A Study on the Selection of Strategic Industry in Gyeonggi Province

Shin-Pyo Kim*

Graduate School of Consulting, Kumoh National Institute of Technology, Korea; kefori@hanmail.net

Abstract

The aim of this study is to find the strategic industries that fulfill the on-site demands of the Gyeonggi province region related to the advancement and development of the local industries. As the results of the analysis, the 6 major strategic industries in the Gyeonggi province region were determined to be: (1) manufacturing of electronic components, computers, visual, acoustic and communication equipment, (2) medical substances and pharmaceutical product manufacturing industry, (3) medical, precision, optical equipment and watch manufacturing industry, (4) robotic industry, (5) new renewable energy industry and (6) compound and chemical product industry.

Keywords: Industries, Input-Output, Region, Strategic

1. Introduction

Domestic Product (GRDP) of Gyeonggi Province accounts for approximately 20% of the entire country.

Gross Regional Domestic Product of Gyeonggi Province in 2012 was 250.8574 Trillion Won, which is 19.7% of the Gross National Domestic Product of Korea at 1,274.9893 Trillion Won, thereby ranked the 2nd in Korea after Seoul.

The GRDP of Gyeonggi Province has been illustrating the trend of continuous increase in terms of the proportion of the GNDP, from 13.8% in 1985 to 17.4% in 1995, 19.5% in 2005 and 19.7% in 2012. The population of Gyeonggi Province is the largest, accounting for 24.9% of the total population of Korea with the total number of businesses in the Province accounting for 20.8% of the total in Korea, which is ranked the 2nd after Seoul.

Examination of the size of the land of Korea in terms of the 17 major cities and the provinces as of the end of 2012 illustrates that Gyeongsangbuk Province has 19.0% of the total land of Korea, followed by Gangwon Province with 16.8%, Jeollanam Province with 12.2%, Gyeongsangnam Province with 10.5% and Gyeonggi Province with 10.2% of the land. In terms of the size of population, Gyeonggi Province is ranked with 23.9% of the total population of Korea, followed by Seoul Metropolitan City with 20.0%, Busan Metropolitan City with 6.9% and Gyeongsangnam Province with 6.5%.

The Seoul Metropolitan City has the largest proportion of the total number of businesses in Korea at 21.7%, followed by Gyeonggi Province with 20.8%.

Described as above, Gyeonggi Province is playing an important role as a capital regional economy in leading the further growth of economy in Korea as well as the responsibilities and expectations to take the leading role in activation of the local economy through the creation of high quality employment opportunities.

Therefore, it has been analyzed that there is an urgent need to consider the specialized industry and strategic industry associated with the growth of the local economy within the Gyeonggi Province in order to strategically cultivate the local industries of the Gyeonggi Province.

Accordingly, this Study is aimed at the deduction of strategic industries related to the cultivation of specialized industry and the progress of the local industry that

