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CHAPTER 13

Production Systems and Industrial Districts

In a pioneering paper, Fredricksson and Lindmark (1979) define production systems as a set of linkages of material goods, services and information occurring within and among firms who are directly and indirectly integrated to produce a particular final demand such as a car, a TV set, an airplane, a robot, a paper machine, a spoon or a door. If, in practice, production systems have been primarily discussed in terms of linkages between manufacturing firms, conceptually links with primary sector firms, retailers, wholesalers, trading companies, business services and financial organizations can be readily incorporated (Gereffi 1989). Manufacturing firms themselves typically engage in 'non-manufacturing' activities.

Production systems comprise populations of interacting firms producing and supplying a related set of goods. In the case of a sophisticated product, such as a motor car, there are literally thousands of separate operations or functions involved in its manufacture and considerable choices as to how these tasks are allocated among a set of firms (and among a set of locations). Even in the case of the manufacture of a simple product, such as a spoon, there may be 20-30 different tasks and potentially as many firms. In practice, whether in the case of a ‘complex’ car or a ‘simple’ spoon, there are tremendous organizational variations in the nature of production systems over time and across space. Thus the same industry can be organized by relatively few (horizontally and vertically) integrated firms or by a plethora of small specialized firms (and by any number of combinations in between). These variations reflect different choices about the internal and social divisions of labour which in turn have important implications for industrial location and for the character and potential of local development.
Production systems exhibit widely varying geographic structures. On the one hand, there are production systems which are highly dispersed and globally integrated within the framework of multinational corporations (Donaghu and Barff 1990). On the other hand, there are production systems, or substantial parts of production systems, which are geographically concentrated in dense agglomerations to create 'industrial districts' (Scott and Storper 1990; Scott 1996). Between these two polar cases, a variety of possibilities may be conceived (for example, Leung 1993). There is also considerable controversy regarding the relative importance of industrial districts, in relation to more dispersed forms of production systems, in contemporary industrial change. Historically, industrialization has been a profoundly regional phenomenon (chapter 3), and industrial districts - formed by interacting populations of firms - have been a well established, important feature. However, particularly within the context of fordism, increasing levels of corporate concentration and the growth of multinational corporations, encouraged a dispersal of production away from established concentrations. During the present ICT techno-economic paradigm, some observers have related increasing globalization with increasing dispersal of production and the fragmentation of regional economies (Amin and Robins 1990; Lovering 1990). Other observers, including Piore and Sable (1984), argue that a defining feature of contemporary trends towards flexibility is the re-agglomeration of activity within industrial districts, including in new industrial spaces (Sabel 1989; Scott 1986 and 1992; Storper and Scott 1986; Storper 1989).

This chapter explores the concepts of production systems and industrial districts in three main parts. First, production systems are explained in terms of the social and internal divisions of labour. Second, the implications of the linkages between firms for local development are illustrated by reference to the concept of the geographic multiplier which is explained and distinguished according to "quantity multiplier and "quality multiplier" effects. Finally, the concept of the industrial district is examined and, particularly with
respect to the related notion of "flexible specialization," contemporary forms are briefly elaborated.

THE INTERNAL AND SOCIAL DIVISIONS OF LABOUR

An internal division of labour occurs when related activities required to produce a final demand (or indeed some intermediate product) are entirely controlled within the firm. A social division of labour occurs when related activities required to produce a final demand occur among a population of small firms performing highly specialized functions. Theoretically, the various possibilities for organizing production may be conceived, in the first instance, as existing between two polar types of ‘governance,’ namely the extremes of all production organized and controlled by one huge firm and all production organized and controlled by an infinite number of tiny firms.

The choice between the internal and social divisions of labour is often summarized as the ‘make or buy’ decision; an internal division of labour occurs when a few firms decide to make themselves the parts and perform the functions they need while a social division of labour occurs when firms decide to buy most of their goods and services from other firms. In this latter case, subcontracting occurs when firms buy, outsource, externalize or contract out part of their production needs to other firms (Holmes 1986; Patchell 1993a; Taylor and Thrift 1983). The two polar cases underlying the make and buy decisions reflect production systems respectively organized according to (integrated corporate) hierarchies or (small firm dominated) markets. Subcontracting, however, permits a range of possibilities between these two cases. In particular, subcontracting by large core firms links the internal and social divisions of labour.

Two approaches to explaining production systems are outlined. The first approach is the transaction cost model which, as originally articulated by Coase (1937) and recently elaborated by Williamson (1975; 1979), explains choices of markets or hierarchies as a (neoclassical) exercise in maximizing efficiency (usually minimizing costs). The second
approach recognizes greater flexibility in these choices, focuses more on the varying rationales for subcontracting, and adopts the dual model of business segmentation as its point of departure (Figure 8.3).

