

Determinants of Locational Choice of Manufacturing Firms in the Seoul Region: An Analysis of Survey Results****

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I. Introduction

This paper as part of the World Bank research project(RPO 672-91), "An Evaluation of Industrial Location Policies for Urban Deconcentration," presents the results from a survey of establishments conducted to study the locational choice of manufacturing firms in the Seoul region.

Using the annual manufacturing surveys compiled by the Korean National Bureau of Statistics(NBS), the location patterns of employment and their changes were extensively analyzed in another paper(Lee, 1985a); this analysis, performed in terms of births, deaths, and relocation of firms, revealed a high degree of employment location dynamics and strong evidence of the spatial decentralization of manufacturing employment in the Seoul region, as briefly described in the next section.

In order to explain these observed location patterns, a survey of manufacturing establishments was conducted in the Seoul region using the 1981 NBS manufacturing survey as the sample base. The survey questionnaire was designed to take about one hour to complete and

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did not require the respondents to look up their accounting books; still the questionnaire contained a large amount of information with over 400 computer readable variables. This paper will present most salient aspects of the survey results which provide the basis for understanding the changing location patterns of manufacturing employment summarized in the next section. The analysis in this paper is descriptive but the underlying theoretical framework is that of the previous studies on Bogota, Colombia(Lee, 1981; 1982a).

After a brief overview of the manufacturing employment location patterns in the region, the sampling strategy is briefly described and the sample outcome is summarized. In the rest of the paper, the survey results are presented in three categories of findings: (1) Establishment characteristics, (2) site characteristics, and (3) the factors considered to be important for the respondent's locational choice. These results are contrasted and compared among the sample establishments by establishment size, firm type(i.e., mature firms, births, and movers), and industries studied.⁽¹⁾

The underlying theoretical framework is that a firm of particular type will locate at a site with particular attributes in such a way that the selected location is optimal to the firm in an urban area, in terms of profits, costs, or some other criteria(Lee, 1982a). The establishment characteristics include type of products, production process, building characteristics, lot size, floor space, and skill composition of workers. The site attributes include proximities to product markets and input suppliers, commuting distance, transport modes, the quality and availability of public utilities and municipal services. The survey questionnaire prepared for this study contains a section on policy instruments used by the Korean government intended to influence firms' locational choice, which was absent in the Bogota study. The results on the effectiveness of policy instruments are reported in Lee(1985a).

II. Overview of Employment Location Patterns in the Seoul Region

In the studies of employment location in the literature, changes in location patterns in an urban area were examined by decomposing changes in the stock of employment in an area by the flows of births and deaths, relocation of jobs, and stationary growth and decline of employment.⁽²⁾ This approach by concentrating on changes at the margin is analytically

(1) The studies by Schmenner(1981) on Cincinnati and New England and by Lee(1982b) on Bogota provided the empirical framework for this study.

(2) Schmenner(1981), Struyk and James(1975), Leone(1971), Firm(1976), Dennis(1978), Mason(1980), and Lee(1981, 1982b, 1985a).

attractive since it avoids possible cross-section bias. The Seoul study also followed this approach, and the survey results reported in this paper will contrast and compare the behavioral responses by this classification of firms.

According to Chun and Lee(1985), manufacturing jobs accounted for 32 percent of employment in Seoul, which comes close to the manufacturing share of about 30 percent in large U.S. cities such as Boston, Chicago, and Los Angeles. In terms of employment dynamics, however, Seoul does not resemble large old U.S. cities like New York, Boston, or Cleveland. Table 1 indicates that the annual birth rate of firms in Bogota exceeds that of all five U.S. cities compared; Phoenix, with a birth rate of 7.6 percent, comes closest to Bogota's 8.8 percent. But the birth rate of firms in Seoul is more than twice that of Bogota; it is by far the highest even after discounting for the fact that 1978 was the cyclical peak. It should be also noted that the annual birth rate is greater than the annual death rate for Seoul, Bogota, Cali, Phoenix, and New York; the opposite is true for Boston, Minneapolis, and Cleveland. Seoul's annual rate of relocation was comparable to those of other cities.

<Table 1> Birth, Death, and Relocation Rates in Seoul, Bogota, Cali, and U.S. Cities

| | Births | | | | Deaths | | | | Movers ^{d)} | | | |
|------------------------------------|----------------|---------------------|------------|---------------------|----------------|---------------------|------------|---------------------|----------------------|--------------------|------------|--------------------|
| | Establishments | | Employment | | Establishments | | Employment | | Establishments | | Employment | |
| | % of base | Annual rate | % of base | Annual rate | % of base | Annual rate | % of base | Annual rate | % of base | Annual rate | % of base | Annual rate |
| Cleveland ^{a)} | 9.97 | 3.22 | 2.59 | 0.86 | 14.07 | 4.49 | 7.75 | 2.52 | 13.83 | 4.41 | 5.77 | 1.89 |
| Minneapolis-St. Paul ^{a)} | 12.29 | 3.94 | 6.17 | 2.02 | 18.00 | 5.67 | 11.25 | 3.62 | 15.93 | 5.05 | 8.28 | 2.69 |
| Boston ^{a)} | 6.10 | 1.99 | 1.30 | 0.43 | 13.40 | 4.28 | 8.00 | 2.60 | 9.80 | 3.17 | 4.70 | 1.54 |
| Phoenix ^{a)} | 24.40 | 7.55 | 12.10 | 3.88 | 20.20 | 6.32 | 5.30 | 1.74 | 8.90 | 2.88 | 4.70 | 1.54 |
| New York ^{b)} | 10.21 | 4.98 | 3.95 | 1.96 | 7.56 | 3.71 | 3.55 | 1.76 | 11.45 | 5.57 | 1.24 | 0.62 |
| Bogota ^{c)} | 52.38 | 8.79 | 31.96 | 5.70 | 27.01 | 4.90 | 12.61 | 2.40 | 19.12 | 3.56 | 16.59 | 3.12 |
| Cali ^{c)} | 43.13 | 7.44 | 24.48 | 4.48 | 26.88 | 4.88 | 11.27 | 2.16 | 18.33 | 3.42 | 10.40 | 2.00 |
| Seoul ^{d)} | — | 19.71 ^{e)} | — | 11.55 ^{e)} | — | 14.43 ^{e)} | — | 10.26 ^{e)} | — | 3.74 ^{f)} | — | 1.86 ^{f)} |
| Seoul Region ^{d)} | — | 22.75 ^{e)} | — | 13.11 ^{e)} | — | 13.57 ^{e)} | — | 8.59 ^{e)} | — | 4.85 ^{f)} | — | 3.00 ^{f)} |

a) From R. Struyk and F. James, *Intrametropolitan Employment Location*, Lexington Books, 1975; covered 1965~68 period(1965 was the base year).

b) From R. Leone, *Location of Manufacturing Activity in the New York Metropolitan Area*, 1971; covered 1967~69 period(1967 was the base year).

c) From Lee(1982b), covered 1970~1975 period(1970 was the base year).

