A Study on Korea's Textile Industry and the Milan Project: Using the Input-Output Model

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1. Introduction

The objective of this paper is twofold. First, employing the input-output model, the paper investigates the effects of textile industry on the industrial structure in Daegu, Korea. Second, this paper also evaluates "the Milan Project" designed to revive textile industry in Daegu area since Daegu has been leading that industry in Korea. Then the current paper intends to provide the policy implications for the local government as well as the central government in Korea.

The textile industry, characterized by the labor intensive one, had been a key sector in Daegu region from early 1960s through late 1970s, during which Korea accomplished very rapid economic growth with the help of the active industrial and trade policy. Especially, after switching from the import substitution strategy to export promotion strategy by the Korean government in the early 1960s, the textile industry in Daegu region had played a significant role on the expansion of Korean exports and the prosperity of regional economy until the late 1970s. Since that time on, the region's textile industry began to lose its comparative advantage and/or the international competitiveness because of the rapid rise in wages and the emergence of Southeast Asian Countries and China.

Very recently the local government with the help of the central government designed and implemented an aspiring large-scale five year project, so called "Milan Project" (1999-2003) to boost the depressed industry and to revitalize the stagnant regional economy. Thus this paper analyses the current situations of the region's textile industry and attempts to evaluate the performances of the project based on the initial plans since the textile industry is still a key industry of Daegu area in terms of both the number of employment and the amount of value added even though the relative share of that industry in the national economy has drastically decreased.

We employ the input-output model to show the linkage effects of both forward and backward directions and consider more categorized sub-divisions of the textile industry to show possible structural adjustments within that industry. The Milan Project put a great emphasis on the development of fashion, design and apparel sectors rather than the traditional manufactures of fabrics; that is, structural adjustments are being sought from the middle stream of lower value-added to the downstream of high value-added. Considering these facts, we analyze the linkage effects of both the whole industry and the sub-division industries in relation to the associated industries at the regional and national level in order for the recovery of the international competitiveness in the world market.

The limitation of the research naturally rises in the reliability of the data associated with the industry in the specific region since we divided the traditional textile industry into four different sub-industries, which are not well established in the regional level. Nevertheless, the

current paper will present some fruitful policy implications that would help enhance the international competitiveness of the textile and apparel industry and thus revive the regional economy.

The rest of the paper is organized as follows; Section 2 describes the overview of the Korea's textile industry and the Milan Project. Section 3 constructs Daegu region's input-output table, which will be used to figure out the economic structure of the Daegu economy, particularly focusing on the textile industry. In addition, the properties of the textile industry are investigated using the input-output model in terms of both linkage and multiplier effects in section 4. Section 5 evaluates the Milan Project and provides some policy suggestions for the possible post Milan Project. Concluding remarks are given in section 6.

2. Korea's Textile Industry and the Milan Project

The textile industry had been a key sector in Korea from early 1960s through late 1980s, during which Korea accomplished a rapid economic growth with the help of the active industrial and trade policy.   In the course of an export-oriented economic development, the textile industry had played a significant role on the expansion of Korean exports and the prosperity of the Korean economy until the late 1980s.   Since that time on, the textile industry has begun to lose its comparative advantage and/or the international competitiveness because of the rapid rise in wages and the emergence of China and Southeast Asian Countries.

Since Korea undertook an export-oriented economic development, it has been a major exporting country of textile products. Nowadays Korea's textile exports are ranging from synthetic yarns, synthetic fabrics, and knitted fabrics through made-up textiles and garments. In 2000 Korea was the fourth largest exporting country next china, Italy, and the United States in rank of market share in the world trade.(See Table 1) In 2001 Korea's exports was 1.6 billion dollars, which accounted for 4.5% share in the world market, while it went down from 1.88 billion dollars in 2000.(See Table 2)

[Table 1] Share of Major Exporting Countries in the World Trade (2000)

	World	China	Italy	U.S.	Korea	Germany
Exports(100 million$)	356.4	89,9	25.2	19.6	18.8	17.9
Market Share (%)	100	25.2	7.1	5.5	5.2	5.0

Source; WTO, International Trade Statistics, 2000

[Table 2] Share of Korea's Textile Exports in the World Market

	1985	1990	1995	2000	2001
Exports(100 Million $)	7.1	14.8	18.7	18.8	16.0
Market Share(%)	7.0	5.7	5.3	5.2	4.5

Source: UN Trade statistics, KOTIS.

So far, Korea's textile industry still remains one of key manufacturing industries in terms of the number of firms, employment and exports.   Table 3 shows that Korea's textile industry accounts for 18.0% share of manufacturing industry in terms of the number of firms, 14.0% share in terms of employment, 10.7% in terms of exports, even though the relative shares of that industry in the national economy has decreased from 2000.
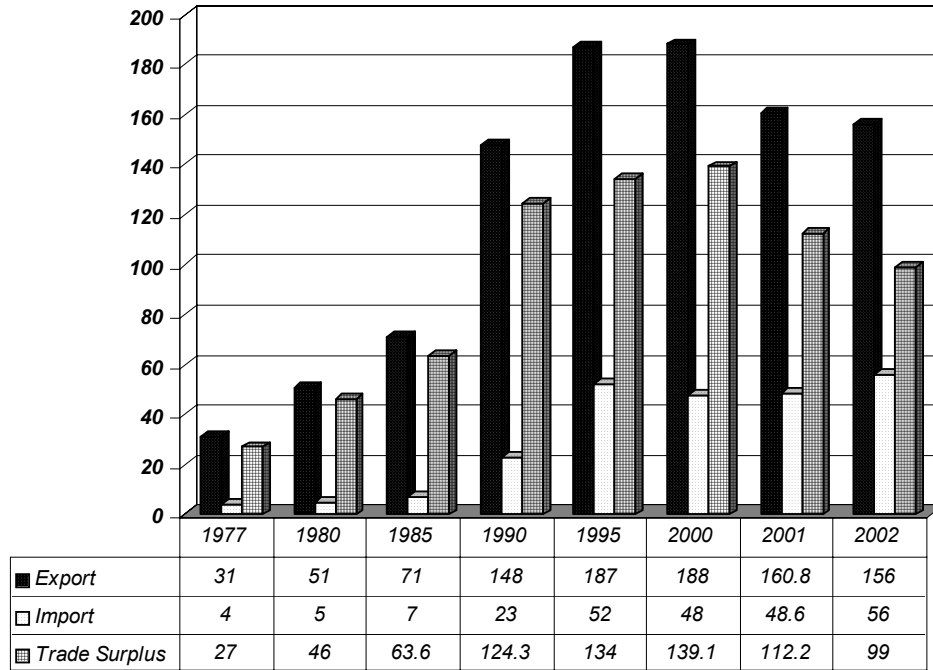
[Table 3]   Share of Textile Industry in Korea (2000~1)

(Unit: 1,000 workers, billion won, billion won, 100 Million $)

		# of Firms	Employment	Production	Value-Added	Exports
2000	Manufacturing	98,110	2,653	564,830	219,420	1722.7
	Textile	18,130	393.8	39,810	17,120	187.8
	Share (%)	18.5	14.9	7.0	7.8	10.9
2001	Manufacturing	105,873	2,467	583,793	221,860	1,504
	Textile	19,011	371	40,845	16,372	161
	Share (%)	18.0	14.0	7.0	7.4	10.7

Source: National Statistical Agency, Annual Survey.

