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Development of Performance Analysis Model for SMEs through Meta-Analysis

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Abstract

This study is to develop a performance analysis model for SMEs.Based on similar performance indicators through previous studies, performance indicators for SMEs were rewritten.Through the Korean Journal Citation Index (KCI), 75 related data were classified and a comprehensive SME performance analysis model was developed.Performance analysis was divided into two axes and classified into tables.The horizontal axis is the spatial performance range, which is divided into three areas: performance management by department/function, integrated performance management for the entire organization, and governance performance management requiring policy feedback. The vertical axis is subdivided into short-term, mid-term, and long-term by time and growth stage, and is divided into three parts: technical performance according to technological input, economic performance as organizational performance, and social performance for policy utilization. Then, performance indicators were mapped to each column. As a result of the survey, 28% of technical performance was analyzed as a result of frequency analysis, and performance indicators were organized into five categories: IT, R&D, certification, patent, and innovation. Economic performance was divided into 29%, BSC, HRD, logistics, production quality management, financial support, asset management, etc. 6 categories, social performance 43%, ESG, marketing, export, policy support, consulting, cooperation, etc. 7 categories.Limitations of the study include the narrowness of the survey that derived only performance indicators despite being a meta-analysis, and the performance model was mapped and classified according to growth stage and support period.however Insufficiency of validity due to lack of evidence, performance indicators were developed, but there were limitations in utilization for practical use.

Keywords: *Performance Analysis, Performance Indicators, Meta-analysis, Management Analysis, Economic Ripple Effects*

1. INTRODUCTION

1.1 Purpose of research

The purpose of this study was to find the results of the question of what performance analysis is for SMEs. A meta-analysis of research results related to performance analysis was conducted to develop a performance analysis model for SMEs.

2. UNDERSTANDING OF RESEARCH

2.1 Research method

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A meta-analysis is a statistical method that draws conclusions by integrating all published research results on a specific topic[1]. This research method was intended to develop a performance analysis model for SMEs through meta-analysis as shown in Table 1. First, in order to help understand the research, the current status and common factors of the performance analysis studied so far are found through policy reports and related papers. Second, meta-analysis results for performance analysis are classified by temporal and spatial common factors. Third, to develop a performance analysis model, which is the purpose of this study, we search for similar research cases. Fourth, a performance analysis model is developed by mapping the research results classified by factor to similar research cases.

Table 1. Research method

	understanding of research		empirical research		conclusion
division	performance analysis understanding	related to performance analysis meta-analysis	Classification by field of meta-analysis results	Suggestion of detailed plans for the development of new indicators	after Application plan
Details matters	Use of policy reports	Use of related papers	Classification of existing performance analysis cases	Development of performance analysis tools	
		Academic Promotion Foundation 75 KCIs	Temporal and spatial classification	Performance analysis model development	

2.2 Understanding performance analysis

2.2.1. Concept of performance management

Performance management uses mutually promised quantitative and qualitative indicators to effectively and achieve performance goals, which are the organization's vision or strategy.[2], It is a series of processes that systematically tally, manage, and provide feedback on organizational and individual performance[3]. Through this performance management, it is possible to identify the difference between the expected level and the result level, and to determine the competency development and compensation relationship of members.

2.2.2. Concept of performance management

Performance management emphasizes the effective management of strategic plans, activity processes, evaluation and feedback with various activities to achieve goals. Performance management consists of three dimensions: First, preparation of performance indicators such as goals for performance measurement. Second, evaluation of the performance data generated during the performance process and the degree of goal attainment. Third, use the evaluation results [4].

2.2.3. Scope of performance management

According to Bouchaert & Halligan (2008), and the Korea Society for Policy Analysis and Evaluation (2012), the performance range is classified as Table 2. The first scope is at the administrative performance

management level, where performance is defined in a generalized way and management is governed by regulations. The second scope is performance management by function. At this stage, performance, measurement, and management are linked, but different performances are defined and managed in the process of human resources, finance, customer management, and strategy management. The third scope is integrated performance management. At this stage, comprehensive performance information is created based on a specific performance measurement system, and is characterized by cohesion, integration, consistency, and convergence. The fourth scope is governance performance management. It covers a wide range of performance categories, including levels of government and social factors [5].

