
Public Procurement for Innovation in Korea[†]

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Abstract

Public procurement for innovation is used as one of the major policy tools to stimulate innovation and promote growth of small and medium-sized enterprises (SMEs) in Korea. However, it is evaluated that this policy has not been so effective in promoting technological innovation among SMEs largely because it heavily depends on price competitiveness of SMEs products and services. In order to draw some policy implications, this study examines the PPI policies of selected countries as comparative references and conducts an empirical analysis on Korean Public Procurement Services (PPS) data for identifying challenges of the current policy in Korea. We conclude that in order to enhance technological innovations of SMEs, PPI policy in Korea should 1) focus more on the potential competitiveness of SMEs, 2) enlarge public demands especially on R&D services, 3) encourage private sector participation in the public procurement market, 4) improve the assessment criteria for public procurement market registration, and 5) restructure the responsible organizations.

Keywords

Public procurement for innovation, technology-based innovative SMEs, demand-side innovation policy, Korea

[†] This paper is based on the results of policy study “Improvement Strategies of Public Procurement Market Policy for Fostering Technology-based Innovative SMEs” published by Science and Technology Policy Institute in 2014.

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1. INTRODUCTION

A policy for small and medium-sized enterprises (SMEs) represents more than a corporate policy in both developed and developing countries. In most countries, SMEs are responsible for economic development by generating employment growth and strengthening value chains within each industry. They are, however, vulnerable to external changes since they are not competitive in terms of capital, productivity, and network, compared to large enterprises. It is therefore important for the government, in the name of establishing a sound and secure industrial ecosystem, to prioritize its policy agenda for enhancing SME competitiveness. Governments could once provide direct subsidiaries and pursue a protective policy structure for SMEs development, for there were high trade barriers between countries. However, with the globalized economy and lower trade barriers under the World Trade Organization (WTO) system, governments have shifted their focus onto stimulating innovation and strengthening SME competitiveness. It is now conventional for governments to implement R&D supporting programs for SMEs. Many countries, including Korea, attempt to enhance SME innovativeness and to strengthen their linkage to various institutions, such as universities and public research institutions. These official measures, however, do not always guarantee successful R&D outcomes. Instead, they occasionally raise issues concerning inefficient allocation of public resources or market failure due to government interference.

Public procurement is another important instrument of government expenditure. The role of public procurement has changed from being a mere tool for government expenditure to becoming a catalyst for corporate innovation. Although it is important to procure at a competitive price what public entities need, governments also need to recognize public procurement as an innovation strategy for when a market is not mature enough or market failure is expected. As a nation's economy grows, its ratio of government expenditure on public procurement per GDP tends to increase; even though each country faces different circumstances, government should provide opportunities for SMEs to enhance their innovation capabilities by creating market demands within the conventional public sector such as for new technology concerning security, the environment, and healthcare. It is critical for SMEs to create market needs by participating in public procurement since they are more concerned with survival from a short-term perspective, whereas large enterprises could exercise patience for technology development from a long-term perspective. This could be applied to R&D, the products of which would then qualify as public procurement innovation. The difference with conventional SME policy is that public procurement policy guarantees merchandizing channels even if the market should fail. Therefore, public procurement policy can foster SME innovation with more achievable, feasible, and detailed strategic solutions.

This study looks into policy cases in Korea to analyze the efficacy and efficiency of different kinds of policies, namely SME policy, R&D policy, and public procurement policy. The Korean government provides various programs towards enhancing SME innovation by combining policies. Major public procurements of innovation policies are analyzed with empirical data to measure policy efficiency and explore policy implications.

2. THEORETICAL REVIEW

2.1. Technology-based Innovative SMEs

2.1.1. Theoretical Background of Technology-based Innovative SMEs

“Innovative SMEs” can be defined as SMEs with technical innovation, production innovation and managerial innovation. Kim (2005) suggests that “innovation-type SMEs” are an upper-level designation encompassing technology-based innovative SMEs as well as new-technology-based, high-technology-based, and matured technology-based SMEs. Although these classifications illustrate subtle differences, they agree insofar as innovative SMEs producing better performance than other SMEs in terms of technological innovation (Hicks & Hedge, 2005).

TABLE 1. Definitions and Characteristics of "Innovation-type SMEs"

Classification	Definition & Characteristics	Criteria
Innovative SMEs	Deliver high performances with technological innovations	New product development, patent, technological innovations
Technology-based SMEs	Gain competitive advantages with original technology	R&D personnel, R&D expenditure, patent, new products
New Technology-based SMEs (NTBF)	Spin-off/out companies from university and research institutes to commercialize their new technology	Technological competitiveness, corporate establishment year
High-tech SMEs	SMEs engaged in competitions within high-technology industries	R&D investment, technical staff, early stage in technology lifecycle
Matured Technology-based SMEs	Innovative SMEs with small size and long business history	Patent, employees
Innovation type SMEs	SMEs with a competitive advantage of technological innovation	Technological competitiveness, R&D expenditure

Source: Kim (2005)

2.1.2. Technology-based Innovative SMEs in Policy Context

The Korean government provides national certification to technology-based innovative SMEs in order to define policy targets. The “Inno-Biz” certification and venture business certification are targets for analysis. Inno-Biz companies, under the “Act on the Promotion of Technology Innovation of Small and Medium Enterprises,” are categorized as innovative SMEs consisting of “technological innovation-oriented SMEs” and “management innovation-oriented SMEs” (Enforcement Decree of the Framework Act on Small and Medium Enterprises, 2012). Venture businesses are defined under the “Act on Special Measures for the Promotion of Venture Businesses.”

It is noticeable that Korea has clearly provided definitions and categorizations for technology-based innovative SMEs. Although management innovation-oriented SMEs are included in terms of government policy implementation, it is necessary to exclude them in this study because of our principal focus on technology-based SMEs.