[Figure 1] Trade Performance of Textile Industry: 1977~2002

(unit: 100 million $)

	1977	1980	1985	1990	1995	2000	2001	2002
■ Export	31	51	71	148	187	188	160.8	156
□ Import	4	5	7	23	52	48	48.6	56
▦ Trade Surplus	27	46	63.6	124.3	134	139.1	112.2	99

Source: KOTIS.

In 2001 Korea's textile industry produced more than 40,845 billion won and exported 53% of the production.   Also, the textile industry has been a major exporting sector in Korea until 2000.   Figure 1 indicates that Korea's textile industry has generated trade surplus by more than 10 billion dollars since the late 1980s, even though its exports has decreased during 2001~2. Notably, in 2002 the Korean textile industry accomplished trade surplus of about 10 billion dollars in spite of deep recession worldwide.

[Table 4] Share of Textile Industry in Daegu (1999~2001)

	# of Firms		Employment	
	1999	2001	1999	2001
Manufacturing	10,583	12,076	324,385	334,688
Textile & Clothing	3,346	3,635	89,693	82,690
Share (%)	31.7	30.1	27.7	24.7

Source: National Statistical Agency, Annual Survey.

[Table 5] Share of Daegu Region's Textile Industry in Korea

(Unit: million won)

		# of Firms	Employment	Production	Value-Added
1962	Kyungbuk (including Daegu)	661 (25.56%)	35,425 (28.70%)	10,397 (30.43%)	4,312 (31,44%)
	Nation	2,586	123,436	34,163	13,714
1970	Kyungbuk (including Daegu)	1,411 (22.07%)	50,920 (19.04%)	48,579 (19.42%)	28,814 (30.73%)
	Nation	6,393	267,479	250,213	93,750
1998	Daegu-Kyungbuk	3,216 (21.61%)	86,324 (25.34%)	9,269,853 (30.50%)	4,063,678 (30.45%)
	Nation	14,884	340,652	30,392,600	13,346,653
1999	Daegu-Kyungbuk	3,346 (20.10%)	89,693 (24.22%)	10,160,553 (31.00%)	4,743,705 (31.83%)
	Nation	16,645	370,287	32,774,568	14,905,306
2001	Daegu-Kyungbuk	3,635 (19.02%)	82,690 (22.97%)	9,027,475 (25.00%)	3,820,856 (25.45%)
	Nation	19,107	360,046	361,188,875	15,012,513

Source: National Statistical Agency.

In recent years Korea's textile industry has witnessed a gradual decrease in both production and export volume.   In 2002, the production of textile products fell 5.4% to 2.59 million tons and the export volume also went down 2.5% to $15.7 billion.   The domestic demand edged down 3.6% to 1.2 million tons, undermined by the deterioration of consumer sentiment in the second half of 2002.   While import of raw materials for clothing showed no significant increase, the volume of garment import surged last year.

[Table 6] Recent Performance of Korea's Textile Industry

(Unit: US$ million; 1,000 ton; %)

	2000	2001	2002
Production	3,981	2,742(-10.3)	2.594(-5.4)
Local Market	-	1,243(3.2)	1,198(-3.6)
Export	18,783	16,081(-14.4)	15,674(-2.5)
Import	5,736	4,860(1.5)	5.688(17.0)

For a long time, Korea's textile industry has been posting trade surpluses of more than $10

billion per year.   But the situation in 2002 turned somewhat difficult, largely due to lower demand from advanced markets such as the US, Japan and the EU.   Import regulations and trading blocs also undercut the nation's competitiveness in the world textile market.   As China fast emerges as the new textile powerhouse, Korea's stature might be weakened further.   Other challenges included cuts in export prices and new trading blocs worldwide.

Daegu region has been the largest textile industrial complex in Korea for the past four decades.   According to Table 5, the textile industry still remains a key industry in Daegu area in terms of the number of firms, and employment, even though the relative share of that industry in Daegu's manufacturing sector decreased from two years ago.   In 2001, Daegu's textile industry commands 30.1% share of manufacturing sector in terms of number of firms and 24.7% share in terms of employment.   Especially, Daegu region has been famous for the largest production site of fabrics, polyester and synthetic, within Korea.   However, the relative share of Daegu's textile industry in the national economy has drastically decreased in terms of the number of firms, employment, production, and value-added in recent years.

Since 1997, Daegu has sought out advanced strategies for its textile industry that will be able to develop the city to a center of the high-tech fashion industries. As a result, in September 9, 1998, the Minister of Commerce, Industry & Energy finally announced an aspiring large-scale five-year project, so called the Milan Project (1999-2003) to boost the depressed industry and to revitalize the stagnant regional economy.

The Milan Project aims at developing the textile industry in Daegu-Kyungbuk area, as the mecca of the textile and fashion industry in the world by the high-tech and high value-added industry for the 21th century. The Milan Project aims to nurture the textile businesses in the Daegu region to be highly competitive in the world market for the 21st century. The project offers special supports to research and development in design and apparel as well as yarns, dyeing, fabrication, textile machinery and synthetic fabrics. However, the Milan Project puts a great emphasis on the development of fashion, design and apparel areas rather than the traditional manufactures of fabrics and seeks structural advancement from the middle stream of low value-added to the downstream of high value-added.

According to the Milan Project, 680 billion won(567 million U.S. dollars; 1$ = 1,200 Won) was planned to be invested for the 17 specific plans in the master plan by 2003. The 17 specific investment plans of the Milan Project are summarized as follows: Textile R & D Center, Dyeing & Design Center, Knit Production Center, Fashion Design R & D Center, Fashion Information Office, Korea Textile & Fashion Institute (KOTEFI), Preview in Daegu (PID), etc. The central government shares 54% of the total investment, private enterprises, 38.5% and the local government, 7.5%. The specific plans had accomplished 73.6% at the end of 2002.

3. The Construction of the Daegu Region's Input-Output Table

3.1. The Basic Concept of the Input-Out Model

In the input-output framework the complete n×n system is just given by

$$(I-A)X=Y$$
$$X= (I-A)^{-1} Y$$

where *A* is defined as technical coefficient matrix, *X* and *Y* are column vectors of gross output and final demand, *I* is the identity matrix, $(I-A)^{-1}$ is the Leontief inverse matrix or product inducement matrix.   A measure of the strength of the backward linkage effects in sector *j* is given by the sum of the elements in the *j*th column of the direct and indirect coefficients matrix, $(I-A)^{-1}$. Similarly, a measure of the direct and indirect forward linkage effects in sector *i* is given by the sum of the elements in the *i*th row of $(I-A)^{-1}$.

  The notion of multipliers rests upon the difference between the initial effect of an exogenous(final demand) change and the total effects of that change. An output multiplier for sector *j* is defined as the total value of production in all sectors of the economy that is necessary to satisfy a worth of final demand for sector *j'*s output. An income(employment) multiplier is defined as the impacts of the changes in final-demand spending on the changes in income(employment) received by households, respectively.

