A QUEST FOR INDUSTRIAL DISTRICTS:

An Empirical Study of Manufacturing Industries in Java[1]

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ABSTRACT

Java is an excellent laboratory for testing the traditional industrial district and New Industrial District (NID) theory for Small & Cottage Establishments (SCE), since there are many clusters of SCE throughout the island. To analyze them we depart from previous methodologies that apply a case study approach and examine only a small set of clusters (Bachruddin et al., 1996; Sandee & Weijland, 1989; van Diermen, 1997; Weijland, 1999). Unlike previous narrowly focused case studies, this study covers all manufacturing subsectors and regions in Java by analyzing the unprocessed data of 1996 Economic Census (SE96). This census is the most comprehensive database in Indonesia, providing detailed information with respect to establishments by various size of establishment (large, medium, small, cottage), sector, and region, from provincial to district level.

This paper showed that industrial district theory, rather than the New Economic Geography (NEG) theory, better explained the clustering of SCE. None of the key hypothesized by NEG factors to explain the uneven distribution of manufacturing activities obviously applies to SCE. Increasing returns, economies of scale and imperfect competition are the key factors that explain spatial concentration of Large & Medium Establishments (LME) in and around urban regions (Fujita, Krugman, & Venables, 1999: 345-6; Krugman, 1996). Yet, the explanatory power of these factors is questioned when one attempts to illuminate SCE clustering. This suggests that NEG virtually ignores the role and presence of SCE in the regional clusters.

The NEG model of agglomeration forces may apply only to the SCE within metropolitan regions. This study found that there were SCE within the metropolitan areas that do show high spatial concentration. According to NEG theory, market size is one of the centripetal forces that attract industries to concentrate in metropolitan regions. Yet, the discriminant analysis showed that the market size was the least important factors affecting SCE in clustering in the regions. As the great majority of LME are heavily concentrated in the metropolitan regions due to the agglomeration forces, this suggests there is an overlapping spatial pattern of SCE and LME in metropolitan regions. Nevertheless, our empirical study showed that the sub-contracting relation between SCE and LME in Java is still in the "embryonic" stage.

Our analysis suggests that all three forms of industrial districts, namely Marshallian industrial districts, industrial complex clusters, and mature clusters, can be found in Java. This supports Harrison's suggestion that "the *conception* of the district surely goes beyond Marshallian externality and agglomeration theory" (Harrison, 1992: 478). Our study provides at least some justification for integrating the industrial district theory and agglomeration theory to understand the SCE and LME clustering in Java.

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1. INTRODUCTION

Clustering is a salient feature of manufacturing industries, regardless of industrial size. Clusters are defined most generally as *geographic concentrations of the same manufacturing subsector* (Kuncoro, 2000: chap.2). What emerges are spatially clustered networks of mostly small and cottage manufacturing establishments. The literature calls these *industrial districts*. Such "districts" have become a focus for the study of how and where industries locate and cluster. Alfred Marshall was the first economist to observe the disposition of certain kinds of industries to localize in specific areas of England, Germany and other countries (Becattini, 1990; Bellandi, 1989). He defined an industrial district as a specialized geographical cluster of production (Marshall, 1919). These clusters represent "traditional" or Marshallian industrial districts and are commonly found in rural regions and company towns.

The recent literature on clusters argues that new types of industrial districts have emerged. Theorizing about new industrial districts (NID) of flexibly specialized firms, including prototypical forms such as the Emilia-Romagna region of Italy or Silicon Valley in the United States, symbolizes this move beyond neoclassical agglomeration theory to explain the dynamics of industrial districts. Markusen, for example, based on a survey of US metropolitan growth during 1970-1990, introduced at least three types of additional industrial districts, namely the hub-and-spoke districts, satellite industrial platform districts, and state-centered districts (Markusen, 1996). Recent literature also argues that the Marshallian external economies alone are insufficient to explain cluster development. Theories of industrial district neglect the conscious pursuit of joint action, overrate the success of small enterprise clusters and underrate the strength of the large corporation, and fail to distinguish between incipient and more advanced stages of industrialization (Schmitz & Nadvi, 1999: 1504-7).

This paper suggests that much can be learned by linking the study of clustering with both traditional industrial district and NID theory. Our concern is to link the two literatures and explore the existence of industrial districts in Indonesia, in particular Java. The features of SCE and their role in regional

clusters are largely neglected by the New Economic Geography (NEG) theory. The distinguishing features of the SCE are that they are generally small in scale, less advanced in technology than the LME, highly dependent on local resources, much more labor intensive, supported by unpaid family workers, and have access only to their own or local funds. SCE are predominantly a rural phenomenon. Most SCE are not attracted by the large markets of metropolitan regions, although some SCE do locate there.

This paper also addresses the relationship between LME and SCE in terms of inter-firm linkages and sub-contracting relations. Interfirm linkages, the mix of competition and cooperation, agglomeration externalities, and knowledge spillover among firms within a cluster are the key factors underpinning the growth and formation of clusters (Harrison, 1992; Nadvi & Schmitz, 1994). Along with the growing industrial sector, the functional complementarity between LME and SCE is increasingly established and translated into interfirm linkages. These linkages played an important role in Japan, Taiwan, and China but are weak in most developing countries such as India and the Philippines (Hill, 1982; Shah, 1994). While sub-contracting, in Japan for example, is widely recognized as a key success for Japanese industries, also attracting great interest in recent years (Whittaker, 1997: 85-106), our empirical study will show that sub-contracting relations between SCE and LME in Java have been weak.

Within Java, SCE clustering has been identified in both rural and urban regions (Poot, Kuyvenhoven, & Jansen, 1991; Sandee, Rietveld, Supratikno, & Yuwono, 1994; van Diermen, 1997; Weijland, 1999). Substantial differences have been observed between clusters, even when they belong to the same manufacturing subsector. A case study of clustered rural small-scale roof tile enterprises, for example, shows that differences occurred among four districts in Central Java in terms of technology, labour, networks, marketing, and market orientation (Sandee, 1994). Likewise, clusters of small workshops producing furniture in Jabotabek and Jepara illustrate different market segments within this industry (Sato, 2000; van Diermen, 1997: 113-9).

