 38 empirical studies, with a total of 288 effect sizes. We conducted coding and analyzed the effect size based on correlation using Comprehensive Meta-analysis (CMA) 3.0. Using the methodology of Borenstein et al.(2009), it recalculates the effects of meta-analysis, employing a random effects model.

In previous studies, most research provided a correlation matrix that was selected as the effect size metric for the meta-analysis. However, few studies reported beta coefficients (β) or t-statistics (t), and not a correlation coefficient (r). Therefore, β and t have been transformed into r (Peterson & Brown, 2005; Wolf, 1986).

The equations for transforming t or β into r are as follows.

$$r = \frac{t}{\sqrt{t^2 + df}} \quad \text{or} \quad r = \frac{\beta}{\sqrt{\beta^2 + n_1 + n_2 - 2}}$$

$$r = \beta + .05\lambda \quad (\lambda: \beta \geq 0 = 1, \quad \beta < 0 = 0)$$

In Meta-analysis, r is converted into Fisher's Z (z) for minimizing biases, since the distribution of

transformed r is under the asymmetric distribution. The equation for transforming r into z is as follows.

$$z = \frac{1}{2} \ln \left(\frac{1+r}{1-r} \right)$$

Under the assumption that studies with larger samples are more reliable and accurate, studies that have a larger sample size are weighted using formulas of inverse-variance weighting (W_i) and weighted averages (M). Lastly, to report estimated effect sizes, z is converted to r for ease of understanding and interpretation (Borenstein et al., 2009).

Results and Discussion

Identifying Heterogeneity and Publication Bias

To identify heterogeneity, the null hypothesis that all studies have a common effect size is assumed and tested. The classical measure of heterogeneity uses Q statistic and I^2 statistic based on Cochran (1954). The null hypothesis of Q statistic is that Q statistic is equal to the degrees of freedom (df), and follows a central chi-squared distribution with $df = K-1$ (where K is the number of r). And the p-value can be reported for any observed value of the Q statistic. In general, the null hypothesis that the studies are homogeneous is rejected when a p-value is less than 0.05 (Borenstein et al., 2009). If the heterogeneity of the studies is confirmed, the random effect model should be preferred. In this study, high heterogeneity is verified since p-values are less than 0.05 and I^2 values are over 90% (Table 2) (Deeks et al., 2008). Therefore, the random effect model is used since we do not assume that studies within each subgroup share a common effect size.

Publication bias can be checked by fail-safe N, which shows the reliability of research results. When fail-safe N is lower than $5K+10$, it is considered hard to rely on (Rosenthal, 1979). In this study, there is no publication bias since fail-safe N for the entire model is higher than $5K+10$.

Results of Meta-Analysis

Table 2 presents the effect size for relationships between predictor variables and firm growth. The results provide information on the number of r (K) and effect size (ES_r). In the case of Model 1, the subfactor of firm growth, including financial performance and innovation success, was analyzed by 288 K . In Models 2 and 3, firm growth verified each ES_r by dividing the subfactors into financial performance and innovation success. And a few nonsignificant predictors were found. In particular, subsidy did not have an impact on financial performance and innovation success.

The results show that CEO characteristics has the highest ES_r relationship between firm growth from Model 1 (Research Question 1), and the ES_r of CEO characteristics is also higher than other predictors from Models 2 and 3. In addition, the ES_r of innovation characteristics has a positive relationship with firm growth. In particular, in Model 2, financial performance has high ES_r of innovation intensity and R&D employees,

while in Model 3, innovation success has a significantly high ES_r of four types of innovation. Based on these results, we can confirm that entrepreneurship and firm innovation are key success factors for a firm's growth. These findings support previous research based on the innovation-based growth theory.

