

Spatial Characteristics of the Manufacturing Industry and their Policy Implications for the Industrial Development in Indonesia

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I. INTRODUCTION

A location decision is considered to be one of the most important considerations in starting a manufacturing enterprise. It is usually based on a variety of factors concerning location. These locational factors vary from manufacturer to manufacturer depending on types of goods produced, types of raw materials used, kinds and nature of technologies employed, and so forth. While economic factors such as revenues and costs are thought to be of most importance, non-economic factors may sometimes determine the choice of manufacturing location. A geographical distribution of manufacturing establishments is a spatial realization of locational decisions made by various types of manufacturing entrepreneurs, and these are based on a variety of economic and non-economic factors along with locational conditions revealed by each region concerned.

As an archipelago consisting of some 13,000 islands of various size, Indonesia has shown an interesting spatial profile in population and economic activity. The most astonishing fact is that Jawa island, constituting mere 6.9% of the total land area, accommodates 62% of the total population and accounts for 86% of the total employment in the medium & large scale manufacturing sector. These geographical patterns of distribution have been formed through dynamic spatial processes of various types of interacting activities. With a given distribution of natural resources, one of the fundamental questions is how to control these dynamic processes to achieve a more desirable spatial pattern. The desirable pattern may change depending on the overall economic and social conditions, which usually change over time.

What is essential here is a future perspective on spatial development with an accurate forecast on the environment. Considering that most of the activities cannot be controlled directly by the government, it is thus very important to know how they behave spatially and what are the key factors affecting their behaviors.

The primary purpose of the paper is to identify key factors influencing the locational decisions of manufacturing entrepreneurs and thereby suggest effective policy options in industrial development in Indonesia (especially, from the viewpoint of spatial development). The second section describes briefly the data and method used for the analysis. The third section investigates the existing geographical distribution of the manufacturing industry, while, in the fourth section, a regression analysis will be carried out to examine several variables which have affected the locational pattern of manufacturing industries. The paper ends in section five with a summary of findings and their policy implications for industrial development in Indonesia.

II. DATA AND METHOD

To analyze the spatial characteristics of the manufacturing industry, employment data from the medium & large scale manufacturing sector from Industrial Statistics in 1980 is used in this paper.¹⁾ However, this does not mean that the small scale sector is not important in the role it has played in the spatial development of the manufacturing industry. In fact, it has contributed a lot to the economy of rural areas in that it promotes the production of local goods and providing secondary jobs for farmers. It was observed, however, that there is a significant difference in spatial characteristics between the small scale sector and the medium & large scale sector.²⁾ According to the definition of the Central Bureau of Statistics, small scale manufacturing establishments are those engaging 5 to 19 employees, with or without machine power, whereas medium & large scale firms are those with at least 20 persons. Whenever we use "small scale" or "medium & large scale" manufacturing industry, these conform to this definition. The level of disaggregation is by province or by Kabupaten (regency) & Kotamadya (municipality). The Republic of Indonesia comprises 27 provinces, including the capital region of Jakarta, and under provinces, there are three levels of local administration, highest level of which is Kabupaten (regency) or Kotamadya (municipality).³⁾

As of 1980, there are 241 Kabupatens and 49 Kotamadyas as a whole (hereafter, abbreviated sometimes as Kabu. and Kota., respectively). Finally, the Population Census conducted in 1980 by the Central Bureau of Statistics is used for population data.⁴⁾

With the Kabupaten level medium & large scale employment data, an ordinal regression analysis will be performed in Section Four in order to examine key locational factors which have affected the spatial distribution of the medium & large scale industry. Here, two types of models are tested with respect to the dependent variable: One using the number of manufacturing employees directly and the other employs the ratio of the number of manufacturing employees to the population (precisely, the number of employees per 1,000 population).⁵⁾ These dependent variables are to be explained by some other variables showing locational conditions. The independent (explanatory) variables considered in this analysis are land and port accessibility indices and the population of the largest city in a Kabupaten (including Kotamadyas as cities in the Kabupaten). In the analysis, a dummy variable will also be used to see a structural difference between islands. The primary purpose of this exercise is to know the behavioral characteristics of manufacturing firms over space through several locational variables so that we could get a better understanding of the way to facilitate a desirable course of action over space in industrial development.