Table 2. Four types of performance management

performance range (space) Execution step (hour)	administrative performance management (Preparation of strategic system)	By function performance management (performance by department)	integrated performance management (whole organization)	governance performance management (policy preparation)
PLAN	Establishment of performance management system (regulation, education, control system)	Preparation of performance measurement indicators specialized for individual functions	Establish hierarchical performance measurement indicators	Preparation of comprehensive performance measurement indicators
operate (DO)	Linked operation between policy goals and performance measurement	Creation of other operating systems such as personnel, planning, marketing, etc.	Integrated system operation	Internal system and external system are integrated and operated
use of information (CHECK)	reporting purpose Disclosure of performance information	Can be used by segmentation	Leverage consistency, inclusivity and cohesion	Linked to social use
Limit (ACT)	Subdivided, optional, rules limited	lack of cohesion	The more complex the environment is exposed, the more difficult it is to operate	Uncontrollable and unmanageable

Source: Korea Society for Policy Analysis and Evaluation, Office of the Prime Minister, 2012. 7. Government performance management, operation status and performance analysis (modified content)

When the four types of performance management are organized, the performance range corresponding to the spatial element and the performance stage, the temporal element, are organized. Depending on the size of the space, it can be seen that the index creation → performance by department → performance of the organization → derivation of policy. In addition, the execution stage was planned (PLAN) → operation (DO) → information utilization (CHECK) → limit (ACT), that is the PDCA cycle, according to the lapse of time[6].

2.2.4. Performance analysis and performance indicators

In order to create performance indicators for SMEs, performance indicators were developed as shown in Table 3 based on the tables developed by Kim Min-cheol and Seong Nak-il (2012) and Shin Yeol and Oh Chul-ho (2016)[7].

Table 3. Performance items and performance indicators for SMEs

Application Period(hour) result (Growth stage)	Performance items and performance indicators			
	short-term	mid-term	long-term	Diagnosis
technical performance (technical input)	・Technical guidance (number of cases)	·Patent applications and registrations (number of cases) ·Technology transfer (number of cases) ·Process development (process reduction) · Papers (number of papers) ·Equipment construction (number of cases) · Productivity improvement (quality improvement)	·Prototype production (sales performance) ·Technical value evaluation (outcome) ·Dissemination of research results (international exchange, personnel exchange)	business participation Motivator task success trouble factor business promotion appropriateness
economic performance (Performance within the organization)	·Sales increase	· Stabilization of financial indicators (results of management analysis)	·Stock listing ·Market entry ·Investment attraction	
social performance (policy use)	·Group training	· Increased employment (number of employees) Fostering human resources (departmental development) · Papers (number of papers)	·Company size growth (sales) ·Analysis of economic ripple effects	

Source: Shin Yeol, Oh Cheol Ho, 2016. 3, SME support policy performance analysis (contents modified)

Table 3. Performance items and performance indicators for SMEs was organized as follows. It is a performance indicator created by classifying technology (technical input) → economy (intra-organizational performance) → society (policy utilization) into short-term → mid-term → long-term according to input or time required for each growth stage according to input factors.

3. EMPIRICAL RESEARCH

3.1 Performance analysis of SMEs and analysis of related research data

In order to derive performance indicators to develop a performance analysis model, 75 related data were organized as shown in Table 4. Through the Korean Journal Citation Index (KCI) of the National Research Foundation of Korea.

Table 4. Performance analysis of SMEs and analysis of related research data

Main Category	subdivision	thesis title
BSC (Balance and management)	Level of smartization efforts	The effects of the support level of Korean SMEs in smart manufacturing on BSC-based firm performance
	information system	A Study on the Relationships among the BSC Based Performance Indexes of SMEs' Information System