According to the definition above, it is possible to estimate the number of technology-based innovative SMEs by adding up the number of Inno-Biz enterprises and venture (startup) businesses.¹ The total number of innovative SMEs is approximately 58,782 (repetitions included²), consisting of 29,192 venture businesses and 17,187 Inno-Biz companies as of October 2013. The ratio is 1.7% of the total number of SMEs³ (3,415,863) as of May 2013 (Small and Medium Business Administration SME Survey & Statistics System, 2013).

TABLE 2. Technology-based Innovative SMEs in Korea (as of October 2013)

(Unit: #, %)

Year	Output											
	'98-'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13.10
Venture Biz	35,944	7,702	7,967	9,732	12,218	14,015	15,401	18,893	24,645	26,148	28,193	29,192
Inno-Biz	2,946	2,375	2,762	3,454	7,183	11,526	14,626	15,940	16,243	16,944	17,298	17,187
Management Innovation Biz	0	0	0	0	2,619	6,510	11,324	13,988	16,642	17,558	14,867	12,403
Total	38,890	10,077	10,729	13,186	22,020	32,051	41,351	48,821	57,530	60,650	60,358	58,782
Repetitions (%)	1,833 (4.7)	1,519 (15.1)	1,890 (17.6)	2,455 (18.6)	5,402 (24.5)	8,913 (27.8)	11,091 (26.8)	12,207 (25.0)	14,393 (25.0)	14,348 (23.7)	13,216 (21.9)	11,756 (20.0)
Total w/o Repetitions	37,057	8,558	8,839	10,731	16,618	23,138	30,260	36,614	43,137	46,302	47,142	47,026

Source: Statistics Korea (2014)

2.2. Literature Review on Public Procurement of Innovation

The following literature review focuses on public procurement for innovation (PPI) and the question as to whether public procurement fosters technological innovation or not (see Table 3 for overview).

TABLE 3. Literature Review on Public Procurement of Innovation

Publications	Overview	Conclusion & Implication
Dalpé (1994)	Defined public procurement roles to promote innovation with case studies	Public procurement fosters industrial innovation when public procurers have technological expertise, a large public procurement budget to reduce risks, and supply-demand alignment
Phillips (2004)	Interactive supply-demand relationship fosters technological innovation	Technological competitiveness can be shared through public procurement and stimulate innovation

¹ In Korea, the government certifies venture businesses, while startup companies are self-defined in the private sector in the US.

² The total number should consider repetitions that are certified as both venture business and Inno-Biz and subtract management innovation-oriented SMEs.

³ In Korea, SMEs should, according to the Enforcement Decree of the Framework Act on Small and Medium Enterprises, satisfy the following criteria: an average amount of sales is not less than 150 billion won (textile industry, etc.) and 400 billion won (finance industry, etc.); total assets are 500 billion won or more and not less than 100 billion won of equity capital.

Publications	Overview	Conclusion & Implication
Edler & Georghiou (2007)	Why and how public procurement stimulates innovation	Four conditions (inter-department interactions, private sector demand, public supply-demand alignment, procurement value chain) should be realized for PPI
Potts (2009)	Measuring service efficiencies in the public and private sectors	Difficult to come up with innovation in the public sector since it removes "good waste" due to high prices
Edquist & Zabala-Iturriagoitia (2012)	Define public procurement for innovation	Public procurement fosters either gradually or drastically

Source: Dalpé (1994); Edler & Georghiou (2007); Edquist & Zabala-Iturriagoitia (2012); Phillips (2004); Potts (2009)

Certain in-depth European studies on PPI present the following implications for successful PPI implementation:

First, establishing effective control over interdepartmental interaction and collaboration is essential (Edler & Georghiou, 2007). Since the government and many public organizations are involved in the public procurement process, it is necessary to integrate departmental activities to generate synergy. Strengthening association and connectivity among demand-side participants, and establishing strong channels with supply firms are also important responsibilities under PPI.

Second, public procurement sustainability should be achieved by creating further demands in the private sector (Edler & Georghiou, 2007). As an intermediary, the government should encourage private participants to actively engage in the public procurement market and make innovative products exposed to potential buyers for more transaction opportunities. PPI fosters private investment and private demand, and pursues sustainability by helping suppliers gain credibility that is guaranteed by the government. This enables suppliers to attain funding and financial opportunities.

Third, expectations from the supply and demand sides should be well aligned and managed. SMEs anticipate a higher price to increase profit and to invest in technological innovation, while buyers in the public procurement market tend to focus on competitive price rather than outstanding product quality. It is critical for government to adjust the expectations from both sides.

Fourth, it is essential to develop a communication system to stimulate interactions between suppliers and buyers in the public procurement market (Phillips, Warrington, Knight, & Caldwell 2004). In order to manage data efficiently and to resolve information asymmetry, a centralized ICT platform should be established. It would aid participants in exchanging information.

2.3. Major Countries' Public Procurement of Innovation Policy Cases

In addition to the PPI concept, we have selected the PPI policy examples of certain countries for case study. These countries include the United States and certain European countries, all of which that have actively engaged in PPI implementation. Their main policy cases, characteristics, and responsible organizations are presented as follows:

TABLE 4. Major Countries' Public Procurement of Innovation Policy

Policy/Program	Overview	Characteristics	Organization
[USA] Small Business Innovation Research (SBIR) Stage Three	2.5% of federal R&D budget is allocated to SMEs' R&D budget	- Consists of three stages; during the 3rd stage, SBA supports finding distribution channel - Eligible to receive additional funding outside SBIR	SBA
[UK] Making Government Business accessible to SMEs	Increased government expenditure (both direct and indirect) on SMEs to 25%	- Establishes "contract finder" - Minimizes prerequisites - Operates "mystery shopper" scheme - Organizes Innovation Launch Pad	CCS
[EU] Procurement of Innovation Platform	Fosters innovation in design and delivery of public services by purchasing innovative solutions	- Public buyers launch calls to purchase innovative goods and services through PPI and purchase R&D services through pre-commercial procurement (PCP)	EC EIP
[Germany] Sustainable Procurement Initiative	Strategic initiatives to foster technological innovation and public service through sustainable public procurement	- Develops large-scale public procurement projects under the federal government's guideline	FMI
[Finland] Smart Procurement Program	Purchases products from SMEs with innovative technologies in order to promote public service efficiency	- Encourage private participants to enter into public procurement market and develop public service to pull demands	TEKES
[Sweden] Pre-commercial Procurement Call	Develops technological needs and purchases R&D capability to achieve technological and social innovation	- Fosters innovation in large-scale public services; corporations are encouraged to participate in calls for innovative ideas	VINNOVA

* US Small Business Administration (SBA), UK Crown Commercial Service (CCS), European Commission Entrepreneurship and Innovation Program (EC EIP), Federal Ministry of the Interior (FMI), Finnish Funding Agency for Innovation (TEKES), Swedish Innovation Agency (VINNOVA)

* Source: Cabinet Office (2013); EC (2008); GHK (2010); Nissinen (2014); OECD(2007); Stern(2011); Weber (2012)

The implications from this overview of PPI policy cases of these leading countries are as follows:

First, creating demand by establishing public services is critical. European countries implement PPI as an instrument to derive social benefits through public services, creating major public demand and promoting technological development. Furthermore, doing so would lead to a sustained pattern of technological innovation, employment growth, and business development.

Second, public buyers should provide further demand in order to lead innovations in the procurement market. Public buyers in Europe implement PPI policies to develop their needs and purchase solutions. These requested solutions could be products, services, and R&D activities, and they could be either produced goods or ideas in the preproduction stage. Flexibility is especially important in implementing PPI policy. It is possible for governments to have expanded roles and responsibilities such as technological transactions and R&D collaborations in the public procurement process.

Third, the processes for delivering demands should be diversified. The conventional process for public procurement is that the public sector states demands and companies that are equipped with

matching technology or services participate in the deal. It is, however, worthwhile to design a new process in which suppliers suggest specific needs to buyers during the public procurement procedure. It is also necessary to diversify the instrument itself by collecting data on diverse public demands and sharing them with local governments and other public institutions through an established platform.

Fourth, the evaluation process and criteria for technological innovativeness should be strict and comprehensive. Thorough assessment helps build trust in the evaluation results and the technology itself. It would decrease the risk of public procurement products and services that are still in the development stages. Improving the evaluation process and gaining credibility would substantially benefit SMEs in the private market.

Fifth, it is important to stimulate the procurement market by attracting private investment. Public buyers should encourage suppliers and investors to participate in the procurement process. This would promote the diversity of participants and ensure continuity in the private market after companies graduate from the public procurement market.

Last, a governance structure for PPI planning and implementation should be established. European countries have inaugurated an organization for innovation and allocated the responsibilities of supply-demand management and R&D project management. In the United States, responsible organizations have strengthened their associations with related institutions and closely collaborated for R&D, commercialization, and purchasing.

3. METHODOLOGY

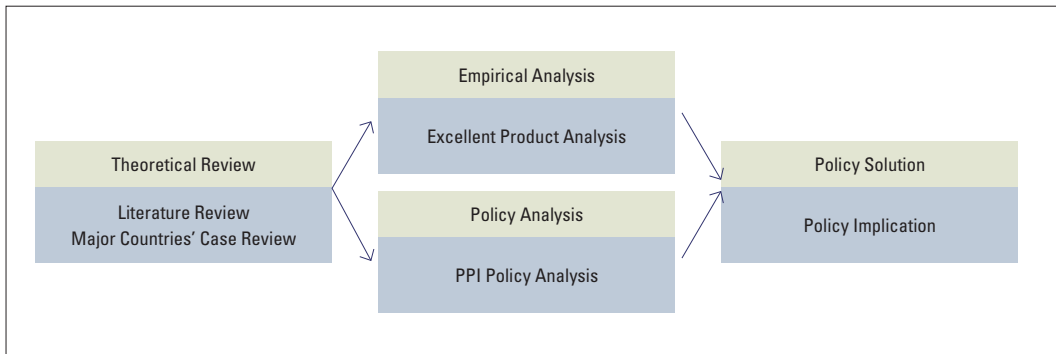
3.1. Research Framework

This study utilizes two approaches in analyzing the efficacy and limitations of PPI policy in Korea. First, by assessing data from “Excellent Product Market” (operated by Public Procurement Service), we look into whether high-quality products show higher performances in the market compared to conventional products. Second, by reviewing current Korean policies for technology-based innovative SMEs and comparing them with those of other countries, we examine the characteristics, distinctiveness, and limitations of public procurement in Korea. Based on the two approaches above, policy implications, agendas, solutions, and strategies for promoting Korean technology-based innovative SMEs are discussed.

3.2. Analysis Methodology for Excellent Product Market

This section assesses the effectiveness of the Excellent Product Designation policy as to whether it contributes to technological innovation in SMEs. The Excellent Product Market consists of 787 enterprises and 29,000 products, and records suggest 1,970 billion KRW in procurement (Public

FIGURE 1. Research Framework



Procurement Service, 2013). This may effectively represent the procurement market in its entirety as the total market for Korean SMEs' Technology Development Product⁴ is 2500 billion KRW or 77.6% of total market size (Small & Medium Business Administration, 2015).