III. SPATIAL DISTRIBUTION OF THE MEDIUM & LARGE SCALE MANUFACTURING INDUSTRY⁶⁾

In the medium & large scale manufacturing industry, about 60% of the total employment (976 thousand employees in total in 1980) are engaged in either the food processing industry (ISIC 31) or the textile industry (ISIC 32).⁷⁾ Though there is a variation among manufacturing sectors, excessive employment concentration in Jawa island characterizes the medium & large scale industry (86% are in Jawa island as a whole).⁸⁾ A striking example is the textile industry (ISIC 32), in which 97% of the total numbers employed are taking place in Jawa. Wood processing industry (ISIC 33) is an exception, for which most of the employment is outside Jawa (74% in the outer islands). The other island provinces are as yet at a rudimentary stage in the development of larger scale manufacturing, but they are rich in natural re-

sources so that it is not surprising that they specialize mostly in resource-based, up-stream industries like wood processing and plantation-based industries. On the other hand, market potential is very high in the Jawa provinces and thus such consumer-oriented, down-stream industries as food processing, textile, and printing & publishing industries are abundant on Jawa island. Promotion of import substituting industries by the government in the first stage of industrial development is thought to have facilitated this spatial imbalance, since these import substituting industries were mostly related to the production of consumer goods.

The growth performance in employment between 1975 and 1980 indicates two global employment shifts in space: One towards Sumatra and Kalimantan away from Jawa island and the other towards Jakarta and West Jawa within Jawa island. Namely, Jakarta and West Jawa have gained their employment share by 4.3 percentage points in total, but a loss in share by the other Jawa provinces exceeds it, resulting in a global loss in Jawa island of 3 percentage points, and these have mostly been taken by Sumatra and Kalimantan. During this process, the following four sectors have, in particular, played an important role: ISIC 32, 33, 35 (chemical & rubber), and 38 (fabricated metal & machine), for which ISIC 32 and 38 are, for the most part, responsible for the structural change in Jawa island, while ISIC 33 and 35 for the employment shift towards Sumatra and Kalimantan provinces. In the process, food processing and textile industries (ISIC 31 and 32) have lost their share by 8 percentage points as a whole and these have largely been taken by wood processing, chemical & rubber, and electric appliance & machinery industries (ISIC 33, 35, and 38). It could be said in general that the manufacturing structure of 1975 has been formed essentially through the promotion of import-substituting, consumer-oriented industries, whereas the structure of 1980 indicates a structural transformation towards relatively export-oriented, intermediate goods industries, and this entails spatial shifts in manufacturing employment.

The Kabupaten & Kotamadya employment data on the medium & large scale manufacturing industry reveals another interesting point in the spatial distribution. Namely, larger scale firms are likely to choose their manufacturing locations in or in the vicinity of relatively big cities, especially those in Jawa island. In 1980, 47% of the total employment was concentrated in

Kotamadyas as a whole. The pattern of employment distribution within provinces varies from province to province, but one Kabupaten (including inside Kotamadyas) dominates in most of the outer island provinces, while no clear dominant structure is found for Jawa provinces. Instead each Jawa province contains two or three agglomerations.⁹⁾ It seems that the difference in the pattern of employment distribution between Jawa and the outer island provinces is due largely to the degree of industrialization and the types of industries developed in the provinces.