Table 2. The effect size for the relationship between predictor variables and firm growth

<i>Predictor</i>	<i>Model 1</i>			<i>Model 2</i>		<i>Model 3</i>		
	<i>K</i>	<i>ES_r</i>		<i>Financial Performance</i>		<i>Innovation Success</i>		
	<i>K</i>	<i>ES_r</i>		<i>K</i>	<i>ES_r</i>	<i>K</i>	<i>ES_r</i>	
Firm characteristic								
Size	21	0.151 *		12	0.240 *	9	0.037 *	
Age	17	0.101 *		10	0.131 *	7	0.085 *	
Finance	48	0.206 *		39	0.274 *	9	0.027	
Subsidy	9	0.012 *		2	0.030	7	0.008	
CEO Characteristics								
Entrepreneurship	29	0.342 *		13	0.363 *	19	0.326 *	
Innovation Characteristics								
Product Innovation	10	0.090 *		8	0.041 *	2	0.461 *	
Process Innovation	6	0.086 *		4	0.020	2	0.374 *	
Marketing Innovation	6	0.187 *		4	0.060 *	2	0.469 *	
Organizational Innovation	42	0.271 *		11	0.086 *	31	0.342 *	
Innovation Intensity	34	0.228 *		18	0.303 *	16	0.164 *	
R&D Intensity	51	0.144 *		36	0.092 *	15	0.211 *	
R&D Employees	11	0.219 *		4	0.259 *	7	0.196 *	
<i>K</i>		288			158		130	
<i>Q</i>		9887.300			5999.990		3887.311	
<i>df(Q)</i>		287			157		129	
<i>P</i>		0.000			0.000		0.000	
<i>f²</i>		97.097			97.383		96.692	
<i>Fail-safe N</i>		9338.000			2875.000		4368.000	

* $p < .05$

As a result of Research Question 2, we verified that the predictors that affect the growth of SMEs in each country were different (Table 3). The firm characteristics of Mittelstands in Germany have a stronger positive effect size on growth than in Korea. And firm size and age are important factors for Mittelstands' growth. These results and the fact that 45% of Mittelstands are family-owned companies imply that maintaining generational continuity builds up tacit knowledge and management strategies, which plays an important role in creating business performances¹.

Table 3. Comparison between Germany and South Korea

<i>Predictor</i>	<i>Germany</i>		<i>South Korea</i>	
	<i>K</i>	<i>ES_r</i>	<i>K</i>	<i>ES_r</i>
Firm characteristics				
Size	14	0.198*	7	0.047*
Age	15	0.140*	2	0.080
Finance	34	0.162*	14	0.312*
Subsidy	7	0.008	2	0.030
CEO Characteristics				
Entrepreneurship	2	0.252*	27	0.348*
Innovation Characteristics				
Product Innovation	6	0.030*	4	0.242*
Process Innovation	2	0.016*	4	0.168*

¹ Federal Ministry of Economics and Technology, www.bmwi.de.

Marketing Innovation	5	0.085*	1	0.784*
Organizational Innovation	28	0.159*	14	0.506*
Innovation Intensity	20	0.134*	18	0.342*
R&D Intensity	14	0.170	37	0.132*
R&D Employees	2	0.358*	9	0.191*

*P<.05

In Table 3, the Mittelstands in Germany show high effect sizes in R&D intensity and R&D employees in innovation characteristics, while SMEs in Korea show high effect sizes in innovation activities. In Germany, investments in R&D human resources and physical capital have been considered key success factors for Mittelstands' growth. Indeed, around 82% of all apprentices who are trained by various programs are working in Mittelstand companies². This investment in R&D employees with capital investments of innovations by a company itself and the government contributes to promote cooperation between researchers and private firms and to strengthen firm competitiveness. Due to these efforts both the public and private sectors, Mittelstands have been able to outperform other SMEs.

However, to generalize these results, it will be necessary to analyze more related studies. We used inverse-variance weighting and weighted averages to reduce differences between predictors, but there are significantly large differences between predictors since each country's predictors have different sample sizes. Thus, follow-up studies will need to collect more related studies to balance the number of *K* in each predictor.

Table 4. Comparison of top 5 success factors: Germany and South Korea

Ranking	Germany		South Korea	
	Financial performance	Innovation Success	Financial performance	Innovation Success
1	Innovation Intensity	R&D employees	Entrepreneurship	Marketing Innovation
2	Size	Entrepreneurship	Finance	Organizational innovation
3	Entrepreneurship	Organizational innovation	Innovation Intensity	Product Innovation
4	Finance	Marketing Innovation	R&D employees	Innovation Intensity
5	R&D Intensity	R&D Intensity	Organizational innovation	Process Innovation

Finally, we compared the analysis result ranks of each country's growth subfactors with high *ESr*, which are financial performance and innovation success (Table 4). The five highest factors of *ESr* for German Mittelstand and Korean SME development were drawn by financial performance and innovation success. The factors, R&D intensity and R&D employees, could be considered firm characteristics because the relationship between R&D intensity and finance, as well as the relationship between R&D employees and firm size, is highly correlated (Dierickx & Cool, 1989). In this case, it has been verified that expanding

² Federal Ministry of Economics and Technology, www.bmwi.de.

innovation strategies based on a firm's discriminatory ability is essential for rapid growth.