Java is an excellent laboratory for testing the traditional industrial district and NID theory for SCE, since there are many clusters of SCE throughout the island. To analyze them we depart from previous methodologies that apply a case study approach and examine only a small set of clusters (Bachruddin et al., 1996; Sandee & Weijland, 1989; van Diermen, 1997; Weijland, 1999). A case-study approach is useful in shedding light on the internal functioning of industrial clusters, but it cannot be used in illustrating the general characteristics or evolution of industrial clusters (Paniccia, 1998). By contrast, we will present inter-cluster comparisons to highlight the dynamics and different characteristics of SCE clusters, which support the hypotheses of industrial district theory. We observe that Java has at least 10 leading SCE clusters with different industrial structures.

Unlike previous narrowly focused case studies, this study covers all manufacturing subsectors and regions in Java by analyzing the unprocessed data of 1996 Economic Census (SE96). This census is the most comprehensive database in Indonesia, providing detailed information with respect to establishments by various size of establishment (large, medium, small, cottage), sector, and region, from provincial to district level. Our focus of analysis is all the SCE in Java, which consist of 161,349 establishments, accounting for about 66% of the total SCE establishments in Indonesia. These establishments are spread across in 5 provinces with 107 districts (*kabupaten* and *kotamadya*). However, it does not mean that these data have no caveats. The SE96 data of SCE that we use are based on the sample census of October 1996. We do not have any access to the SE96 Complete Count Results so that the data must be used with caution[2], especially when we compare the SCE and LME.

The outline of this paper is as follows. First, we observe the SCE patterns in Java and then compare them with the spatial pattern of LME. Since some patterns of clustering of SCE and LME also occur across the island, we will try to identify industrial districts in Java.

[2] The data are available in two, three, and four digit ISIC manufacturing sectors. However, detailed examination shows that small sample size for SCE results in large confidence intervals in particular at three and four digit levels (Rice & Abdullah, 2000).

2. CLUSTERING OF LME AND SCE

In Indonesia, the rapid growth of Large and Medium Establishments (LME) since the 1970s has overshadowed the sluggish growth of SCE. Nevertheless, SCE have played a considerable role in generating employment, increasing the number of establishments, and supporting household income. Small and cottage establishments, defined as establishments[3] employing 5-19 workers and less than 5 workers respectively, account for the largest proportion of establishments and the majority of employment in Indonesia's manufacturing establishments. Figure 1 demonstrates that 99.2% of Indonesia's manufacturing establishments in 1996 were SCE. Albeit less striking in terms of employment, SCE also contributed 59% of the country's manufacturing employment, compared with 41% for LME. In policy terms, SCE deserve special attention because not only do they provide additional income to a substantial part of the labour force from low income households in rural areas, but also create an important starting point for poverty alleviation (Sandee *et al.*, 1994). Rural cottage enterprises have also served as a seedbed for further industrial development (Weijland, 1999) and as a complement to agricultural production for the poor segment of rural society as a kind of "survival strategy" in Indonesia.

Figure 1 is about here

Java is the "heartland" of both LME and SCE in Indonesia. Given the differences in scale between SCE and LME, by 1996 the proportion of SCE within Java to total employment was about 75% and so was to value added (Table 1). Although less striking than LME in terms of employment and value added, the role of SCE within Java was remarkable. With more than 161,000 establishments, SCE within Java represented about 66% of the country's establishments, far higher than those of LME which only counted about 7%.

[3] Biro Pusat Statistik defined an e*stablishment* as a unit of economic activity operated with the objective of producing goods/services for sale or exchange, with at least one person in charge and assumes the management authority such the authority in human resource development (recruitment), marketing, etc, including supporting units located in an area separated from the main office building/area (BPS, 1998).

Table 1 is about here

The spatial pattern of LME is concentrated heavily in Java's main metropolitan regions. By 1996, the LME in Greater Jakarta (Jabotabek), together with Greater Bandung and Greater Surabaya, accounted for more than 65% and 71% of Java's total employment and output respectively. This evidence, together with Map 1, confirms the *bi-polar pattern* that has been observed by (Hill, 1990; Hill, 1996). Greater Jakarta and Greater Surabaya have become two dominant LME industrial centers or agglomerations (Kuncoro, 2000: chap.3). The suburbanisation of industry, together with further transport and communication development, has enabled industrial development to spread rapidly both east and west into the *kabupaten* of Serang and Karawang (Henderson *et al.*, 1996). In the case of Jabotabek, industrial development has spread to another metropolitan area, namely Greater Bandung (Dharmapatni & Firman, 1995). We may call this region the Greater Jakarta-Bandung corridor, which is likely to form network cities. Likewise, a similar pattern has occurred in the Greater Surabaya, in which industrial development spread rapidly in the west and south into the *kabupaten* of Kediri and the city of Malang. LME were concentrated mainly along the Jabotabek-Bandung corridor in the west and the Surabaya-Malang corridor in the east.

Map 1 is about here

Outside Java's metropolitan regions, as shown by Map 1, LME clustering was found mostly in Central Java, in particular around the cities of Semarang, Surakarta, and Kudus. Although much smaller than Jabotabek and Surabaya, Semarang and Surakarta represented two of Java's major industrial centers (see Chapter 3). Semarang and Surakarta had a similar industrial structure dominated by the textiles & clothing and the food industry, which showed an important role in terms of employment and value added. Kudus, a "company town" to the northeast of Semarang, has for most of the 20th century been known as a centre of the country's clove cigarette (*kretek)* industries (Castles, 1967). This makes a

large contribution not only to employment and value-added, but also to regional domestic product of Kudus. The major players within LME clusters of Kudus are two giant clove cigarette companies, namely Sukun and Djarum; in 1999 the latter took seventh place in the list of the top 200 Asian companies[4].