ESG (sustainable management)	CSR (corporate social responsibility)	The impact of CSR activities in Domestic SMEs on their financial performances
		Impacts of CSR Activities in the Social Field on CSR Performance in SMEs
	management strategy	A Study about the Effect on the Management Performance from the Relevancy between Business Strategies and the Strategical Performance Indicators in Small and Medium Enterprises(SMEs)
	technical regulation	The Impact of Technological Regulation on the Technological Innovation and Performance of Small and Medium Enterprises (SMEs)
	Technical Competence and Sales Competence	A Study on the Effect of Small and Medium-sized Enterprises' Technological Capabilities and Sales Capabilities on Corporate Performance
	entrepreneurship	The Moderating Effects of Entrepreneurship on the Sustainability Management Performances of Small and Medium Enterprises
		An Empirical Study on the Influence of Humane Entrepreneurship on SMEs Performance
	leadership	A Study on the Effect of Superleadership of Small and Medium Enterprises on Business Performances
	strategic orientation	The Influence of SME CEO's Strategic Orientation on Corporate Performance: Mediating Effect of Strategic Network
	integrated activity	A Study on the Effects of SME's Integration Activities on Corporate Performance through Sustainable Management
HRD (Human Resource Management)	ERP performance	An Empirical Study on the impact of the ERP Competence upon Business Performance within Small and Medium Business Firm Context
	industry-academia cooperation	Analysis on Factors Affecting Performance of Industry-Academia Cooperation Based Workforce Training and Development
	human resource management	Strategic Human Resource Management and Performance in Small and Medium-Sized Firms
IT (Information Technology)	IT resources	A study on the effect of SME IT resource on performance
	Informatization work environment	The Effects of Information Systems Based Working Environment on the Performance of SMEs
R&D (technology development)	Technology development support	Analysis on the Supporting Policy for Small & Medium Sized Firms
	industry-academia-research cooperation	An Analysis of Industry-University-Institute R&D Collaboration and Firm Performance on SMEs
	IT company	Analysis of Determinant Factors for R&D Performance of IT Small and Medium-sized Enterprises
	poor performance	A Study on the Causes of Poor R&D Performance of SMEs in Korea and Policy Measures
	commercialization	Factors influencing commercialization of government SME R&D project: effect of patent and certification
	new product	Influence of Absorption Capacity of SMEs on New Product Development Performance
marketing	e-Marketplace	An Empirical Study on Promotion Factors and Performance through e-Marketplace for Small & Medium companies
	Overseas Marketing Support Project	A study on factors affecting the use and performance of SMEs' overseas marketing support projects
distribution	geography, psychology	The Effects of Geographical Proximity, Psychological Distance, and Knowledge Networking on Technology Development Performance
Production quality management	TPM	The Impact of TPM Activities cn the Business Performance of Small and Medium Sized Enterprises
	Productivity Management System	An Empirical Study on the Influence of SME's Productivity Management System on Productivity Performance
	Quality Management	The Quality Circle, SMEs' Performance, and Mediating Role of Organizational Ambidexterity
Export	export voucher	A Study on the Efficiency of Operation of Export Voucher Program to Support Export of Small and Medium Enterprises
	Export Support Project	A Empirical Study on Evaluating Financial Performance of Export Promotion Beneficiary Enterprises in Korean SMEs
	Export support system	The Influence of Perception and Utilization of Export Support Programs on Export Performance of Korean SMEs
	market, brand	The Influences of SMEs' Market Orientation and Brand Orientation on Firm Capabilities and Performance in Export Markets
certification	Suitable industry designation system	Effect of Designation of SMEs-suitable Industry on SMEs Performance: Evidence from Service Sectors