Through these data, this study examines the procurement opportunities for technology-based innovative products as well as financial performance transitions between prior and post-Excellent Product Market registration. First, businesses enrolled in the Excellent Product Market are categorized into two groups: with or without major licenses. It is analyzed whether the groups with licenses outperform those that are without. In order to measure the changes of corporate financial performances, we use the enrollment date in the Excellent Product Market as a criterion. Data are from Public Procurement Service for Excellent Product Market's public procurement performances as of 2013 and Korea Enterprise Data's CRETOP database for corporate financial performance.

3.3. Analysis Methodology for PPI Policy

This section presents an analysis on PPI policies in Korea by reviewing policy characteristics, recognizing limitations, and suggesting implications.

The Public Procurement Service (PPS) is the central procurement agency responsible for planning and implementing public procurement policies and purchasing procedures. The Small and Medium Business Administration (SMBA) is responsible for SME promotion policies. The Ministry of Trade, Industry and Energy (MOTIE) is responsible for industrial growth policies. Because these public organizations' roles and responsibilities are overlapped and scattered at the same time, PPI policy is still vague in terms of responsible organizations and policy objectives. Consequently, PPI policy is presented with a new framework in this study. This framework consists of a policy agenda,

⁴ Technology Development Product should be certified with technology related licenses, produced successful R&D products, and registered on PPI market. According to the Technology Development Product Preferential Purchase Policy, public organizations should purchase 10% of Technology Development Product from their budgets for SMEs product purchase.

procurement procedures, and an implementation structure. Each category has also been studied at the strategic, operational, organizational level. First, the policy agenda analysis examines technological innovation, buyers' demands, and points of purchase. Second, analysis of the procurement process shows types of capital and innovation assessment criteria. Third, the policy structure analysis presents the responsible organizations and types of policy implementation.

4. RESULTS OF RESEARCH

4.1. Empirical Analysis

4.1.1. Procurement Opportunity for Technology-based Innovative Products

The first analysis is to examine potential procurement opportunities for the Excellent Product Market's goods and services. Public procurement through the Excellent Product Market is largely carried out in the fields of construction and office machines in terms of transaction amount (52.7% in total). Office machines rank before construction in terms of transaction numbers. Only 5.5% of total transactions were in the fields of science, technology, medicine, and ICT. These results confirm that the current public procurement policy has little competency for supporting technology-based innovative products.

TABLE 5. Transaction Amount and Numbers of Excellent Products ('96~'10, cumulative) (Unit: million KRW, %)

	Constructions	Science, Tech. & Medical	Machines & Equipment	Office Machines	Electricity & Electronics	ICT	Chemicals & Materials	Total
Transaction amount	3,031,742	3,398	1,301,201	894,079	1,384,296	407,566	420,425	7,442,707
Transaction numbers	133,596	562	40,525	188,140	31,138	20,992	18,089	433,042
Rate (amount)	40.7	0.0	17.5	12.0	18.6	5.5	5.6	100.0

* Sales amount is total sales amount between 1996 and 2010.

* Sales data in the field of Science, Technology and Medical is available from 2007.

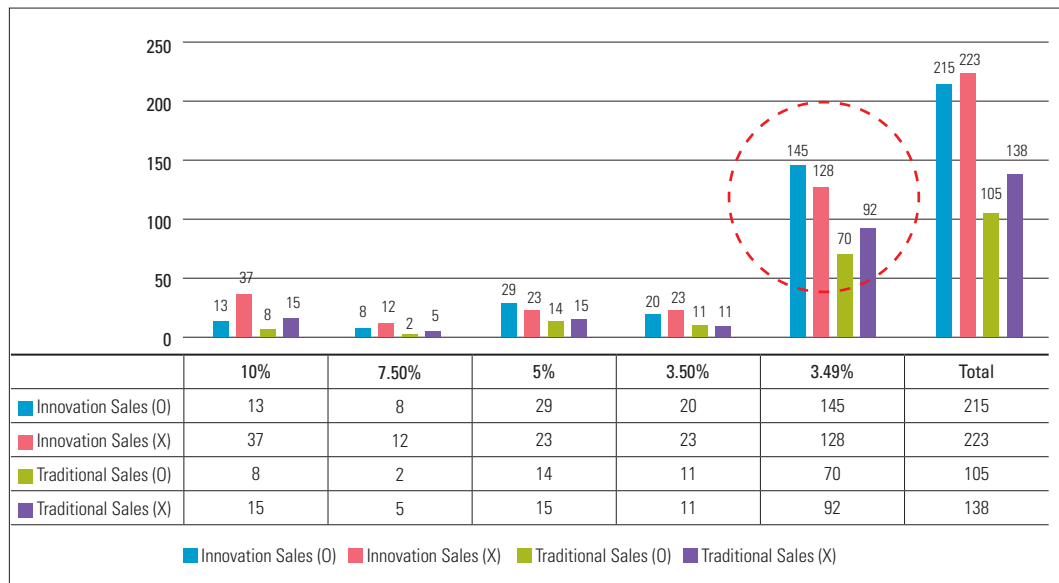
* Source: Government Excellent Products Association

The current Excellent Product Market was established for public buyers to purchase products directly and satisfy their needs in a timely manner. However, it is not focused on sophisticated technology or highly innovative products that can promote SMEs' growth and innovation. Instead, most of the products in public procurement transactions are purchased because they meet buyers' already existing demands.

According to the data above, transactions in the Excellent Product Market are mostly conducted for general products that can be classified into two groups: products with innovation and those without. In this study, the companies that provide these products are respectively called "innovative enterprises" and "traditional enterprises." Certain implications for both enterprise groups are explored through a financial analysis concerning the ratio of R&D investment per total sales.

When the ratio of R&D expenditure per total sales is higher than 3.5%, innovative enterprises⁵ have lower chance of participating in procurement transactions compared to traditional enterprises. This shows that the Excellent Product Market has little demand for high technology or technology-based innovative products. Although innovative enterprises easily enter into the market due to their innovative competences, this does not guarantee successful performances in procurement transactions.