Compared with the spatial pattern of LME that is heavily biased towards metropolitan regions, SCE have *multi-location patterns* (Map 2)[5]. Some striking patterns can be identified. First, SCE do not have the bipolar pattern and metropolitan regions do not predominate. SCE in Jabotabek, together with Greater Bandung and Greater Surabaya, accounted for merely 32%, 37% and 17% of Java's employment, output and number of establishments respectively (Table 1). The spatial concentration in Java's metropolitan regions is much less pronounced in the case of SCE, although there is some "overlapping" of LME and SCE in these regions. This will be discussed further in the next section in particular with respect to the issue of inter-firm linkages. Within Jabotabek, for example, this finding confirms van Diermen's (1997: 106-8) empirical evidence that the location of LME and SCE was confined to the three *kabupaten* of West Jakarta, East Jakarta, and Bekasi.

Map 2 is about here

Second, outside Java's metropolitan regions, a considerable amount of SCE are concentrated spatially in small cities, notably in the coastal regions. Combining Map 2 and Map 3 shows the SCE clustered in small cities with population less than 1.5 million. Most of these cities are located in the Central Java-Yogyakarta province, notably around Temanggung-Magelang corridor[6],

[4] A historical review of the Kudus cigarette industry is well documented by (Castles, 1967). Recent figures indicate that PT Djarum has been the largest *kretek* producers in Kudus, the second largest of the country's *kretek* firm (Hornaday, 1994), and ranked as the 7th in the 200 list of top Asian companies in 1999 (FEER, 2000).

[5] Detailed discussion with respect to the distribution of SCE and LME and the method to classify 107 districts in Java based on employment can be seen in the Appendix 7.1.

[6] Although the notion of urban corridor has been used interchangeably with "megalopolis", "extended metropolitan region" and "ecumenolopolis", it is commonly characterized as absorbing an increasing proportion of a country's population and economic growth (Choe, 1998; McGee, 1995). This phenomenon has been an interesting object of study of emerging corridors within the Western Pacific Rim, ASEAN, and East Java (Dick, Fox, & Mackie, 1993; Rimmer, 1995).

Yogyakarta-Surakarta corridor, Jepara-Pati corridor, and coastal regions such as Semarang, Tegal, and Pekalongan, and Cirebon. These small cities are connected by a good road transport network and seaports, allowing linked firms to minimise their transportation costs. While the coastal regions offer many locational advantages, in particular within small cities whose urban function depends on trading (Rutz, 1987: 86). This also explains why SCE are not largely pulled into medium size cities with population ranging between 1.5 to 2.5 million such as Karawang and Cianjur in West Java, Cilacap and Brebes in Central Java, and Jember in East Java.

Map 3 is about here

Third, Map 2 highlights the general pattern of SCE is predominantly in rural areas. This is demonstrated by the widely dispersed "white" districts across the island, indicating that those districts have SCE employment of less than 1,300. Further detailed examination shows that almost half of the districts in Java, such as Ngawi and Tulungagung-Trenggalek, have SCE employment of less than 1,300, with the majority having less than 800 workers. As far as the number of establishments is concerned, about 74% of SCE can be regarded as rural[7] industries (Table 2). Such industries in these rural regions produce traditional products (e.g. red sugar, wood carving, agricultural tools) primarily for local markets. On the other hand, the LME usually play a minor role in these rural regions.

Table 2 is about here

Based on the above general spatial patterns of SCE, we derive the following hypotheses, which will be tested in the next section:

[7] As far as rural-urban definition is concerned, a village—as an area unit— in Indonesia is classified as an *urban* region when it satisfies three criteria (BPS, 1994: 16; BPS, 1999: 6-7). First, it has a population density of minimum 5,000 person per square kilometres. Second, its population working in agriculture does not exceed 25%. Third, it retains minimum eight urban-related facilities, e.g. post office, bank, cinema, hospital, and school. Although the distinctions between urban and rural are tending to become increasingly blurred in particular in extended metropolitan regions (Jones & Visaria, 1997; McGee, 1991), it is still useful in analyzing SCE.

- Java has several kinds of SCE clusters with distinctive characteristics, which comply with the features of industrial districts.
- SCE in industrial clusters are more productive than that in non-industrial clusters. We test Porter's theory that small scale industrial clusters, characterised by geographic concentrations of interconnected companies and institutions in a particular field, appear to be a highly productive form of industrial organization (Porter, 1998).

3. INTER-CLUSTERS COMPARISON

3.1. Method of Analysis

Our study employs a *subsector approach* for analyzing Java's industrial clusters. The primary reason for using this approach stems from the fact that although a cluster is often characterised by a particular industry, it may incorporate various 'sub-industries'. The subsector approach was originally developed by Boomgard *et al.* (1992) to provide operational direction for SCE promotion. The SCE is viewed as interacting with other firms, both large and small, in a vertical production/distribution system. It rests on four principal concepts, namely verticality, coordination within channels, competition between channels, and leverage, and also on the domain of New Institutional Economics, in particular Williamson's work on transaction and information costs (Boomgard *et al.*, 1992: 200-1). Sen & Mahajan used this approach to examine micro-enterprises in India, and found it useful for identifying these fast growing sectors (Sen & Mahajaan, 1993). In indonesia, this approach has been used to recognize how subsectors are integrated into production and distribution chain of two industries in Jakarta (van Diermen, 1997), and to analyse the impact of innovation on interfirm linkages and networks in clusters with different locations and market outlets in rural tile production and marketing in Central Java (Sandee, 1994).

We follow the tradition of the subsector analysis that begins with the selection of a product group in which SCE are important in terms of their size and location (Boomgard *et al.*, 1992). Therefore, the next section will examine the

location and size of the top ten clusters in Java. Then, we need to know to what extent a district is specialised or diversified. To examine and perform inter-cluster analysis, we use the Krugman's index of regional divergence to quantify differences in structures, and hence, regional specialisation. More specifically, the index is defined as (Krugman, 1991: 75-6):

$$SI_{jk} = \sum_{i=1}^{n} | E_{ij}/ E_j - E_{ik}/ E_k | \quad (1)$$

where E_{ij} refers to the level of employment in industry *i=1,…,n* for region *j*; E_j is the total industrial employment for region *j*; E_{ik} is level of employment in industry *i=1,…,n* for region *k*; E_k is the total industrial employment for region *k.* If the index is equal to zero, then the two regions have identical industrial structure. The index will be two if the regions are completely specialised.