IV. KEY FACTORS FOR MANUFACTURING LOCATIONS: A REGRESSION ANALYSIS BASED ON KABUPATEN & KOTAMADYA LEVEL MEDIUM & LARGE SCALE MANUFACTURING EMPLOYMENT DATA

There are a variety of factors affecting the location of manufacturing industries. These locational factors vary from manufacturer to manufacturer depending on types of raw material used, types of goods produced, types and nature of technologies employed, and so on. For those processing natural resources directly, proximity to resource sites should be one of the most important factors for their manufacturing locations, while the presence of international ports in the close vicinity is essential for those producing exclusively export commodities and for those relying largely on imported raw materials. It is the purpose of this section to identify key locational factors affecting the spatial distribution of manufacturing employment as a whole. This is done by way of a linear regression analysis on Kabupaten & Kotamadya level medium & large scale manufacturing employment data.

IV-1. LOCATIONAL FACTORS TO BE CONSIDERED IN THE REGRESSION ANALYSIS

Among various kinds of variables describing location conditions, accessibility (i.e., easiness of reaching to raw material sites or market sites) is considered to be one of the most important variables for the locational decisions of most manufacturing firms. As an island country, Indonesia has relied heavily on sea and air transport. Though the role of air in commodity transportation is still limited, sea transportation has played a substantial role in moving resources and products from island to island. That the outer is-

lands are rich in natural resources while major consumer markets are located within Jawa island will further justify the importance of sea and air transportation and therefore sea and airports. It is very interesting to know therefore how significant the degree of accessibility to sea and airports has been in determining the spatial distribution of manufacturing employment. A sea port accessibility index is thus constructed in the analysis.¹⁰⁾ In this exercise however, accessibility to airports is not taken into consideration as an explanatory variable, since most of products in Indonesia are still very much low value added and hence their transport by air is costly compared with the values generated in the production processes.

Another important variable to describe the condition of each region as a manufacturing location is land accessibility. While sea and air port accessibility is assumed to present easiness of transporting goods to and from the other provinces, islands, and countries (depending on the status and function of ports concerned), land accessibility is assumed to delineate the easiness of reaching to the other part of a relatively small region like Kabupatens and provinces through land transportation. For our analysis, only road transportation is considered as most important to define the land accessibility index and the other types of land transportation such as railways and waterways are ignored for the following reasons.¹¹⁾

1. Except the north and south Sumatra regions, there is no railway network in the outer islands and waterways are used mostly in Kalimantan and some parts of Sumatra island; and
2. The role of railways and waterways in commodity transportation is still limited to the extent that only specific types of goods such as logs, cement, oil, fertilizer, and plantation goods are treated.

Cities are usually chosen for manufacturing locations for several reasons:

1. They are a source of relatively high skilled labor;
2. They provide consumer markets for goods and services; and
3. They offer a variety of urban services such as water supply, electricity, drainage system, housing, sanitation, and so forth.

It is interesting to see therefore how significant the size of the major city of a Kabupaten has been in attracting manufacturing investors. The population of the biggest city of a Kabupaten is another variable to be considered as explaining the distribution of manufacturing employment.

IV-2. REGRESSION ANALYSIS ON THE SPATIAL DISTRIBUTION OF MEDIUM & LARGE SCALE MANUFACTURING EMPLOYMENT

Using aforementioned variables, several regression models are tested. There are two sets of models: the first set uses the number of medium & large scale manufacturing employees directly for the dependent variable, while the second set employs the ratio of the number of medium & large scale manufacturing employees to the population. The results from our regression analysis are summarized in Exhibit 1. In view of the fact that Jawa island has attracted an excessive number of manufacturing firms (in comparison with the outer islands), a dummy variable is introduced to find the structural difference between Jawa and the outer islands.

Exhibit 1 Results from Regression Analysis

1. Variables in the Regression Analasis

Y	=	Number of employees
YP	=	Number of employees per 1,000 population
LAND	=	Land accessibility index
PORT	=	Port accessibility index
POP	=	Population of the biggest city in a Kabupaten
DM	=	Dummy variable designating a structural difference between Jawa and the outer islands
	=	[0 if Kabupaten is in the outer islands [1 is Kabupaten is in Jawa

2. Regression Result*

2.A Result using Number of Employees (Y) as Dependent Variable**.