FIGURE 2. Performances of Innovative & Traditional Enterprises in the Excellent Product Market



4.1.2. Financial Transformation after Excellent Product Market Registration

According to the financial performance analysis, Excellent Product Market registration has helped enterprises achieve stability while producing little effect on R&D activities. As of 2012(y), the sales growth rates increased compared to prior years (y-1). We could assume that public procurement transactions contribute to corporate total sales growth, profit growth, and inventory turnover.⁶ It is, however, noticeable that a ratio of R&D expenditure per total sales substantially dropped from 3.5% to 2.5%. Companies with licenses and awards for their technological competitiveness and innovation were often accepted into the Excellent Product Market, but once they enter into the acknowledged group, they were “locked-in”⁷ and tended to normalize R&D expenditure.

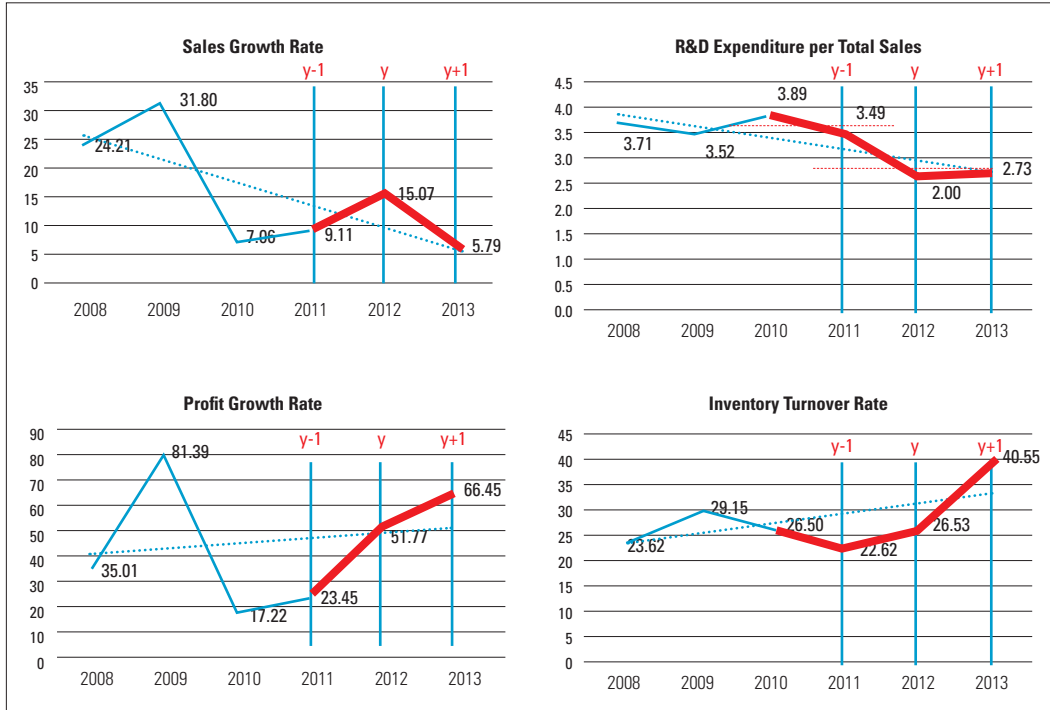
⁵ In this study, the definition of an excellent enterprise is that of a business entity with five major Excellent Product certifications: NEP (New Excellent Product), NET (New Excellent Technology), EPC, GR, or Green. Excellent Enterprises have obtained several patents based on these certifications.

⁶ Performance data is from enterprises registered in Excellent Product Market during six years from 2008 to 2013. It assumes that performance data between 2008 and 2010 has affected from major external circumstances such as financial crisis.

⁷ When a business is “locked-in,” it usually stops developing new products or services and maintains status quo because of sunk costs, transaction costs, or low morale. This study shows that locked-in enterprises stop investing in R&D in order to increase profits after entering the public procurement market.

FIGURE 3. Performance Changes after Excellent Product Registration

(Unit: %)



4.1.3. Implication

Empirical analyses using Excellent Product Market data reveal the current status of the Korean public procurement market and some implications.

First, the public procurement market has little demand for high-technology manufactures. It shows asymmetry between technology-based innovative SMEs and the public procurement market. While competitive price and suppliers' reputations are meaningful for public buyers in the decision-making process, technology-based innovative SMEs often could not satisfy such criteria. The government should develop new solutions to increase and diversify their needs for technology-based innovative products apart from traditional procurement items.

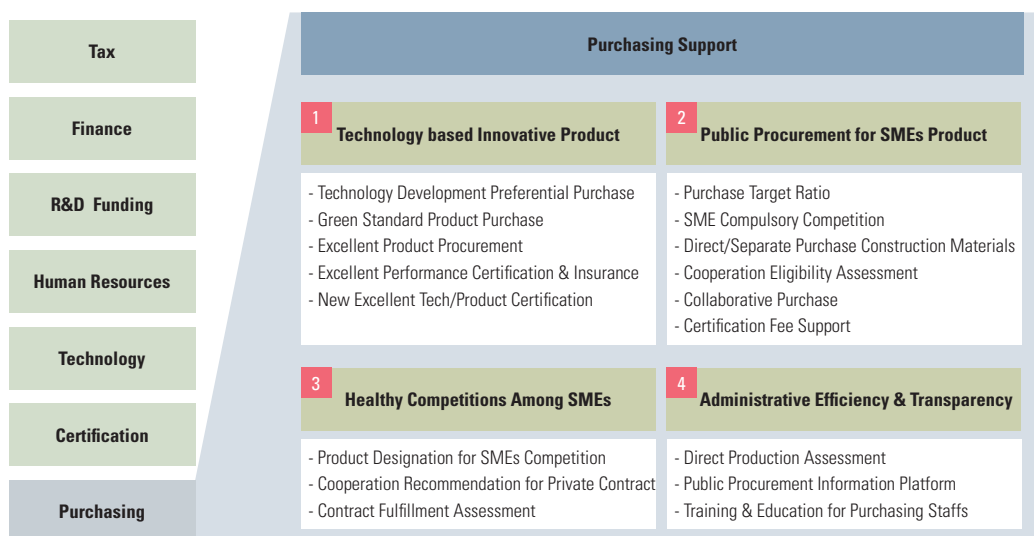
Second, the evaluation criteria such as licenses and awards for the Excellent Product Market inadvertently encourage participant enterprises to become "locked-in." This describes the situation where SMEs increase their R&D investment to enter into the public procurement market and upon doing so intentionally cut R&D expenditure to maximize their profits. This is the principal reason why the public procurement market cannot stimulate constant innovation. When these firms graduate from the public procurement market, they may not be competitive enough to survive in the private sector.