3.2. Location and Size

Despite the general dispersion of SCE across Java, as explained in section 2, we identify the foremost industrial clusters based on employment rank and spatial proximity. Table 3 indicates ten clusters dominate in almost all of Java's industrial subsectors. With the exception of non-metal mineral industry, the share of Java's top ten clusters in terms of employment is 70% or more for each subsector. It also highlights that SCE were pulled to Java's extended metropolitan regions, in particular Jabotabek, Greater Surabaya, and Greater Bandung, in which their share of Java's employment was subtantial. Other clusters are found along inter-city corridors such as Surakarta-Yogyakarta and Jepara-Pati, and cities on the northern coast of Java such as Semarang, Tegal, and Cirebon.

Table 3 is about here

In terms of size, there is a tremendous difference among these ten clusters, which can be classified into three groups[8]. The difference is very likely to reflect the non-homogenous patterns within SCE as inequality is growing

among clusters. The most striking feature is the pre-eminence of clusters in the Jabotabek and Temanggung-Magelang region, in which each absorbed more than 24,000 workers. The second group of largest SCE clusters is less than half the size of the Temanggung-Magelang cluster (Figure 2). This second group, with workers between 10,000 and 14,000, is represented by clusters in Greater Surabaya, Greater Bandung, Surakarta-Yogyakarta, and Jepara-Pati. The third group is just over one-fourth the size of the first. With between 3,500 and 10,000 workers, SCE clusters in Tegal, Cirebon, Tulungagung-Trenggalek, and Semarang fall into the last group.

Figure 2 is about here

As far as industrial district theory is concerned, an industrial cluster is attributed to the spatial proximity as one of the important key for success. However, most studies usually employ data at provincial or even regional level so that they often neglect the possibility that an industrial cluster encompasses the administrative territorial boundaries. Recall Map 2, we find that although the clusters often fit within political boundaries, they also cross district or even provincial borders. In Greater Jabotabek, for example, the SCE clusters straddle every district in the Jakarta province, Bogor, Bekasi, Tangerang, and Serang in the West Java province.

3.3. Inter-Cluster Comparison

Having known the location of SCE clusters, it allows us to move from the question "Where is manufacturing concentrated?" to the question "What kind of manufacturing will be concentrated?". This is one of the major issues when one discusses industrial clustering (Fujita et al., 1999: 283). This section will attempt to address the unresolved questions.

The results using Krugman's regional divergence index show that there is a significant divergence of industrial structures among SCE clusters. The most

[8] Further examination using a discriminant analysis reveals that these groupings correctly classify 81% of the Java's district.

striking features of Table 4 is the index between Temanggung-Magelang and Jabotabek region, which show the highest figure. This indicates that the two regions have a very different industrial structure. Temanggung-Magelang is a traditional SCE cluster, with a lot of rural industries specialising in tobacco-related activities. In constrast, Jabotabek, as the biggest metropolitan area in Indonesia, has more a diverse industrial structure, with the clothing industry as a leading sector.

Table 4 is about here

Krugman's indices among SCE clusters in Java's metropolitan areas highlight other interesting evidence. There is a tremendous divergence of SCE industrial structure between Jabotabek and Greater Surabaya, and between Jabotabek and Greater Bandung. This may be attributed to the huge difference in size of cluster: Greater Surabaya is only half of the size of Jabotabek; while Greater Bandung has about two-fifth the size of Jabotabek. Size differences between industries may produce a hierarchical urban system, as argued by classical urban economists such as Christaller (Christaller, 1933). Yet much more convergence in industrial cluster appears between SCE clusters in Greater Surabaya and Greater Bandung. In these two metropolitan regions, SCE in the textile and clothing industries play an important role with relative similarity in terms of share (Figure 3). One may conclude that metropolitan regions with more or less the same size are likely to produce a convergence of industrial structures.

Figure 3 is about here

The lowest Krugman index is found between Cirebon and Semarang region. This suggests that those two coastal regions have more or less similar industrial structure. Compared with other coastal regions, such as Tegal, they do have a convergent industrial structure. This suggests that coastal regions offer a somewhat similar locational advantage for SCE.

Krugman's indices, nevertheless, do not show a clear pattern for other regions. The indices range from 0.1 to 0.18 for Jepara-Pati, Surakarta-

Yogyakarta, and Tulungagung-Trenggalek. Among these regions, Yogyakarta-Surakarta, for an example, has the most diverse SCE structure but its indices are more or less similar to Tulungagung-Trenggalek, which is largely specialised in non-metal and textile industry. This may reflect the shortcoming of this index, which biases towards the most specialised and the most diverse region.

4. A QUEST FOR INDUSTRIAL DISTRICTS

4.1. The Concept of Industrial District

Industrial clusters are often associated with industrial districts. The empirical studies of SCE clusters have been triggered by the success of small firm industrial districts in Italy, especially in a region called the Third Italy (Tuscany, Emilia Romagna, and nearby regions) since the early 1980s. Some major features of the structure of manufacturing in this Italian industrial district, namely: geographic concentration, sectoral specialisation, and strong networks of small firms. Similar characteristics have been observed in Silicon Valley (USA), West Jutland (Denmark), and Baden-Wurttemberg (Germany), Madrid, Fuenlabrada, Castellon, Mondragon and Valles Oriental (Spain) (Pyke & Sengenberger, 1992); and some cases from Africa, Asia and Latin America (Hayter, 1997; Nadvi & Schmitz, 1994; Schmitz, 1995).

The literature suggests three types of industrial districts. First, clusters may represent “specialised industrial districts”, or Marshallian industrial districts (Marshall, 1919). The relevance of Alfred Marshall’s work is reflected by the growing development of similar ideas in the more recent work of the Italian industrial district, which has been defined as a specialised geographical cluster of production (Becattini, 1990; Bellandi, 1989). According to this line of theory, specialised clusters are *geographic concentrations of the same manufacturing subsector*.