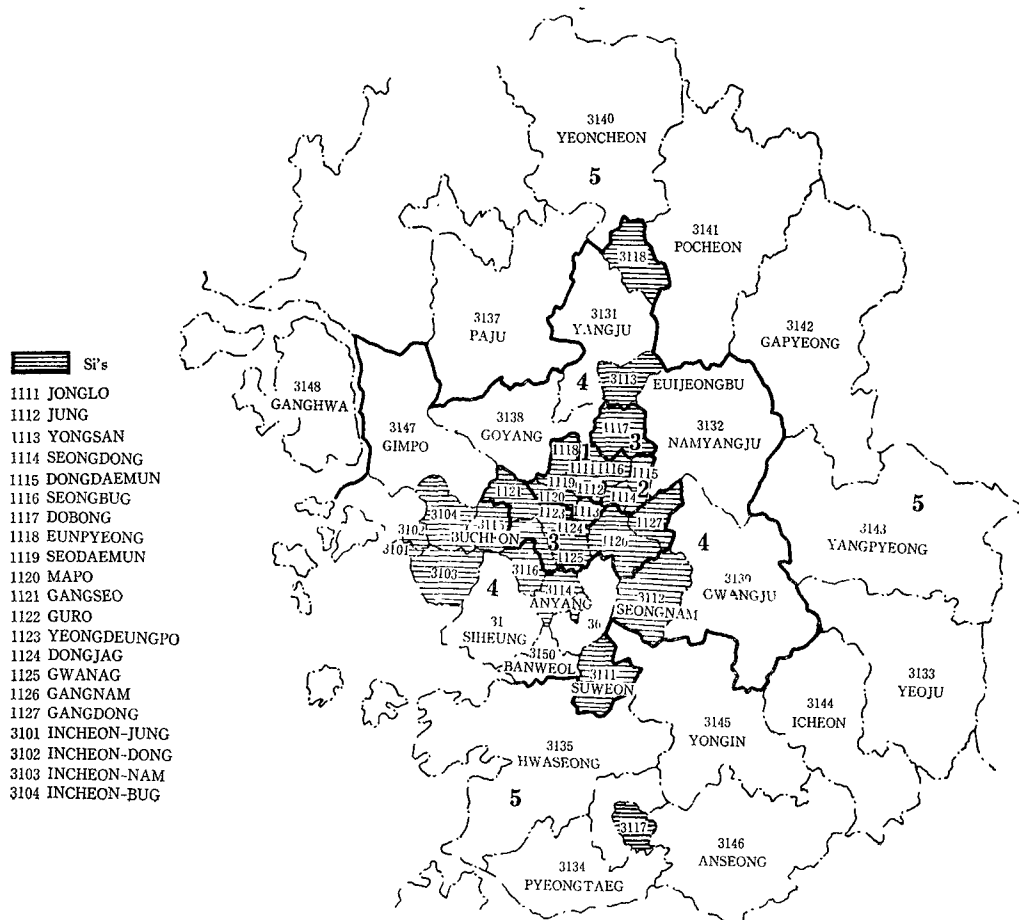
d) Seoul is the area within the city limit; the Seoul region includes Gyeonggi province where Seoul is located.

e) Rates for 1977~1978 with 1977 as the base year.

f) The annual average for 1978~1981 as percent of the base year number of establishments and employment respectively.

In all cases, the activity rates in terms of establishments are greater than the rates based on employment. This indicates that the marginal firms are small ones which have a greater propensity to move, to start up and close down business.

The Seoul region in this study includes Seoul and Gyeonggi province where Seoul is located. Seoul has 17 districts called Gu; Gyeonggi has 9 cities(Si's) and 19 counties(Gun's) including Banweol, a new industrial district. For analyzing changes in employment location patterns, these 45 subareas are aggregated into five "rings," three in Seoul and two in Gyeonggi(see Figure 1). Ring 1 is the Central Business District(CBD); Ring 2 includes Gu's in old Seoul to the north of the Han river, except for the northmost Gu that belongs to Ring 3 which includes all Gu's in South Seoul(south of the river). Ring 4 has Banweol and 8 cities except Songtan, a newly elevated Si, near the southern border of the province, and Ring 5 includes all outlying Gun's.



<Fig. 1> Ring System in the Seoul Region

<Table 2> Changes in Employment and Establishments^{a)} by Ring in the Seoul Region, 1973 and 1978

| | 1 9 7 3 | | 1 9 7 8 | | Annual Average Growth Rate (%) |
|----------------|---------|-------|-----------|-------|---|
| | Number | % | Number | % | |
| Employment | | | | | |
| Ring 1 | 45,224 | 7.8 | 30,381 | 3.0 | -7.6 |
| Ring 2 | 162,403 | 28.0 | 167,960 | 16.3 | 0.7 |
| Ring 3 | 202,289 | 34.8 | 340,826 | 33.1 | 11.0 |
| Ring 4 | 155,351 | 26.8 | 425,000 | 41.2 | 22.3 |
| Ring 5 | 15,577 | 2.7 | 67,136 | 6.5 | 33.9 |
| Total | 580,844 | 100.0 | 1,031,328 | 100.0 | 12.2 |
| Establishments | | | | | |
| Ring 1 | 1,567 | 19.0 | 1,144 | 8.8 | -6.1 |
| Ring 2 | 2,786 | 33.7 | 3,091 | 23.8 | 2.1 |
| Ring 3 | 1,479 | 17.9 | 3,515 | 27.1 | 18.9 |
| Ring 4 | 1,829 | 22.1 | 4,248 | 32.7 | 18.4 |
| Ring 5 | 608 | 7.4 | 981 | 7.6 | 10.0 |
| Total | 8,269 | 100.0 | 12,981 | 100.0 | 9.4 |

a) Establishments with 5 or more employees.

Data Source: NBS Manufacturing Survey Files.

Source: Lee (1985a).

<Table 3> Distribution of Manufacturing Employment and Establishments by Ring in the Seoul Region, 1973~1980

| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Employment ^{a)} | | | | | | | | |
| Ring 1 | 7.8 | 5.5 | 6.1 | 4.1 | 3.8 | 3.0 | 3.1 | 3.1 |
| Ring 2 | 28.0 | 26.9 | 22.5 | 20.4 | 19.3 | 16.3 | 15.2 | 14.8 |
| Ring 3 | 34.8 | 34.7 | 34.6 | 36.2 | 34.2 | 33.1 | 32.0 | 30.3 |
| Ring 4 | 26.8 | 29.9 | 33.3 | 35.0 | 37.7 | 41.2 | 42.2 | 43.4 |
| Ring 5 | 2.7 | 3.0 | 3.5 | 4.2 | 5.0 | 6.5 | 7.5 | 8.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Establishments ^{a)} | | | | | | | | |
| Ring 1 | 19.0 | 17.7 | 18.5 | 13.7 | 12.8 | 8.8 | 10.2 | 8.9 |
| Ring 2 | 33.7 | 32.5 | 26.3 | 25.6 | 26.8 | 23.8 | 21.6 | 21.3 |
| Ring 3 | 17.9 | 20.8 | 21.9 | 25.5 | 25.2 | 27.1 | 27.3 | 26.5 |
| Ring 4 | 22.1 | 22.8 | 26.6 | 28.4 | 28.8 | 32.7 | 32.8 | 34.4 |
| Ring 5 | 7.4 | 6.2 | 6.7 | 6.8 | 6.5 | 7.6 | 8.0 | 8.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

a) Establishments with 5 or more employees.

Data Source: NBS Manufacturing Survey Files.

Source: Lee (1985a).

