

The Effect of Government Support on e-Business

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Abstract

This study investigates how government support influences the performance of e-business companies. Drawing on previous studies, funding support for technology development and marketing support, currently accounting for the biggest part of the support provided by the Korean government to the e-business sector, were selected as independent variables. Meanwhile, performance indicators specific to e-business such as human resources development, competitiveness enhancement, profitability, and growth in technology assets were chosen as dependent variables.

The data was collected through a survey of CEOs and executives of e-business companies that had received or were receiving government support. The empirical analysis of the data found that funding support from government for technology development had a positive influence on competitiveness enhancement, profitability, and technology asset growth. Marketing support, while it had a significant influence on competitiveness enhancement and technology asset growth, proved to have no measurable effect on profitability.

Keywords : e-business, government support, e-business industry

I . Introduction

One of the great shifts in industrial paradigms brought by the information age of the 21st century is the increased importance of value-added and technological competitiveness. To viably compete in the new marketplace transformed by the digital revolution, countries around the world are heavily investing in the creation of new value-added and technology development. To help the industry meet these new competitiveness requirements, governments

are providing active support to promising high value-added sectors under comprehensive, long-term plans. In Korea, to assist the industry in gaining technological independence needed to successfully compete in the global information race, its government has been expanding and diversifying its support toward industry for the development of next-generation technologies, their commercialization and creation of new business models based on these technologies. The goal is to foster new engines for future growth of the Korean industry.

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As is well-known, South Korea is today among the world's most advanced nations in terms of information technology. The country's rise as a world IT powerhouse — that Koreans like to call "IT Korea" - owes much to an ideal combination of active government support for technology development with an equally active investment in technological innovation by its industry. The technology-friendliness of its society and markets was also a significant contributing factor to this success. In the aftermath of the Asian Financial crisis of 1998, as part of an effort to get its reeling economy back on track, the Korean government decided to support the competitiveness of its small and medium-sized enterprises (SMEs) and venture firms. The idea was to create national wealth and new jobs by providing holistic government support to innovative-technology firms. Joining this effort by government, the Korean industry, academia, and research community worked together tirelessly to develop new technologies and explore new markets. Also, IT firms, unlike traditional manufacturing industries which promote co-operation and harmony, these values being essential for productivity, had organizational cultures that valued originality, creativeness and innovativeness in their members and boldness and enterprising spirit in a CEO. This atmosphere in the industry, together with a national temperament favorably disposed toward new technology, served as a catalyst to the Korean IT boom. It is during these years on the heels of the financial crisis that technological infrastructure necessary for a thriving IT industry

and booming e-business came to completion, laying the groundwork for "IT Korea".

However, the IT development initiative of these years was not without its downsides. Quite a few of the government support programs overlapping or redundant, and actions of some government officials and business leaders involved in related projects were ethically questionable. The result was a growing mistrust in government support programs. The selection of government-funded technology development projects, often short-sighted or random, did not adequately take into consideration the industry's actual capability to commercialize a technology or its market potential. As a result, corporate profitability worsened, and the commercialization of many of the new technologies resulting from these projects was delayed. Also, Korean companies' fervor for technology was not always accompanied by commensurate efforts to commercialize the results from technology development programs or backed up by marketing capabilities. This imbalance had a disastrous consequence on the financial health of these firms and played a nonnegligible role in KOSDAQ's bankruptcy and the dot.com bust.

These glitches and pitfalls spawned widespread doubts about the effectiveness and even relevance of government support programs for SMEs and venture firms. As these programs, in some cases, propped up nonviable firms, they also had the effect of the market's internal restructuring process; hurting the long-term national competitiveness of Korea and preventing efficient and fair allocation of

resources among its economic actors. Amid the mounting the skepticism on government support programs, their overall effectiveness as well as their various other aspects were called into question, including in which fields these programs are most effective and which field priority support should be given. Few of these many unanswered questions, however, have been ever addressed by researchers. The number of studies assessing the achievements of government support programs in this field is, as a matter of fact, surprisingly small. Assessments provided by a handful of existing studies on this topic are hardly satisfactory, as their focus is too narrow, dealing, for instance, with a single project carried out by one particular institution. These studies are at the same time too general to be informative or useful, as they measure the effect of a government support program on the industry as a whole, and not a specific industry sector. Also, whilst there have been a sizeable number of studies investigating private-sector factors influencing the growth of the e-business industry, very few inquiries have been made into similar influence factors coming from the public sector. Most studies on public-sector influence factors have been broadly concerned with the industry as a whole, and not e-business or any other specific sectors.

To address these shortcomings in the existing literature, we elaborated a research model expanding on existing models comprising independent variables that are primarily macro-variables and dependent variables that are primarily micro-constructs. The independent

variables, variables related to government support in this study, have in their scope all technology development funding programs and marketing support programs by government institutions, while the dependent variables relating to the effect of government support is exclusively concerned with e-business; in other words, they only measure the effect of the support programs on e-business.

II . Theoretical Background

1. Government Support Programs

1) Technology Development Funds

Technology development funds are programs through which the government provides funding toward new technology development projects in the form of interest-free and unsecured loans with no collateral requirements. The size of funding (maximum amount of loan and maximum ratio of government contribution), minimum required ratio of private sector contribution and the percentage of repayment as percentage of the loan amount (only for successfully completed projects) vary depending on the project. Upon the completion of the project, the recipients of funding support are required to repay, upon the successful completion of the project, only a portion of the loan principal. As an incentive to encourage broad participation in the program, no repayment obligation is imposed on participants unless the technology development comes to a successful completion. The details of support available under these programs are as follows:

(1) Tax Relief

The Ministry of Strategy and Finance and the National Tax Service offer businesses a variety of tax relief programs. Those tax relief programs that have a direct or indirect relationship with the Technology Development Fund are as follows:

Concerning R&D and human resources development, Korean corporations or individuals are allowed to write off the full amount of reserve funds to cover the cost of technology development or technological innovation projects, deposited with a banking institution, treating it as a business for the corresponding fiscal year.

Meanwhile, research institutions and companies importing capital goods for the purposes of scientific research or R&D receive a reduction in customs duties (Tariff Act, Article 90). There is also a program granting a temporary reduction, full or partial, of special excise tax on those products considered critical to technology development, for which the trade authority seeks to expand domestic demand in accordance with an appropriate export strategy (Special Consumption Tax Act, Article 1 - 2). In regard to technology imports, taxes are waived on royalties and licensing fees, in the case of advanced technologies deemed essential for the enhancement of international competitiveness of the Korean industry and its structural improvement, to encourage and facilitate inward transfers of such technologies, (Special Tax Treatment Control Act, Article 121 - 6).

Finally, new technology financing firms and other organizations and individuals investing in

or financing new technology projects are allowed to deduct losses incurred from such projects (Special Tax Treatment Control Act, Article 17).

(2) Funding Support for Technology Development and Joint R&D Projects

The Ministry of Commerce, Industry and Energy is the government agency conducting the largest number of technology development support programs. Programs by the Ministry of Commerce, Industry and Energy sponsors spans a vast spectrum of technology areas and vary in length and size, ranging from the 'Growth Engine Technology Development Program,' 'Medium-term Core Technology Development Program' and the 'Next-Generation Technology Development Program' to the 'Common Core Technology Development Program,' 'Region-Specific Technology Program' and 'Parts and Materials Technology Program.'

The Ministry of Science and Technology, meanwhile, focuses on promising next-generation technologies, technologies with social and public benefits, and traditional mainstay high-tech fields, and channels its support toward select strategic areas well equipped with human and material research infrastructure, sponsoring more particularly large-scale long-term corporate R&D projects with potential to lead to the development of globally-competitive breakthrough technologies, such as the 21st frontier R&D projects.