Specifically, in the case of Germany, entrepreneurship and investment of human resources and finances in R&D were the key factors for firm growth. And in the case of Korea, culture and efforts for innovation and entrepreneurship were the key factors for firm growth. Innovation intensity was the most important predictor of financial performance for German Mittelstands, while entrepreneurship was the most important predictor for Korean SMEs. For innovation success, possessing R&D employees was the most important predictor for Mittelstands, while marketing innovation was the biggest success factor for Korean SMEs.

Conclusions

This study conducted a meta-analysis to verify and confirm the effect size of predictors on firm growth by combining data from previous studies on SME growth. By comparing Germany's Mittelstand, with strong competitiveness in the global market, and Korean SMEs, for which global competitiveness has fallen recently, we provided strategic implications for the growth of Korea's SMEs. The verification results of the research questions show that, first, entrepreneurship has a larger effect size on firm growth than other factors in both countries (Research Question 1). Secondly, R&D investment, including human resources and physical capital, has a strong relationship with Mittelstands' growth (Research Question 2).

Although the proportion of R&D expenditure to GDP by public institutions in Korea is the highest among OECD countries, R&D investments in SMEs are low. To promote Korean SMEs' sustainable growth, it is suggested that SMEs acquire competencies to develop competitive technologies and products by increasing R&D investments. Furthermore, human resource development programs, such as Germany's apprenticeship system, will be necessary to secure skilled employees, while there should be industry-university linkages for the continuous education and training of workers.

References

- Almus M & Czarnitzki D, The effects of public R&D subsidies on firms' innovation activities: The case of Eastern Germany, *Journal of Business & Economic Statistics*, **21**(2003)226-236.
- Andries P & Czarnitzki D, Small firm innovation performance and employee involvement, *Small Business Economics*, **43**(2014) 21–38.
- Audretsch D B & Elston J A, Can institutional change impact high-technology firm growth?: evidence from Germany's newer market, *J Prod Anal* , **25** (2006) 9–23.
- Barney J, Firm resource and sustained competitive advantage, *Journal of Management*, **17**(1991) 99-120.
- Bartz W & Winkler A, Flexible or fragile? The growth performance of small and young businesses during the global financial crisis: Evidence from Germany, *Journal of Business Venturing*, **31**(2016) 196-215.
- Bausch A & Rosenbusch N, Does innovation really matter? A meta-analysis on the relationship between innovation and business performance. *Proceeding of the Babson Kauffman Entrepreneurship Research Conference*, (Babson Park, MA), 2005.
- Beck S, Prügl R & Walter K, Communicating the family firm brand: Antecedents and performance effects, *European Management Journal*, *In press*, (2019) 1-13.
- Block J & Schwens C, *A meta-analysis about the relationship between family firms and firm performance*, Ph D Thesis, Universität Trier, Germany, 2016.
- BMWi, *In focus: Germany as a competitive industrial nation*, 2015.