Table 2 shows the strong decentralization of manufacturing employment in the Seoul region. During 1973~1978, the CBD(Ring 1) experienced a net loss of manufacturing jobs at an annual rate of -7.6 , but manufacturing employment grew at an accelerating rate as the distance from the city center increases. The annual growth rate of employment in Ring 5 was 34 percent! This resulted from a steady movement of manufacturing firms outward as they grew larger and needed more space. Moreover, the evidence shows that *small new* firms tended to locate in the central area where various externalities were readily available, and the birth of *large new* firms tended to take place in the outer areas of the city. In Rings 2 and 3 the annual growth rate of employment was much smaller than that of establishments while the opposite was true for Rings 4 and 5.

Table 3 shows changes in location patterns of manufacturing employment by ring over a longer period, 1973~1980. The decentralization trend was remarkably constant during the period: Rings 1, 2, and 3(i.e., Seoul) lost employment shares while Rings 4 and 5(i.e., Gyeonggi) gained their shares(see Lee, 1985a for more details).

III. Sampling Strategy and Sample Outcome

A sample of 499 manufacturing establishments interviewed in the survey was drawn from the 1981 manufacturing establishment survey file of the National Bureau of Statistics. The file contained 33,425 manufacturing establishments with five or more employees, of which 15,119 establishments were located in the Seoul region. In response to our request NBS included in the 1981 survey questionnaire additional questions, including the founding date of the establishment, the previous location, the date of relocation, and reasons for relocation. This information enabled us to take a random sample stratified by the following four categories: (1) location tenure, i.e., newly established firms(births), relocated firms(movers), and those stayed at the same location(mature firms)⁽³⁾; (2) firm size by employment; (3) the zone system defined by the 45 subareas of Gu's, Si's, and Gun's; and (4) the type of industries defined by the SIC codes.

In order to minimize the cost of sampling while having a sufficient number of observations for econometric estimation, we chose two-digit industries, the textile and the fabricated metal industries. These industries without much locational idiosyncrasy should be more amendable

(3) Births are defined as those established in 1979 or thereafter; movers are those that relocated during 1979~1981; mature firms are those established before 1979 and never moved.

to policies than some other industries such as cement or steel. Moreover, both industries had a large share of establishments in the region accounting for 52.4 percent of total manufacturing. The homogeneity of firms in each industry group makes it possible to test behavioral hypotheses with sufficient degrees of freedom (in Lee, 1985b).

The second consideration given in the sampling process was to over-sample large firms so that the number of workers included in the sample could be maximized and also to over-sample those firms relocated in response to government actions such as relocation orders. Finally, an attempt was made to cover a wide geographic area in such a way that spatial analyses could be possible covering the entire region. Our target sample size was 500 with about equal shares of establishments among the three types of location tenure.

The realized sample of 499 establishments consists of 221 mature firms, 137 births, and 141 movers (see Table 4). The average size of newly established firms was smallest (Table 6). The sample coverage across zones was satisfactory; of the 45 subareas in the region, 39 were represented. The geographic distribution of the sample firms was consistent with that of the population.

<Table 4> Sample Composition: Number of Establishments by Zone and Firm Type

| Zone | Mature | Births | Movers | Total |
|--------|--------|--------|--------|--------|
| Ring 1 | 8 | 11 | 2 | 21 |
| | 38.10 | 52.38 | 9.52 | 100.00 |
| | 3.62 | 8.03 | 1.42 | 4.21 |
| Ring 2 | 55 | 22 | 8 | 85 |
| | 64.71 | 25.88 | 9.41 | 100.00 |
| | 24.89 | 16.06 | 5.67 | 17.03 |
| Ring 3 | 65 | 32 | 15 | 112 |
| | 58.04 | 28.57 | 13.39 | 100.00 |
| | 29.41 | 23.36 | 10.64 | 22.44 |
| Ring 4 | 78 | 59 | 104 | 241 |
| | 32.37 | 24.48 | 43.15 | 100.00 |
| | 35.29 | 43.07 | 73.76 | 48.30 |
| Ring 5 | 15 | 13 | 12 | 40 |
| | 37.50 | 32.50 | 30.00 | 100.00 |
| | 6.79 | 9.49 | 8.51 | 8.02 |
| Total | 221 | 137 | 141 | 499 |
| | 44.29 | 27.45 | 28.26 | 100.00 |
| | 100.00 | 100.00 | 100.00 | 100.00 |

Source: The Project Sample Establishment Survey.

In some cases the four-way stratification severely limited the possibility of drawing sample establishments from a specific population category. For example, not enough textile firms were located in certain subareas. It should be noted here that the sample was drawn from the 1981 establishment file and the survey was taken in 1983. Some firms apparently changed their line of production during this period; the final sample included nine establishments in other industries (Table 5).

As shown in Table 6, the average size of sample firms was 115 persons, which was much larger than the average size of all establishments in the Seoul region (77 persons in 1981 according to NBS). This resulted from the sample design of over-sampling large firms. In particular, it should be noted that the average firm size of births was 60 persons compared to 27 in the population. In the sample the average firm size of movers was slightly larger than that of births, but the average size of mature firms was more than twice these two groups.

<Table 5> Sample Composition: Number of Establishments by Zone and Industry

| Zone | Textile | Fabricated Metal | Other Manufacturing ^{a)} | Total |
|--------|---------|------------------|-----------------------------------|--------|
| Ring 1 | 17 | 4 | 0 | 21 |
| | 80.95 | 19.05 | 0.00 | 100.00 |
| | 7.83 | 1.47 | 0.00 | 4.21 |
| Ring 2 | 57 | 28 | 0 | 85 |
| | 67.06 | 32.94 | 0.00 | 100.00 |
| | 26.27 | 10.26 | 0.00 | 17.03 |
| Ring 3 | 46 | 64 | 2 | 112 |
| | 41.07 | 57.14 | 1.79 | 100.00 |
| | 21.20 | 23.44 | 22.00 | 22.44 |
| Ring 4 | 76 | 158 | 7 | 241 |
| | 31.54 | 65.56 | 2.90 | 100.00 |
| | 35.02 | 57.88 | 78.00 | 48.30 |
| Ring 5 | 21 | 19 | 0 | 40 |
| | 52.50 | 47.50 | 0.00 | 100.00 |
| | 9.68 | 6.96 | 0.00 | 8.02 |
| Total | 217 | 273 | 9 | 499 |
| | 43.49 | 54.71 | 1.80 | 100.00 |
| | 100.00 | 100.00 | 100.00 | 100.00 |

a) Includes the printing, the chemical, the mineral, the basic metal industries.

Source: The Project Sample Establishment Survey.

〈Table 6〉 Sample composition: Number of Establishments by Firm Type and Establishment size