The Ministry of Information and Communication provides funding to select technology projects that are either in core

information technology areas or in promising next-generation technology areas, deemed to be critical for furthering the goals in the blueprint for making Korea the global leader in the world IT market and taking its informatization to the next level. Software projects receive funding up to 200 million won per technology, and hardware projects up to 300 million won, under this program. Meanwhile, to enhance the convenience of IT users and boost the competitiveness of the IT industry, the Ministry also sponsors projects to develop technological standards in key fields such as GIS, ITS, next-generation web and mobile telecommunications, digital TV, and information protection. Broadly involved in both domestic and overseas standardization initiatives, the Ministry of Information and Communication provides support toward standard testing and authentication activities. Funding support is generally directed only toward development projects in the most critical information technology areas.

The Small and Medium Business Administration offers financial assistance toward SMEs' technology development projects in the form of unsecured, interest-free loans. The beneficiaries of this funding program are required to repay a portion of the loan principal, only if the project comes to a successful completion. Similar in concept to the funding programs offered by the Ministry of Commerce, Industry and Energy and the Ministry of Information and Communication, this program, however, exclusively targets SMEs and short-term new product development technology

projects which can be completed within one year or less.

The Korea Intellectual Property Office (KIPO) has in place a funding program for prototype development projects for patented technologies. This program, aimed at facilitating the process of commercialization of inventions by SMEs, funds projects for manufacturing prototypes of a patented invention or invention awarded with utility model rights up to up to 80% of total project costs. The maximum grant for a single project is set to 30 million won.

The Ministry of Culture and Tourism, the largest sponsor of projects in IT and e-business fields, offers funding support to cultural content development initiatives. The aim is to discover promising cultural content products at the early stage of development and assist their commercialization process through comprehensive support. To encourage innovative content-related initiatives and as part of the effort to help Korean content products pave inroads into overseas markets, the Ministry provides special support toward select projects deemed to have a strong export potential (star projects). Funding support is extended to projects to develop mobile content for mobile internet platforms such as handsets and PDAs, multi-platform internet content, game-based educational content, T-learning and other internet content enabled by the latest technologies. The Ministry also sponsors internet content projects in areas related to finance, home, lifestyle and law, as well as content projects for developing solutions for next-generation platforms such as telematics, LBS, and home

networks. Funding support is extended to game development projects as well.

(3) Technology Business Incubation Funds

Technology business incubation funds are aimed at assisting projects developing new capital goods and contributing to the diffusion of new technologies. Unlike technology development funds offering unsecured, interest-free loans, these programs extend long-term loans at low interest rates toward the cost of business incubation (business setup costs, working capital, etc.). This mode of financing new business development is used in various government agencies, and programs having a direct or indirect relationship with technology development are as follows:

The Ministry of Commerce, Industry and Energy finances capital good prototype development projects based on technologies resulting from the industrial infrastructure technology program or patented technologies, or involving industrial designs. Projects involving technologies and products falling within the category of cutting-edge technologies and products (Ministry of Commerce, Industry and Energy Notice No. 2002-24) are also eligible for financing support under this program. The New Technology Diffusion Program is another such program. Financing is provided toward business startup for commercialization of products developed with government funding support and products having obtained technology certification marks such as NT, EM and KT. The Ministry also has in place a financing program

for projects contributing to companies' integration of e-business in their business processes, as an innovation tools. Many of these projects are related to the promotion of B2B transactions and e-MP, and examples include B2B transaction standardization projects and inter-company networking.

The Ministry of Science and Technology offers R&D loans, funded through its Science and Technology Promotion Fund, as part of the effort to encourage and support research in fundamental science and technology and promising new industrial technology fields. Government-level state R&D projects and companies carrying out projects following up on the latter projects are eligible for this financing program. Having as its goal to expand national knowledge infrastructure in science and technology by financing R&D activities and supporting R&D infrastructure projects, the program is primarily intended to benefit key R&D projects in promising technology fields of national importance and companies carrying out follow-up projects on state-funded research programs, concerning both fundamental research and new technology research programs.

The most important vehicle operated by the Ministry of Information and Communication to finance business incubation in technology fields is the Information and Communications Promotion Fund. Long-term loans at low interest rates are issued to companies engaged in multimedia, telecommunications, semiconductor and information security businesses who are embarking on an information technology

development project to boost their R&D capabilities. Eligible projects must be furthermore deemed to have a potential to contribute to the advancement of the information and communications industry and its state of technology. The Home Network Infrastructure Support program is another program of this type. Under this program, loans are extended to telecommunications companies, construction companies, broadcasters and consumer electronics manufacturers involved in projects to implement home network-related infrastructure or develop digital home services.

The Small and Medium Business Administration offers long-term, low-interest loans toward the cost of business development on patented technologies held by small and medium-size companies. This program to assist SMEs in commercializing quality technologies provides financing to business projects by companies selected as "Inno-Biz," possessing patents or utility model rights, awarded since three years or less, or planning to develop a business on technologies transferred from Korean and overseas universities or research institutions over the last three years. Loans are issued toward the cost of setting up facilities and equipment for manufacturing, testing, cost of purchasing raw materials and parts and market development-related costs.

(4) Technical Support and Training

Twelve local Small and Medium Business Administration and branches provide technical support and training to SMEs based in their

respective regions to deliver rapid solutions to issues encountered during the production process and help them strengthen their technological competitiveness. Specialists from local universities and research institutions are dispatched to company premises to assist in resolving technical issues and provide training.

Under the Triangle of Technology Assistance for SMEs (TRITAS) program, a team of university faculties and students (usually a 2-3 member team) pays house calls to SMEs located in the community, needing technical support. An opportunity to train with university professors qualified in relevant technology fields, this program also affords students a chance to observe actual production sites and meet with prospective employers.

The industry-academia-research joint technology consortium program is designed to give SMEs access to technically-qualified manpower from universities and research institutes and technology development resources these institutions possess. Currently, industry-university technology development systems are in place across regions of Korea, funded jointly by the central government and local municipalities through a matching funds program.

The Ministry of Science and Technology operates a technical support program effectively linking R&D capabilities of universities with R&D resources of industry. This program is also aimed at promoting practical cooperation between industry and universities and stimulating R&D activities in universities.

Other technical support and training mechanisms include the program by the Ministry of Information and Communication to assist IT venture firms with technical and management issues, and the Regional Innovation Manpower Development Program by the Ministry of Commerce, Industry and Energy which serves as an instrument to deliver technical assistance to companies located outside the capital area as well as foster quality human resources through R&D subsidies issued to postgraduate researchers at local universities.

2) Marketing Support System

(1) Support for Industry and Technology Exhibitions

The Small and Medium Business Administration sponsors exhibition activities by SMEs and SME associations in an effort to afford them marketing opportunities and help expand their sales channels. Funding is provided toward the cost of inviting overseas buyers, renting exhibition facilities and booths and advertising expenses.

Under the SME Trade Promotion Team program, the Small and Medium Business Administration contributes toward the costs of booth rental (up to 2 booths) and setup (up to 50% of the booth rental charge), incurred by SMEs participating in exhibitions and fairs hosted overseas. SMEs participating as members of the market development team are remunerated for hours spent on consultation fees, and reimbursed for facility rental charges. To assist exporting firms with marketing, the Small and Medium Business Administration offers overseas

marketing services (EC21, ecpalaza).

KOTRA regularly invites overseas buyers and arranges meetings with exporting firms, and dispatches overseas market development teams in collaboration with its trade centers around the world. KOTRA also uses its global network of trade centers to provide support to Korean companies wishing to participate in overseas trade exhibitions and fairs.

Meanwhile, the Ministry of Foreign Affairs and Trade, in cooperation with economic associations and local municipalities, dispatch market development teams and trade delegations to locations around the world. As for the Ministry of Culture and Tourism, it sponsors the full cost of participation in overseas exhibitions by companies in sports-related businesses, including booth rental and setup costs, and one-way transportation costs. The Korea Federation of Small and Medium Business (Kbiz) dispatches market development teams to prospective foreign markets and contributes toward the cost of SMEs' group participation in overseas exhibitions, including costs for renting booths and advertising material-related expenses.