The second form of industrial district derives from the *industrial complex model*, which emerged from classical and neoclassical economics. The main features of the industrial complex model are: (1) sets of identifiable and stable relations among firms which are conceived primarily in terms of trading links; (2)

minimisation of spatial transaction costs (i.e. transport costs, telecommunication costs, shipment costs) in the formation of crucial, pre-planned or identifiable linkages (Gordon, 2000). This model is in line with the Markusen's and Whittaker's study suggesting the importance of vertical inter-firm linkages between LME and SCE of "new" industrial districts in the USA and Japanese urban regions (Markusen, 1996; Whittaker, 1997). A study of industrial districts in Japan shows the large concentration of very small firms in the metropolitan centers of Tokyo, Osaka, and Nagoya (Whittaker, 1997). Unlike hundreds of small firm clusters called *sanchi*, which produce traditional or semi-traditional goods and tend to locate outside the main urban centres, Japanese metropolitan concentrations are remarkable both for their scale and the high proportion of small firms with their localised industry (*jiba sangyo*).

The third form of industrial district is the *social network model*. This model was developed within sociological literature and the neo-institutionalist school (Gordon, 2000). Unlike the other types of industrial district, this cluster reflects not only an economic response to the pattern of available opportunities and complementarities, but also an unusual level of embeddedness and social integration. Since a form of social capital, generated and maintained through a combination of social history and ongoing collective actions, is the key factor, these clusters are referred to as *mature clusters*. The last is found as the striking feature of European and American industrial districts, which have evolved over time and are deeply rooted within traditional, institutional, and cultural contexts rather than established through policy intervention. The evolution of Silicon Valley as an industrial district, for example, suggests that activities of local and national institutions (e.g. Stanford University and the U.S. Department of Defense) had played important roles in fostering collaboration and rapid diffusion of market information, technology, and skill within this high-tech cluster (Saxenian, 1995).

4.2. Industrial Districts in Java

Which of the three types of industrial districts best explain SCE clusters in Java? Most of Java's SCE clusters are specialised clusters with only one or two dominant industries. Figure 3 provides detailed information about industrial structure in each of the top ten clusters. SCE clusters in Temanggung-Magelang are the best example. In this region, the food industry accounted for 94% of the region's industrial structure. Further breakdown to ISIC 3 digit level shows that this subsector is mainly a cluster of processed tobacco and cigarette flavours. Many households in this region involved in this processed tobacco & cigarette flavour production. Households in these regions still rely on agriculture and agribusiness, as illustrated by Table 5, in which household incomes from agriculture and mainly agriculture sector are 28% and 13% respectively. One may conclude that the features of the Temanggung-Magelang cluster fits the type of a specialised industrial cluster which are prominent in size. The prominent in size is attributed to its linkages with LME in other region. For business players in the clove-cigarette industry, the Temanggung-Magelang region has long been known as a major supplier of tobacco[9]. Two giant clove cigarette makers, namely Djarum (in Kudus) and Gudang Garam (in Kediri), have relied on their sources of raw materials from Temanggung-Magelang.

Table 5 is about here

SCE clusters in the metropolitan regions of Jabotabek, Greater Surabaya and Greater Bandung seem to support the features of the type of industrial complex clusters where a set of SCE clusters emerge due to the agglomeration forces of metropolitan area. Further detailed examination of the leading sectors in each cluster, as indicated by Table 6, shows that SCE clusters in metropolitan regions are far more diversified industrial structure than other SCE clusters. LME also exhibited a high degree of spatial concentration within these metropolitan

[9] The Temanggung-Magelang region is admistratively within the *karesidenan* (Residency) Kedu. Castles notes that this area has been the largest harvested area of people's tobacco (*tembakau rakyat*) since 1939 (Castles, 1967: 140).

regions (see Map 1). This high degree of LME and SCE spatial concentration can be identified as industrial complexes (Czamanski & Ablas, 1979).

Table 6 is about here

Other SCE clusters seem to fulfill the features of mature clusters. The SCE cluster of woodworking in Jepara on Central Java's north coast, for example, has been famous since the 17th century for the production of finely carved teak furniture (Alexander & Alexander, 2000). The modern Jepara furniture industry, which began less than two decades ago, has produced highly specialized commodities for demanding and sophisticated export markets although the production has been concentrated in small, unmechanized, rural workshops. Mature clusters are also found in the textile and garment clusters in Tegal and Pekalongan, along with the clay product clusters in Surakarta-Yogyakarta.

Historical patterns can be explained by the age distribution of firms. Proponents of the New Economic Geography (NEG) believes that history matters in explaining the persistence of unequal distribution of economic activities (Krugman, 1995; Krugman, 1996; Krugman, 1998). We may differentiate between *mature* and *new clusters* (Kuncoro, 2000: chap. 2). The classification is derived from the historical origins and role of policy (Ingley & Selvarajah, 1998). Mature clusters are often regarded as traditional industrial districts that have been centres of craft industry. Craft-based, design-intensive industries such as clothing, textiles, furniture, jewellery, ceramics, sporting goods, etc., are found in old centres of craft production such as the Third Italy, parts of France, Greece, Portugal, Germany, Spain, and Scandinavia (Scott & Storper, 1992).

History does matter in the case of Java's SCE. A detailed account for age of firm in all Java's districts suggests that SCE are more likely to cluster in clusters because of an established pattern of location for many decades, and hence support the presence of mature clusters. The highly specialized commodities for demanding and sophisticated export markets have been concentrated in small, unmechanized, rural workshops, which are also found in

Jepara woodworking clusters, and textile and garment clusters in Tegal, Pekalongan, Surakarta, and Bandung.