- Borenstein M, Hedges L V, Higgins J P T & Rothstein H R, *Introduction to Meta-Analysis*, (Chichester: John Wiley & Sons), 2009.
- Bouncken R B, Pluschke B D, Pesch R & Kraus S, Entrepreneurial orientation in vertical alliance: Joint product innovation and learning from allies, *Rev Manag Sci*, **10**(2016) 381-409.
- Brüderl J & Preisendörfer P, Fast growing businesses: Empirical evidence from a German study, *International Journal of Sociology*, **30**(2000) 45–70.
- Calabrò A, Campopiano G & Basco R, Principal-principal conflicts and family firm growth The moderating role of business family identity, *Journal of Family Business Management*, **7**(2017), 291-308.
- Capon N, Farley J U & Hoening S, Determinant of financial performance: A meta-analysis, *Management Science*, **36**(1990) 1143-1159.
- Caves R E, Industrial organization, corporate strategy and structure, *Journal of Econotnic Literature*, **58**(1980) 64-92.
- Classen N, Carree M , Gils A V & Peters B, Innovation in family and non-family SMEs: an exploratory analysis, *Small Business Economics*, **42**(2014) 595–609.
- Cochran W G, The combination of estimates from different experiments. *Biometrics*, **10**(1954)101-129.
- Crook T R, Crook T R, Combs J G & Woehr D J, Does human capital matter? A meta-analysis of the relationship between human capital and firm performance, *Journal of Applied Psychology*, **96**(2012) 443-456.
- Czarnitzki D & Dlanote J, R&D policies for young SMEs: Input and output effects, *Small Business Economics*, **45**(2015) 465-485.
- Deeks J, Higgins J & Altman D G, *Analysing data and undertaking meta-analysis*, (Cochrane Handbook for Systematic Reviews of Interventions: Cochrane Book Series), 2008.
- Deloitte, *2016 Global manufacturing competitiveness index*, 2016.
- Dierickx I & Cool K, Asset stock accumulation and sustainability of competitive advantage. *Management Science*, **35**(1989)1504–1511.
- Gibrat R, *Les Inégalités économiques*, (Paris, France), 1931.
- Gruenwald R K, *Cause of high-growth of small-and mid-cap companies in the DACH countries*, PhD Thesis, Cracow University of Economics, Poland, 2016.
- Han S C, *A study on business performance of the technology innovative SMEs*, Graduate School of Entrepreneurial Management Hanbat National University, Masters’ Degree Thesis, Daejeon, Korea, 2008.
- Harms R, A multivariate analysis of the characteristics of rapid growth firms, their leaders, and their market, *Journal of Small Business and Entrepreneurship* **22**, **4**(2009) 429–454.
- Harms R, Wagner M & Glauner W, Relating personal, firm-based and environmental factors to the monetary and temporal engagement in corporate social responsibility in German Gazelles, *Journal of Small Business and Entrepreneurship* **23**, **2**(2010) 195–210.
- Harrod R F, An Essay in Dynamic Theory. *The Economic Journal*. **49**(1939)14-33.
- Hertel M & Menrad K, Adoption of energy-efficient technologies in German SMEs of the horticultural sector: The moderating role of personal and social factors, *Energy Efficiency*, **9**(2016)791–806.
- Hicks J R, *The theory of wages*, (London: MacMillan), 1932.
- Hyun S & Choi Y, A study on the corporate characteristics of technological innovativeness-type small business and R&D performance according to technological innovation, *Asia Pacific Journal of Small Business*, **35**(2013) 193-215.
- Kim J, *Impact of Innovative SME’s Research and Development Capabilities on the Patent Performance and New Product Development*, Masters’ Degree Thesis, Graduate School of Konkuk University, Seoul, Korea, 2013.
- Kim J & Kim M, Effects of innovation and export on the performance of medium-sized firms: The moderating role of corporate type, *Korean management review*, **43**(2014) 1787-1812.
- Kim T, *A study on the relationship among an entrepreneurship, technological innovation and management performance: Focused on automobile parts companies*, Masters’ Degree Thesis, The Graduate school of Business Management Hanyang University, Seoul, Korea, 2014.
- Kim M H, *The Effect of R&D Expenses on Employment Growth in the SME Sector*, Ph D Thesis, Seoul National University, Seoul, Korea, 2013.
- Kwak S H, The moderating effect of innovation activity on business performance in service industry, *The Korea Service Management Society*, **12**(2011), 227-245.