Exhibition-related industry support activities by KOTRA include dispatching trade and investment delegations, sponsoring and assisting Korean companies' participation in overseas exhibitions, and hosting Korean product exhibitions/ buyer meetings. Finally, support programs available at most of local municipalities, operated usually in collaboration with techno parks, providing financial and logistic assistance to market development teams and exhibition

activities in Korea and abroad, by community-based companies.

(2) Export Publicity Support

The Small and Medium Business Administration offers export management services to Korean companies without previous export experience. Trained specialists from export management companies (EMC) with expertise on key export destinations or product groups are enlisted to complete export procedures for companies as well as walk them through the process so that they learn related requirements and become familiarized with the ins and outs of this process. the export process

To help SMEs harness the internet for overseas marketing, the Small Business Corporation assists them with the creation of foreign-language websites and e-catalogues. Related services are provided through its online portal, 'Internet SME Center.'

The Small Business Corporation also offer assistance with SMEs and venture firms' plan to foray into overseas markets. Some 170 companies deemed to have a strong potential to successfully market their products overseas are paired with an 'overseas support center,' chosen among private-sector organizations located in corresponding export destinations, capable of assisting them with their export needs.

KOTRA has in place a large array of export support programs, and the following are some of the examples:

The Overseas Branch Program by KOTRA is a marketing support program in which its trade

centers in various regions of the world play the role of an overseas branch for a SME. These trade centers perform market research for the company and search for potential trading partners to help them develop an export channel. The range of services include gather market information and identifying potential buyers, arrange meetings with the buyers and practical assistance for SME staff traveling to the trade center, such as making hotel reservations and booking trips.

KOTRA also operates logistics centers for shared use among Korean companies and offers e-trade support services (support for participation in B2B e-Trade). Its SME export support team composed of trade experts helps SMEs follow up on exports negotiations to lead the initial contact with a buyer to an actual deal.

The Ministry of Finance and Economy publishes information brochures on trade barriers and trade environments worldwide, and its overseas offices offer online business services. KITA, meanwhile, has a trade financing program and provide various types of trade assistance through its Trade Service Discount Club and e-Trade Corporation. Finally, the Korea Export and Import Insurance Corporation performs credit checks on overseas importers and credit collection services on behalf of Korean exporters.

(3) Trade, Marketing and Education Support

To meet the need for trained export specialists among SMEs, the Small and Medium Business Administration regularly sends a group of current or prospective employees of SMEs to

KOTRA's overseas trade centers to participate in overseas market development activities as trainees. Trainees undergo a 6-week trade training program paid by the Small and Medium Business Administration, and another 4-week training session to acquire practical trade knowledge before participating in a 3 to 6-month on-the-job training program at KOTRA's overseas trade centers. Expenses during overseas training are partially covered by the Small and Medium Business Administration.

In the context of a program to incubate new export firms by the Small and Medium Business Administration, the Small Business Human Resource Development Center offers a course on practical trade knowledge and skills and trade courses for CEOs. Staff of all SMEs whose export value is less than US\$ 100,000 based on the previous year's performance are required to attend the practical trade knowledge course. The CEO trade course focuses on export marketing strategies. The Small Business Human Resource Development Center also invites foreign experts to speak on international trade environments, offers local training to overseas-dispatched government officials and SME employees, and provides courses on the government trade policy to relevant officials.

Other trade and education support programs include trade conferences hosted by KITA which also offers courses on how to cut trade costs and conducts overseas marketing campaigns. Finally, the international business program by KOTRA trains international business experts. Subjects covered under this program, harnessing its far-

reaching global network and strong expertise on trade and investment for the benefit of training and education, ranges from overseas marketing and international business to FDI inducement and customized outsourcing.

2. Existing Literature

1) Previous Studies on Funding Support for Technology Development

Seoh, S. H. (1998) investigated, in a study in the context of a research project sponsored by the Institute for Industrial Policy Studies, the evolution of industrial infrastructure technology development projects in Korea, assessing also the technical achievements and economic contributions by these projects. A comprehensive analysis of the effect of government technology development support programs, the study identifies issues and shortcomings in these programs and point out future directions for improving their effectiveness.

The study found that the most important factors for the successful outcome of these programs at a technical level as well as commercial level were access to and use of technology information, good timing of technology development, R&D progress management, and having pre-determined marketing channels. The study also reports that the odds for commercial success were greater for technology-intensive programs involving a large number of research staff with a shorter project period.

In another study, this time for a research

project sponsored by the Korea Institute of Industrial Technology Evaluation and Planning (ITEP), Seoh, S. H. (2000) assessed the effectiveness of the technology innovation and development program by the Small and Medium Business Administration, identifying also key factors influencing the project's outcome. The study also pointed out areas needing improvement in this program both at a strategic level and management level and proposed directions for future projects. The study evaluates the results of this project by the Small and Medium Business Administration in terms of contributions at a technical, commercial and other level, and at the level of technology management and R&D performance. Factors most significantly influencing the project's effectiveness at a technical and commercial level, the study reports, were marketing capabilities, technical planning and management strategy. Factors related to the management of R&D such as the timeliness of the research program, progress management and the appropriateness of human resources were also cited among important determinants.

In a report titled "The Achievements and Tasks of The Technology Innovation and Development Program," submitted to the Industry, Commerce and Energy Committee of the National Assembly, Kang, I. G. (2004) argued that to ensure the success of future projects of this type, a number of policy and institutional-level improvements must be introduced. These improvements included a more thorough pre-project planning process, fairer distribution of

funding support, comprehensive national-level assessment of the results of a project and the creation of a coherent technology evaluation system and technology marketing system to facilitate and support the transfer and industrial application of technology. His assessment of the project, key success factors and shortcomings was accompanied by an overview of support programs currently available for SMEs and ventures, the level of satisfaction about the support programs.

Kim, W. G. (2007) estimated the relationship between labor productivity and R&D intensity, using a fixed effects model with data of 18 industries and yearly panel data between 1993 and 2005. His analysis found that the total R&D intensity from two years ago had a statistically significant positive effect on the current rate of increase in labor productivity. The study also found that the government's current R&D support intensity has a significant positive effect on the current R&D intensity of the private sector and its future R&D intensity in four and six years time from now. Meanwhile, the current corporate R&D intensity, according to the same study, has a positive effect on the rate of employment growth in seven years time from now.

The Korea Core Industrial Technology Investment Association (KITIA) investigated the effect of government R&D funding support, provided through matching grant-style programs linked to private investment, on the performance of companies developing parts and materials who were selected to be recipients of such support between 2000 and 2006. The

performance of funding recipients was evaluated through their growth indicators (growth in sales, total assets, and corporate value), profitability (operating income-to-sales ratio, income before taxes-to-sales ratio, and return on equity), and stability (current ratio, debt ratio, loan reliance and interest coverage ratio). A comparison of companies having received from government R&D funding support with parts and materials firms and other general small and medium-size manufacturing firms that had not received such support revealed that the former performed better than the latter based on most indicators, with a particularly large gap observed in favor of the former, in terms of sales growth, asset growth and corporate value enhancement.

Song, H. J. et al. (2006) compared SMEs receiving funding support from government with those that are not to determine whether government funding support contributed to SMEs' performance. The study found no difference between the two in terms of net income growth during the first year of funding receipt, but observed an improvement in favor of the former in the following year. Meanwhile, when the funding recipients were divided into two groups by debt ratio, government funding support had a positive performance effect only on SMEs with high debt ratios, and not those with low debt ratios. The result was unchanged even when the debt ratio was set to 100% or the growth in income before taxes was set as the dependent variable. The study, further, found that the larger the size of funding to a SME with a high debt ratio, the greater performance effects,

suggesting that an increase in the size of funding could further increase the effectiveness of the support program.