  The input-output model provides a framework within which to assess the economic impacts associated with the introduction of a new industry or an additive final demand into an economy. The impact effects is given by the $\triangle X=(I-A)^{-1}\triangle Y.$
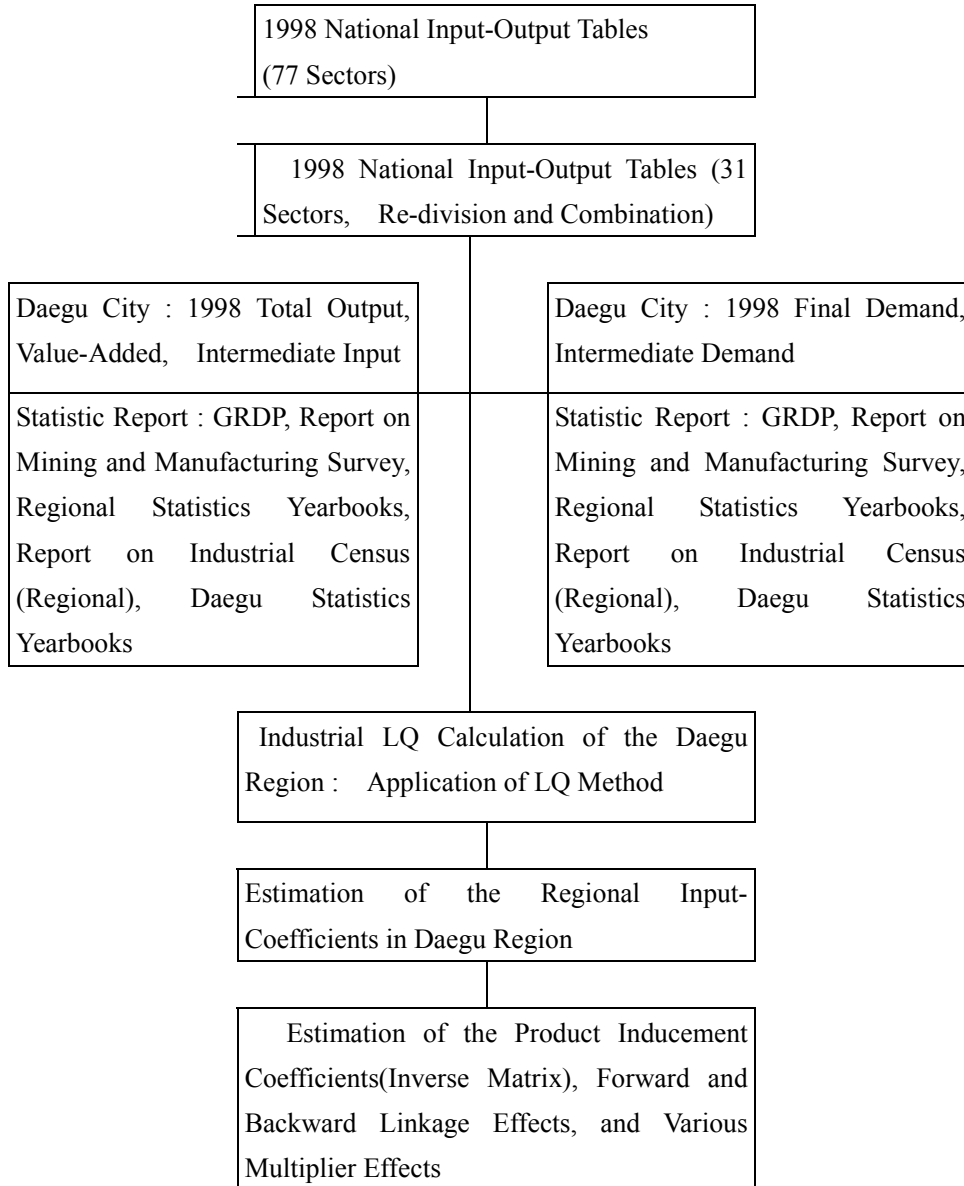
3.2. The Framing Process of Daegu Input-Output Model

The Daegu region's Input-Output table was constructed according to the specified steps shown in Figure 2. Firstly, using the National Input-Output table of 1998 released by the Bank of Korea, which classified 77 industries, we reclassified and modified them into 31sectors to accommodate the Daegu region's economic structure. That is, differently from the National Input-Output table, the regional table employed the price list of producers together with taking the classification criteria of the national table, the amounts of regional production, value-added, final demand and the characteristics of regional industrial structure, and the region-specific properties of textile industry into consideration.

Since the textile industry has still been the key traditional industry in Daegu for the past 40 years, we classified the industry into four categorized sub-divisions, ① spinning, weaving of

textiles   ②knitting mills   ③wearing apparels and accessories   ④ other textiles to construct the region's Input-Output table, which will later be used to analyze the interindustrial linkage effects among industries and within the textile industry.   The more detailed classification of the textile industry is given in Table 7.

[Figure 2] The Framing Process of the 1998 Daegu Input-Output Model

1998 National Input-Output Tables (77 Sectors)

1998 National Input-Output Tables (31 Sectors,   Re-division and Combination)

Daegu City : 1998 Total Output, Value-Added, Intermediate Input	Daegu City : 1998 Final Demand, Intermediate Demand
Statistic Report : GRDP, Report on Mining and Manufacturing Survey, Regional Statistics Yearbooks, Report on Industrial Census (Regional), Daegu Statistics Yearbooks	Statistic Report : GRDP, Report on Mining and Manufacturing Survey, Regional Statistics Yearbooks, Report on Industrial Census (Regional), Daegu Statistics Yearbooks

Industrial LQ Calculation of the Daegu Region :   Application of LQ Method

Estimation of the Regional Input-Coefficients in Daegu Region

Estimation of the Product Inducement Coefficients(Inverse Matrix), Forward and Backward Linkage Effects, and Various Multiplier Effects

[Table 7] Classification of the Textile Industries

	Sectors	Detailed Sectors
4	Spinning, Weaving of Textiles	Fiber Yarn(Natural Fiber Yarn, Chemical Fiber Yarn), Fiber Fabrics(Natural Fiber Fabrics, Chemical Fiber Fabrics, Other Fiber Fabrics , Fiber Bleaching and Dyeing), Mixed Cotton Yarn, Dyed or otherwise Finished Silk(Cotton).
5	Knitting Mills	Knitting Fabrics
6	Wearing Apparels and Accessories	Wearing Apparels, Suits, Other Accessories, Tanning and Dressing of Leather, Underwear, Outwear, Fur Articles
7	Other Textiles	Textile Products, Other Textile Products, Cordage, Rope and Fishing Nets

Sources: The Bank of Korea, 1998 Input-Output Tables, 2001. 12, pp.298-299

Then we calculated the values of the amounts of total outputs, value-added, and intermediate inputs in each industry, utilizing the Gross Regional Domestic Product and Report on Mining and Manufacturing Survey. Based upon these values, we obtained the location quotients(LQ) of each regional industry, and constructed Daegu's Input-quotients table of 1998 by the method of location quotients.

The basic framework of this model is characterized by the single region and static Input-Output model with the type of noncompetitive import. While we couldn't make individual items for both inflow and outflow due to the data restrictions in the regional level, instead, we treated that inflow is included in imports, and outflow is in exports.

3.3. The Estimates of Total Output, Value-Added and Final Demand.

The amounts of total outputs and value-added in 1998 were calculated by the Gross Regional Domestic Products(GRDP) and Reports on Industrial Census of 1998. We used the location quotients of each industry in Daegu area by the method of location quotients in accordance wth the amount of total output for making the region's Input-Output table. We had the negative input coefficients of primary metal products and nonmetallic minerals since the residuals were treated by the Stone's negative input method. The region's amounts of total value-added, where the amounts of intermediate inputs were subtracted from the amounts of total output in each industry of the region, are composed of employee's compensation, operation surplus, depreciation of fixed capital and indirect taxes less subsidies.

The industrial linkage analysis equipped with the Input-Output model can be a very useful instrument because it enables us to investigate both the interdependence between industries and the multiplier effects. In particular, the employment and income multipliers are the key indicators to select the specific industries as promising ones for the region's economic prosperity. For the sake of the employment multiplier, we need the data on the employee by industry in the region.