- Lee B, Huh M & Kang K, Organizational Ambidexterity and Performance in Korean Hidden Champions, *Korean Journal of Business Administration*, **27**(2014), 1585-1602.
- Lee S S, A study on entrepreneurship, competitiveness of SWOT, and performance in Hidden Champion Firm, *Asia-Pacific Journal of Business Venturing and Entrepreneurship*, **11**(2016) 21-33.
- Lim J N & Peltner F, Innovation performance of construction enterprises: An empirical assessment of the German and Singapore construction enterprises, *Construction Innovation*, **11**(2011) 282-304.
- Miller D & Friesen P H, Strategy making and environment—the third link, *Strategic Management Journal*, **3**(1983) 221–35.
- OECD, *Oslo Manual Guidelines for collecting and interpreting innovation data(Third edition)*, 2005.
- Park H S, *A Study on management performance resulting from technology innovation activities of innovation Type SMEs by growth stages*, Masters' Degree Thesis, Graduate School of Konkuk University, Seoul, Korea, 2011.
- Peteraf M & Bergen M, Scanning dynamic competitive landscapes: a market-based and resource-based framework, *Strategic Management Journal*, **24**(2003) 1027–1041.
- Peterson R A & Brown S P, On the use of beta coefficients in Meta-Analysis, *Journal of Applied Psychology*, **90**(2005) 175-181.
- Prahalad C K & Hamel G, The core competence of the corporation, *Harvard Business Review*, **68**(1990), 79-91.
- Rammer C, Czarnitzki D & Spielkamp A, Innovation success of non-R&D-performers: substituting technology by management in SMEs, *Small Business Economics*, **33**(2009) 35-58.
- Rammer C & Schmiele A, Drivers and effects of internationalize innovation by SMEs, *ZEW-Centre for European Economic Research Discussion Paper*, **8**(2008)
- Rant M B & Cerne S K, Becoming a hidden champion: From selective use of customer intimacy and product leadership to Business attractiveness, *South East European Journal of Economics and Business*, **12**(2017), 89-103.
- Rosenthal R, The file drawer problem and Tolerance for null results, *Psychological Bulletin*, **86**(1979) 638-641.
- Rumelt R, Towards a strategic theory of the firm. In *Lamb, Competitive Strategic Management*. Englewood Cliffs, NJ: Prentice-Hall, 1984.
- Schafer D, Stephan A & Mosquera J S, Family ownership: does it matter for funding and success of corporate innovations?, *Small Business Economics*, **48**(2017) 931-951.
- Schumpeter J A, *The theory of economic development*, (Harvard University Press, Cambridge), 1934.
- Schumpeter J A, *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle(1 edition, Transaction Publishers)*, 2011
- Simmon H, Hidden champions, *Speerspitze der Deutschen Wirtschaft. Wiesbaden*, **60**(1990).
- Solow R M, A contribution to the theory of economic growth. *Quarterly Journal of Economics*. **70** (1956): 65-94.
- Steeger J H & Hoffmann M, Innovation and family firms: ability and willingness and German SMEs, *Journal of Family Business Management*, **6**(2016), 251-269.
- Suh M B, *A Study on the Influence of R&D Investment on the Management Performance: Focus on the INNOBIZ*, Ph D Thesis, Kyungwon University, Kyungwondo, Korea, 2007.
- Yoo K, *The effects of technology innovation ability, technology commercialization ability and R&D intensity on the R&D performance: Focused on technology innovative SME(Small and Medium-Sized Enterprise)*, PhD Thesis, Department of Business Administration The Graduate School of Anyang University, Anyang, Korea, 2016
- Yoo T, *An empirical study on the effect of technology innovation activities on technology and management performances in INNO-BIZ companies*, PhD Thesis, Hoseo University Asan, Korea, 2009.
- Yoon H & Seo R, A Study of the core factors affecting the performance of technology management of Inno-Biz SMEs, *Journal of Technology Innovation*, **19**(2011), 111-144.
- Yoon J, *A longitudinal study on the analysis of causal relationship between the effects of technology innovation: focused on the comparison of venture, Inno-Biz and Non-certification manufacturing SMEs*, Ph D Thesis, Graduate School of Soongsil University, Seoul, Korea, 2015.
- Yoon J & Seo M, Relationships among International Entrepreneurship, Technology and Marketing Capacities, and International Performance in Technology-focused Small and Medium Enterprises, *Korean Academy of International Business Management*, **18**(2014), 137-159.
- Yoon K & Kim M, A study on mediating effect of international marketing activity between R&D and network capabilities and performance of Korean INNOBIZs, *International Area Studies Review*, **14**(2010), 181-204.

- You N, *The effects of Inno-Biz on performance of ventures: Focused on funding and technology innovation*, Masters' Degree Thesis, Seoul National University, Seoul, Korea, 2018.
- Yu C, *A Study on the success factors of commercialization of R&D investment companies: Focused on innovative SMEs*, Ph D Thesis, Service Bussiness School Kyonggi University, Kyonggido, Korea, 2017.
- Wolf F, *Meta-Analysis: Quantitative method for research synthesis*(Beverly Hills CA: Sage), 1986.