Funding through support programs of this kind is distinct from funding through capital increase (an option available to SMEs listed on the KOSDAQ) or the issuance of corporate bonds, as they are most often a combination of loans and grants offered in highly advantageous conditions. Gwak, S. G. and Song, H. J. (2003) examined the characteristics of SMEs receiving government funding support and how they influence performance among these firms. More specifically, the study analyzed the relationship between profitability growth among SMEs and venture firms and their level of reliance on government funding, to determine whether government support had a positive performance effect. The study found that companies with high debt ratios (debt ratios calculated without taking into account government provided funds) and smaller assets depended more greatly on government funding support. By company type, SMEs and venture firms generally depended more on government funding support than others. Finally, the analysis found no measurable influence of government funding support on the performance of SMEs and venture firms; a result contradicting initial expectations.

Kim, H. U. (2004), in his study on the effect of governing funding support on the performance of SMEs, criticized the existing literature, saying that most of previous studies on this subject focused more on strategies on how to improve funding programs than measuring the actual

effectiveness of existing programs, and that their evaluations of the effectiveness of funding programs were at best general, as they relied on macroeconomic aggregate indicators. He, therefore, pointed out the need for evaluating the effectiveness of a funding support program based on more specific evidence, in other words, using concrete data of individual companies receiving funding assistance. His analysis, using Ashenfelter's (1978) model, found that there was no real difference in terms of operating profit between companies that were beneficiaries of government funding and those that were not, although in some rare cases, government funding produced adverse effects on the operating profit of beneficiary firms. This study also reported that government fund support proved particularly ineffective, when provided to recent startups and young companies.

2) Previous Studies on Marketing Support

Jang, S. J. (2006) compared marketing support programs currently in place to determine which of them are most effective. The study was prompted by the results of a survey of resident firms of BI about their marketing activities and their suggestions for improvement with regard to marketing support programs by government, which pointed to a strong need for a more effective support strategy. Marketing activities conducted by these firms ranged from online marketing through company websites, participating in industry exhibitions and developing proprietary brands to publishing product catalogues, opening sales points in

shopping malls, creating sales brokerage websites and setting up branches (both in Korea and abroad), and entering into joint marketing agreements with other businesses and government agencies. Marketing support programs by government which proved the most effective were marketing training programs, programs sponsoring participation in exhibitions, and programs providing support for designing websites and publishing catalogues, product certification programs and overseas market development support programs. Surveyed companies, therefore, also desired a greater level of support for marketing training, participation in exhibitions, overseas market development, and production certification.

3) Other Studies on Government Support

Ashenfelter (1978) investigated the effect of a job training program by the US government. The research model used in this study has provided a methodological framework for many later studies assessing the micro-effects of government policies. This study evaluated the effectiveness of a job training program conducted by the US government, sometime around 1964 by looking at whether there was any significant difference in wages between workers who had attended the program and workers who had not.

The survey examined the relationship between government support programs and the technology performance of companies receiving government support. Government support programs considered in the scope of this survey include technology development-related tax

breaks, funding support for technology and business development, direct participation in R&D, technical support, supply of technology information, technical manpower support and education and training, product purchase through government procurement programs and marketing support (exhibitions, export publicity, etc.). Indicators chosen for technology

performance of companies were R&D activities (whether or not a company has its own R&D center or a R&D department, and the size of R&D staff and staff turnover), product innovation (frequency of new product/service release), and patent performance.

The existing literature on government support program is summarized in <Table 1> below:

<Table 1> Summary of Previous Studies Investigating the Effectiveness of Government Support Programs

Researcher	Research outline	Research results
Ashenfelter (1978)	<ul style="list-style-type: none"> - Measured the effective of government job training programs by comparing wage increase between workers who had received training and workers who had not 	<ul style="list-style-type: none"> - Provided a basic methodological framework for evaluating the micro-effects of government policies
Seoh, S. H. (1998)	<ul style="list-style-type: none"> - Analyzed the technical and economic contributions of an industrial infrastructure technology development support program - Comprehensively analyzed the effect of technology development support programs in general - Identified issues and shortcoming of the program and proposed improvement measures 	<ul style="list-style-type: none"> - Confirmed the importance of access to and use of technology information, the timing of technology development, adequate management of R&D progress, and well-defined marketing strategy ahead of technology development for successful commercialization
Seoh, S. H. (2000)	<ul style="list-style-type: none"> - Measured the technology development performance of government development projects over a period of three years - Developed an optimal technology models and methods for SMEs - Diagnosed issues in technology development support programs and explored strategies for improvement 	<ul style="list-style-type: none"> - Analyzed performance results in terms of technological, commercial and supplementary contributions and contributions at the levels of technical management and R&D activities - Explained factors influencing technological performance
Gwak, S. G. & Song, H. J. (2003)	<ul style="list-style-type: none"> - Measured companies' efforts toward securing government funding support in terms of their government funding reliance - Examined whether there is a significant relationship between companies' reliance on governing funding support and their financial and performance characteristics (debt ratio calculated without considering government-provided funds, total asset, sales, and R&D expenditures) 	<ul style="list-style-type: none"> - Found no positive relationship between government funding support and performance - Suggested the likelihood that the results were influenced by the method of selecting funding recipients used by government agencies and their follow-up method

Researcher	Research outline	Research results
Kim, H. K. (2004)	<ul style="list-style-type: none"> - Examined whether government funding support reduces the credit risk of SMEs and enhances their performance 	<ul style="list-style-type: none"> - Found no difference in terms of operating profitability between recipients and non-recipients of government funding - Provided evidence that a shift in the government's financial support policy for SMEs is inevitable
Kang, I. G. (2004)	<ul style="list-style-type: none"> - Surveyed the status of support programs for SMEs and venture firms and the level of satisfaction felt by SMEs, and evaluated their effectiveness and identified key factors influencing the effectiveness - Pointed out issues and inefficiencies in support programs and suggested strategies for improvement 	<ul style="list-style-type: none"> - Pointed out the need for a more thorough planning and effective coordination of support programs and customized R&D support tailored to recipients' needs - Argued for the need to shift the focus of support programs from technology development to the diffusion and commercialization of results - Called for a wholesale overhaul of the process of selection, evaluation and management of R&D projects
Science and Technology Policy Research Institute (2005)	<ul style="list-style-type: none"> - Tax breaks on technology development-related costs, support for technology business development (funding support), direct participation in R&D, technical support, supply of technology information, support for technical human resources development, and product purchase through government procurement contracts - Surveyed government marketing support programs (exhibitions, export publicity, etc.) 	<ul style="list-style-type: none"> - Examined the relationship between R&D activities (whether or not a company has its own R&D center or a R&D department, and the size of R&D staff and staff turnover), product innovation (frequency of new product/service release), and patent performance. - Provided pointers for policymaking in technology development (measures to be undertaken to accelerate innovation in the private sector and boost national competitiveness, etc.)
Jang, S. J. (2006)	<ul style="list-style-type: none"> - Technologically competitive companies with a viable business plan move into business incubation centers - SMEs face marketing difficulties due to the low level of market awareness, consumers' skepticism and the lack of a dedicated marketing unit - Pointed out the need to explore measures to help boost marketing activities of BI resident companies 	<ul style="list-style-type: none"> - Confirmed that the main causes of marketing difficulties experienced by SMEs are the lack of funds, manpower and management capabilities. - Argued that more empirical studies should be conducted on BI resident firms - Argued for the need to awaken CEOs of BI resident firms to the importance of marketing
Song, H. J. et al. (2006)	<ul style="list-style-type: none"> - Verified the extent to which governing funding support contributed to SMEs' performance - Compared the performance of recipients and non-recipients of government funding, using growth in net income as the dependent variable 	<ul style="list-style-type: none"> - Found that government funding had the greatest performance effect on SMEs with high debt ratios - The larger the size of funding, the greater the improvement in SME performance - Emphasized the need of selection and concentration in funding support

Researcher	Research outline	Research results
	<ul style="list-style-type: none"> - Pointed out inefficiencies in the government's R&D investment - Examined whether and how different funding support designs and strategies would affect R&D performance 	<ul style="list-style-type: none"> - Analysis used annual R&D expenditures, length of R&D project cycles and years of experience of project leaders as independent variables (input) - Confirmed the significant relationship between dependent variables (output); namely, the research paper index, patent index, education (master's and Ph.D. degree) index, and the network index
Kim, W. G. (2006)	<ul style="list-style-type: none"> - Estimated the relationship between the rate of labor productivity increase and R&D intensity using the fixed effects model 	<ul style="list-style-type: none"> - Confirmed that government R&D support has a positive effect on labor productivity increase and employment growth over a long term
KITIA (2007)	<ul style="list-style-type: none"> - Investigated how government R&D funding support (provided through matching fund programs linked with private-sector contributions) influenced the growth, stability and profitability of parts and materials developers receiving support 	<ul style="list-style-type: none"> - Found that companies receiving R&D funding support performed better than other companies receiving no funding support in terms of sales growth, asset growth and corporate value enhancement

III. Research Model and Hypotheses

1. Research Model

Drawing on previous studies, the following research model was developed to determine how government support programs for SMEs and venture firms influence the growth and development of the e-business industry.