| | 1~4 ^{a)} | 5~9 | 10~19 | 20~49 | 50~99 | 100~199 | 200~299 | 300~ Over | Total |
|--------|-------------------|--------|--------|--------|--------|---------|---------|--------------|----------------------|
| Mature | 7 | 31 | 28 | 48 | 50 | 34 | 7 | 16 | 221 |
| | 3.17 | 14.03 | 12.67 | 21.72 | 22.62 | 15.38 | 3.17 | 7.24 | 100.00 |
| | 87.50 | 58.49 | 35.90 | 35.56 | 45.45 | 48.57 | 33.33 | 66.67 | 44.29 |
| | 2.86 | 6.97 | 14.39 | 32.19 | 68.34 | 130.12 | 249.14 | 1650.50 | 172.75 ^{b)} |
| Births | 1 | 14 | 28 | 46 | 25 | 13 | 5 | 5 | 137 |
| | 0.73 | 10.22 | 20.44 | 33.58 | 18.25 | 9.49 | 3.65 | 3.65 | 100.00 |
| | 12.50 | 26.42 | 35.90 | 34.07 | 22.73 | 18.57 | 23.81 | 20.83 | 27.45 |
| | 2.00 | 6.14 | 13.32 | 31.80 | 69.84 | 130.23 | 207.00 | 374.80 | 60.38 |
| Movers | 0 | 8 | 22 | 41 | 35 | 23 | 9 | 3 | 141 |
| | 0.00 | 5.67 | 15.60 | 29.08 | 24.82 | 16.31 | 6.38 | 2.13 | 100.00 |
| | 0.00 | 15.09 | 28.21 | 30.37 | 31.82 | 32.86 | 42.86 | 12.50 | 28.26 |
| | — | 7.25 | 13.00 | 33.90 | 73.43 | 143.22 | 239.00 | 378.00 | 77.18 |
| Total | 8 | 53 | 78 | 135 | 110 | 70 | 21 | 24 | 499 |
| | 1.60 | 10.62 | 15.63 | 27.05 | 22.04 | 14.03 | 4.21 | 4.81 | 100.00 |
| | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| | 2.75 | 6.79 | 13.62 | 32.58 | 70.30 | 134.44 | 234.76 | 1225.67 | 114.89 |

a) Persons.

b) The bottom number in each cell is the mean employment size of firms in that cell.

Source: The Project Sample Establishment Survey.

IV. The Survey Results

This section presents selected findings from the establishment survey in three categories: (1) Establishment characteristics, (2) site characteristics, and (3) important factors for locational choice of firms. Particular attention is given to the movers by summarizing their characteristics and the important factors that influence their choice of location. The materials are presented by comparing the three types of firms (mature, births, and movers) and by summarizing observed patterns by "ring" as the distance from the CBD increases.

1. Establishment Characteristics

Production plant. Table 7 shows several aspects of operational characteristics of the production plant. For the sample firms as a whole, more firms use a line-flow type production process housed in a single story plant. There are, however, interesting contrasts among the three types of firms. The "birth firms"⁽⁴⁾ are smaller than both movers and mature firms

(4) For convenience, the births, i.e., newly established firms, will be called the "birth firms."

〈Table 7〉 Plant Characteristics by Firm Type

| | Mature | Births | Movers | All |
|---|--------|--------|--------|-------|
| Production Process(% of estab.) | | | | |
| Line flow | 42 | 44 | 50 | 45 |
| Batch | 23 | 26 | 18 | 23 |
| Both | 25 | 18 | 25 | 23 |
| Other | 10 | 12 | 7 | 9 |
| Total | 100 | 100 | 100 | 100 |
| Average Age of Buildings(years) | 13 | 10 | 6 | 10 |
| Land Owners(% of estab.) | 76 | 47 | 78 | 69 |
| Land for Expansion at Plant Site(% of estab.) | | | | |
| Sufficient | 5 | 6 | 9 | 6 |
| Modest | 9 | 7 | 24 | 13 |
| Insufficient | 12 | 8 | 22 | 14 |
| None | 74 | 79 | 45 | 67 |
| Total | 100 | 100 | 100 | 100 |
| Number of Floor Levels(% of estab.) | | | | |
| One story | 68 | 74 | 73 | 71 |
| Two stories | 20 | 14 | 20 | 18 |
| Three stories | 6 | 8 | 2 | 6 |
| Four or more | 1 | 2 | 0 | 1 |
| Combination | 5 | 2 | 5 | 4 |
| Total | 100 | 100 | 100 | 100 |
| Number of 8-Hour Shift(% of estab.) | | | | |
| One | 81 | 88 | 85 | 84 |
| Two | 15 | 10 | 14 | 14 |
| Three | 4 | 2 | 1 | 2 |
| Total | 100 | 100 | 100 | 100 |
| Average Employment Size(persons) | (173) | (60) | (77) | (115) |
| Number of Establishments | 221 | 137 | 141 | 499 |

Source: The Project Sample Establishment Survey.

and more than a half of them are renters without having much land space for expansion. Compared with other two types of firms, a larger proportion of the birth firms tends to use a batch process type production technique on a single shift basis. The buildings used by the birth firms are much older than those of movers and tend to be more complex with a combination of single and multi-level structures. These plant characteristics of the birth firms represent those of places of manufacturing activities in the central area. These findings on the attributes of the birth firms are consistent with the "incubator hypothesis" which states

that *small new* firms tend to locate in a central area where various externalities are readily available.⁽⁵⁾ As expected, proportionately more movers tend to use modern(line-flow) production technology and have more land space for future expansion.

On the whole the plant characteristics of the birth firms are quite similar to those of the mature firms except that the latter are almost three times larger, and use more multi-story buildings, and more multi-shift operations than the former. It is possible that the birth firms tend to locate in the established industrial areas where mature firms operate(Lee, 1981).

Multi-plant operations. It is significant to note that only 31 firms(six percent) of the sample reported multi-plant operation; of these 31 establishments, 17 were the company headquarters with their main plant and only the remaining 14 were branch plants. Five firms had two branch plants while two firms had as many as five. Of a total of 18 branches reported in the survey, six were located in Seoul, eleven in Gyeonggi and one outside the region. Only five establishments of the multi-plant firms were specializing in a portion of manufacturing process, indicating the near absence of the vertical integration of production process through branch operations. We may conclude that the manufacturing industry in Korea is dominated by single-plant operations.

2. Site Characteristics

Shipments and market access. In order to assess various means of input and output shipments, the questionnaire asked the percentage distribution of the value of goods shipped by different modes of transport. The use of trucks was by far the dominating means of goods shipments; Table 8 shows that 79 percent of firms use trucks for shipping all of their final products, and 85 percent of firms receive all of their inputs delivered by truck. On the average the sample firms use trucks for the shipment of about 83 percent of inputs and 88 percent of outputs. The use of trucks by movers was much greater than the other two groups, indicating better access to roads and trucking facilities in outer areas where they recently moved to.

The use of trucks has been well documented as a major explanatory factor for the decentralization trend in the U.S. cities.⁽⁶⁾ Although the highway net work in Korea is by no means at a scale comparable to the U.S., it seems clear that the extensive use of trucks (and the decreasing importance of rail) has contributed to the decentralization trend of

(5) The "incubator hypothesis" was tested in Lee(1981) for Bogota. Struyk and James(1975) tested this hypothesis for U.S. cities.

(6) For example, Hoover and Vernon(1959), and Moses and Williamson(1967).