*Author for correspondence

| Categories | Land Area | | Number of population, | | Number of establishments | |
|-------------------|------------------------|-------|-------------------------------|-------|---------------------------------|-------|
| | Area(km ²) | % | Proportion (1,000 persons) | % | Establishments (1,000 units) | % |
| Seoul | 605 | 0.6 | 9,976 | 20.0 | 780.9 | 21.7 |
| Busan | 770 | 0.8 | 3,445 | 6.9 | 270.1 | 7.5 |
| Daegu | 884 | 0.9 | 2,475 | 4.9 | 192.6 | 5.3 |
| Incheon | 1,041 | 1.0 | 2,793 | 5.6 | 177.2 | 4.9 |
| Gwangju | 501 | 0.5 | 1,514 | 3.0 | 105.9 | 2.9 |
| Daejeon | 540 | 0.5 | 1,540 | 3.1 | 104.6 | 2.9 |
| Ulsan | 1,060 | 1.1 | 1,116 | 2.2 | 74.6 | 2.1 |
| Gyeonggi-do | 10,172 | 10.2 | 11,937 | 23.9 | 751.1 | 20.8 |
| Gangwon-do | 16,790 | 16.8 | 1,503 | 3.0 | 125.2 | 3.5 |
| Chungcheongbuk-do | 7,406 | 7.4 | 1,551 | 3.1 | 112.7 | 3.1 |
| Chungcheongnam-do | 8,669 | 8.7 | 2,132 | 4.3 | 147.8 | 4.1 |
| Jeollabuk-do | 8,067 | 8.1 | 1,805 | 3.6 | 136 | 3.8 |
| Jeollanam-do | 12,270 | 12.2 | 1,768 | 3.5 | 132.9 | 3.7 |
| Gyeongsangbuk-do | 19,029 | 19.0 | 2,645 | 5.3 | 199.5 | 5.5 |
| Gyeongsangnam-do | 10,535 | 10.5 | 3,247 | 6.5 | 242.1 | 6.7 |
| Jeju-do | 1,849 | 1.8 | 559 | 1.1 | 49.3 | 1.4 |
| Total | 100,188 | 100.0 | 50,004 | 100.0 | 3,602.5 | 100.0 |

 Table 1.
 The current demographics of Gyeonggi Province in 2012

Data: Statistics Korea, Korea Statistical Yearbook, 2013.

comply and fulfil the on-site demands of the Gyeonggi Province.

2. Research Methodology

2.1 Industrial Structure of Gyeonggi Province

ICT manufacturing industry in Gyeonggi Province in 2012 had national market share of 46.1% on the basis of the added value productivity and 50.4% on the basis of the total number of employees, and its proportions in the manufacturing industry of Gyeonggi Province on the basis of the added value productivity and the total number of employees were very high at 41.5% and 19.3%, respectively.

In the category of the added value productivity for the manufacturing industries of Gyeonggi Province, the areas of ICT manufacturing industry such as semiconductor (24.6%), electronic components (7.7%) and communication and broadcasting equipment (7.3%) were ranked the top 1st to 3rd. The total proportion of these 3 areas increased from 24.3% in 2002 to 39.6% in 2012.

6 ICT related items are included in the 10 major export items of Gyeonggi Province, and the proportion of the value of the exports of ICT related items among the total export volume of the Gyeonggi Province as of the end of 2013 was 39.9%.

The areas of businesses including medical and precision equipment, and ICT manufacturing are displaying the fastest growth in the manufacturing sector of Gyeonggi Province, while the areas of health, social welfare and business services are showing rapid growth in the service sector of Gyeonggi Province.

Annual increase in the added value productivity of the manufacturing sector in Gyeonggi Province during the period of 2007~2012 was the highest for the area of medical, precision and optical equipment (15.3%), followed by ICT manufacturing industry (13.5%) and automobile and trailer (9.1%), while the number of employees was in the order of others and transportation equipment (12.6%) and medical, precision and optical equipment (8.4%).

Table 2.10 major business categories in themanufacturing sector of Gyeonggi Province in Termsof the added value Productivity

| Rank | 2002 | | 2012 | | |
|------|---|------|---|------|--|
| | Category of manufacturing | % | Category of manufacturing | % | |
| 1 | Semiconductor | 15.8 | Semiconductor | 24.6 | |
| 2 | Computer • peripherals | 8.0 | Electronic components | 7.7 | |
| 3 | Motor vehicles, • Engine | 7.9 | Broadcasting and Communications Equipment | 7.3 | |
| 4 | Electronic components | 4.6 | Motor vehicles• Engine | 6.3 | |
| 5 | plastic products | 4.3 | Motor vehicles components | 4.7 | |
| 6 | Medicines | 4.3 | plastic products | 4.1 | |
| 7 | Fabricated metal products | 4.0 | Special purpose machinery | 4.1 | |
| 8 | Broadcasting and communications Equipment | 3.8 | General Purpose Machinery | 3.6 | |
| 9 | Motor vehicles components | 3.4 | Other fabricated metal products | 3.5 | |
| 10 | General purpose machinery | 3.4 | Otherchemicals products | 3.2 | |

Data: Statistics Korea, Korea Statistical Yearbook, 2013.