We estimated the 1998 employee by industry using the employment date from the Report on the Census on Basic Characteristics of Establishments of 1998 made by KNSO(Korea National Statistical Office). The value-added (income) multiplier can be obtained from the amounts of value-added by each industry, and in accordance with the amounts of employee's compensation. The amount of intermediate inputs in Daegu is estimated to 17,672.5 billion won(Korea currency), which is 54% of the total outputs. The ratios of intermediate input to the total output by industry are given as follows; 73.4% in fabric and textile, 72.4% in mining and quarrying, 72.0% in primary metal products, 66.4% in electronics and other electric equipment in order.

While the ratio of intermediate demand to the total output shows up to 600.8% in mining and quarrying sector, it is 90.1% each in paper and wood products, nonmetallic minerals, and primary metal products, 80.1% in fabric and textile process, 75.1% in precision instruments, 74.1% in petroleum, coals and chemicals, 70.1% in printing and publishing in order. In case of apparels and others, the ratio of intermediate input is 60.2% but that of intermediate demand is just 5.0%.

[Table 8] Intermediate Input and Intermediate Demand by Industry in Daegu.

3.4 Input Coefficients and Production Inducement Coefficient in Daegu

Since the values of all elements in the input coefficient matrix took the values of between 0 and 1, they satisfied the required nature of the input coefficients. And the condition that the values of diagonal elements in the production inducement coefficients matrix are always equal to or greater than one is also satisfied. Then we can test whether the Hawkins-Simon(H-S) condition is met once we get the production inducement coefficient matrix of the region.

Table 9 shows that the H-S condition of the Input-Output model of 1998 in Daegu is satisfied since the values of all industries are less than one. The inducement coefficients of value-added indicate the highest value of 1.9363 in the transportation and warehousing sector, 0.9355 in public administration and defense, 0.8739 in real estate and business services, 0.8619 in education and health services, 0.8415 in printing and publishing in order as reported in Table

9.   But the inducement coefficients of value-added in all four categorized sub-divisions of the entire textile industry are less than the average value of 0.6714 in all industries, implying that the textile industry makes lower contribution to the induced value-added.

[Table 9] Value-added Inducement Coefficient and Employment Inducement Coefficient.

According to the employment inducement coefficient in Table 13-1, the knitting mills sector records the highest value of 0.0606, the next highest value of 0.0576 in eating, drinking places, and hotels and other lodging places, 0.0483 in other textile products, 0.0478 in furniture and miscellaneous manufactured products, 0.0470 in printing and publishing, 0.0465 in public administration and defense, 0.0447 in leather products.   Despite the relatively high values of textile related products in employment inducement coefficients, the textile industry in Daegu specializing the sector of spinning, weaving of textile shows a very low value of 0.0190, which is lower than the average value of all industries, implying a small contribution to the employment inducement.

4. The Properties of the Textile Industry in the Input-Output Model

4.1. The Industrial Structure of Daegu and Location Quotient

Investigating the industrial structure of Daegu economy in terms of the amounts of total output, the wholesale and retail trade sector ranks the highest weight of 13.26%, the construction sector the next of 12.71%. Table 14 shows 10.89% in the spinning, weaving of textile and other textiles, 10.76% in the real estate and business services, 5.51% in the finance and insurance.   While the spinning, weaving of textile sector's weight of 10.89 is relatively high, which in turn means the sector is a main part of the textile industry in Daegu, the other three textile related sectors show very low values of less than 1%.

The location quotient(LQ) which represents the degree of specialization of a specific industry in the regional economy compared with the national economy in terms of the relative weights in the composition of industries may help to figure out the properties of the region's economic structure. If the location quotient of a certain industry is greater than one, then the industry is more specialized in the corresponding region than in the nation, and thus it becomes an outgoing industry, vice versa. That implies the greater the location quotient is, the more specialized the relevant industry is.

Table 10 of the location quotients by industry in Daegu shows the highest value of location

quotients, 26.96 in the spinning, weaving of textile sector, the next 4.75 in the eating, drinking places, and hotels and other lodging places and 2.84 in the social and personal services, 1.40 in the finance and insurance sector.   While the spinning and weaving sector has the highest value of location quotient (26.95), the other three subdivisions of the textile industry resulted in relatively very low values of location quotient; 1.32 in other textile products, 0.32 in the wearing apparels and accessories, 0.27 in the knitting mills. This means that those subdivision sectors of textile industry in Daegu are rarely specialized. The outcome is not so surprising since we presumed that the structure of the textile industry was not advanced.

[Table 10] The Location Quotients by Industry in Daegu

4.2. The Forward and Backward Linkage Effect by Industry

The linkage effect is defined as a bilateral interaction between different industries; the purchasing of goods produced in other industries as intermediate goods is called a backward linkage effect, selling goods to other industries as intermediate goods is called a forward linkage effect.   In order to implement effective industrial policy, this linkage effect may be used as one of the strategies to select a leading industry. The power of dispersion index indicates backward linkage effects, which means the degree of interdependence through purchases from other industries. The opposite concept can be obtained by considering the degree of sensitivity, which reveals the forward linkage effects, say, the degree of industrial interdependence through a specific industry's sales to other industries.

As shown in Table 11 of the forward and backward linkage effects by industry in Daegu, the paper and wood products industry indicates the highest value of the power of dispersion, 1.3819, and the printing and publishing industry the next of 1.2774, the knitting mills 1.0263. In case of the degree of sensitivity, the real estate and business services sector shows the highest value of 2.5293 and the paper and wood products industry the next value of 1.8388. Considering both the power of dispersion index and the degree of sensitivity index, the general machinery and equipment, transportation and warehousing, and paper and wood products show higher values of both indices than one, which means these industries have a strong potential power for growth in the region.

The entire textile industry shows pretty high values of both the degree of sensitivity index (forward linkage effect) and the power of dispersion index (backward linkage effect), 1.1330 and 1.2460, respectively. Unlike the above outcome, the categorized subsectors of the textile industry indicate lower values of both effects less than one, except for the power of dispersion index of 1.0263 in the knitting mills sector.   In particular, it is turned out that there are big

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differences among textile related sectors with relatively low values. This fact reveals the industrial structural within the textile industry is oriented to low value-added structure. In addition, the backward linkage effect is, in general, shown to be greater than the forward linkage effect in the textile industry of Daegu.

[Table 11] The Forward and Backward Linkage Effects by Industry in Daegu

4.3. Multiplier Effects by Industry

(1) Output Multiplier

Let us consider three types of multipliers; output multiplier, employment multiplier and the income multiplier, respectively, using the Input-Output model. These multipliers describe the quantitative effects on other industries associated with a change in final demand in a certain industry both directly and indirectly in the relevant regional economy.

The output multiplier, which is equal to the production inducement coefficient in an individual industry, is composed of direct and indirect effects. Since the power of dispersion index can be obtained by dividing the production inducement coefficients of self-sectors by the average of all those, the output multipliers are changing parallel with the production inducement coefficients, even though the two have different values.

As a result, the output multiplier of the paper and wood products industry is the highest of 2.1376, and that of printing and publishing sector is the second of 1.9761. The multiplier associated with the knitting mills sector is pretty high, 1.5875. Now dividing the output multiplier into two parts; direct and indirect effects, the paper and wood products industry gives the highest direct effect with the value of 1.5953. The next highest one comes from the printing and publishing industry, the value of 1.5323. For the indirect effect, the paper and wood products industry also presents the highest value of 0.5423.