Model 1:

$$Y = -611.4 + 30.1 \text{ POP} + 4,361.8 \text{ DM}$$

(18.252) (4.281)

R=0.809 R²=0.654

Model 2:

$$Y = -4,254.6 + 967.8 \text{ LAND} + 751.0 \text{ PORT} + 3,805.1 \text{ DM}$$

(3.254) (3.208) (2.354)

R=0.507 R²=0.257

Model 3:

$$Y = -1,722.7 + 991.1 \text{ LAND} - 2,365.8 \text{ PORT} + 362.9 (\text{PORT})^2 + 5,286.2 \text{ DM}$$

(3.507) (3.719) (3.387)

(5.240)

R=0.580 R²=0.336

2.B Result using Number of Employees per 1,000 Population (YP) as Dependent Variable.

Model 1:

$$YP = 1.068 + 0.013 POP + 4.291 DM$$

(7.487) (4.403)

R=0.552 R²=0.305

Model 2:

$$YP = -1.553 + 0.493 LAND + 0.638 PORT + 2.925 DM$$

(2.117) (3.469) (2.314)

R=0.465 R²=0.216

Model 3:

$$YP = 0.243 + 0.515 LAND - 1.618 PORT + 0.262 (PORT)^2 + 4.013 DM$$

(2.315) (3.229) (4.807) (3.265)

R=0.536 R²=0.287

Notes: * Sample size=238
 ** t - statistics in parenthesis

Though it seems apparent that the employment distribution has a certain correlation with such variables as population, land accessibility and port accessibility as shown by the first set of models, these models nevertheless offer several interesting points (see 2-A of Exhibit 1). First, as shown in Model 1, the population of the biggest city of a Kabupaten (with the dummy variable) could, through the regression line, explain around 65% of the total variation in the dependent variable (Y), indicating the importance of the population size of the major city of a Kabupaten for locational decision making, though it is widely observed that urbanization proceeds in tandem with industrial development.¹²⁾

Secondly, estimated coefficient values of the dummy variable indicate that there appears to be a significant structural difference between Jawa and the outer islands. Model 1 of the first set implies that, even with the same population size (of the biggest city), Jawa Kabupaten accommodates, on average, about 4,400 more employees than that of the outer islands. A similar explanation could be made for Models 2 and 3, in which the population variable is replaced by the land and port accessibility indices. Namely, it seems that a substantial portion of employees that have taken place in Jawa Kabupatens can neither be explained by the population size of the biggest city nor by the land and port accessibility indices, though there appears to be a tendency for manufacturing employment to shift away from Jawa island in

accordance with a recent improvement in the locational conditions offered by the outer island provinces. Several factors may be responsible for this. (All these factors are of course interrelated.)

1. Population density is much higher in Jawa than the outer islands (690 persons per sq. KM in Jawa against 30 persons in the outer islands) so that it is much easier in Jawa island in general to secure relatively high quality labor (even from rural areas).
2. Generally speaking, Jawa island is better provided with other industrial infrastructures such as electricity and water supply. Most of the Jawa Kabupatens are inter-connected by an electricity distribution network system, but most of the outer island provinces are still relying largely on diesel powered independent electric generators.
3. In Jawa, so-called agglomeration economies are in force in some market oriented industries. A prominent example is the textile industry, for which 97% of the employment are located in Jawa island.
4. Government policies in the first two REPELITAs (5 year national development plans from 1969 to 1979) favor manufacturing locations in Jawa island. It is evident that the promotion of import substituting industries (substituting for imported consumer goods) facilitates an excessive industrial development in Jawa island, since the market potential of Jawa provinces is much higher than that of the outer islands.

Another interesting point from the first set of regression results is that the quadratic term of the port accessibility index in Model 3 is significant at the 1% level of significance. This indicates that accessibility to higher ranked ports is of greater importance for locational decision making. It is generally true that the higher the rank of a seaport is, the more business opportunities the location can offer: wider market territories, easier access to raw material sites, and so forth. That import substituting industries have relied heavily on imported machines and equipment may help promote manufacturing locations close to international ports (aside from the recent policy shift towards export oriented industries).