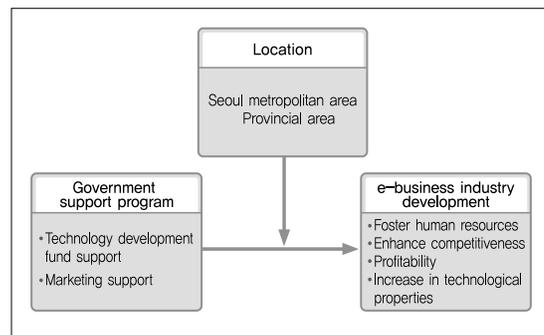
First, we examined the effect of government support programs on the development of the e-business industry.

Second, we verified whether the region in which a company is located can have moderating effects on the relationship between government support programs and the development of the e-business industry.

For the government support program, the most dominant technology development fund

support and marketing support were determined as variables. And, for the development of the e-business industry, its unique elements vis-à-vis those of other industries - namely, the fostering of human resources, competitiveness enhancement, profitability, and increase in technological properties - were determined as variables.

Based on the existing researches examined above, a research model, as shown in <Figure 1>, was established, and the operational definition



<Figure 1> Research model

of the variables and the measurement items were measured on the basis of a 5-point Likert are shown in <Table 2>. All question items scale.

<Table 2> Operational definition of variables and measurement items

Category	Research variables	Operational definition and measurement items	Relevant research
Government support program	Technology development fund support (5 questions)	<p>The entirety of the government's direct and indirect transfer of money in an effort to promote corporate R&D activities</p> <ol style="list-style-type: none"> 1. Degree of support for tax breaks 2. Degree of technology development fund support 3. Degree of business development fund support 4. Degree of participation in R&D projects 5. Degree of technological support and guidance 	<p>STEPI Seo Sang-hyeok Kim Hyeon-uk Gang Il-gu</p>
	Marketing support (3 questions)	<p>An array of governmental programs to cultivate corporate domestic and overseas marketing abilities</p> <ol style="list-style-type: none"> 1. Degree of support for domestic and overseas exhibitions 2. Degree of support for export publicity 3. Degree of support for education on international trade and marketing 	<p>STEPI Jang Seok-ju</p>
Development of the business industry	Fostering of human resources (4 questions)	<p>The qualitative and quantitative enhancement of corporate staff due to the government support program</p> <ol style="list-style-type: none"> 1. Degree of increase in the number of papers 2. Degree of contribution to the fostering of human resources 3. Degree of increase in the number of research personnel 4. Degree of increase in the number of overseas marketing personnel 	<p>STEPI Hong Sa-gyun Jang Seok-ju Gang Il-gu</p>
	Enhance competitiveness (3 questions)	<p>The entirety of the enhancement of real corporate capability, potential capability and external capability on the basis of the government support program and the fostered human resources</p> <ol style="list-style-type: none"> 1. Degree of increase in the number of products launched over the last three years 2. Degree of contribution to the structuring of human networks 3. Degree of contribution to innovation 	<p>STEPI Seo Sang-hyeok Hong Sa-gyun</p>

Category	Research variables	Operational definition and measurement items	Relevant research
Development of the business industry	Profitability (4 questions)	An increase in various management indices accompanied by technological development and enhanced marketing capability over the last three years thanks to the government support program Increase in indices	STEPI Jang Seok-ju Seo Sang-hyeok Gang Il-gu
		<ol style="list-style-type: none"> 1. Degree of increase in export value over the last three years 2. Degree of increase in net profit over the last three years 3. Degree of increase in workforce over the last three years 	
Development of the business industry	Increase in technological properties (2 questions)	Laying the foundations for marketing by ensuring the security of developed technologies, and of technological superiority, stability and reliability, and by boosting the corresponding corporate image and external credit	STEPI Jang Seok-ju Hong Sa-gyun
		<ol style="list-style-type: none"> 1. Degree of increase in intellectual properties over the last three years 2. Domestic and overseas accreditation marks and certifications over the last three years 3. Degree of increase in award-winning achievements over the last three years 	

2. Research Hypothesizing

1) Government support and development of the e-business industry

Hong Sa-gyun et al. (2006) examined and confirmed a significant correlation between annual research costs, research institutes, the degree of a manager's experience, the paper index, and the education (Master's degree and Ph.D.) index. As mentioned in the government support system, the government and the relevant institutes implement various direct or indirect systems in an effort to motivate corporations to develop technologies. Accordingly, the recipients of such support are provided sufficient time and funding to produce output. Specifically, they will publish papers on the output of development,

their research personnel earn Master's and Ph.D degrees to achieve self-development, and in this process, the number of corporate research personnel will increase. Thus, this study hypothesized the following research propositions.

Hypothesis 1: The government support program will have positive (+) effects on the fostering of human resources.

Hypothesis 1.1: The technology development fund will have positive (+) effects on the fostering of human resources.

Jang Seok-ju (2006) found that, with regard to points of improvement aimed at facilitating marketing, corporations very much want to participate in exhibitions, expand their marketing personnel, and take marketing courses. As reviewed in the government support

program, the government and the relevant institutes implement diverse programs such as support for domestic and overseas exhibitions, support for export publicity, and support for international trade and marketing in an effort to enhance corporate marketing capabilities. This support will help corporations to educate their marketing personnel, to increase their overseas marketing personnel, and eventually to foster experts. Thus, this study hypothesized the following research propositions.

Hypothesis 1.2: Market support will have positive (+) effects on the fostering of human resources.

Generally, the government's technology development fund support is provided in the mid and long term or in the long term at low interest rates. Recipients of such support should thus have the time and funding to establish a positive cycle involving: "introduction of a new concept – development of new technology – launching of a new product – introduction of an upgraded concept" (this process is referred to as innovation). Hong Sa-gyun et al. (2006) proved that as corporations perform the government-supported technology development, they are able to form human research networks. Assuming that these factors work together to boost corporate competitiveness, this study hypothesized the following propositions:

Hypothesis 2: The government support program will have positive (+) effects on

boosting competitiveness.

Hypothesis 2.1: The technology development fund support will have positive (+) effects on boosting competitiveness.

It is essential to establish marketing human networks in order to ensure penetration of a new market by a new technology based on a new concept. Corporations can achieve innovation only by penetrating new markets, and through an array of this process can enhance their competitiveness. The government and the relevant institutes, such as KOTRA, SMBA, and SBC, continue to implement the policy to help structure the domestic and overseas markets for SMEs and venture firms – their biggest weakness – and explore new markets. They offer education on trade and marketing to cultivate the capabilities of marketing personnel, support their participation in domestic and overseas exhibitions, and thus facilitate the establishment of domestic and overseas marketing foundations, i.e., human networks of sales agencies and agents. Furthermore, they, in consideration of the peculiarity of overseas marketing, support export publicity activities directly and indirectly. Presuming that this support is crucial for enhancing corporate competitiveness, this study hypothesized the following propositions:

Hypothesis 2.2: Marketing support will have positive (+) effects on enhancing competitiveness.