		Designation of SMEs-Suitable Industry and SMEs' Performance: Evidence
	environmental management system	Research Study on Outcome Evaluation of Environment Management System in SME
funding	R&D funding	Government R&D Subsidies and the Performance of Small and Medium Enterprises
	technology guarantee	Financial Performance Analysis of Effects of Technology Guarantee on SMEs
		The Causal Effect of KIBO Technology-based Guarantee on the Financial Performance of SMEs under Imperfect Capital Market
	policy fund	A Study on the Financial Effect of Policy Fund in Small and Midium Company
		The Effects of Policy Funds for Small and Medium Enterprises
		The Performance and Its Factors of Policy Funds in Small and Medium Sized Firms
		Effects of DIP Financing Support for SMEs on their Performances
		A Study on the Effects of the Policy Funding Program Provided to the Small and Medium Sized Enterprises in Gangwon-Do
asset management	AIS	A Study on Improving Outcome of Accounting Information System(AIS) in Small to Medium Sized Enterprises
	ERP system	Developing A Performance Measurement Model for Implementation Process of Enterprise Resource Planning Systems on Small and Medium sized Enterprises
	financing	The Impact of Financing Behavior on the Korean SMEs' Performance and Efficiency
	asset management	Corporate Liquidity Management by SME and Its Managerial Performance
	Utilization of external resources	The Impact of External Resources Utilization Strategies and Absorptive Capability on the Korean Small and Medium-sized Enterprises' Performance
Policy support	Policy support	The Effect of Government's Support Policy and Experience on the Performance of SMEs
		Government R&D Subsidies and the Performance for Small & Medium Enterprises(SMEs) in Korea
		An analysis of Efficiency on the SME support policies and management performance
consulting	financial consulting	A Study on the Effects of Financial Structure on Management Performance in Small and Medium sized Enterprises for Financial Consulting
	expert guidance	The effects of expert's consulting on management performance in small and medium sized enterprises
	Will to innovate	The Effect of Management Consulting Service Characteristics on Business Performance through Absorption Capacity and Innovation Willingness of SMEs
Patent	introduction of technology	Inward Licensing and Innovative Performance: Evidence from Korean Manufacturing SMEs
innovation	Openness, Organizational Competence	Impact of SME's Open Innovation and Organization Capabilities on Corporate Performance
	open innovation	Does Open Innovation Contribute to Innovation Performance? :Empirical Evidences from Korean SMEs
		Open Innovation and Performance of SMEs: Comparison between Daegu/Kyeongbuk and other regions
	Determinants of Internationalization	Determinants of Internationalization in Korean Innovative SMEs and Their Performance
	technological innovation	A Meta-analysis on Antecedents and Consequences of Technological Innovation: Focused on Empirical Analyses of South Korea's SMEs
	Technology Innovation Competence	A Relationship between Innovation Capability and Performance: Differences in Firm Development Stages
	technological innovation	An Empirical Study on Effect of Technology Innovation of Small and Medium Business on Business Performance
	evaluation index	A Study for the Impact of the Key Evaluation Indexes on the Business Performance in Korean Inno-Biz
	innovation activities	The Effects of Innovation Activity to Business Performance in Small and Medium Enterprises
Cooperation	SCM (Supply Chain Management)	Supply Chain Collaboration and Performance: A Comparative Study between Large-Sized, Middle-Standing, and Small-Medium-Sized Enterprise
	technology intensity	The Effect of Partner Type and Technological Intensity on Innovation in SMEs
	technical cooperation	A Study on the Effect of Technology Collaboration on Innovation Performance of SMEs
		A Study on the Influence of External Technical Cooperation and technology information activities on the Innovation Performance of SMEs

	Win-Win Cooperation	A Study of the Influence of Win-Win Cooperation and Core Competence on Social Relationship Capital and SME Performance
	performance sharing system	A Study on the Success Factors for Benefit Sharing System Between Large and Small to Medium Enterprises
		The Transaction Network Effect of the Performance Sharing System between SMEs and Workers
	Performance indicators and gaps	An Empirical Study of Performance Gap among Car Companies in Korea
	outsourcing	The impact of SMEs' outsourcing partner capabilities on partnerships and firm
	partnership	A Study of Performance Analysis for the Productivity Innovation Partnership Program

3.2 Derivation of performance indicators

To derive performance indicators, the results of classification Table 4. were re-corrected by linking them with Table 5.. were revised as shown in Table 5. As a result of classifying them by growth stage again, first, technical performance according to technological input, second, economic performance as a result of organizational performance, and third, short-term, mid-term, and long-term factors classified according to social performance and time required for policy utilization are merged. Thus, the performance indicators were classified. To summarize, the technical performance classified by growth stage was 28% as a result of frequency analysis, and the performance index was organized into 5 categories: IT, R&D, certification, patent, and innovation. Economic performance was 29%, and the performance index was BSC, HRD, and logistics. , production quality management, financial support, asset management, etc. were reduced to 6 categories, social performance was 43%, and performance indicators were organized into 7 categories: ESG, marketing, export, policy support, consulting, and cooperation. The performance indicators classified according to the support period were HRD, financial support, marketing, policy support, and consulting in the short term, IT, R&D, certification, patent, BSC, logistics, asset management, ESG, cooperation in the mid term, and innovation and production in the long term. It was classified as quality control and export.