〈Table 8〉 Shipments of Output and Inputs by Firm Type

| | Mature | Births | Movers | All |
|--|--------|--------|--------|--------|
| Output Shipped by Truck(% of estab.) | | | | |
| Less than 50% | 1.8 | 0 | 1.4 | 1.2 |
| 50~74% | 3.2 | 0 | 2.1 | 2.0 |
| 75~99% | 4.5 | 2.2 | 2.8 | 3.4 |
| 100% | 73.3 | 81.8 | 84.4 | 78.8 |
| n.a. | 17.2 | 16.1 | 9.2 | 14.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| (Mean) ^{a)} | (79.4) | (83.8) | (88.5) | (83.2) |
| Inputs Shipped by Truck(% of estab.) | | | | |
| Less than 50% | 2.3 | 1.5 | 0.7 | 1.6 |
| 50~74% | 1.8 | 0.7 | 3.6 | 2.0 |
| 75~99% | 2.7 | 0.7 | 2.1 | 2.0 |
| 100% | 81.0 | 84.7 | 90.8 | 84.8 |
| n.a. | 12.2 | 12.4 | 2.8 | 9.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| (Mean) ^{a)} | (84.8) | (85.9) | (94.6) | (87.9) |
| Outputs Sold in Seoul ^{b)} (% of estab.) | | | | |
| Less than 25% | 14.5 | 11.0 | 17.0 | 14.2 |
| 25~49% | 7.2 | 8.8 | 20.6 | 11.4 |
| 50~74% | 19.5 | 11.0 | 25.5 | 18.8 |
| 75~100% | 27.6 | 31.4 | 20.6 | 26.7 |
| n.a. | 31.2 | 38.0 | 16.3 | 28.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| (Mean) ^{a)} | (42.5) | (40.4) | (43.2) | (42.1) |
| Inputs Bought in Seoul ^{b)} (% of estab.) | | | | |
| Less than 25% | 7.3 | 8.7 | 9.9 | 9.8 |
| 25~49% | 8.1 | 5.8 | 6.4 | 7.0 |
| 50~74% | 9.9 | 8.0 | 19.9 | 12.2 |
| 75~100% | 48.0 | 48.9 | 45.4 | 47.5 |
| n.a. | 26.7 | 28.5 | 18.4 | 24.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| (Mean) ^{a)} | (56.2) | (55.8) | (59.9) | (57.2) |
| Number of Establishments | 221 | 137 | 141 | 499 |

a) The average percent of the value of output or inputs for categories of firms.

b) Includes the city of Seoul only.

Source: The Project Sample Establishment Survey.

manufacturing employment in the Seoul region. It is remarkable to note that only one firm uses rail for shipping all of its output and six more firms for only a small portion. For the shipment of raw material inputs, however, only one firm indicated that it receives its inputs

by rail, but only about 20 percent.

In large cities in developed countries, the manufacturing sector tends to be an "export" sector (Lowry, 1964). In the Seoul region on the average the sample firms export (to outside the region) only 58 percent of their outputs and import 43 percent of inputs (Table 8). The birth firms are more oriented to the local markets for both output and inputs than the other two groups. On the whole it seems difficult to classify the manufacturing industries as the export sector in Seoul. According to Schmenner (1981), in Cincinnati, for example, manufacturing firms exported between 70 to 90 percent of their output depending on the

<Table 9> Evaluation of Present Location by Firm Type

| | Mature | Births | Movers | All |
|---|--|--------|--------|-----|
| | (Percent of Establishments in Each Type) | | | |
| "Very Satisfied" ^{a)} with: | | | | |
| Land Space | 14 | 9 | 18 | 14 |
| Building Space | 9 | 6 | 12 | 9 |
| Cost of Land for Expansion | 6 | 4 | 4 | 5 |
| Availability of Skilled Workers | 2 | 4 | 4 | 3 |
| Availability of Unskilled Workers | 2 | 4 | 5 | 3 |
| Quality of Public Utilities ^{b)} | 9 | 7 | 6 | 8 |
| Quality of Municipal Services ^{c)} | 15 | 15 | 13 | 14 |
| Highway Access | 24 | 23 | 18 | 22 |
| Railroad Access | 6 | 10 | 7 | 7 |
| Proximity to Clients | 10 | 16 | 3 | 10 |
| Proximity to Suppliers | 16 | 20 | 5 | 14 |
| Amenities of Zone | 24 | 18 | 26 | 23 |
| Rent Payment | 2 | 3 | 1 | 2 |
| Cost of Skilled Workers | 2 | 4 | 4 | 3 |
| Cost of Unskilled Workers | 3 | 4 | 3 | 3 |
| Cost of Public Services | 6 | 3 | 4 | 5 |
| Proximity to Competitors | 11 | 12 | 6 | 10 |
| Land Expandability | 5 | 3 | 5 | 4 |
| Proximity to Business Services | 15 | 21 | 8 | 15 |
| Property Tax Burden | 3 | 7 | 20 | 7 |
| Cost of Municipal Services | 9 | 4 | 10 | 7 |
| Security | 24 | 18 | 14 | 20 |
| Recreation Facilities | 5 | 4 | 1 | 4 |
| Community Attitudes | 13 | 15 | 9 | 12 |
| Number of Establishments | 221 | 137 | 141 | 499 |

a) The questionnaire offered three possible responses: very satisfied, satisfied, not satisfied.

b) Electricity, Water, etc.

c) Police, fire protection, etc.

Source: The Project Sample Establishment Survey.

size of the firm; the mover firms with 100 or more employees in that city exported 95 percent of their outputs.

Evaluation of present location. In order to evaluate the conditions of the present location, the respondent was asked to state whether he *feels* very satisfied, more or less satisfied, or dissatisfied with respect to various locational attributes. Table 9 reports the percent of firms in each firm type that answered "very satisfied" with respect to each individual attribute. For example, 14 percent of the mature firms responded "very satisfied" with respect to land space at the present site. As a whole, the sample firms were "very satisfied" with highway

〈Table 10〉 Evaluation of Present Location by Zone

| | Ring 1 | Ring 2 | Ring 3 | Ring 4 | Ring 5 | All |
|---|--------|--------|--------|--------|--------|-----|
| "Very satisfied" ^{a)} with: | | | | | | |
| Land Space | 0 | 5 | 4 | 17 | 48 | 14 |
| Building Space | 0 | 5 | 5 | 10 | 25 | 9 |
| Cost of Land for Expansion | 0 | 0 | 0 | 6 | 25 | 5 |
| Availability of Skilled Workers | 5 | 6 | 1 | 3 | 0 | 3 |
| Availability of Unskilled Workers | 5 | 6 | 1 | 4 | 0 | 3 |
| Quality of Public Utilities ^{b)} | 0 | 13 | 6 | 7 | 13 | 8 |
| Quality of Municipal Services ^{c)} | 33 | 19 | 13 | 10 | 28 | 14 |
| Railroad Access | 0 | 6 | 5 | 7 | 20 | 7 |
| Highway Access | 0 | 4 | 27 | 21 | 65 | 22 |
| Proximity to Clients | 52 | 12 | 12 | 5 | 8 | 10 |
| Proximity to Suppliers | 67 | 19 | 17 | 9 | 18 | 14 |
| Amenities of Zone | 5 | 12 | 13 | 26 | 70 | 23 |
| Rent Payment ^{d)} | 0 | 5 | 0 | 2 | — | 2 |
| Cost of Skilled Workers | 5 | 4 | 2 | 4 | 0 | 3 |
| Cost of Unskilled Workers | 5 | 4 | 3 | 3 | 3 | 3 |
| Cost of Public Services | 0 | 7 | 5 | 3 | 10 | 5 |
| Proximity to Competitors | 14 | 9 | 9 | 7 | 25 | 10 |
| Land Expandability | 0 | 0 | 2 | 3 | 28 | 4 |
| Proximity to Business Services | 57 | 31 | 14 | 8 | 3 | 15 |
| Property Tax Burden | 5 | 2 | 3 | 14 | 10 | 7 |
| Cost of Municipal Services | 5 | 1 | 5 | 5 | 30 | 7 |
| Security | 33 | 31 | 15 | 15 | 35 | 20 |
| Recreation Facilities | 24 | 4 | 5 | 2 | 3 | 4 |
| Community Attitudes | 0 | 7 | 12 | 11 | 38 | 12 |
| Number of Establishments | 21 | 85 | 112 | 241 | 40 | 499 |

a) The questionnaire offered three responses: very satisfied, satisfied, not satisfied.

b) Electricity, water, etc.

c) Police, fire protection, etc.

d) Owners' responses included.