KITIA (2007) examined the profitability,

growth and stability of the recipients of the government technology development fund, thereby proving that they are superior to non-recipients in these fields. The government's technology development fund support will increase export value – items of profitability – through the indirect assistance of fostering human resources and enhancing competitiveness, and raise the number of research personnel and marketing personnel accordingly, in a process that will in turn increase net profits. Also, with regard to the government's technology development fund investment, corporations can have such funds accounted as deferred assets if they are spent exclusively as R&D costs, and they can receive long-term, low-interest loans, thereby reducing their non-operating costs and increasing their net profits. Thus, this study hypothesized the following propositions:

Hypothesis 3: The government support program will have positive effects (+) on profitability.

Hypothesis 3.1: The technology development fund support will have positive effects (+) on profitability.

The government and the relevant institutes conduct diverse marketing support programs in an effort to foster domestic and overseas marketing personnel. This will establish corporate marketing human networks, while innovation efforts will drive the launching of new products: this in turn will increase sales, export value and workforce, and eventually profitability. Also, in the event the program covers some of the costs of domestic and

overseas exhibitions and export publicity, and offers free education on trade and marketing or covers a portion of such costs, this will reduce administrative costs of corporate sales, thereby increasing net profits. Thus, this study hypothesized the following propositions:

Hypothesis 3.2: Marketing support will have positive effects (+) on profitability.

STEPI (2005), in a technological innovation survey, examined the relationship between the technology development fund support (tax breaks on technology development, fund support for technology development, and development of the results into a business, the government's participation in R&D projects, the government's guidance on and support for technology, and the government's provision of technological information], the degree of filing applications for intellectual properties, and the acquisition of new technology certification marks. Hong Sa-gyun et al. (2006) examined and confirmed a significant correlation between research costs, research periods, the manager's experience, and the patent index. The government's technology development fund support will promote corporate innovation efforts and the development of new technologies, and corporations will file applications for intellectual properties such as patents and utility models in an effort to ensure the security of such developed technologies. Also, corporations will endeavor to earn certification marks (KT, NT, EM, etc.) for various superior technologies and new technologies to promote their superiority, and the government and the relevant institutes

will present diverse awards to these superior intellectual properties and new technologies. Thus, this study hypothesized the following propositions:

Hypothesis 4: The government support program will have positive (+) effects on increasing technological properties.

Hypothesis 4.1: The technology development fund support will have positive (+) effects on increasing technological properties.

Jang Seok-ju (2006) surveyed the corporate requirements for export marketing support and points of improvement for marketing promotion, and thus confirmed that a large number of corporations call for support for product authorization and overseas market exploration. STEPI surveyed the status of corporate technological innovation to determine the relationship between the government support efforts (marketing support for exhibitions and export publicity, and support for technical personnel and education and training), the degree of filing applications for intellectual properties, and the acquisition of safety and quality marks, and overseas export marks.

The government's marketing support program will promote corporate innovation efforts and the launching of new products. Corporations will file applications for intellectual properties such as design rights and trademark rights to protect new products; they will also earn safety marks (EMI) to secure the safety of such products, and obtain publicly certified marks to secure the reliability of such products. They will further earn various nations' export certification marks

(CE, UL, CCC, etc.) in order to export their products overseas. The government and the relevant institutes will present diverse awards to corporations which have superior intellectual properties and are superior exporters. Thus, this study hypothesized the following proposition:

Hypothesis 4.2: Marketing support will have positive effects (+) on increasing technological properties.

2) Location's moderating effects

Generally, the Seoul metropolitan area has a vast number of superior personnel along with well-established infrastructures and economic power.

Therefore, corporations in the Seoul metropolitan area, compared with those located in provincial areas, can easily secure superior personnel, utilize the ample infrastructures, and enjoy greater ease in raising funds and entering the markets, thereby giving them competitive superiority.

The e-business industry is not markedly different from other industries in terms of the securing of manpower and competitiveness. That being the case, in the event the government provides the same support to corporations located in provincial areas and to those located in the Seoul metropolitan area, the latter will utilize the superior manpower, ample infrastructures, and greater economic power, and secure absolute competitive superiority over the former. Given that corporations based in the Seoul metropolitan area will also remarkably increase their technological properties and profitability,

compared with those located in provincial areas, the study hypothesized the following propositions:

Hypothesis 5: The effects of the government's support program on the development of the e-business industry will differ according to corporate location.

Hypothesis 5.1: The effects of the technology development fund support on the development of the e-business industry will differ according to corporate location.

Hypothesis 5.2: The effects of the marketing support on the development of the e-business industry will differ according to

corporate location.

IV. Results of Empirical Analysis and Discussion

1. Characteristics of Research Sampling

1) Sample selection and data collection

We used questionnaires when surveying the SMEs and venture firms which received the governmental support. Between October 5, 2007 and November 5, 2007, we surveyed members of KITIA online, members of the IT SoC Association

<Table 3> Characteristics of the respondents

Category		Frequency (%)
Gender	Males	103 (91.2%)
	Females	10 (8.8%)
Age (years)	20 – 29	3 (2.7%)
	30 – 39	35 (31%)
	40 – 49	54 (47.8%)
	50 or over	21 (18.6%)
Education	High school or under	3 (2.7%)
	Junior college (attending)	9 (8%)
	University (attending)	55 (48.7%)
	Graduate school (attending)	46 (40.7%)
Job	R&D	35 (31%)
	Administration	70 (61.9%)
	Sales	1 (0.9%)
	Production	1 (0.9%)
	Others	6 (5.3%)
Position	Employees	2 (1.8%)
	Assistant Managers	12 (10.6%)
	Managers	11 (9.7%)
	Deputy General Managers	10 (8.8%)
	General Managers	9 (8%)
	Executives	32 (28.3%)
	CEOs	37 (32.7%)

<Table 4> Characteristics of the sampled corporations

Category		Frequency (%)
Field	Internet	10 (8.8%)
	Mobile	9 (8.0%)
	Structuring infrastructure	4 (3.5%)
	IT SoC	22 (19.5%)
	IT manufacturing	24 (21.2%)
	Semiconductors	8 (7.1%)
	Others	37 (31.9%)
Location	Seoul metropolitan area	59 (52.2%)
	Provincial areas	54 (47.8%)

and of the Daegu and Gyeongbuk Development Council via e-mail, and clients of various banks offline. We collected 250 answered copies of the questionnaire, from which we removed any copies from corporations not related to the e-business along with other disqualified copies, leaving a final 113 effective copies.

Specifically, we surveyed the CEOs and other high-ranking officials of corporations who could provide responsible answers and better know their organizations in an effort to effectively examine the effects of the government support program on the development of the e-business industry.

2) Characteristics of the sample

The characteristics of the respondents and the sampled corporations are outlined in <Table 3> and <Table 4>. By gender, males numbered 103 (91.2%), representing the majority of the respondents, with the largest number of respondents, 54 (48.8%), aged 40 to 49 years. By education, there were 55 university graduates (48.7%) and 40 graduate school graduates

(40.7%), representing most of the respondents. Also, by job, the largest number of respondents, i.e. 70 (61.9%), was engaged in administrative jobs, while R&D personnel accounted for 35 (31%). By position, CEOs numbered 37 (32.7%), representing the largest portion, and executives totaled 32 (28.3%), followed by assistant managers and deputy general managers.

With regard to the characteristics of the sampled corporations, IT manufacturing companies constituted the largest number at 24 (21.2%), and IT SoC companies numbered 22 (19.5%), together representing the largest portion.

The companies located in the Seoul metropolitan areas numbered 59 (52.2%), while those in provincial areas numbered 54 (47.8%).

2. Analysis of the Reliability and Validity of the Measurement Tool

1) Verification of the reliability of the measurement tool

Reliability means the dispersion of measurements which result from a repeated measurement of the

same concept. Reliability was verified using the Cronbach alpha analysis.

The results of the reliability test (see <Table 5>) indicated that the Cronbach alpha value of all the research variables ranged from 0.6 to above 0.8, showing a good degree of reliability. This means that items for measuring each variable can be grouped under a homogeneous category.