[Table 12] Output Multiplier: Direct and Indirect effects

(2) Employment Multiplier

This employment multiplier measures the effects on the change in employments in all industries over the region associated with the employment change in a certain industry. Total employment effects are represented by the sum of direct employment effect and indirect employment effect, and thus the employment multiplier is just the ratio of direct effect to total effect.

Looking at the properties of these employment effects, the labor intensive industry

generates relatively high direct employment effect, but low indirect employment effect. By contrast, the capital intensive industry generates relatively low direct effect, but high indirect effect, which leads to a higher employment multiplier.

Table 13 reports the employment multipliers which are obtained from the number of employees by the region's industry and both direct and indirect employment effects. According to Table 13, the agriculture, forestry and fisheries industry shows the highest employment multiplier of 8.3450, the next one of 2.5239 in the paper and wood products and that of 1.7090 in the spinning, weaving of textiles sector. For direct employment effects, the knitting mills sector takes the first place of 0.0511, and the eating and drink places, hotels and other lodging places sector takes the second place of 0.0500. This outcome shows that the relatively labor intensive industry generates high values of the direct employment effects. Contrary to the direct employment effects, the capital intensive industry results in relatively high indirect employment effects; 0.0152 in the paper and wood products sector and 0.0146 in the printing and publishing sector. In case of the textile related industry, the spinning, weaving of textiles sector produces relatively high employment multiplier, but other sectors do a medium level of effects.

[Table 13] The Employment Multiplier: Direct and Indirect Effects

(3) The Value-Added Multiplier

The value-added(income) multiplier is defined as the ratio of the amount of direct value-added to the amount of total value-added in all related industries incurred by one unit of change in value-added in a certain industry. Total amount of value-added is the sum of the amounts of direct value-added and indirect value-added, and the direct value-added amounts to the rate of employee's wages to the value of a unit of output.

[Table 14] The Value-added Multiplier: Direct and Indirect Effects

As reported in Table 14, the eating and drinking places, hotel and other lodging places sector gives the highest value of the value-added multiplier, 2.5027, and the next highest multiplier is 2.3686 in the paper and wood products sector, and 1.9032 in the spinning, weaving of textiles sector, 1.6146 in the construction sector. The direct value-added effects are relatively high in the following sectors; education and health, public administration and defense, real estate and business services, and transportation and warehousing sector. Rather, paper and wood products, printing and publishing, eating, drinking places and hotels sectors show

relatively high indirect value-added effects.

The value-added multiplier in the eating, drinking places and hotels and other lodging places sector is 2.5027, which indicates that one unit of increase in terms of value-added in the relevant sector raises 2.5027 times of the increase of the value-added across all related industries. This multiplier is equal to the ratio of total value-added effect(0.5044) to the direct value-added effect(0.2651) since the total value-added effect is the sum of the direct value-added effect(0.2072) and the indirect value-added effect(0.3112).

5. The Evaluation of the Milan Project and Some Policy Suggestions

5.1 The Region's Prospective Industries and Implications for Textile Industry

We have constructed and analyzed the Daegu Input-Output model of 1998 to figure out the properties of the region's economic structure particularly focusing on the textile industry, which has long been the key sector in Daegu economy as well as in the Korean economy during the fast growing period.

Table 15 summarizes the main outcomes stemmed from the analysis of the regional Input-Output model in terms of the power of dispersion index, the degree of sensitivity index, and three types of multipliers; output, employment, and value-added multipliers. According to Table 8, the power of dispersion index is pretty high in the following sectors; paper and wood products, printing and publishing, general machinery and equipment, public administration and defense, knitting mills sectors, while those sectors of real estate and business services, paper and wood products, finance and insurance, food and kindred products show relatively high degree of sensitivity. In addition, the sectors of agriculture, forestry and fisheries, paper and wood products, transportation and warehousing, spinning and weaving of textiles, present quite high values of the employment multipliers.

In case of the value-added multipliers, the eating and drinking places, and hotels and other lodging place, paper and wood products, spinning and weaving of textiles sectors show relatively high values of the multipliers.   Based upon the above outcomes, we can conclude the following sectors have a strong growth potential for the region's economic prosperity; transportation equipment(auto parts), paper and wood products, printing and publishing, and spinning and weaving of textiles.

As long as the four sub-sectors of the textile industry are concerned, both the spinning and weaving and knitting mills sectors generate quite significant linkage effects in the related industries, but the wearing apparels and accessories sector does little effects on the other sectors.

This outcome may be interpreted as the region's textile industry has a very weak industrial structure, that is, the region's textile industry is specialized on the middle stream such as spinning and weaving sector, which generally make low value-added, while the downstream of the industry such as high value-added sub-sectors of fashion, apparels, and design are merely developed.

[Table 15] Some Selected Industries in the Regional Economy

Rank	Power of Dispersion Index	Degree of Sensitivity	Employment Multiplier	Value-added Multiplier
1	Paper and Wood Products	Read Estate and Business Services	Agriculture, Forestry and Fisheries	Eating and Drinking Places, and Hotels and Other Lodging Places
2	Printing and Publishing	Paper and Wood Products	Paper and Wood Products	Paper and Wood Products
3	Transportation Equipment	Finance and Insurance	Transportation Equipment	Transportation Equipment
4	General Machinery and Equipment	Wholesale and Retail Trade	Construction	Printing and Publishing
5	Furniture and Miscellaneous Manufactured Products	General Machinery and Equipment	General Machinery and Equipment	Spinning, Weaving of Textiles
6	Precision Instruments	Petroleum, Coal Products and Chemicals	Communications and Broadcasting Services	General Machinery and Equipment
7	Public Administration and Defense	Food and Kindred Products	Spinning, Weaving of Textiles	Precision Instruments
8	Knitting Mills	Transportation and Warehousing	Electric, Gas and Water Services	Furniture and Miscellaneous Manufactured Products
9	Social and Personal Services	Primary Metal Products	Read Estate and Business Services	Mining and Quarrying

5.2 The Structural Adjustment in the Textile Industry: The Milan Project

As already mentioned in the above on the analysis of four categorized sub sectors of the textile industry, except that the knitting mills sector's power of dispersion index is greater one, the index is less than one in the remaining three sectors.   Unlike, considering the four sectors as one whole textile industry, both the power of dispersion and the degree of sensitivity indices are greater than one, 1.1330 and 1.2460, respectively. This contrast implies that the structure of textile industry in Daegu is biased to the up-stream away from the middle and down streams(fashion, apparels and designs).

Thus, the local government of Daegu needs to invest more in the down stream for boosting the depressed leading industry in the region. For this purpose, the local government with the help of central government propelled a promising project to revive the region's traditional key industry in 1999, which is so-called "The Milan Project".   The Milan Project put much emphasis in fashion, design and apparels rather than on fabrics and dying to shift the low value-added to high value-added structure, changing the policy of "few items and mass production system" to "diverse items and small production system".

The followings are some suggestions for the Post-Milan Project since the on-going project ends the year of 2003.

First, the post project should continuously emphasize the textile equipments and fashion and apparel sectors, therefore leading to produce more value-added and to resolve the trade deficits in that sub-sectors.   While structural improvements should be continuously made to help upgrading traditional sub-sector of spinning and weaving, structural adjustments immediately taken to foster the fashion and apparel sectors.

Second, the software in the textile industry such as operation procedure, marketing and R&D should be considered prior to the infrastructure such as Textile Development Center, Fashion Information Office, Fashion & Textile Polytechnic Institute, etc which were mainly built during the 1999~2003 period of the 1st Milan Project.   New management skills such as supply-chain management(SCM), IT-based global marketing, Quick-Response(QR) logistics, etc should be developed and implemented for the region's textile industry.