6. INSTITUTIONAL FACTORS

The Indonesian Government has introduced various measures to improve SCE performance. The measures include (Kuncoro, 1997: 318-25, Sandee *et al.*, 1994: 122-4):

- Strengthening the linkages between large and small enterprises by the *Kemitraan (Partnership)* program. The SCE may choose some forms of Partnership Program such as *Bapak-Anak Angkat* (Foster Parent-Foster Child), forward linkage, backward linkage, venture capital, subcontracting, or *Perkebunan Inti Rakyat* (Core-Nucleus Farming) system.
- Strengthening capital. This is accomplished by assigning 1 to 5% of State Enterprise Profit on assistance to SCE and cooperatives, instructing banks to allocate 20% of total credit funds to the development of SCE, and asking large enterprises to sell a certain proportion of their shares to cooperatives.
- Developing SCE via: (1) *Sentra Industri Kecil* (Small-scale industry cluster program) such as PIK (*Pemukiman Industri Kecil*, small-scale industry villages), LIK (*Lingkungan Industri Kecil*, or small-scale industry environment), and SUIK (*Sarana Usaha Industri Kecil*, or small-scale industry infrastructure); (2) cooperatives and KUB (*Kelompok Usaha Bersama*, joint business group).

Our interest is examine to what extent the partnership programs, have encouraged SCE to cluster. Since there are virtually no data for other partnership program, we use the proportion of SCE involved in foster parent scheme. This is also a proxy of inter-firm linkages between LME and SCE. We test whether having a foster parent corresponds to higher probability of SCE to operate in those clusters.

Our observation suggests that the partnership and inter-firm linkages between LME and SCE in Java are still in an embryonic stage. Table 7 shows there was only about 4 per cent of SCE that are involved in a partnership program through the foster parent scheme. Linkages between LME and SCE are being fostered by the government and by large companies like Astra International[10] contributes marginally to the tendency to cluster. The SCE involved in the foster parent scheme, have received many benefits, notably in the procurement of raw materials, money/capital goods, and marketing.

Table 7 is about here

7. CONCLUSIONS

This paper found that outside Greater Jakarta and Greater Surabaya, LME clusters have been identified mostly in Central Java, in particular around Semarang, Surakarta, and Kudus. Although much smaller than Jabotabek and Surabaya, Semarang and Surakarta represented two of Java's major industrial centers, which had a similar industrial structure dominated by the textiles & clothing and the food industry. Kudus, a "company town" to the northeast of Semarang, has been known as a centre of the country's clove cigarette (*kretek)* industries.

The geographic distribution of SCE in Java has not one but several different spatial patterns. The bulk of SCE is scattered across rural Java. Our empirical study shows that SCE are predominantly a rural, rather than an urban phenomenon. The great majority of SCE consists of rural industries that served a local market, while the LME in general play a minor role in these rural regions. The spatial concentration of SCE in Java's metropolitan regions was far less

[10] Astra established Dharma Bhakti Astra Foundation (YDBA) on May 2, 1980 as the realization of Astra's commitment and participation in the Small to Medium Scale Enterprises (SMEs) and cooperatives. Since founded DBAF with applied company in Astra Group Such as Federal Motor PT, United Tractors PT, Astra Daihatsu Motor PT, Toyota Astra Motor, PT. Komponen Group, Bank Universal ,Astra Mitra Ventura PT, Astra Argo Lestari PT, Sumalindo Lestari Jaya PT, and related institutions (http://www.ydba.astra.co.id/, 25/4/2000).

pronounced. However, a small proportion of SCE concentrate spatially either in small cities, notably in coastal regions, or regions which have strong ties with farm and non-farm activities.

This paper showed that industrial district theory, rather than the NEG theory, better explained the clustering of SCE. None of the key hypothesized by NEG factors to explain the uneven distribution of manufacturing activities obviously applies to SCE. Increasing returns, economies of scale and imperfect competition are the key factors that explain spatial concentration of LME in and around urban regions (Fujita et al., 1999: 345-6; Krugman, 1996). Yet, the explanatory power of these factors is questioned when one attempts to illuminate SCE clustering. This suggests that NEG virtually ignores the role and presence of SCE in the regional clusters.

The NEG model of agglomeration forces may apply only to the SCE within metropolitan regions. This study found that there were SCE within the metropolitan areas that do show high spatial concentration. According to NEG theory, market size is one of the centripetal forces that attract industries to concentrate in metropolitan regions. Yet, the discriminant analysis showed that the market size was the least important factors affecting SCE in clustering in the regions. As the great majority of LME are heavily concentrated in the metropolitan regions due to the agglomeration forces, this suggests there is an overlapping spatial pattern of SCE and LME in metropolitan regions. Nevertheless, our empirical study showed that the sub-contracting relation between SCE and LME in Java is still in the “embryonic” stage.

Our analysis suggests that all three forms of industrial districts, namely Marshallian industrial districts, industrial complex clusters, and mature clusters, can be found in Java. This supports Harrison’s suggestion that “the *conception* of the district surely goes beyond Marshallian externality and agglomeration theory” (Harrison, 1992: 478). Our study provides at least some justification for integrating the industrial district theory and agglomeration theory to understand the SCE and LME clustering in Java.

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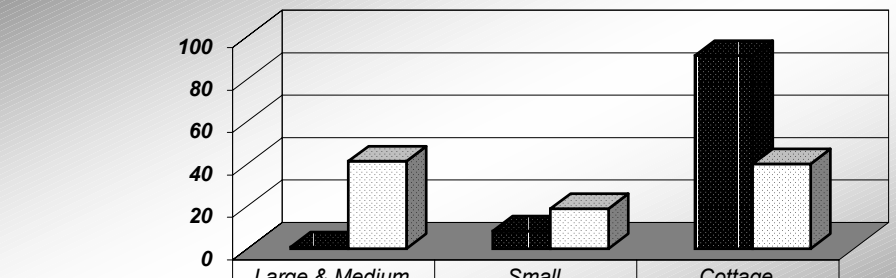
Figure 1. Manufacturing Establishments by Employment and Number of Establishments: Indonesia, 1996 (%)



	Large & Medium	Small	Cottage
Establishments (%)	0.8	8.3	90.8
Workers (%)	41.3	18.8	39.9

Source: BPS (1999: 258-9)

Table 1. Share of LME and SCE within Java and Indonesia: 1996 (%)