The second set of models uses the number of employees per 1,000 population (hereafter, referred to as employment-population ratio) as the dependent variable and provides more interesting points on the spatial pattern of industrial development (see 2-B of Exhibit 1). As shown by the observed t

values, the port accessibility index and the population variable are significant at the 1% level and the land accessibility index is significant at the 5% level. Again a significant structural difference was observed between Jawa and the outer islands.

These results could be interpreted as follows. First, those Kabupatens with the bigger major city not only accommodate more employees (in absolute terms) but also provide larger employment-population ratio (see Model 1 of 2-B). For example, Kabu. Gresik with Surabaya in East Jawa provides 23 employees per 1,000 population, which is much larger than that of Kabu. Sleman with Yogyakarta (11 employees per 1,000 population). Surabaya is 5 times as big as Yogyakarta in population size (2 million against 400 thousand persons). Among others, economies of scale are worth mentioning in this connection. Economies of scale are of importance virtually in all industries in their locational decision making. Some industries can realize economies of scale (i.e., lowest average costs) at a fairly low output level so that one may find them in many small towns, while in other industries economies of scale can be realized only at very large production levels so that they may be found only in a few locations. Those classified as small scale manufacturing industries like brick manufacturing, rice milling, krupuk and tahu manufacturing and the furniture and fixture industry may fall in the former category of industries (they have been widely observed). Meanwhile, the steel industry and automobile assembling are typical examples of the latter category (they are concentrated in the western part of Jawa). In other words, in smaller towns (with surrounding hinterlands), the population may not be sufficient to support those industries with large economies of scale, but big cities may accommodate various types of industries, from those with large economies of scale to those with small scale economies. One can find a variety of manufacturing activities in large cities like Jakarta and Surabaya, and this is due in part to economies of scale.

Models 1 and 3 suggest that, for each 1,000 people, Jawa Kabupatens accommodate, with the same population size or the same land and port accessibility indices, about 4 more employees than outer island Kabupatens. Jawa island absorbs 62% of the total population in 1980, but accounts for 86% of the medium & large scale manufacturing employment, meaning on average 9.2 employees per 1,000 population in Jawa against 2.4 employees

per 1,000 population in the other islands. This simply indicates the existence of structural difference between Jawa and the outer islands, though the population size of the largest city of a kabupaten or the accessibility indices can, as Models 1 and 3 show, account for some part of this discrepancy (most larger cities are located in Jawa island and the degree of accessibility is generally higher in Jawa). Possible factors causing the structural difference have already been mentioned.

A comparison between the first and second sets suggests a very interesting point for the land accessibility index. Namely, it seems that better land accessibility (i.e., larger number of road links by definition) is of greater significance in attracting more employees, but less substantial in facilitating larger employment-population ratio. This point could be very well illustrated by those Kabupatens with better land accessibility but with very bad port accessibility, since the market territories of those industries having chosen these Kabupatens for their manufacturing locations would likely be confined to relatively small areas, so that they may not be able to realize their economies of scale unless the Kabupatens themselves have large markets. In other words, kinds of industries are likely to be limited in these Kabupatens to those with relatively low scale economies. Kabu. Bandung in West Jawa is an apparent exception, where the estimated employment-population ratio (through Model 3) is much smaller than its actual value (6.9 against 22.3 employees per 1,000 population), but this is due to the presence of a very large city in the Kabupaten (i.e., Kota. Bandung). As a matter of fact, Model 1 provides a much larger estimate on employment-population ratio for Kabu. Bandung (24.4 employees per 1,000 population).

Meanwhile, better port accessibility could not only attract more employees but is also likely to bring about a larger employment-population ratio, as indicated by the regression coefficient of the port accessibility index in Model 2 of the second set, which is larger than the coefficient of the land accessibility index. Moreover, Model 3 of the second set suggests that better port accessibility could promote accelerated industrial development. However, if a Kabupaten is located outside Jawa and has no land accessibility, then it is estimated that the port accessibility index has to be, on average, more than 6 to get any manufacturing investment, meaning that the major city of the Kabupaten has to have a sufficiently high ranked port in the close vicinity.