2.2 Research Methodology for Gyeonggi Province Regional

The basic direction for the selection of the strategic industries in the region of the Gyeonggi Province can be established by comparing the priorities for the industries through quantitative indices by categorizing the industries into:

- Industrial environment.
- Technology environment.
- Policy environment²⁻⁴.

Therefore, this Study aims to deduce promising future strategic industry that is specialized in the region of Gyeonggi Province with high growth potential by analyzing the industrial environment, technological environment and policy environment of Gyeonggi Province, and allocating integrated scores for each of the industries. The summary of the indices for selection of the strategic industries of the Gyeonggi Province is given in the Table 3.

Here, the Location Quotient (LQ) refers to the representative index for measurement of the extent of the specialization of a particular industry in a given region in comparison to the extent of specialization in the entire nation. The formula for LQ is as follows:

 $LQ_i = (R_i / R) / (N_i / N) (1)$ LQ_i : i industry LQ R_i : Output of i industry in the region $_i$ R: Output of all industries in R region N_i : Output of i industry in the country N: Output of all industries in the country

| Evaluation | Domains | Itoms | Remark |
|--------------|----------------|------------------------|--------|
| industries o | f the Gyeong | gi Province | |
| Table 3. | the indices to | r selection of the str | ategic |

| Evaluation Indicators | Domains | Items | Remarks |
|---------------------------|---|---|-----------|
| Industrial Environment | Location Quotient(34) | -Eemployees(10) -Establishments (9) -Output(5) -Added value(5) -Export(5) | 40 Points |
| | Industry Interrelation Coefficient(6) | -Output(2) -Value Added(2) -Employment(2) | |
| Technology Environment | Innovation resources(10) | -Research resources owned (10) | 30 Points |
| | R&D budget(10) | -Budget for each of the technologies(5) -Budget for each of the industries(5) | |
| | Patent activity analysis(10) | -Patent applications made(10) | |
| Policy Environment | Local government's policy(22.6) | -Gyeonggi Research Institute(8) -Gyeonggi Technopark(4) -Project for promotion of local industry(4) -Expert survey(7) | 30 Points |
| | Central government's policy(7.4) | -New growth engine policy(3) -Leading industry in metropolitan economic zone(4) | |
| | 100 Point | | |

The basic equation of the Input-Output Model of Leontief is given below:

$$\begin{split} &X = (I - A)^{-1} (Y - M) (2) \\ &X: Column vector of value of output \\ &(I - A)^{-1}: Leontief inverse matrix \\ &Y: Column vector of the final demand \\ &M: Column vector of export value \end{split}$$

It is possible to compute the input-output effect of industries including the effects of inducing manufacturing, added value and employment opportunities through the application of the equation (2).

3. Selection of the Strategic Industries of the Gyeonggi Province

3.1 Industrial Environment

3.1.1 Computation of LQ

The For the computation of LQ for each of the industries of the Gyeonggi Province, 73 sections of the Report of the census of establishments issued by the Statistics Korea in 2012 was used¹².

Firstly, the results of computation of the LQ for the basis of the number of the employees of the Gyeonggi Province were in the order of:

- Manufacturing of electronic components, computers, visual, acoustic and communication equipment (2.315).
- Manufacturing of furniture (2.123).
- Manufacturing of medicinal substances and pharmaceutical products (2.085), etc.

Secondly, the companies-based LQs were in the order of:

- Manufacturing of electronic components, computers, visual, acoustic and communication equipment (2.331).
- Manufacturing of pulp, papers and paper products (2.165).
- Manufacturing of rubber and plastic products (2.143), etc.