REGION	Employment		Value of output		Number of Firms	
	LME	SCE	LME	SCE	LME	SCE
1. Greater Jakarta	37.5	16.6	49.6	20.2	15.4	5.3
2. Greater Surabaya	15.8	8.2	14.7	9.1	10.0	7.5
3. Greater Bandung	11.5	7.1	6.6	7.9	3.8	4.3
Metropolitan regions (1-3)	64.9	31.9	70.8	37.3	29.2	17.0
4. Other regions	35.1	68.1	29.2	62.7	70.8	83.0
Total Java	100.0	100.0	100.0	100.0	100.0	100.0
% Java of Indonesia	81.7	75.6	81.9	74.6	7.4	65.6
Memo items:	*(in thousand)*		*(in millions Rp)*		*(in thousand)*	
Total Java	3,442	168	199,920	192	2	161

Note: LME=Large & Medium Establishments; SCE=Small & Cottage Establishments

Source: Calculated from 1996 Economic Census (SE96) and Industrial Survey

Map 7.1. Employment in Large and Medium Manufacturing Establishments: Java, 1996

Map 7.2. Employment in Small and Cottage Manufacturing Establishments: Java, 1996

Table 2. The Distribution of SCE by Urban-Rural Regions, 1996

Regions		Establishments		Total SCE
		Cottage (1-4)	Small (5-19)	
Urban	Count	35,242	6,957	42,199
	% of Total	21.8%	4.3%	26.2%
Rural	Count	113,390	5,760	119,150
	% of Total	70.3%	3.6%	73.8%
Total	Count	148,632	12,717	161,349
	% of Total	92.1%	7.9%	100.0%

Source: Calculated from SE96

Map 7.3. Population Distribution by District: Java, 1996

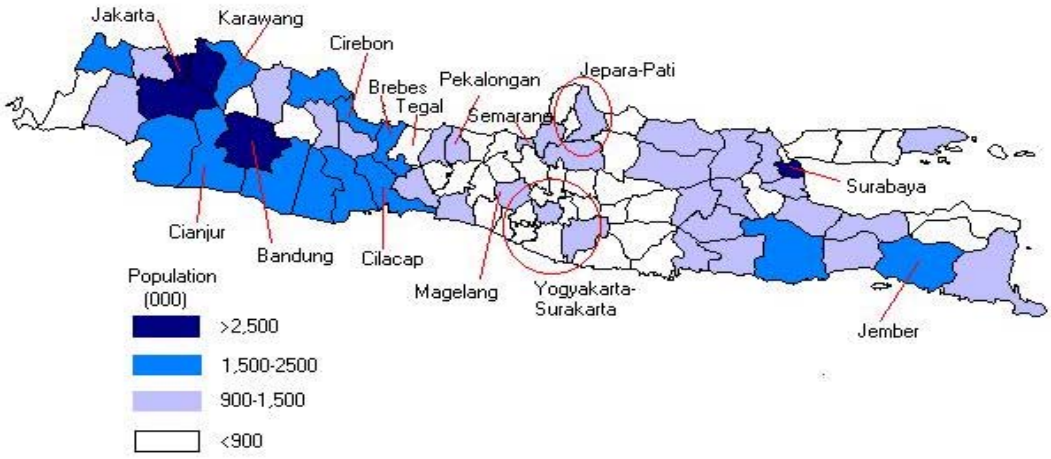
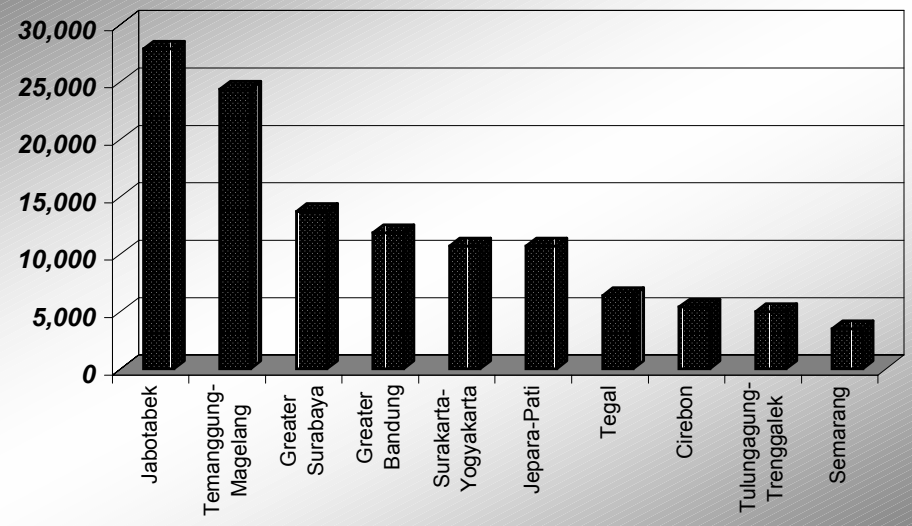


Table 3.Employment of SCE: Top ten clusters in Java, 1996							
Region	% of total Java						Total
	Food	Textile	Wood	Nonmetal	Metal	Others	Employment
1. Jabotabek	5.3	36.2	11.6	8.4	12.4	25.5	27,868
2. Temanggung-Magelang	47.3	0.3	1.1	1.2	5.4	0.5	24,367
3. Greater Surabaya	2.0	15.1	7.2	5.3	11.9	16.8	13,732
4. Greater Bandung	4.1	18.6	7.5	9.7	5.8	7.4	11,881
5. Surakarta-Yogyakarta	2.9	3.5	6.2	1.6	2.3	6.8	10,719
6. Jepara-Pati	3.1	3.3	22.0	5.0	11.0	4.1	10,709
7. Tegal	1.3	6.1	11.3	1.7	15.7	1.3	6,392
8. Cirebon	1.9	1.3	12.5	0.4	1.2	4.9	5,994
9. Tulungagung-Trenggalek	1.0	2.9	1.7	3.5	1.7	0.6	4,986
10. Semarang	1.0	0.8	2.4	0.0	5.5	9.7	3,501
Total 1-10	69.9	88.0	83.5	36.9	72.9	77.7	116,351
Others	30.1	12.0	16.5	63.1	27.1	22.3	51,504
Total Java	100.0	100.0	100.0	100.0	100.0	100.0	167,855
Source: As Table 1							