Third, it is necessary to develop world renowned brand such as Prada, Gucci and Benneton, in addition to the systematic education and training programs for producing outstanding fashion designers. This kind of effort should be highly appreciated because brand and fashion will make a great amount of value-added in the textile industry.

6. Concluding Remarks

This paper builds and analyzes the Input-Output model of Daegu to characterize the properties of the regional economy in terms of production inducement effect, forward and backward linkage effect, and three types of multipliers. This paper particularly focuses on the textile industry, the region's key leading sector, in order for providing some suggestions towards both the expected structural rearrangements of the regional economy and the structural adjustments among the sub sectors within the textile industry.

When the relative weights by industry in terms of the total output are examined, the wholesale and retail trade sector ranks the highest of 13.26%, the second one is 12.71% in the construction sector and the third is 10.89% in the spinning, weaving of textile sector. By the way, the location quotient given by the total out is the highest of 26.95 in the spinning and weaving sector, while the eating and drinking places, and hotels and other lodging places 4.75, and the social and personal services sector 2.84. Besides the general machinery and equipment, transportation and warehousing, and paper and wood products sectors are considered as being future prospective industries because they show significant linkage effects with other related sectors with the values of the power of dispersion and the degree of sensitivity indices being greater than one. Based upon the above findings, we can provide the following policy implications for the structural adjustments both between industries and within industry.

First, the transportation equipment, paper and wood products, printing and publishing, general machinery and equipment, precision instruments, spinning, weaving of textile sectors need to be considered as the region's future prospective industries since they represent very high forward and backward linkage effects as well as high multipliers. Second, the textile industry, which has long been the key sector in Daegu and is yet a dominating sector in terms of the amounts of total output, though depressed today, so that the industry should be advanced further with the incorporation of the region's comparative advantages. That is, the structural adjustments should be done toward high value-added division(fashion, apparels and design) within the industry. Third, in addition to the region's specialized sectors of transportation equipment and textile industries, other strategic industries should be developed to dampen the possible negative effects associated with the decline of the above two major industries. Fourth, the business services industry also should be further developed and advanced to support the important functions of the metropolitan city, Daegu with the population of 2.5 million. Both manufacturing and services sectors should be developed in balance. Lastly, we should invest more on the culture and sightseeing, exhibition and convention industries together with local firms' own brand and overseas marketing power in order to enhance the international competitiveness of the region.

[Figure 8] Intermediate Input and Intermediate Demand by Industry in Daegu.

	Classification	Total Output(A)	%	Intermediate Input(B)	%	Intermediate Demand(C)	%	B/A	C/A	Value-added	Employee
1	Agriculture, Forestry and Fisheries	219,306	0.67	88,824	0.50	142,115	0.80	40.5	64.8	130,482	162
2	Mining and Quarrying	9,539	0.03	6,905	0.04	57,307	0.32	72.4	600.8	2,634	169
3	Food and Kindred Products	855,436	2.63	563,051	3.19	445,719	2.52	65.8	52.1	292,385	9,368
4	Spinning, Weaving of Textiles	3,537,525	10.89	2,599,896	14.71	2,833,610	16.03	73.5	80.1	937,629	39,360
5	Knitting Mills	133,038	0.41	79,643	0.45	71,444	0.40	59.9	53.7	53,394	6,795
6	Wearing Apparels and Accessories	137,890	0.42	82,948	0.47	6,903	0.04	60.2	5.0	54,942	4,304
7	Other Textiles	224,737	0.69	122,606	0.69	83,483	0.47	54.6	37.1	102,131	8,752
8	Textile Mill Products, Apparel	10,294	0.03	6,584	0.04	4,123	0.02	64.0	40.1	3,710	370
9	Paper and Wood Products	73,524	1.46	315,190	1.78	426,713	2.41	66.6	90.1	158,335	4,712
10	Printing and Publishing	145,335	0.45	83,290	0.47	101,864	0.58	57.3	70.1	62,045	4,709
11	Petroleum, Coal Products and Chemicals	662,808	2.04	447,496	2.53	491,100	2.78	67.5	74.1	215,311	8,022
12	Nonmetallic Minerals	163,110	0.50	94,621	0.54	146,986	0.83	58.0	90.1	68,490	2,279
13	Primary Metal Products	459,210	1.41	330,571	1.87	413,813	2.34	72.0	90.1	128,639	4,626
14	Fabricated Metal Products	613,935	1.89	359,558	2.03	384,126	2.17	58.6	62.6	254,377	13,157
15	General Machinery and Equipment	1,127,001	3.47	707,591	4.00	670,785	3.80	62.8	59.5	419,410	18,619
16	Electronic and Other Electric Equipment	505,461	1.56	335,820	1.90	284,299	1.61	66.4	56.2	169,640	8,657
17	Precision Instruments	210,636	0.65	134,340	0.76	158,178	0.90	63.8	75.1	76,297	5,117
18	Transportation Equipment	1,350,017	4.15	880,815	4.98	657,526	3.72	65.2	48.7	469,201	14,033
19	Furniture and Miscellaneous Manufactured Products	129,321	0.40	74,712	0.42	63,903	0.36	57.8	49.4	54,609	4,702
20	Electric, Gas and Water Services	384,001	1.18	204,653	1.16	239,691	1.36	53.3	62.4	179,348	2,406
21	Construction	4,131,577	12.71	2,420,059	13.69	1,649,286	9.33	58.6	39.9	1,711,518	31,003
22	Wholesale and Retail Trade	4,307,334	13.26	2,107,273	11.92	2,027,016	11.47	48.9	47.1	2,200,061	132,871
23	Eating and Drinking Places, and Hotels and Other Lodging Places	1,328,192	4.09	818,031	4.63	713,776	4.04	61.6	53.7	510,161	66,421
24	Transportation and Warehousing	1,060,984	3.27	544,549	3.08	456,802	2.58	51.3	43.1	516,435	35,533
25	Communications and Broadcasting Services	966,175	2.97	372,609	2.11	556,553	3.15	38.6	57.6	593,566	5,192
26	Finance and Insurance	1,791,176	5.51	703,902	3.98	1,067,315	6.04	39.3	59.6	1,087,274	31,163
27	Real Estate and Business Services	3,494,963	10.76	1,180,678	6.68	2,052,700	11.62	33.8	58.7	2,314,285	35,278
28	Public Administration and Defense	773,970	2.38	317,791	1.80	0	0.00	41.1	0.0	456,179	28,420
29	Educational and Health Services	819,614	2.52	239,563	1.36	246,196	1.39	29.2	30.0	580,051	26,289
30	Social and Personal Services	1,764,277	5.43	844,332	4.78	739,013	4.18	47.8	41.9	1,019,945	56,588
31	Others	704,640	2.17	604,600	3.42	480,156	2.72	85.8	68.1	10	15,653
	Total	32,495,026	100	17,672,501	100	17,672,501	100	54.4	54.4	14,833,954	624,730

[Figure 9] Value-added Inducement Coefficient and Employment Inducement Coefficient.