Source: The Project Sample Establishment Survey.

access, proximities to suppliers and business services, land space, amenities, and municipal services, while dissatisfied with the availability of both skilled and unskilled workers, and the cost of public services.

As expected, a much larger proportion of the recent movers felt "very satisfied" with land and building space than the birth and mature firms. However, only a few movers responded "very satisfied" with respect to proximities to clients, suppliers, and business services; proportionately more birth firms were satisfied with these attributes and railroad access indicating their tendency to locate in the central area.

The information in Table 9 was processed according to the zone of location (by ring) and reported in Table 10. The level of satisfaction increases with the distance from the center with respect to land and building space, highway access, amenities, and the cost of municipal services. The opposite is true for the availability of skilled and unskilled workers and the quality of municipal services; in particular, as the distance increases the level of satisfaction declines rapidly with respect to proximities to clients, suppliers, and business services, and also for recreation facilities. These findings support the hypothesis that the rapid decentralization of manufacturing jobs in the region has not been accompanied by adequate housing development and public investment for infrastructure and other urban services.

The Quality of Public Infrastructure Services was more closely evaluated in the survey. Table 11 shows the quality variations by ring in the region. For all items listed, the quality of services declines markedly as the distance from the CBD increases. This again confirms that public policies for infrastructure investment have been lagging behind the increasing demand for better quality services as both jobs and people move to outer areas.

〈Table 11〉 Quality of Public Infrastructure Services by Zone

| | Ring 1 | Ring 2 | Ring 3 | Ring 4 | Ring 5 | All |
|--|--|--------|--------|--------|--------|-----|
| | (Percent of Establishments in Each Ring) | | | | | |
| Electricity Never Interrupted | 67 | 57 | 58 | 35 | 28 | 47 |
| Water Never Interrupted | 71 | 85 | 83 | 49 | 15 | 61 |
| Excellent Telephone Service | 100 | 76 | 53 | 46 | 58 | 56 |
| Excellent Telegraph Service | 71 | 41 | 14 | 25 | 5 | 26 |
| Excellent Garbage Collection Service ^{a)} | 19 | 11 | 10 | 7 | 10 | 9 |
| Excellent Fire Protection | 57 | 58 | 39 | 25 | 35 | 36 |
| Number of Establishments | 21 | 85 | 112 | 241 | 40 | 499 |

a) 178 firms responded as using municipal services.

Source: The Project Sample Establishment Survey.

3. Important Factors for Location Choice

Characteristics of movers. As shown in Table 12, for the majority of firms in both industries, the condition of the plant at the previous location was either cramped or worn out. Only a small number of firms had still serviceable plants. Most movers went through changes in production technology. The fabricated metal industry, however, experienced less changes in technology; as much as 22 percent of firms in this industry kept the same production method after move. In the case of the textile industry the plant relocation accompanied substantial changes in technology.

The fabricated metal industry, with less changes in production technology, was able to retain more workers after relocation than the textile industry. For all sample firms, 80 percent of employees stayed with the same establishment after relocation.

〈Table 12〉 Characteristics of Movers

| | Textiles | Fabricated Metal | Other Manufacturing | Total |
|--------------------------------------|-----------------------------|------------------|---------------------|-------|
| | (Percent of Establishments) | | | |
| Condition of Previous Plant | | | | |
| Good but cramped | 40 | 43 | 100 | 43 |
| Good but obsolete | 3 | 6 | 0 | 5 |
| Still serviceable | 20 | 7 | 0 | 10 |
| Worn out | 37 | 43 | 0 | 41 |
| n.a. | 0 | 1 | 0 | 1 |
| Total | 100 | 100 | 100 | 100 |
| Change in Technology After Move | | | | |
| Considerably | 9 | 11 | 0 | 10 |
| Moderately | 80 | 66 | 50 | 70 |
| No Change | 11 | 22 | 50 | 20 |
| n.a. | 0 | 1 | 0 | 0 |
| Total | 100 | 100 | 100 | 100 |
| Percent of Workers Stayed After Move | | | | |
| Less than 50% | 23 | 19 | 50 | 20 |
| 50~99% | 49 | 40 | 0 | 42 |
| 100% | 23 | 39 | 50 | 35 |
| n.a. | 5 | 2 | 0 | 3 |
| Total | 100 | 100 | 100 | 100 |
| (Mean) ^{a)} | (76) | (82) | (70) | (80) |
| Number of Establishments | 35 | 104 | 2 | 141 |

a) Average percent of the number of workers who stayed after move.
Source: The Project Sample Establishment Survey.

〈Table 13〉 Distance of Move by Employment Size: Seoul and Gyeonggi

| | | 1~24 Persons | 25~99 Persons | 100 or more Persons | Total |
|--------------------------|--------------|-----------------|------------------|------------------------|--------|
| Seoul | 1~ 2km | 50.0% | 58.3% | — | 48.0% |
| | 3~ 5 | 30.0 | — | 33.3 | 16.0 |
| | 6~10 | 10.0 | 8.3 | 33.3 | 12.0 |
| | 11~15 | 10.0 | 8.3 | 33.3 | 12.0 |
| | 16~20 | — | 25.0 | — | 12.0 |
| | Total | 100.0 | 100.0 | 100.0 | 100.0 |
| | (Mean in km) | (4.3) | (7.5) | (8.3) | (6.3) |
| Number of Establishments | | 10 | 12 | 3 | 25 |
| Gyeonggi | 1~ 2km | 7.4% | 1.8% | — | 2.6% |
| | 3~ 5 | 3.7 | 1.8 | — | 1.7 |
| | 6~10 | 3.7 | 5.3 | — | 3.5 |
| | 11~15 | — | 10.5 | 3.1 | 6.0 |
| | 16~20 | 11.1 | 3.5 | 9.4 | 6.9 |
| | 21~25 | 11.1 | 1.8 | 3.1 | 4.3 |
| | 26~30 | 14.8 | 10.5 | 9.4 | 11.2 |
| | 31~35 | 11.1 | 10.5 | 9.4 | 10.3 |
| | 36~40 | 14.8 | 14.0 | 18.8 | 15.5 |
| | 41~50 | 7.4 | 14.0 | 12.5 | 12.1 |
| | 51~60 | 14.8 | 17.5 | 21.9 | 18.1 |
| | 61 or more | — | 8.8 | 12.5 | 7.8 |
| | Total | 100.0 | 100.0 | 100.0 | 100.0 |
| | (Mean in km) | (31.9) | (39.0) | (44.6) | (38.9) |
| Number of Establishments | | 27 | 57 | 32 | 116 |

Source: The Project Sample Establishment Survey.

Table 13 shows that the moving distance increases with firm size.⁽⁷⁾ This was true for both Seoul and Gyeonggi. Within Seoul most of small firms moved about 1 to 2 kilometers while large ones more than 5 kilometers. The average moving distance was many times longer in Gyeonggi than Seoul. The general pattern of moving distance by firm size holds when the sample firms from Seoul and Gyeonggi are pooled in Table 14.

Important Location Factors for Movers. In order to examine the experiences of the movers after relocation, the respondent was asked to evaluate changes in various attributes of the establishment and the plant site. Table 15 lists these attributes and reports to what extent they changed after relocation. First, we note that in terms of median percent increase after move, plant space, land space, and the commuting distance of managers increased most, each

(7) This confirms the similar findings by Moses and Williamson(1967) and Schmenner(1982).