Outer island port cities like Pontianak in West Kalimantan and Banjarmasin in South Kalimantan may illustrate this situation, for which the presence of higher ranked ports like international or national ports seems essential to attract large manufacturing investments, since the hinterland areas are as yet very much underdeveloped (i.e., the land accessibility is very low). Bengkulu in Sumatra island registered only 94 employees in 1980, and this is due mainly to the fact that it was not until recently that the province inaugurated the first high-ranked regional port (The land transportation is not well developed either).

V. CONCLUDING REMARKS

The primary purpose of the paper has been to examine the spatial distribution of manufacturing industry and to identify key factors affecting the locational decisions of manufacturing firms. The following is a summary of the findings from the analysis and provides some policy implications and suggestions for the industrial development in Indonesia.

One of the major findings is that neither the population variable nor the port and land accessibility index could explain huge distributional unbalance in manufacturing employment between Jawa and the outer islands. Namely, even with the same condition in terms of the population size of the biggest city or the land and port accessibility, Jawa Kabupatens accommodate, on average, about 4 more employees for each 1,000 population than outer island Kabupatens, indicating the still overwhelmingly favorable location condition of Jawa as opposed to the outer islands. Though there appears to be a tendency for manufacturing industries to shift away from Jawa, those industries that have chosen outer island locations are mostly related to natural resource oriented activities.

Viewed in the light of fair industrial development, it is of course desirable to decentralize larger manufacturing activities away from Jawa island. The government has in fact tried to decentralize manufacturing industries through such direct policy measures as priority licensing (with tax incentives) of BKPM (Investment Coordinating Board)¹³, but it is judged that this has not yet been effective enough to attract sizable manufacturing investments outside Jawa, though highly natural resource oriented industries like wood processing and rubber based industries are found to have chosen locations in the outer island

provinces. Population density is much higher in Jawa than the outer islands so that it is much easier in Jawa in general to secure relatively high quality labor. Jawa island is also better provided with general industrial infrastructures such as electricity and water supply as well as urban services. Furthermore, a number of large consumer and intermediate goods markets are interspersed on Jawa island along with an interconnected network of roads and railroads. These factors are more than enough to support an excessive manufacturing concentration on Jawa island. From the point of view of efficiency therefore, further manufacturing agglomeration on Jawa island, especially in big cities, may be desirable. Though this may entail negative effects on the environment (e.g., environmental pollution and traffic congestion), it seems that its marginal social benefits still exceed its marginal social economic costs. The regression analysis clearly exhibits the significance of port and land accessibility in the locational choice of manufacturing industries regardless of Jawa or the outer islands, but Jawa has apparent locational advantage in many other respects.

A straightforward solution to ease Jawa island of the manufacturing concentration may be to shift radically development resources to some priority areas on the outer islands (e.g., further development of national or international port cities and industrial zones and estates development with priority investment in transportation and industrial infra-structures in the outer islands). However, with the austere budget and huge capital discrepancy between Jawa and the outer islands, this may not be feasible or effective enough to support manufacturing decentralization in the short run. Therefore, very careful, accumulative development efforts are needed which consider regional characteristics, the overall transportation network and the behavioral characteristics of each manufacturing industry. The point here is that port and land accessibility are not the only factors affecting the locational choice of larger scale manufacturing entrepreneurs, though it is very important. Even those relying heavily on natural resources in the outer islands may choose locations in Jawa, and this is due simply to the fact that locational decision making is based on a variety of economic and non-economic factors.

The regression analysis offers another interesting point in the pattern of industrial development over space. Namely, those Kabupatens with a bigger major city not only accommodate more employees but also provide larger

employment-population ratio. Difference in economies of scale among manufacturing sectors seems essential in explaining this. In other words, in smaller cities (with surrounding hinterlands), the population may not be sufficient to support those industries with large scale economies, but big cities can accommodate a variety of industries, from those able to realize economies of scale at a fairly small output level to those with very large scale economies. That bigger cities usually have good access to higher ranked ports enables them to further enhance their capacity.