Table 5. SME performance indicators derived

Application Period (hour) result (Growth stage)	short-term	mid-term	long-term	frequency	percentage %
technical performance (technical input) (5 types, 21 items, 28%)		IT		2	2.67
		R&D		6	8.00
		certification		3	4.00
		Patent		1	1.33
			innovation	9	12.00
economic performance (Performance within the organization) (6 types, 22, 29%)		BSC		2	2.67
	HRD			3	4.00
		distribution		1	1.33
			Production quality management	3	4.00
	funding			8	10.67
		asset management		5	6.67

social performance (policy utilization) (6 types, 32 items, 43%)		ESG		10	13.33
	marketing			2	2.67
			Export	4	5.33
	Policy support			3	4.00
	consulting			3	4.00
		Cooperation		10	13.33
sum total				75	100.

3.3 Development of performance analysis model and indicators for SMEsUniversity

In order to derive the performance indicators, Table 4. and Table 5. based on the tables developed by Kim Min-cheol and Seong Nak-il (2012) and Shin Yeol and Oh Chul-ho (2016) were linked to analyze the performance of SMEs as shown in (Table 6). A model was developed.

Table 6. Comprehensive SME performance analysis model

performance range (spatial) / performance variable (time, growth stage)			Classification of performance indicators by case		
performance concept	period	performance indicator (example)	By function performance management (by department)	integrated performance management (whole organization)	governance performance management (Policy feedback)
technical performance (technical input)	short-term	technology transfer			Certification development, certification development
	mid-term	Patent registration	R&D, certifications, patents	IT support	
	long-term	Prototype production		innovation	
economic performance (Performance within the organization)	short-term	sales increase	HRD, funding		Presentation of business performance analysis
	mid-term	business analysis	BSC, Logistics	asset management	
	long-term	stock listing	Production quality management		
social performance (policy utilization)	short-term	consulting	marketing, consulting	Policy support	Suggestion of economic ripple effect analysis
	mid-term	employment increase	Cooperation	ESG	
	long-term	Economic Ripple Effect Analysis		Export	

Table 6. The comprehensive SME performance analysis model was divided into two axes to derive performance indicators. The horizontal axis is the spatial performance range, which is divided into departmental and functional performance management, integrated performance management for the entire organization, and governance performance management that requires policy feedback. The vertical axis is the temporal performance range, subdivided into short-term, mid-term, and long-term by growth stage, and divided into technical performance according to technological input, economic performance as performance within the organization, and social performance for policy utilization, and performance indicators were mapped for each.

4. CONCLUSION

4.1 Conclusion of the study (presentation of governance performance management)

As a conclusion of the study, the technical performance, economic performance, and social performance were presented as examples to utilize the above-derived performance indicators for governance performance management.

4.1.1. Technical achievements (suggestion of certification development plan)

Through the derived performance indicators, a total of 10 practical certification development processes for technical achievements at the governance level are summarized. ① Things to consider in advance ② Qualification system development ③ Job analysis and teaching plan development ④ Question bank development ⑤ Refresher course design ⑥ Test strategy development ⑦ Test execution ⑧ Profit plan ⑨ Expansion of qualification demand ⑩ Formation of public opinion[8].

4.1.2. Economic performance (management performance analysis plan suggested)

If a management analysis plan is presented through practical financial statements for economic performance at the governance level through the derived performance indicators, first, stability through current ratio and debt dependence second, profitability through normal profit to sales ratio, third, total asset growth rate and sales growth rate Fourth, analyze and present activity through total asset turnover[9].

4.1.3. Social Performance (Proposal of economic ripple effect analysis plan)

In order to derive economic effects, EVA analysis, Real Option analysis, technical ripple effect, and economic ripple effect analysis are used. In this study, I would like to introduce industry correlation analysis. The inter-industry table was started by Vasily Leontiev, and in Korea, it was first drawn up in 1960 by the Bank of Korea. Each production inducement effect is derived using the input coefficient (induction coefficient), the production inducement coefficient, the added value inducement coefficient, and the employment inducement coefficient. Inter-industry analysis analyzes and measures the direct and indirect ripple effects of fluctuations in final demand on production activities in each sector under the assumption that the input structure for each sector is stable for a certain period of time. In other words, if the inter-industry table is prepared, the functional relationship between the country's final economic demand and output, income, and added value can be grasped with quantitative figures that can be compared[10].

4.2 Significance and limitations of the study

Limitations of the study include the narrowness of the survey that derived only performance indicators despite the meta-analysis, the insufficient validity of the lack of evidence even though the performance model was mapped and classified according to the growth stage and support period, and the development of the performance indicators, but it is difficult to use them realistically. There was a limitation of utilization.

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