〈Table 14〉 Distance of Move by Employment Size the Seoul Region

| km | 1~24 Persons | 25~99 Persons | 100 or more Persons | Total |
|-------------------------|-----------------|------------------|------------------------|--------|
| 1~ 2 | 18.9% | 11.6% | — | 10.6% |
| 3~ 5 | 10.8 | 1.5 | 2.9 | 4.3 |
| 6~10 | 5.4 | 5.8 | 2.9 | 5.0 |
| 11~15 | 2.7 | 10.1 | 5.7 | 7.1 |
| 16~20 | 8.1 | 7.3 | 8.6 | 7.8 |
| 21~25 | 8.1 | 1.5 | 2.9 | 3.6 |
| 26~30 | 10.8 | 8.7 | 8.6 | 9.2 |
| 31~35 | 8.1 | 8.7 | 8.6 | 8.5 |
| 36~40 | 10.8 | 11.6 | 17.1 | 12.8 |
| 41~50 | 5.4 | 11.6 | 11.4 | 9.9 |
| 51~60 | 10.8 | 14.5 | 20.0 | 14.9 |
| 61 or more | — | 7.3 | 11.4 | 6.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| (Mean in km) | (24.5) | (33.5) | (41.5) | (33.1) |
| Number of Establishment | 37 | 69 | 35 | 141 |

Source: The Project Sample Establishment Survey.

〈Table 15〉 Experiences After Relocation of Movers

| | Percent of Movers ^{a)} | | | | |
|------------------------------|---------------------------------|------------------|------------------|------|------------------------------------|
| | After <Before | After =Before | After >Before | n.a. | Median % Increase ^{b)} |
| Production | 18.4 | 6.4 | 69.5 | 5.7 | 18.0 |
| Plant space | 2.1 | 6.4 | 82.9 | 8.5 | 100.0 |
| Land space | 2.1 | 4.3 | 87.2 | 4.3 | 100.0 |
| Rent Payment | 2.8 | 5.0 | 13.5 | 78.7 | 20.0 |
| Number of skilled workers | 11.4 | 14.9 | 57.5 | 16.3 | 17.5 |
| Wage of skilled workers | 1.4 | 7.1 | 80.1 | 11.4 | 20.0 |
| Number of unskilled workers | 13.5 | 12.1 | 52.5 | 18.9 | 20.0 |
| Wage of unskilled workers | 0.7 | 7.8 | 73.8 | 17.7 | 20.0 |
| Distance to work by managers | 15.6 | 9.2 | 53.2 | 22.0 | 100.0 |
| Distance to work by workers | 29.3 | 16.3 | 30.5 | 22.8 | 10.0 |
| Distance of product shipment | 6.4 | 18.4 | 53.9 | 21.3 | 10.0 |
| Distance of input delivery | 6.4 | 14.2 | 57.5 | 22.0 | 30.0 |
| Profits | 38.3 | 9.2 | 33.3 | 19.2 | 0.0 |
| Local tax payment | 26.2 | 19.2 | 24.8 | 29.8 | 0.0 |
| Cost of public services | 9.2 | 24.8 | 31.2 | 34.8 | 0.0 |

a) 141 Movers of the Sample; sum equals 100% for each item.

b) Median of actual percent increase after move among all firms responded.

Source: The Project Sample Establishment Survey.

〈Table 16〉 Important Factors for Choosing Present Location(Percent of Movers)

| Factors | Order of Importance ^{a)} | | |
|-----------------------------------|-----------------------------------|-------|-------|
| | 1st | 2nd | 3rd |
| Land space | 15.6 | 10.6 | 5.0 |
| Building space | 10.6 | 7.8 | 2.8 |
| Rent payment | 2.8 | 2.8 | 1.4 |
| Availability of skilled workers | 3.6 | 2.1 | 4.3 |
| Cost of skilled workers | 0.7 | — | — |
| Availability of unskilled workers | 0.7 | 1.4 | 0.7 |
| Cost of unskilled workers | — | — | — |
| Cost of public services | — | 0.7 | 0.7 |
| Quality of public services | 0.7 | 0.7 | 4.3 |
| Proximity of suppliers | 5.0 | 2.1 | 5.0 |
| Proximity of clients | 7.1 | 6.4 | 1.4 |
| Proximity of competitors | 0.7 | 0.7 | 1.4 |
| Highway access | 2.1 | 2.1 | 4.3 |
| Railroad access | — | — | — |
| Land expandability | 1.4 | 0.7 | 0.7 |
| Cost of lot for expansion | 1.4 | 1.4 | 2.1 |
| Proximity to business services | — | 0.7 | — |
| Property tax burden | 1.4 | 0.7 | 1.4 |
| Municipal services | — | — | — |
| Cost of municipal services | 0.7 | — | — |
| Security | — | — | — |
| Amenity of environment | 1.4 | 2.8 | 2.8 |
| Recreation facility | 0.7 | 0.7 | — |
| Community attitudes | — | 0.7 | — |
| Purchasing price of lot | 16.3 | 8.5 | 4.3 |
| Simpleness of lot purchase | 2.1 | 2.8 | — |
| Distance to Seoul | 5.7 | 7.8 | 3.6 |
| Distance of relocation | 0.7 | — | — |
| Industrial area | 2.1 | 1.4 | 0.7 |
| Access to government services | 7.8 | 1.4 | 2.1 |
| Prospect of future development | — | 5.0 | 2.8 |
| Other | 7.1 | 4.3 | 1.4 |
| Missing | 3.6 | 23.4 | 46.8 |
| Total | 100.0 | 100.0 | 100.0 |

a) Of 141 movers, 136 responded to 1st, 108 to 2nd, 75 to 3rd.

Source: The Project Sample Establishment Survey.

by 100 percent. Although the majority of firms experienced an increase in the input delivery distance and the product shipment distance, the median value of actual increases was small. The commuting distance of workers also did not change much. This does not mean that

〈Table 17〉 Changes in Quality of Public Services After Relocation(Percent of Movers)

| | Substantially Improved | Somewhat Improved | Unchanged | Became Worse | n.a |
|------------------|------------------------|-------------------|-----------|--------------|------|
| Electricity | 16.3 | 31.2 | 46.1 | 5.7 | 0.7 |
| Water | 12.1 | 28.4 | 39.0 | 19.2 | 1.4 |
| Fire protection | 7.8 | 22.0 | 57.5 | 10.6 | 2.1 |
| Police Service | 4.2 | 15.6 | 58.9 | 19.9 | 1.4 |
| Sewerage | 11.4 | 34.4 | 31.9 | 22.0 | 0.7 |
| Waste Removal | 7.8 | 31.9 | 36.9 | 22.7 | 0.7 |
| Road Maintenance | 7.8 | 24.1 | 39.7 | 27.7 | 0.7 |
| Telephone | 6.4 | 19.9 | 30.5 | 42.6 | 0.7 |
| Telegraph | 3.6 | 9.9 | 44.0 | 9.2 | 33.3 |

Source: The Project Sample Establishment Survey.