2) Verification of the validity of the measurement tool

Validity refers to whether or not the measurement tool concerned actually performs its intended measurement. As such, to test the validity of questionnaire surveys in social science survey and research means testing the construct validity, which is tested through a factor analysis.

A factor analysis was conducted to test the

validity of the measurement tool, the major factor analysis was selected, and, for the factor rotation, the Varimax rotation was selected from among the orthogonal rotation methods. Finally, factor numbers with an eigenvalue over 1 were selected. The commonality of each item – i.e. the correlation between items for measuring a variable – when they are over 0.5 is deemed to be significant, and this study conducted a factor analysis of the independent variables and the dependent variables.

For the factor analysis of the independent variables, “the three technology development items” whose factor loadings were lower than the base 0.5 were removed, and then a factor analysis was conducted; the factors whose variables’ commonality index was over 0.5 and whose eigenvalue was over 1 were determined, as shown in <Table 6>.

<Table 5> Results of the reliability test

Research variables		No. of items	Alpha coefficient
Governmental support	Technology development fund support	5	.765
	Marketing support	3	.776
e-business Industrial development	Foster human resources	4	.764
	Enhance competitiveness	3	.752
	Profitability	4	.864
	Increase technological properties	3	.673

<Table 6> Factor analysis of the independent factors

	Components	
	1	2
Technology development 2	.859	.091
Technology development 4	.842	.068
Technology development 1	.725	.286
Technology development 5	.582	.204
Marketing 2	.164	.890
Marketing 3	.227	.841
Marketing 1	.106	.690

As a result of the factor analysis of the dependent variables, competitiveness 1 whose factor loadings were lower than 0.5 was removed, and factors whose variables' commonality index was over 0.5 and whose eigenvalue was over 1 were determined, as shown in <Table 7>.

As a result of the analysis, six items relating to the enhancing of competitiveness and the fostering of human resources had a loading of over 1 per factor. This result suggests that items for measuring the enhancement of competitiveness and the fostering of human resources actually measure not different contents but the same contents. Thus, these two variables were incorporated into a single variable of competitiveness enhancement¹⁾.

3. Analysis of Correlation between Variables

In an effort to determine the correlation between research variables whose reliability and validity were confirmed as above, the Pearson correlation analysis was conducted. Generally, if the absolute value is over 0.6, this indicates the presence of a correlation (Jeong Chung-yeong, 2001); as shown in <Table 8>, which reflects the analysis results, the correlation between all variables was found to be low, except in the case of the correlation between profitability and competitiveness enhancement which, at 0.631, represented a positive correlation, as in the existing researches.

However, if the correlation coefficient of variables is over 0.8, and the VIF is greater than

<Table 7> Factor analysis of the dependent variables

	Components		
	1	2	3
Competitiveness enhancement 2	.805	.079	.311
Fostering human resources 2	.759	.255	.256
Competitiveness enhancement 3	.736	.297	.228
Fostering human resources 1	.672	.082	-.078
Fostering human resources 3	.643	.459	.107
Fostering human resources 4	.539	.233	.425
Profitability 4	.181	.830	.124
Profitability 3	.146	.827	.183
Profitability 1	.262	.826	.206
Profitability 2	.421	.576	.437
Technological properties 2	.061	.083	.847
Technological properties 1	.140	.191	.732
Technological properties 3	.225	.218	.611

1) After fostering human resources and competitiveness enhancement were integrated, hypothesis 1 and hypothesis 2 were integrated into hypothesis 1.

<Table 8> Correlation between the research variables

Variables		Technology development Fund	Marketing	Competitiveness	Profitability	Technological properties
Independent variables	Technology development fund	1				
	Marketing	.395	1			
Dependent variables	Competitiveness enhancement	.574	.447	1		
	Profitability	.498	.255	.631	1	
	Increase in technological properties	.292	.395	.499	.510	1

<Table 9> Results of the multiple regression analysis of the relationship between the government support program and the development of the e-business industry

Dependent variables	Regression model adequacy			Regression coefficient			Hypothesis adoption
	R	R ²	F value (Significance)	Independent variables	Beta	t value (Significance)	
Competitiveness enhancement	.617	.380	32.195 (.000)	Technology development fund support	.475	5.662 (.000***)	Adopted
				Marketing support	.245	2.919 (.004**)	Adopted
Profitability	.499	.249	11.962 (.000)	Technology development fund support	.483	5.267 (.000***)	Adopted
				Marketing support	.039	.428 (.670)	Dismissed
Increase in technological properties	.396	.157	9.932 (.000)	Technology development fund support	.182	1.893 (.061*)	Adopted
				Marketing support	.289	3.010 (.003**)	Adopted

*: p<0.1 **p<0.05 ***p<0.01

10, multicollinearity between variables can occur; but since the correlation coefficient of each variable in this study is under 0.8, multicollinearity does not occur, and a multivariate analysis can be conducted.

4. Verification of the Hypotheses

1) Verification of hypotheses 1, 2, and 3

A multiple regression analysis was conducted to verify the hypotheses on the relationship

between the government support program and the development of the e-business industry, the results of which are shown in <Table 9>. Hypothesis 1 on the relationship between the government support program and the competitiveness enhancement was tested; all variables were found to have positive effects on competitiveness enhancement, and thus hypotheses 1.1 and 1.2 were adopted.

Hypothesis 2 on the relationship between the government support program and profitability was tested; the technology development fund support was found to have positive effects on profitability; and thus hypothesis 2.1 was adopted while hypothesis 2.2 was dismissed.

Hypothesis 3 on the relationship between the government support program and an increase in technological properties was tested; technology development support and marketing support were found to have positive effects on an

increase in technological properties, and thus hypothesis 3.1 and hypothesis 3.2 were adopted.

2) Verification of hypothesis 4

A moderated regression analysis was conducted to test the mediating effects of location (Seoul metropolitan area, provincial areas) on the relationship between the government support program and the development of the e-business industry. After location was set as a dummy variable (Seoul metropolitan area=0, provincial area=1), it was established as an interaction term with the independent variable, i.e. government-supported industry, and was included in the regression analysis to test hypothesis 4. As a result, the moderating effects of location were found to be statistically insignificant at the significance level of 5 of all interaction terms; therefore, hypothesis 4 was dismissed (see <Table 10>, <Table 11>, <Table 12>). Thus, there

<Table 10> Testing of the moderating effects of location on the relationship between the government support program and competitiveness enhancement

Dependent variables	Regression model adequacy			Regression coefficient		
	R	R ²	F value (Significance)	Independent variables	Beta	t value (Significance)
Model 1	.617	.380	32.195 (.000)	Technology development	.475	5.662(.000)
				Marketing	.245	2.919(.004)
Model 2	.631	.398	17.026 (.000)	Technology development	.360	3.185(.000)
				Marketing	.333	3.416(.005)
				Technology development *Location	-.020	1.610(.111)
				Marketing *Location	-.072	-.1747(.389)

*: p<0.1 **:p<0.05 ***:p<0.01

<Table 11> Testing of the moderating effects of location on the relationship between the government support program and profitability

Dependent variables	Regression model adequacy			Regression coefficient		
	R	R ²	F value (Significance)	Independent variables	Beta	t value (Significance)
Model 1	.499	.249	17.6195 (.000)	Technology development	.498	5.943(.000)
				Marketing	.039	0.428(.670)
Model 2	.510	.260	9.133 (.000)	Technology development	.463	5.378(.000)
				Marketing	.035	.374(.709)
				Technology development *Location	.047	.252(.801)
				Marketing *Location	-.024	-.164(.870)

*, p<0.1 **;p<0.05 ***;p<0.01

<Table 12> Testing of the moderating effects of location on the relationship between the government support program and an increase in technological properties

Dependent variables	Regression model adequacy			Regression coefficient		
	R	R ²	F value (Significance)	Independent variables	Beta	t value (Significance)
Model 1	.396	.157	9.932 (.000)	Technology development	.182	1.893(.061)
				Marketing	.358	3.987(.000)
Model 2	.456	.208	6.879 (.000)	Technology development	.182	1.893(.061)
				Marketing	.516	6.390(.000)
				Technology development *Location	.176	1.249(.169)
				Marketing *Location	.103	1.111(.269)

*, p<0.1 **;p<0.05 ***;p<0.01

were no moderating effects between the government support program and the e-business industry development according to location.