4.2. Policy Analysis of SMEs with Respect to the Governmental Support System

4.2.1. Technological Innovation Support Program for SMEs

Korea's public procurement policy offers an extensive range of support. This policy package, called the Technological Innovation Support Program for SMEs, covers seven sectors: tax, finance, R&D funding, human resources, technology, certification, and purchase. Purchasing support concerns technological innovation objectives, minor players' protection, and purchasing efficiency. The Technological Innovation Support Program for SMEs otherwise provides support towards achieving technological innovation and corporate growth.

FIGURE 4. Purchasing Support of Technological Innovation Support Program for SMEs



4.2.2. Public Procurement of Innovation Policy

The goals and objectives of the purchasing support policies of the Technological Innovation Support Program for SMEs attempt to be inclusive by promoting technological innovation while protecting minor players and vulnerable participants at the same time. Its philosophy articulates that securing corporate competitiveness will yield technological innovation in the long run. It is, however, insufficient to simply recognize PPI status and suggest implications, since a coherent SME policy for achieving technological innovation through the public procurement process would not be presented. This study provides a new framework for concisely defining public procurement policy for stimulating technological innovation.

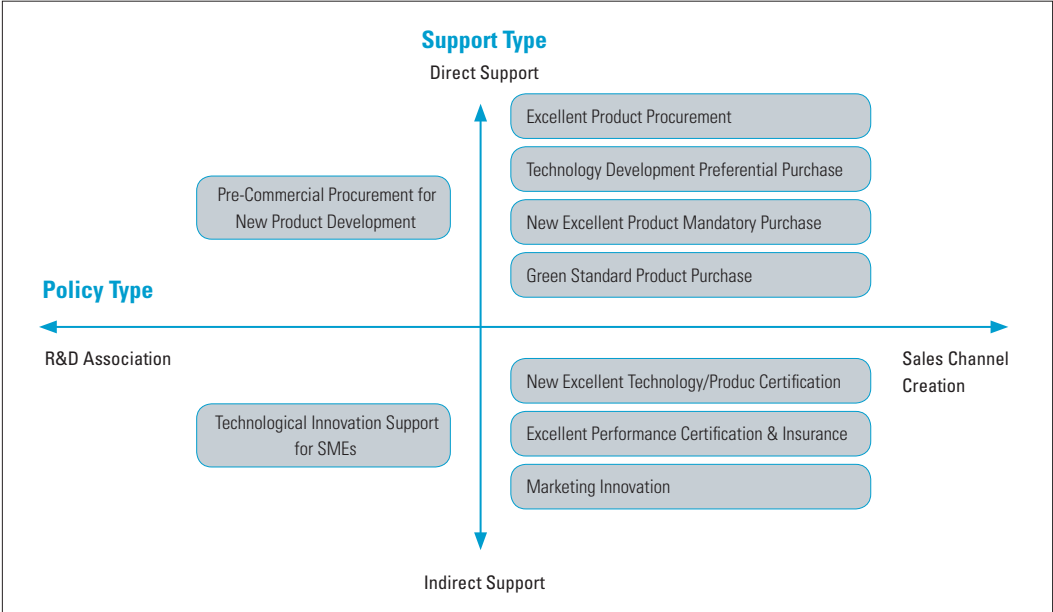
4.2.3. Public Procurement of Innovation Policy in Korea

For the analysis, we categorized Korean PPI policies in terms of direct or indirect support and R&D or sales support. PPI policies in the Technological Innovation Support Program for SMEs are the

main focus of the study, and some R&D-related policies or programs are also included since they aim for procurement and supply-demand matches. This is an inevitable approach, since Korean PPI policies so far have only been concerned with creating markets to expand sales channels. The reason why the policies are absorbed into establishing sales channels is that the government regards the procurement of SME products as the purchasing of existing products. While pre-commercial procurement (PCP) policies are widely adopted in European countries, it is difficult to find a similar example in the Korean policy context. The PCP concept has partially been applied to programs or implemented with an ambiguous definition of the term. R&D and procurement policies are highly segregated since they are developed and implemented separately under their respective responsible organizations. Therefore, it is also necessary to examine R&D policies to provide a concise definition of PPI policy in Korea.