〈Table 18〉 Relocation, Branch Operation, on-site Expansion of Mature firms by Employment size (Percent of Establishments)

| | Less than 25 persons | 25~99 Persons | 100 or more Persons | All |
|-------------------------------------|----------------------|---------------|---------------------|-------|
| Relocation Considered Since 1979 | | | | |
| No | 64.9 | 57.5 | 73.7 | 64.3 |
| Yes | 33.8 | 39.1 | 26.3 | 33.9 |
| n.a. | 1.3 | 3.4 | 0.0 | 1.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Branch Considered Since 1979 | | | | |
| No | 93.5 | 83.9 | 82.5 | 86.9 |
| Yes | 6.5 | 12.6 | 17.5 | 11.8 |
| n.a. | 0.0 | 3.5 | 0.0 | 1.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Branch Opened Since 1979 | | | | |
| No | 96.1 | 92.0 | 87.7 | 92.3 |
| Yes | 2.6 | 3.5 | 5.3 | 3.6 |
| n.a. | 1.3 | 4.5 | 7.0 | 4.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Expanded on Present Site Since 1979 | | | | |
| No | 89.6 | 75.9 | 71.9 | 79.6 |
| Yes | 10.4 | 18.4 | 28.1 | 18.1 |
| n.a. | 0.0 | 5.7 | 0.0 | 2.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Average Firm Size(Persons) | (11) | (54) | (572) | (173) |
| Number of Establishments | 77 | 87 | 57 | 221 |

Source: The Project Sample Establishment Survey.

these distance factors were unimportant for location choice; it is more likely that these factors were so important that the firms tended to move without affecting proximities to the markets and suppliers and access to labor.

Table 16 lists a number of factors that should influence the location choice. The respondents were asked to pick three factors in the order of importance. Land price, and land building space were most important, followed by proximities to clients and suppliers, and access to government services(which are available in Seoul). Relative to these attributes, the availability of workers, wage costs, and the quality and costs of public services were unimportant.

<Table 19> Future Expansion and Relocation Plans by Firm type and Employment size(Percent of Establishment)

| | Mature | Births | Movers | All |
|-------------------------------|-------------------------|------------------|------------------------|-------|
| Plan to Expand Next 5 Years | | | | |
| No | 77.4 | 83.2 | 64.5 | 75.4 |
| Yes | 20.8 | 16.1 | 31.2 | 22.4 |
| n.a. | 1.8 | 0.7 | 4.3 | 2.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Plan to Relocate Next 5 Years | | | | |
| No | 63.4 | 65.0 | 82.3 | 69.1 |
| Yes | 33.0 | 29.9 | 13.5 | 26.7 |
| n.a. | 3.6 | 5.1 | 4.2 | — |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of Establishments | 221.0 | 137.0 | 141.0 | 499.0 |
| | Less than 25 persons | 25~99 Persons | 100 or more Persons | All |
| Plan to Expand Next 5 years | | | | |
| No | 86.0 | 73.3 | 62.6 | 75.4 |
| Yes | 12.0 | 24.0 | 34.8 | 22.4 |
| n.a. | 1.2 | 2.7 | 2.6 | 2.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Plan to Relocate Next 5 Years | | | | |
| No | 61.1 | 68.7 | 81.7 | 69.1 |
| Yes | 37.1 | 25.8 | 12.1 | 26.7 |
| n.a. | 1.8 | 5.5 | 5.2 | 4.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Average Firm Size(Persons) | (173) | (60) | (77) | (115) |
| Number of Establishments | 167 | 217 | 115 | 499 |

Source: The Project Sample Establishment Survey.

In Table 17, it is significant to note that the quality of public utilities and municipal services did not improve substantially after relocation for the majority of firms, which is consistent with the findings on the important location factors above. Moreover, a substantial number of firms felt that the quality of services became worse; the telephone service was affected most. Electricity, water, and sewerage showed some improvement after relocation. The overall picture implies that in the Seoul region the public infrastructure services play an insignificant role in influencing location choice of movers; it may also reflect the ineffectiveness of spatial policies intended to induce industries to certain areas.

Plans to expand and relocate should reflect the extent of the locational dynamics, i.e., the need for adjustment toward a locational equilibrium in an urban area. About a third of the mature firms in the sample indicated that they seriously considered relocation, and 12 percent considered opening branch plants (Table 18). Larger firms tend to have less propensity to move but a greater probability of starting branch operations. While only a few firms actually opened branch plants during this period, a larger number of establishments had on-site expansion.

Table 19 shows that for the sample establishments as a whole including all types of firms, 27 percent indicated having a plan to relocate in the next five years, which amounts to an annual relocation rate of about five percent, that is consistent with what was observed in Table 1. It is interesting to note that proportionately more recent movers showed the propensity to expand on site than mature and birth firms, but a larger proportion of the latter groups however had relocation plans compared to recent movers. The table also shows that large firms tend to expand at the same location while small firms tend to relocate, which again confirms the hypothesis that small firms operate in the central areas.

V. Summary of Findings and Concluding Remarks

A survey of 499 manufacturing establishments was conducted in the Seoul region to study factors that influence the locational choice of individual firms. This paper presented selected findings from the establishment survey in order to understand and explain the observed aggregate patterns of manufacturing employment location in the region (Lee, 1985a).

The survey results revealed the following characteristics of manufacturing establishments: The industry is dominated by single-plant operations with a moderate production scale. The majority of the establishments uses a line-flow type production process housed in a single

story plant and operates on a one-shift basis. The newly established firms (i.e., births) are small and tend to operate in more complex building structures; for them, a batch process type production technique is more common. Most shipments of inputs and final products are made by trucks; rail is seldom used. These characteristics of small new firms are consistent with the "incubator hypothesis" that their birth place tends to be in central areas of the city where various externalities are readily available.

The sample establishments as a whole export less than 60 percent of their products to outside the region. It would be difficult to treat the manufacturing industries in Seoul as the "export sector" in the Lowry (1964) context. The lack of multi-plant operations and the moderate production scale seem to be consistent with the local market orientation of manufacturing establishments in Seoul.

The majority of firms expressed their satisfaction with respect to highway access, proximities to suppliers and business services, while dissatisfied with the availability of workers, and the costs of public services. As expected, the level of satisfaction increases with the distance from the center with respect to land and building space, highway access, and amenities, and it decreases with respect to proximities to clients, suppliers, and business services. The quality of infrastructure services declines markedly as the distance from the CBD increases.

In general the plant relocation tends to accompany changes in production technology. Twenty percent of movers kept the same production method after relocation, however. For the majority of movers, the distance moved within Seoul was fairly short, about 1~2 kilometers; the large size firms moved longer distances. Eighty percent of workers stayed with the firm after relocation. The movers substantially increased both plant and land space at the new location and experienced a significant increase in the commuting distance of managers. For the majority of the firms, however, both input and output delivery distances and the commuting distance of production workers stayed about the same after move. Land price and land and building space were the most important factors in the firm's locational choice, followed by proximities to clients and suppliers, and access to government services. Public infrastructure services seem to play an insignificant role in influencing the firms' locational choice when they move.

Twenty-seven percent of sample firms indicated a plan to relocate within the next five years; proportionately more birth and mature firms showed the propensity to relocate than recent movers. Large firms tend to choose on-site expansion while small firms tend to

relocate.

The survey findings on the individual firm behavior support the changing location patterns of employment summarized in Section 2, and provide a substantial amount of explanations for the observed patterns, in particular, the decentralization of employment in the region. It should be also noted that many of the results on Seoul are similar to those obtained by Schmenner(1982) for U.S. cities and Lee(1982b) on Bogota. Finally, the survey results are of an acceptable quality in terms of the sample composition and the stochastic properties. The econometric estimation of a model of firm location using this data set is presented in another paper(Lee, 1985b).

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