Figure 2. Total Employment of SCE in Top 10 Clusters: Java, 1996



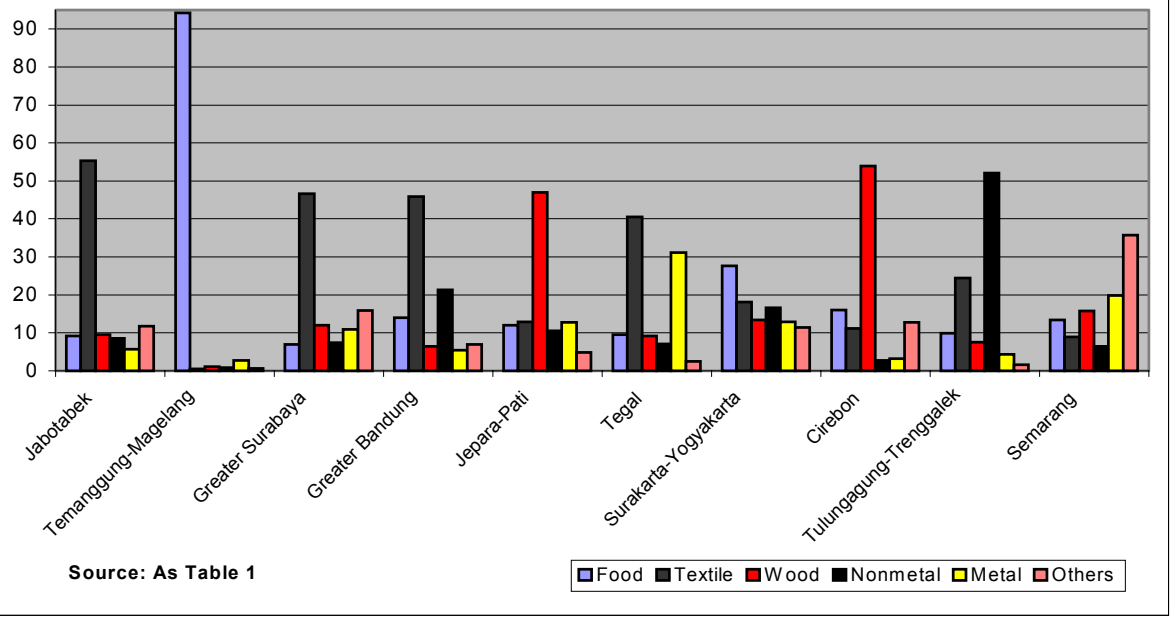
Source: Table 3

Table 4. Krugman's Indices (KI) of Regional Divergence between 10 SCE Clusters: Java, 1996

Region	JBTK	TM	GSBY	GBDG	JP	T	SY	C	TT	S
Jabotabek (JBTK)	-	1.01	0.38	0.43	0.54	0.53	0.46	0.57	0.57	0.59
Temanggung-Magelang (TM)	-	-	0.69	0.62	0.61	0.55	0.54	0.54	0.55	0.50
Greater Surabaya (GSBY)	-	-	-	0.13	0.22	0.17	0.18	0.22	0.25	0.21
Greater Bandung (GBDG)	-	-	-	-	0.23	0.17	0.15	0.22	0.15	0.19
Jepara-Pati (JP)	-	-	-	-	-	0.16	0.15	0.12	0.18	0.18
Tegal (T)	-	-	-	-	-	-	0.14	0.15	0.12	0.10
Surakarta-Yogyakarta (SY)	-	-	-	-	-	-	-	0.17	0.15	0.15
Cirebon (C)	-	-	-	-	-	-	-	-	0.14	0.09
Tulungagung-Trenggalek (TT)	-	-	-	-	-	-	-	-	-	0.11
Semarang (S)	-	-	-	-	-	-	-	-	-	-

Note: If KI = 0, it means that two regions had identical industrial structure.
Source: Calculated from SE96

Figure 3. Industrial Structure (% of total region)



Source: As Table 1

Table 5. Households Income Sector: Central Java, 1995

Sector	Frequency	Percent
Non Agriculture	12,918,337	44
Agriculture	8,225,194	28
Mixed, mainly Agriculture	3,890,016	13
Mixed, mainly Non Agriculture	4,619,719	15
Total	29,653,266	100

Source: SUPAS 1995

Table 6. Leading Subsectors by Regions, 1996

Region	Leading sectors (ISIC 3 digit)
Jabotabek	Clothes; Furniture & utensils of wood, bamboo & rattan; Footwear; Products of clay
Greater Surabaya	Clothes; Tanneries & products of leather; Footwear; Textile
Greater Bandung	Clothes; Footwear; Products of clay; Food
Temanggung-Magelang	Processed tobacco & cigarette flavors
Surakarta-Yogyakarta	Products of clay; Processed tobacco & cigarette flavors
Tegal	Clothes; Fabricated metal products
Cirebon	Clothes; Textile; Food
Tulungagung-Trenggalek	Products of clay, Clothes
Semarang	Printing, publishing, and allied industries; Fabricated metal products
Jepara-Pati	Furniture & utensils of wood, bamboo & rattan; Fabricated metal products

Source: As Table 1

Table 7. Types of inter-firm linkages in Foster Parent (*Bapak Angkat*) Scheme: Java, 1996

Types of linkages	SCE	
	Number	%
Money or capital goods	966	14.65
Procurement for raw materials	1,921	29.13
Marketing	634	9.61
Consulting and guidance	88	1.33
Other unspecified	2,986	45.28
Total number of SCE involved	6,595	100.00
Partnership:		
• Involved in *Bapak-Angkat* Scheme	6,595	4.09
• No partnership	154,754	95.91
Total	161,349	100.00
Source: Calculated from SE96		