We provide the designations of nine PPI policies in Korea with detailed classifications and definitions as follows:

FIGURE 5. Public Procurement of Innovation Policy Classification



Among these nine PPI policies, four policies offer direct support for market creation, two policies associate procurement with R&D, and three policies provide indirect support for effective management of public procurement procedures. Detailed PPI policies and their responsible organizations are as follow:

TABLE 6. Public Procurement of Innovation Policy in Korea

	Programs	Overview	Characteristics	Organization
Direct Support	Excellent Product Procurement	Designate Excellent Product with high quality and innovative technology and provide sales channels for SMEs and Venture Businesses	<ul style="list-style-type: none"> - Within the MAS (Multiple Award Schedule), Excellent Product Market is separately established - Without any mandatory conditions for SMEs, SMEs register to the market - Register criteria include certification and technology assessment - SMBA, MOTIE certifications are accepted 	PPS
	Technology Development Preferential Purchase	Public organizations are required to purchase SMEs' R&D products to encourage SMEs R&D activities	<ul style="list-style-type: none"> - Purchase minimum 10% of R&D products from organization's budget for SMEs product purchases - Technology/Quality Awarded Products, R&D Success Products are included 	SMBA
	New Excellent Product Mandatory Purchase	Public buyers are required to purchase New Excellent Product certified product (minimum 20%)	<ul style="list-style-type: none"> - Promote R&D activities and commercialization for SMEs - Became mandatory in 2006 but hardly complied so far 	MOTIE
	Green Standard Product Purchase	Provide environmental standard and purchase products which complied the contract specification	<ul style="list-style-type: none"> - Provide product specification annually for purchase - Policy for environment and energy sector - Limited to pre-selected product items 	PPS
Indirect Support	New Excellent Tech/Product Certification	Certify R&D products and provide insurance to support initial sales opportunities	<ul style="list-style-type: none"> - Provide certification to enter into the public procurement market - Significant criteria for preferential procurement 	KATS
	Excellent Performance Certification & Insurance	Certify SMEs' R&D products for references to buyers in public sector	<ul style="list-style-type: none"> - Guarantee SMEs reputation especially for first time participant - Help purchasing staff make decisions with certification and insurance 	SMBA
	Marketing Innovation	Support creating sales channels for SMEs and startups which need managerial and organizational support	<ul style="list-style-type: none"> - Support establishing pop-up stores, conducting marketing and global business - Pilot program is implemented - Need to provide detailed strategies to associate with public procurement market 	SMBA
Direct R&D Support	PCP for New Product Development	Connect R&D-purchase procedure to provide R&D funding and sales channels for SMEs	<ul style="list-style-type: none"> - Forecast demand with buyer surveys and encourage private actors to participate - Programs are mainly in military & defense and construction fields 	SMBA
Indirect R&D Support	Technological Innovation Support for SMEs	Public organizations responsible for R&D funding should provide mandatory R&D budget for SMEs	<ul style="list-style-type: none"> - Provides government R&D funding to SMEs (quota applies) - Need to formulate strategies to increase purchases of successful R&D products 	SMBA

* Public Procurement Service (PPS), Small and Medium Business Administration (SMBA), Ministry of Trade, Industry and Energy (MOTIE), Korean Agency for Technology and Standards (KATS)

4.2.4. Public Procurement of Innovation Policy Analysis

Results and implications from analyzing the nine Korean PPI policies in terms of policy agenda, implementation process, and program structure are provided below, as well as comparisons with commensurate policies in other countries.

TABLE 7. Public Procurement of Innovation Policy Analysis

	Programs	Policy Agenda		Buyers' Demand		Purchase Point		Capital Source		Innovation Assessment		Responsible Organization		Policy Type	
		SME Protection	Technological Innovation	Creating Demand	Existing Demand	Prior R&D Purchase	Post R&D Purchase	Public	Private	Certification	Index	Purchasing Agency	Government Ministry/Department	Enactment	Program/Initiative
Korea	PCP for New Product Development	0	0			0		0	0		0		0	0	0
	Technological Innovation Support for SMEs	0	0			0		0			0		0	0	
	Green Standard Product Purchase				0		0	0		0			0	0	
	New Excellent Product Mandatory Purchase				0		0	0		0			0	0	
	Tech Development Preferential Purchase	0			0		0	0		0			0	0	
	Excellent Product Procurement	0			0		0	0		0			0	0	
	New Excellent Technology Certification		0							0			0	0	
	New Excellent Product Certification		0							0			0	0	
	Excellent Performance Certification & Insurance	0								0			0	0	
Major Countries	[US] Small Business Innovation Research		0	0		0		0	0		0	0		0	
	[UK] Making Government Business Accessible to SMEs	0	0	0	0	0	0	0		0	0		0		
	[EU] Procurement of Innovation		0	0	0	0	0	0	0		0				0
	[GERMANY] Sustainable Procurement Initiative	0	0	0	0	0		0		0	0				0
	[Finland] TEKES Smart Procurement Program		0			0	0	0	0		0	0			0
	[Sweden] Pre-commercial Procurement Call		0	0			0		0		0	0			0

First, since Korean SME policy has been developed and implemented to protect enterprises, there is little chance of fostering technological innovation. Providing SMEs with opportunities to participate in the public procurement market and to produce innovative products remain critical. Second, the public procurement market is exposed to limitations because its traditional structure does not

provide sufficient demands. The current procurement market demand has mostly been bounded for government's needs, focusing on price perspective rather than the quality of the products. Proactive approaches to developing demands are crucial. Third, the current public procurement policy primarily focuses on finished goods. It is difficult to encourage R&D-purchase process alignment for producing technology-based innovative products under the prevalent circumstances. Fourth, the current policy provides little chance of private actors participating in the procurement market. Although Pre-commercial Procurement for New Product Development encourages participation from the private sector, large enterprises tend to take the lion's share in the process. It is also necessary to expand target industry sectors since current programs are predominantly implemented in the field of national defense or constructions work. Fifth, the evaluation criteria and process for technological innovation assessment should be improved. Public procurement of innovation policy in Korea evaluates candidate products using technology, product, and performance certifications. This could, however, pose obstacles to technological innovation by hindering SMEs from pursuing continuous R&D activities, and charging excessive fees to obtain certifications. Lastly, it is difficult to find a governance structure for planning, organizing and implementing public procurement service; this is also a major discrepancy compared to the situation of European countries. A coherent and accountable organization must be established, one that can pull further demand and execute strategies and policies for the public procurement market.