Thirdly, the output-based LQs were found to be in the order of:

• Pharmaceutical and cosmetic products (2.475).

- Furniture (2.215).
- Electronic device components (2.110), etc.

Fourthly, added value-based LQ was found to be in the order of:

- Pharmaceutical and cosmetic products (2.559).
- Electronic device components (2.466).
- Furniture (2.45), etc.

Fifthly, export-based LQs were found to be in the order of:

- Agriculture, forestry and fisheries services (2.840).
- Furniture (2.726)
- Pharmaceutical and cosmetic products (2.257), etc.

3.1.2 Computation of the Industrial Inputoutput Coefficient

The As the data for the computation of the coefficients for output, value added value and inducing of employment opportunities for each of the industries in the Gyeonggi Province, the data for Section 79 of the 2005 Interregional Input-output Tables published by the Bank of Korea in 2008 was used1.

Firstly, the results of computation of production inducing effects for each of the industries in the Gyeonggi Province were in the order of:

- Coal products (4.218).
- Others (2.855)
- Automobile (2.704), etc.

Secondly, the results of computation of the value added inducing effects for each of the industries were in the order of:

- Real estate (0.962).
- Transportation related services (0.946)
- Educational services (0.945), etc.

Thirdly, the results of computation of the employment effects with 1 billion Korean Won were in the order of:

- Agricultural products (66.7 persons),
- Forest products (60.3 persons)
- Milling and grinding of grains (59.9 persons), etc.

3.2 Technology Environment

3.2.1 Innovation Resources

For innovation resources analysis, evaluation was made on the basis of the investments made for national research equipment for each of the 8 major research areas of the Gyeonggi-do region as of the end of 2012 established as a national research and development project⁹.

The investment made for research equipment was found to be in the order of:

- Machine processing and testing equipment (133.2 Billion Won).
- Electrical and electronics equipment (107.3 Billion Won).
- Preliminary processing and analysis equipment for compound (120.2 Billion Won), etc.

3.2.2 R & D Budget

R & D budget analysis was carried out through the evaluation of the R & D budgets for each of the technologies and industries within Gyeonggi-do.

As of the end of 2009, the R & D budget allocated to the Gyeonggi-do region was 518.07 Billion Won, accounting for 30.5% of the total of 1.69824 Trillion Won allocated as the R & D budget for 17 major new growth engines in 3 major areas⁸. Among these, the R & D budget for each of the technologies within the Gyeonggi-do region was found to be in the order of:

- New renewable energy (130.539 Billion Won).
- Nano-convergence of new materials (75.271 Billion Won).
- Cutting-edge green city (59.22 Billion Won), etc.

In the analysis of the local innovation capabilities for each of the metropolitan economic zone by the Science and Technology Policy Institute, the total R & D budget for the industries within the Gyeonggi-do region was 12.511203 Trillion Won¹⁰. Among these, the R & D budget allocated to each of the industries was found to be in the order of:

- Electronic components, computer, visual images, audio and communication equipment (7.457985 Trillion Won).
- Automobile and trailer (1.823627 Trillion Won).
- Other machines and equipment (616.003 Billion Won), etc.

3.2.3 Patent Activity

The total number of patent applications in the region of Gyeonggi-do over the period of 12 years from 2001 to 2012 increased at an average annual rate of 6.1%, from 22,741 cases in 2001 to 46,192 cases in 2012¹³. Among the 46,192 cases of patent applications in 2012, the number for each of the technologies was in the order of:

- Electrical and semiconductor (9,329).
- Computer (6,157).
- Electronic communication (4,945), etc.

3.3 Policy environment

3.3.1 Local Government's Policy

The local government's industrial policies within Gyeonggi-do were evaluated by the industries presented in the outcome of the survey on Korea Industrial and Economic Development Institute, Gyeonggi Techno-Park, project for promotion of local strategic industry and local strategic industry experts.