5. Interpretation and Discussion of the Results of Hypothesis Verification

The analysis of the results of the testing of the above hypotheses is outlined as follows.

Hypotheses 1, 2 and 3 on the direct relationship between the government support program and the development of the e-business industry were tested, and all hypotheses except hypothesis 2.2 were adopted. Thus, it is concluded that the technology development fund support can have positive effects on certain aspects of the development of the e-business industry, namely competitiveness enhancement, profitability, and an increase in technological properties, while it is concluded that marketing support can have positive effects on competitiveness enhancement and an increase in technological properties, but not on profitability.

These results raise the following implications.

First, the technology fund support can be provided either directly, both through the government's direct investment of huge amounts of money in corporations and the extension of long-term low-interest loans, or indirectly, through tax breaks and the free provision of technological guidance without offering money. Such direct and indirect support is deemed to motivate corporations to make R&D efforts, thereby having a direct effect on competitiveness enhancement and on the

increase in technological properties. Also, if the supported technology development fund is counted as R&D costs, pilot product manufacturing costs, and materials and equipment purchasing costs, it is accounted for as a deferred asset, thereby having direct effects on the beneficiaries' profitability. Also, loans are extended in the long term with low interest rates, thereby reducing non-operating costs and directly influencing the improvement of profitability.

Second, marketing support constitutes the provision of a small amount of money, such as participation fees for domestic and overseas exhibitions, free interpretation and translation, costs for overseas publicity, production costs for English catalogues, free education about trade and marketing, and the provision of such costs. Although marketing aims to increase sales and profitability, support for participation in domestic and overseas exhibition is, in many cases, provided by the government due to its policy rather than requested by corporations, sometimes making it inefficient and wasteful; thus, it may enhance bolster competitiveness and bolster technological properties in the short term, but does not have any direct effects on profitability.

Hypothesis 4 on the moderating effects of location on the relationship between the government support program and the development of the e-business industry was tested; corporate location was found to have no moderating effects on the relationship between the government support program and the development of the e-business industry.

These results raise the following implications.

Without the provision of government support, there is a possibility that corporations located in the Seoul metropolitan area would nonetheless enjoy greater competitiveness than those located in provincial areas. However, the government's technology development fund support is provided only to R&D-capable corporations which have to pass strict screening criteria, and the marketing support is also provided to promising corporations as its first priority. Beneficiaries located either in the Seoul metropolitan area or in provincial areas are deemed to have identical competitiveness because they have to pass fair and equal criteria.

This study limited itself to e-business-related corporations which received the government support, categorizing them into the Seoul metropolitan area and provincial areas, and thus it is deemed that location did not have any moderating effects on the relationship between the government support program and the development of the e-business industry.

These results raise the following implications.

In the event that corporations located in the Seoul metropolitan area produce greater effects than those in provincial areas, and more favorable treatment is given to the latter, this may create problems in terms of equality and efficiency in providing the support. In light of the findings of this study to the effect that location has no moderating effects on the relationship between the government support program and the development of the e-business industry, the problems of equality and proficiency that have

been raised thus far with regard to the provision of fund support can be addressed. Thus, the government can further expand its regional-specific support to e-business-related corporations located in provincial areas, ensure a balanced development between corporations in the Seoul metropolitan area and provincial corporations, usher in a genuine era of localization, and achieve a balanced development of the national land. The above results of hypotheses testing are summarized in <Table 13>.

V. Conclusion

1. Summary of the Research

This study, targeting Korea's e-business-related SMEs and venture firms, examined the effects of the government support program on the development of the e-business industry, and verified whether the effects of the government support program on the development of the e-business industry differed according to corporate location, i.e., the Seoul metropolitan area and provincial areas.

The findings of the research indicated the following. First, as regards the government support program, the technology development fund support was found to have significant positive effects on all areas including the enhancement of corporate competitiveness, profitability, and increase in technological properties. The technology development fund support — whether direct or indirect — motivated corporations to make R&D efforts,

<Table 13> Comprehensive results of testing of the hypotheses

Principal hypotheses	Hypotheses	Independent variables	Dependent variables	Moderating variables	Results of verification
Hypothesis 1	Hypothesis 1.1	Technology development Fund support	Competitiveness enhancement		Adopted
	Hypothesis 1.2	Marketing support	Competitiveness enhancement		Adopted
Hypothesis 2	Hypothesis 2.1	Technology development Fund support	Profitability		Adopted
	Hypothesis 2.2	Marketing support	Profitability		Dismissed
Hypothesis 3	Hypothesis 3.1	Technology development Fund support	An increase in technological properties		Adopted
	Hypothesis 3.2	Marketing support	An increase in technological properties		Adopted
Hypothesis 4	Hypothesis 4.1	Technology development Fund support	e-business Industry development	Location	Dismissed
	Hypothesis 4.2	Marketing support	e-business Industry development	Location	Dismissed

thereby influencing their competitiveness enhancement, increase in technological properties, and profitability.

Second, as regards the government support program, market support was found to have significant positive effects on corporations' competitiveness enhancement and increase in technological properties, but not on their profitability. From the short-term perspective, the marketing support - although small-scale and

indirect - enhanced corporations' marketing awareness and ability, and thus enhanced their competitiveness and technological properties, but did not have any direct effects on their profitability. This can be interpreted to mean that it may take more time to improve profitability on the basis of enhanced competitiveness and an increase in their technological properties.

Third, there was no difference in the relationship between the government support program and

the development of the e-business industry according to corporate location.

These results suggest that even if more support was provided to e-business-related corporations located in provincial areas, this would have no bearing on cost-efficiency and problems of equality in providing fund support.

2. Implications and Limitations of the Research

This study further developed the existing research model, and thus reestablished independent variables from holistic and macro perspectives, and dependent variables from micro perspectives. The study included all the relevant institutes' diverse technology development fund programs and marketing support programs in the independent variable, namely the government support program, and limited the dependent variable to the e-business industry. In fact, it is the foregoing features which give this study its particularity.

Also, given the characteristics of the IT industry and the e-business industry, such as their rapidly changing speed and their core technologies' importance, the protection, reliability and development speed of the technologies of such industries receive greater emphasis than in other industries. Thus, these points were conceptualized into "technological properties", which was then established as a dependent variable, giving the study a profound meaning.

Despite these theoretical and working implications, the study has several limitations,

outlined below, which it is hoped will be tackled in future research.

First, to measure the development of the e-business industry, we used only qualitative items, but to improve such limitations in any future research, it will be necessary to utilize both qualitative items and quantitative items to objectively examine the development of the e-business industry.

Second, this study targeted only the beneficiaries of the government support program (whether the benefit was big or small), and thus the possibility that the respondents were led into giving affirmative answers cannot be excluded. As such, any future research will be able to produce more accurate results if it includes non-beneficiaries as well.

Third, apart from questionnaire-based surveys, if we had utilized both the government's and the private sector's databases on the government support program, and their databases on industrial trends, we may have produced more objective and precise results.

Fourth, if we were to further segment the e-business sector, and if we then examined the differences in the moderating effects of the government support program on the development of the e-business industry according to such segmented areas, this would be helpful to establishing the government policy.

Fifth, it would be worthwhile to utilize as a mediating variable the frontline industries relating to the e-business industry - such as the IT SoC and IT industry - in an effort to observe via which paths the government support program

has direct and indirect effects on the development of the e-business industry.

Lastly, if new variables such as IT support and education support were added to the independent variables — technology development fund support and marketing support — of the government support program and examined, and if dependent variables — such as technological property - that reflect the major characteristics of the e-business industry, along with their measurement items, were developed and examined, then a more exquisite examination would be produced.

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