This result conforms to the existence of a hierarchical system of cities, in which higher order cities are to cater for the subordinate cities in the provision of goods and services, so that they are likely to offer a wider variety of goods and services, leading to higher concentration of manufacturing industries, and this is closely related to the notion of economies of scale. From the policy point of view, what is essential here may be an efficient spatial arrangement of manufacturing industries considering their scale economies and a hierarchical structure of cities.

In so far as labor absorptive capacity is concerned, medium & large scale manufacturing is not very promising as it accounts for only 20% of total manufacturing employment in 1980. During 1975–1980, the employment has increased at 6.9% annually, but it is still in the range of 1 million employees (Compare with the total labor force of about 56 million). Moreover, recent statistics exhibit a discouraging picture in the sector, in which, from 1980 to 1982, only 90 thousand persons are added to the sector as a whole (annual average growth rate of 4.5%). Nonetheless, the medium & large scale manufacturing sector is indispensable for a number of reasons. Most importantly, it is the engine of national economic development. Through inter-industrial linkages (i.e., backward and forward linkages), it can create dynamic force in the economy, and could thereby generate a large number of job opportunities in the other industrial sectors instead of within the manufacturing sector (of course, linkages among manufacturing sectors have some internal dynamic force to reinforce each other and to enhance their labor absorptive capacity as a whole). Economies of scale do not allow small scale firms to operate in heavy industries like the petrochemical, cement and steel industries, but these industries are essential to the deepening of the industrial structure.

The issue is thus how to increase job opportunities in the economy as a whole rather than in the medium & large scale manufacturing sector by itself. Among others, the promotion of export-oriented, labor intensive industries appears to be promising for at least two simple reasons (despite an obvious disadvantage in this approach that they, by nature, do not have strong forward linkages with domestic industries): First, they do not wholly rely on limited domestic markets and secondly, they employ labor intensive technologies and thus rely heavily on relatively cheap labor, which is abundant in Indonesia, especially in Jawa. Though one may argue, in favor of capital-intensive import-substitution policies, that it may not be possible to expand labor-intensive exports because of the uncertain external market conditions, "the appropriate policy for a country with heavy population pressure is to press forward with its own labor-intensive pattern of economic growth to the extent permitted by the economic application of the existing technology."¹⁴

The actual task is thus to identify those industries most suitable for labor-intensive export promotion. Two aspects are significant with respect to the locational tendency. With respect to labor requirements, they are likely to choose locations in Jawa where abundant human resources are available (relatively high quality and cheap) while export-orientation implies a locational tendency towards those with easy access to sea ports (regardless of Jawa or the outer islands because the target markets are not domestic). Viewed in this light, their locational tendency towards Jawa island is implicit unless there are strong countervailing incentives offered in the outer islands. However, the actual locational choice depends also on other factors (e.g., types of goods produced, types of raw material used, and so forth). Comparatively heavy transportation costs borne in input raw materials put such natural resource based industries as wood processing and rubber industries in the category of outer island orientation. In this sense, exploitation of land resources (especially, cash crops) under the transmigration program conforms to the labor-intensive export promotion with strong emphasis on the outer island development. However, it is reported that processing of land resources (e.g., agrobusiness) has so far taken place in the outer islands independently from the transmigration program, due largely to the lack of easy access to ports and markets from the transmigration sites. What is necessary here is coordinated and integrated development efforts in line with the overall development option.