Firstly, promising future industries of Gyeonggi-do presented by the Korea Industrial and Economic Development Institute (2012) from the perspective of cultivation of industries in Gyeonggi-do included 10 industries including:

- IT convergence industry.
- Green industry.
- Life industry, etc¹⁵.

Secondly, key core local industries that the Gyeonggi Techno-Park (2005) presented included 5 industries such as:

- Electronic components.
- Wired/wireless devices.
- Visual images/audio devices industries, etc⁵.

Thirdly, the strategic industries included in the project for promotion presented in the 5-year national balanced advancement plan for the region of Gyeonggi-do included 4 industries namely,

- Information communication.
- Life.
- Cultural contents industries, etc⁷.

Fourthly, the results of the survey on the expert on promising future industries of Gyeonggi-do promising

future industries as the experts saw it as of the end of 2013 included 7 areas such as:

- New renewable energy.
- Carbon emission reduced energy.
- LED application industries, etc14.

3.3.2 Central Government's Policy

Central government's industrial policies within Gyeonggi-do were evaluated by means of the industries presented in the policies for cultivation of new growth engine and strategic leading industries in the metropolitan economic zones.

Firstly, the results of the exploitation of the 17 major new growth engines in the 3 major areas by the government in 2009 included:

- New renewable energy.
- Carbon emission-reduced energy.
- Highly advanced water treatment, etc⁸.

Secondly, the strategic leading industries selected for each of the metropolitan economic zones in 2011 included 16 industries such as:

- Communication.
- Next-generation semiconductor.
- Display industries, etc⁶.

3.4 Results of Selection of the Strategic Industry

The strategic industries in the region of Gyeonggi-do selected from the perspective of the industrial environment and technological environment examined above were ranked from the 1st to the 10th and weighted score was allocated to each of the industries on the basis of the distribution table presented in the Table 2. Moreover, equally uniform score was allocated to the strategic industries of the region of Gyeonggi-do selected from the perspective of the policy environment on the basis of the distribution table presented in the Table 2. The allocated scores were ultimately added for each of the areas and the industries were ranked in the order of the highest to the lowest score.

As the results of the analysis, the strategic future industries of Gyeonggi-do ranked in the aforementioned method were found to be in the order of:

- Manufacturing of electronic components, computers, visual, acoustic and communication equipment.
- Medical substances and pharmaceutical product manufacturing industry.
- Furniture.
- Medical, precision, optical equipment and watch manufacturing industry.
- Manufacturing of pulp, papers and paper products.
- Robotic industry.
- Manufacturing of rubber and plastic products.
- New renewable energy industry.
- Research institute.
- Compound and chemical product industry.

4. Results and Conclusion

The goal of this Study was to deduce the strategic industries related to the cultivation of specialized industry and the progress of the local industry that comply and fulfil the on-site demands of the Gyeonggi Province.

As the results of analysis, the strategic industries of the Gyeonggi Province included:

- Manufacturing of electronic components, computers, visual, acoustic and communication equipment.
- Medical substances and pharmaceutical product manufacturing industry.
- Medical, precision, optical equipment and watch manufacturing industry.
- Robotic industry.
- New renewable energy industry.
- Compound and chemical product industry, etc.

Therefore, it is anticipated that the 10 major strategic industries of region of Gyeonggi-do selected in this study will not only become the representative industries of Korea but also lead the global market.

In spite of the results of the important study on the selection of the strategic industries in the region of Gyeonggi-do, this Study has limitation in that this Study relied only on the existing literature review method in terms of the evaluation factors for the selection of the strategic industries in the Gyeonggi-do region, and that studies through:

- Statistical analysis.
- Empirical simulation, and, moreover.

• Study on the synergic effect of the convergence amongst the areas of technology, contents and storytelling including creative idea-based 5G mobile communication and wearable smart devices, etc. have been excluded.

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