	Classification	Value-added Inducement Coeff.	Employment Inducement Coeff.	Hawkins-Simon Condition
1	Agriculture, Forestry and Fisheries	0.7687	0.0061	0.0165
2	Mining and Quarrying	0.4642	0.0239	0.0010
3	Food and Kindred Products	0.5474	0.0164	0.0849
4	Spinning, Weaving of Textiles	0.5044	0.0190	0.0804
5	Knitting Mills	0.6309	0.0606	0.0317
6	Wearing Apparels and Accessories	0.6359	0.0435	0.0006
7	Other Textiles	0.6402	0.0483	0.0314
8	Textile Mill Products, Apparel	0.5755	0.0447	0.0094
9	Paper and Wood Products	0.7920	0.0251	0.3985
10	Printing and Publishing	0.8415	0.0470	0.0488
11	Petroleum, Coal Products and Chemicals	0.4663	0.0175	0.0734
12	Nonmetallic Minerals	0.6238	0.0213	0.0525
13	Primary Metal Products	0.4314	0.0154	0.1531
14	Fabricated Metal Products	0.6377	0.0306	0.0964
15	General Machinery and Equipment	0.6935	0.0299	0.2276
16	Electronic and Other Electric Equipment	0.4962	0.0235	0.0787
17	Precision Instruments	0.6659	0.0375	0.1504
18	Transportation Equipment	0.7006	0.0236	0.2352
19	Furniture and Miscellaneous Manufactured Products	0.7217	0.0478	0.0160
20	Electric, Gas and Water Services	0.6112	0.0105	0.0788
21	Construction	0.6688	0.0164	0.0087
22	Wholesale and Retail Trade	0.7672	0.0379	0.0208
23	Eating and Drinking Places, and Hotels and Other Lodging Places	0.5184	0.0576	0.0038
24	Transportation and Warehousing	0.9363	0.0442	0.1344
25	Communications and Broadcasting Services	0.7602	0.0093	0.0675
26	Finance and Insurance	0.7799	0.0229	0.0774
27	Real Estate and Business Services	0.8739	0.0158	0.1254
28	Public Administration and Defense	0.9355	0.0465	0.0000
29	Educational and Health Services	0.8425	0.0378	0.0097
30	Social and Personal Services	0.8619	0.0419	0.0407
31	Others	0.4188	0.0448	0.0169
	Total	0.6714	0.0312	-

[Figure 10] The Location Quotients by Industry in Daegu

	Classification	Nation		Daegu		LQ	
		Total Output(A)	Weight(B)	Total Output(C)	Weight(D)	(D/B)	(C/A)
1	Agriculture, Forestry and Fisheries	33,542,592	3.16	219,306	0.67	0.21	0.65
2	Mining and Quarrying	2,539,580	0.24	9,539	0.03	0.12	0.38
3	Food and Kindred Products	53,153,139	5.00	855,436	2.63	0.53	1.61
4	Spinning, Weaving of Textiles	4,294,071	0.40	3,537,525	10.89	26.95	82.38
5	Knitting Mills	15,828,408	1.49	133,038	0.41	0.27	0.84
6	Wearing Apparels and Accessories	14,055,516	1.32	137,890	0.42	0.32	0.98
7	Other Textiles	5,573,152	0.52	224,737	0.69	1.32	4.03
8	Textile Mill Products, Apparel	5,320,779	0.50	10,294	0.03	0.06	0.19
9	Paper and Wood Products	14,368,071	1.35	473,524	1.46	1.08	3.30
10	Printing and Publishing	7,700,446	0.72	145,335	0.45	0.62	1.89
11	Petroleum, Coal Products and Chemicals	107,168,629	10.08	662,808	2.04	0.20	0.62
12	Nonmetallic Minerals	16,763,715	1.58	163,110	0.50	0.32	0.97
13	Primary Metal Products	54,427,447	5.12	459,210	1.41	0.28	0.84
14	Fabricated Metal Products	18,761,683	1.77	613,935	1.89	1.07	3.27
15	General Machinery and Equipment	28,708,463	2.70	1,127,001	3.47	1.28	3.93
16	Electronic and Other Electric Equipment	93,604,275	8.81	505,461	1.56	0.18	0.54
17	Precision Instruments	4,751,873	0.45	210,636	0.65	1.45	4.43
18	Transportation Equipment	48,971,426	4.61	1,350,017	4.15	0.90	2.76
19	Furniture and Miscellaneous Manufactured Products	7,363,442	0.69	129,321	0.40	0.57	1.76
20	Electric, Gas and Water Services	23,398,313	2.20	384,001	1.18	0.54	1.64
21	Construction	97,469,622	9.17	4,131,577	12.71	1.39	4.24
22	Wholesale and Retail Trade	52,330,216	4.92	4,307,334	13.26	2.69	8.23
23	Eating and Drinking Places, and Hotels and Other Lodging Places	9,145,806	0.86	1,328,192	4.09	4.75	14.52
24	Transportation and Warehousing	45,080,007	4.24	1,060,984	3.27	0.77	2.35
25	Communications and Broadcasting Services	19,886,424	1.87	966,175	2.97	1.59	4.86
26	Finance and Insurance	41,855,577	3.94	1,791,176	5.51	1.40	4.28
27	Real Estate and Business Services	102,092,718	9.60	3,494,963	10.76	1.12	3.42
28	Public Administration and Defense	34,665,394	3.26	773,970	2.38	0.73	2.23
29	Educational and Health Services	55,036,636	5.18	819,614	2.52	0.49	1.49
30	Social and Personal Services	20,305,138	1.91	1,764,277	5.43	2.84	8.69
31	Others	24,795,523	2.33	704,640	2.17	0.93	2.84
	Total	1,062,958,081	100.00	32,495,026	100.00	1.00	3.06

[Table 11] The Forward and Backward Linkage Effects by Industry in Daegu

	Classification	Backward Linkage Effects	The Forward Linkage Effects
1	Agriculture, Forestry and Fisheries	0.8836	0.8246
2	Mining and Quarrying	0.9059	0.7129
3	Food and Kindred Products	0.9274	1.1197
4	Spinning, Weaving of Textiles	0.9915	0.9200
5	Knitting Mills	1.0263	0.7709
6	Wearing Apparels and Accessories	0.9898	0.6545
7	Other Textiles	0.9336	0.7349
8	Textile Mill Products, Apparel	0.9629	0.6551
9	Paper and Wood Products	1.3819	1.8388
10	Printing and Publishing	1.2774	0.7743
11	Petroleum, Coal Products and Chemicals	0.8585	1.1347
12	Nonmetallic Minerals	0.9319	0.7464
13	Primary Metal Products	0.8997	1.0003
14	Fabricated Metal Products	0.9945	0.9728
15	General Machinery and Equipment	1.1457	1.1723
16	Electronic and Other Electric Equipment	0.8805	0.7814
17	Precision Instruments	1.0709	0.8389
18	Transportation Equipment	1.2042	0.9881
19	Furniture and Miscellaneous Manufactured Products	1.1005	0.7059
20	Electric, Gas and Water Services	0.8525	0.9821
21	Construction	0.9949	0.9002
22	Wholesale and Retail Trade	0.9554	1.2246
23	Eating and Drinking Places, and Hotels and Other Lodging Places	1.0120	0.8714
24	Transportation and Warehousing	1.0042	1.0879
25	Communications and Broadcasting Services	0.8271	1.0177
26	Finance and Insurance	0.8632	1.5673
27	Real Estate and Business Services	0.9166	2.5293
28	Public Administration and Defense	1.0285	0.6464
29	Educational and Health Services	0.8520	0.8009
30	Social and Personal Services	1.0252	0.7673
31	Others	1.3007	1.2571
	Total	1.0000	1.0000