5. CONCLUSION

The development of SME policy is a recent event in Korea, as its political sphere has previously pursued large enterprises oriented towards growth. It is also more focused on being protective of and providing subsidiaries to SMEs. Within this context, the public procurement market has prioritized policy providers rather than policy beneficiaries.

In order to successfully exploit the public procurement policies for technology-based innovative SMEs, it is important to restructure existing the fragmented and disconnected policies of SME policy, public procurement policy, and R&D policy. PPI policy requires horizontal integration towards a collaborative and cooperative manner. Based on this structural consolidation, we could expect PPI to effectively match supply and demand, and foster innovations across the R&D processes.

The concepts, policies, and programs of PPI presented in this study have extensively been implemented in major European countries. These benchmark cases present some solutions to make PPI policy more effective and efficient in the Korean context. At the same time, PPI policy in Korea also carries implications for others. While Korean SMEs face a relatively challenging environment, the government does offer a diverse array of policies with substantial and concrete support and benefits. Korea provides a worthwhile policy case for both developing and developed countries in terms of new ideas and instruments. We expect that this study would be useful as an explicit reference for the development of demand-side innovation policy.

REFERENCES

- Cabinet Office. (2013). *Making government business more accessible to SMEs: Two years on*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/231994/SME_Two_Year_On_Report.pdf
- Dalpé, R. (1994). Effects of government procurement on industrial innovation. *Techin Society*, 16(1), 65-83.
- Edler, J., & Georghiou, L. (2007). Public procurement and innovation—Resurrecting the demand side. *Research Policy*, 36(7), 949-963.
- Edquist, C., & Zabala-Iturriagoitia, J. M. (2012). Public procurement for innovation as mission-oriented innovation policy. *Research Policy*, 41(10), 1757-1769.
- Enforcement Decree of the Framework Act on Small and Medium Enterprises, Presidential Decree No.23527, (2012) Small and Medium Business Administration.
- European Commission (EC). (2008). *European code of best practices facilitating access by SMEs to public procurement contracts*. Commission staff working document (SEC 2193). Retrieved from http://ec.europa.eu/internal_market/publicprocurement/docs/sme_code_of_best_practices_en.pdf
- GHK and Technopolis. (2010). *Evaluation of SMEs' access to public procurement markets in the EU. Final Report* (ENTR/04/093-Lot 1). Retrieved from <http://ec.europa.eu/smart-regulation/evaluation/search/download.do;jsessionid=1CF8TT1Nfy2MJwBDWQC1Jx8g8rXtjwDlhK1vqn8M1f32kYbpfBXQ!1601440011?documentId=4289>
- Hicks, D., & Hedge, D. (2005). Highly innovative small firms in the markets for technology. *Research Policy*, 34(5), 703-716.
- Kim, Y. (2005). *Innovative type SMEs- enterprise characteristics, technology learning and business performance*. Science and Technology Policy Institute (STEP I). Retrieved from <http://www.stepi.re.kr/app/report/view.jsp?cmsCd=CM0013&categCd=A0202&ntNo=202>
- Nissinen, S. (2014). *Smart procurement program and the innovative procurement funding scheme in Finland*. Retrieved from <https://www.tekes.fi/contentassets/70055a3aaaae4d42867fbdc5fcc98c58/smart-procurement.pdf>
- Organization for Economic Co-operation and Development (OECD). (2007). *Integrity in public procurement: good practice from A to Z*. Retrieved from <http://www.oecd.org/development/effectiveness/38588964.pdf>
- Phillips, W. Warrington, J., Knight, L., & Caldwell, N. (2004). *Technological change and institutions: the role of public sector procurement*. International Public Procurement Conference proceedings, Vol. 3. Retrieved from http://www.researchgate.net/profile/Nigel_Caldwell/publication/255580536_TECHNOLOGICAL_CHANGE_AND_INSTITUTIONS_THE_ROLE_OF_PUBLIC_SECTOR_PROCUREMENT/links/0deec536c377c685ed000000.pdf
- Potts, J. (2009). The innovation deficit in public services: The curious problem of too much efficiency and not enough waste and failure. *Innovation: Management, Policy & Practice*, 11(1), 34-43.
- Public Procurement Service. (2013). *Public procurement statistics*. Retrieved from <http://www.pps.go.kr/bbs/selectBoard.do?boardSeqNo=161&pageIndex=2&boardId=PPS046&cateSeqNo=1>
- Small and Medium Business Administration. (2015). *Public procurement market now consists with SME products of 70%*. Retrieved from http://www.smba.go.kr/board/boardView.do?board_id=SMBA_NEWS_32&seq=50693&mc=usr0001031&re_level=0&re_step=426999.
- Small and Medium Business Administration SME Survey & Statistics System. (2013). *The business number by size, regions, industry*. Retrieved from http://220.71.4.163:8000/statHtml/statHtml.do?orgId=142&tblId=DT_142N_A20500#

- Statistics Korea. (2014). *Small and medium business administration SME survey & statistics system*. Retrieved from http://220.71.4.163:8000/statHtml/statHtml.do?orgId=142&tblId=DT_A10091#
- Stern, P., Hellman, J., Rijnders-Nagle, M., Terrell, M., & Åström, T. (2011). How public procurement can stimulate innovative services. *Nordic innovation centre report*. Retrieved from http://www.nordicinnovation.org/Global/_Publications/Reports/2011/201102_HowPublicProcurementCanStimulateInnovativeServices.pdf
- Weber, M. (2012). *International perspectives on public procurement of innovation: Procurement of innovation in Germany*. Presentation at the seminar by the Procu-Inno Project, Helsinki, Fraunhofer Institute for Open Communication Systems (FOKUS). Retrieved from http://www.vtt.fi/files/sites/procuinno/procuinno1602_weber.pdf