There is a well-known tradeoff between efficiency and equity in development, and thus compromised solutions are usually needed for overall policy formulation. Some policies favor efficiency at the expense of equity while others are particularly effective in pursuing equity criteria. Since the manufacturing industry is composed of varying types of manufacturing sectors with differing locational tendencies and economic impacts and each region is endowed with a different set of natural resources, overall industrialization strategy may be to facilitate regional specialization in certain types of manufacturing. With limited development resources however, industrial development has to be selective (i.e., priority areas for industrial promotion have to be identified). In the short run framework, those areas with relatively strong industrial foundation (i.e., good port facilities, well established road network, etc.) tend to be given higher priority, since it takes time to materialize new investment in industrial infrastructure. In the long run perspective however, emphasis should be put more on how to exploit resource potentials. Therefore, those areas with high resource potential but which have yet to be developed should be paid more attention to in the long run framework. Actual options in the selection of priority areas for industrial promotion is a certain combination of these two criteria, and this depends on various factors, including equity and efficiency considerations, overall national development perspective, and so forth. Of particular importance in this connection is inter-industrial linkages among up-stream and down-stream industries and their efficient arrangement in the spatial context. Since the government cannot control directly all economic activity, one of its main roles is to facilitate and support a spatially favorable manufacturing environment in accordance with its overall national development perspective.

NOTES

- 1) Central Bureau of Statistics (BPS), *Industrial Statistics 1980: Survey of Manufacturing Industries*, Jakarta, 1982.
- 2) Spatial characteristics of the small scale sector based on the 1979 employment data and their policy implications were discussed in greater detail in T. Akita, "Spatial Distribution of Manufacturing Industry and the Key Locational Factors in Indonesia," *Working Paper in the National Urban Development Strategy*

Project, United Nations Centre for Human Settlement/Government of Indonesia, Jakarta, May 1985.

- 3) For instance, the province of West Jawa consists of 20 Kabupatens and 4 Kotamadyas.
- 4) Central Bureau of Statistics, *Population Census 1980*, Jakarta.
- 5) It is desirable to use, as a dependent variable, a change in employment or a change in the number of establishments to see the "behavioral" characteristics of manufacturing firms. But due to the lack of Kabupaten level time series data, we will use these stock variables as a first attempt, so that the results obtained in this analysis should be interpreted with great care. An analysis using time series data is to be done in the future.
- 6) This section is a summary of Chapter 3 of T. Akita, 1985, op. cit., pp. 4-37.
- 7) ISIC stands for International Standard Industrial Classification. According to the classification, the manufacturing sector is divided into the following nine 2-digit sub-sectors (ISIC number from 31 through 39): Food processing (ISIC 31); textile (ISIC 32); wood processing (ISIC 33); paper & printing (ISIC 34); chemical & rubber products (ISIC 35); non-metallic mineral products (ISIC 36); basic metal products (ISIC 37); fabricated metal & machinery (ISIC 38); and other manufacturing (ISIC 39).
- 8) Indonesia is customarily divided into 6 sub-regions (in accordance with the main islands): Sumatra, Jawa, Bali & Nusa Tenggara, Kalimantan, Sulawesi, and Maluku & Irian Jaya, for which Jawa island is sometimes treated separately from the other islands because of its relative importance in the Indonesian economy. The other islands are generally termed the "outer" islands due to their geographical location against Jawa island.
- 9) Here, Jakarta and Yogyakarta are assumed to belong to West Jawa and Central Jawa, respectively.
- 10) For the formulation of the sea port accessibility index, see T. Akita, 1985, op. cit., pp. 74-76, in which each Kabupaten is evaluated in terms of the degree of accessibility to sea ports.
- 11) For the formulation of the land accessibility index using road data is detailed in T. Akita, 1985, op. cit., pp. 77-78, in which each Kabupaten is assessed in terms of the degree of land accessibility.
- 12) As a matter of fact, urbanization and industrialization should be treated simultaneously as a dynamic spatial process, instead of taking one as a result of the other. For that purpose, a flow variable such as a change in employment during a certain time period should be used for the dependent variable. See Note (5) above.
- 13) The Investment Coordinating Board (BKPM), *Indonesia: A Guide for Investors 1982*, April 1982.

- 14) H. Myint, "Inward and Outward Looking Countries Revisited: The Case of Indonesia," *Bulletin of Indonesian Economic Studies*, 20, August 1984, pp. 39–52.