[Table 12] Output Multiplier: Direct and Indirect effects

	Classification	Production Multiplier	Direct Effect	Indirect Effect
1	Agriculture, Forestry and Fisheries	1.3669	1.2518	0.1151
2	Mining and Quarrying	1.4014	1.2577	0.1437
3	Food and Kindred Products	1.4347	1.2945	0.1402
4	Spinning, Weaving of Textiles	1.5338	1.3647	0.1691
5	Knitting Mills	1.5875	1.3907	0.1968
6	Wearing Apparels and Accessories	1.5312	1.3422	0.1890
7	Other Textiles	1.4441	1.2913	0.1529
8	Textile Mill Products, Apparel	1.4894	1.3247	0.1647
9	Paper and Wood Products	2.1376	1.5953	0.5423
10	Printing and Publishing	1.9761	1.5323	0.4437
11	Petroleum, Coal Products and Chemicals	1.3281	1.2259	0.1022
12	Nonmetallic Minerals	1.4416	1.2941	0.1474
13	Primary Metal Products	1.3918	1.2749	0.1169
14	Fabricated Metal Products	1.5384	1.3553	0.1831
15	General Machinery and Equipment	1.7724	1.4747	0.2977
16	Electronic and Other Electric Equipment	1.3619	1.2491	0.1129
17	Precision Instruments	1.6565	1.4292	0.2273
18	Transportation Equipment	1.8628	1.5102	0.3526
19	Furniture and Miscellaneous Manufactured Products	1.7024	1.4173	0.2851
20	Electric, Gas and Water Services	1.3188	1.2243	0.0944
21	Construction	1.5391	1.3517	0.1874
22	Wholesale and Retail Trade	1.4779	1.3263	0.1517
23	Eating and Drinking Places, and Hotels and Other Lodging Places	1.5655	1.3881	0.1773
24	Transportation and Warehousing	1.5533	1.3650	0.1883
25	Communications and Broadcasting Services	1.2794	1.1928	0.0866
26	Finance and Insurance	1.3353	1.2255	0.1099
27	Real Estate and Business Services	1.4179	1.2788	0.1391
28	Public Administration and Defense	1.5910	1.3524	0.2386
29	Educational and Health Services	1.3179	1.1983	0.1196
30	Social and Personal Services	1.5858	1.3756	0.2102
31	Others	2.0121	1.6650	0.3470

[Table 13] The Employment Multiplier: Direct and Indirect Effects

	Classification	Employment Multiplier	Total Effect	Direct Effect	Indirect Effect
1	Agriculture, Forestry and Fisheries	8.3450	0.0062	0.0007	0.0054
2	Mining and Quarrying	1.3535	0.0240	0.0177	0.0063
3	Food and Kindred Products	1.5063	0.0165	0.0110	0.0055
4	Spinning, Weaving of Textiles	1.7090	0.0190	0.0111	0.0079
5	Knitting Mills	1.1865	0.0606	0.0511	0.0095
6	Wearing Apparels and Accessories	1.3953	0.0436	0.0312	0.0123
7	Other Textiles	1.2403	0.0483	0.0389	0.0094
8	Textile Mill Products, Apparel	1.2456	0.0448	0.0359	0.0088
9	Paper and Wood Products	2.5239	0.0251	0.0100	0.0152
10	Printing and Publishing	1.4516	0.0470	0.0324	0.0146
11	Petroleum, Coal Products and Chemicals	1.4450	0.0175	0.0121	0.0054
12	Nonmetallic Minerals	1.5290	0.0214	0.0140	0.0074
13	Primary Metal Products	1.5323	0.0154	0.0101	0.0054
14	Fabricated Metal Products	1.4280	0.0306	0.0214	0.0092
15	General Machinery and Equipment	1.8139	0.0300	0.0165	0.0134
16	Electronic and Other Electric Equipment	1.3744	0.0235	0.0171	0.0064
17	Precision Instruments	1.5469	0.0376	0.0243	0.0133
18	Transportation Equipment	2.2799	0.0237	0.0104	0.0133
19	Furniture and Miscellaneous Manufactured Products	1.3171	0.0479	0.0364	0.0115
20	Electric, Gas and Water Services	1.6853	0.0106	0.0063	0.0043
21	Construction	2.1894	0.0164	0.0075	0.0089
22	Wholesale and Retail Trade	1.2296	0.0379	0.0308	0.0071
23	Eating and Drinking Places, and Hotels and Other Lodging Places	1.1530	0.0577	0.0500	0.0077
24	Transportation and Warehousing	1.3198	0.0442	0.0335	0.0107
25	Communications and Broadcasting Services	1.7373	0.0093	0.0054	0.0040
26	Finance and Insurance	1.3159	0.0229	0.0174	0.0055
27	Real Estate and Business Services	1.5709	0.0159	0.0101	0.0058
28	Public Administration and Defense	1.2674	0.0465	0.0367	0.0098
29	Educational and Health Services	1.1794	0.0378	0.0321	0.0058
30	Social and Personal Services	1.3077	0.0419	0.0321	0.0099
31	Others	2.0192	0.0449	0.0222	0.0226

[Table 14] The Value-added Multiplier: Direct and Indirect Effects

	Classification	Value-added Multiplier	Total Effect	Direct Effect	Indirect Effect
1	Agriculture, Forestry and Fisheries	1.2921	0.7688	0.5950	0.1738
2	Mining and Quarrying	1.6811	0.4642	0.2761	0.1881
3	Food and Kindred Products	1.6017	0.5474	0.3418	0.2057
4	Spinning, Weaving of Textiles	1.9032	0.5044	0.2651	0.2394
5	Knitting Mills	1.5720	0.6309	0.4013	0.2296
6	Wearing Apparels and Accessories	1.5959	0.6359	0.3984	0.2375
7	Other Textiles	1.4088	0.6402	0.4544	0.1858
8	Textile Mill Products, Apparel	1.5971	0.5756	0.3604	0.2152
9	Paper and Wood Products	2.3686	0.7920	0.3344	0.4576
10	Printing and Publishing	1.9713	0.8416	0.4269	0.4147
11	Petroleum, Coal Products and Chemicals	1.4356	0.4664	0.3248	0.1415
12	Nonmetallic Minerals	1.4856	0.6238	0.4199	0.2039
13	Primary Metal Products	1.5401	0.4314	0.2801	0.1513
14	Fabricated Metal Products	1.5391	0.6377	0.4143	0.2234
15	General Machinery and Equipment	1.8637	0.6936	0.3721	0.3214
16	Electronic and Other Electric Equipment	1.4787	0.4963	0.3356	0.1606
17	Precision Instruments	1.8386	0.6660	0.3622	0.3038
18	Transportation Equipment	2.0158	0.7006	0.3476	0.3531
19	Furniture and Miscellaneous Manufactured Products	1.7091	0.7217	0.4223	0.2995
20	Electric, Gas and Water Services	1.3088	0.6113	0.4671	0.1442
21	Construction	1.6146	0.6688	0.4143	0.2546
22	Wholesale and Retail Trade	1.5021	0.7672	0.5108	0.2565
23	Eating and Drinking Places, and Hotels and Other Lodging Places	2.5027	0.5184	0.2072	0.3112
24	Transportation and Warehousing	1.4705	0.9363	0.6367	0.2996
25	Communications and Broadcasting Services	1.2375	0.7603	0.6143	0.1459
26	Finance and Insurance	1.2849	0.7799	0.6070	0.1729
27	Real Estate and Business Services	1.3199	0.8740	0.6622	0.2118
28	Public Administration and Defense	1.3322	0.9355	0.7022	0.2333
29	Educational and Health Services	1.1905	0.8425	0.7077	0.1348
30	Social and Personal Services	1.4911	0.8620	0.5781	0.2839
31	Others	-	0.4189	0.0000	0.4189

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