The transaction cost model

The transaction cost model is a neoclassical extension of the theory of the firm. Simply stated, whether markets or hierarchies dominate depends on their relative efficiency in reducing transaction costs. Coase’s (1937) fundamental observation, and the starting point for this analysis, is that the use of the ‘market mechanism’ for the buying and selling of goods and services is not free. Rather, markets involve transaction costs. In particular, the search for information regarding the possibilities for exchange and the negotiation and arrangement of the details of exchange, for example, with respect to price, quantity, quality, insurance, transportation, timing and the preparation of documents, including legal contracts, involves expenditures of time and money. In addition, there are uncertainties involved in buying and selling goods and services in the market. Judgments have to be made regarding the extent of the search for information, negotiation may be difficult and details hard to confirm, buyers and suppliers may be unreliable and fail to deliver on time and/or in the right quantity and/or in the right quality, or even they may go bankrupt or be acquired by a competitor. Legal contracts can have loop holes and in any event there are costs and uncertainties in enforcement. Moreover, market transactions may give rise to opportunistic behaviour.

The transaction cost model therefore recognizes the costs and uncertainties of using the market mechanism. In the terms of this model, integrated firms replace market based transactions with hierarchically based or internally administered transactions. In the neoclassical view, hierarchical markets exist whenever they provide a more efficient alternative to market based transaction costs and uncertainties. Potentially, administered
trade between affiliated (that is, controlled) plants, can reduce the costs and uncertainties of information search and negotiation; indeed information flows and many types of decision making processes can be facilitated by routines and informal access. Such gains may be realized in situations in which buying or selling involves large volumes of raw materials, commodities or components, especially if firms are fearful of disruptions to such flows if left to the market. Firms may also prefer hierarchies in which to administer those goods and services which are highly specific to their operations and/or which represent an asset which is critical to their specific competitive advantage. For research and development (R&D) services related to the firm’s particular operations and market roles, for example, the market is likely to be a high cost, uncertain supplier and to generate problems of propriety rights and secrecy. Indeed, the firm may not be able to find exactly the kind of R&D it desires and at the time it desires in the market. According to the transaction cost model, in such a situation, firms invest in internal supplies of R&D because they significantly reduce the costs and uncertainties of relying on markets. Moreover, internal R&D allows to accumulate expertise which can be used again in branch plants or sold in the form of licenses, franchises or exports.

In the transaction cost model, limits to hierarchies occur when markets provide goods and services more cheaply. There are costs in establishing and operating hierarchies and with increasing size hierarchies may become excessively bureaucratic. In situations characterized by small scale, highly differentiated and rapidly changing demands, for example, firms may prefer to participate in markets rather than form hierarchies. That is, the central issue is the relative efficiency of markets versus hierarchies in producing and delivering goods and services. The basic principle of this model is that firms produce goods and services themselves if the additional costs and uncertainties of administration (governance) are more than offset by reductions in the costs and uncertainties of using the market mechanism, and vice versa. In essence, in this view, corporate control is incidental to achieving efficiency.
Given that transaction costs are important, some criticisms of the transaction cost model might be noted. In general, the relationship between control and efficiency is more complicated than anticipated by the model (Ahern 1993; Patchell 1993a). Thus, the model suggests that firms minimize the costs and uncertainties of using the market. Yet, a significant implication of uncertainty is that firms cannot know optimal solutions \textit{a priori}, so that among a population of firms facing similar situations, judgments are likely to vary. While one company may believe that transaction costs can be minimized by control of branch plants, distribution systems and transportation carriers another company may prefer market solutions - and both may turn out to be viable. Similarly, the organization of subcontracting linkages by core firms has varying rationales with differing implications for control and efficiency (Patchell 1993). That is, there is discretionary scope as to whether markets or hierarchies exist. In reality, production systems, even within the same industry, vary in their organization, including by various subcontracting configurations.

\textbf{Subcontracting: linking the internal and social divisions of labour}

In practice, ‘subcontracting’ (or contracting out) is frequently used to classify decisions by firms to buy rather than to make goods and services. However, many of these purchases are not actually underpinned by ‘contracts’ in a formal sense (Holmes 1986). Indeed, formal contracts are noticeable only by their absence in some ‘classic’ industrial districts organized around SMEs, such as the cutlery district of Sheffield (Townsend 1953). While formal contracts are more likely when large firms are involved within the production system, subcontracting relationships among firms are widely underpinned by tradition, trust, custom and power as well as by law. Asanuma (1987), prefers to use ‘inter-firm relations’ rather than subcontracting and 'suppliers' rather than subcontractors. Since subcontracting is so widely used, however, conventional practice is followed here.

Subcontracting is organized in various ways and with varying geographical characteristics. Two basic forms of organization, for example, are hierarchical and lateral
forms of subcontracting (Figure 13.1). In the hierarchical system, contractors maintain very few direct contacts with suppliers but allow their first tier suppliers to organize second tier suppliers. In a lateral system, to gain access to the same number of subcontractors the contracting firm would require far more direct contacts.

Subcontracting relationships may or may not be organized on an exclusive basis and they may or may not be stable over the long term. Geographically, subcontracting may form dense highly localized interactions or involve extremely long distance movements to remote places around the globe. Fredricksson and Lindmark (1979), however, note with respect to Volvo's production system, that more sophisticated, higher value suppliers tended to closer to Volvo than suppliers of standardized goods which require little information exchange.

**Figure 13.1**
Two Models of Subcontracting Organization Around a Core Firm

*Subcontracting: types and rationale* - Firms use subcontractors for various reasons and two main types are recognized: the capacity subcontractor and the specialty subcontractor. The former duplicates an activity also provided by the contracting firm while the contracting firm relies on the specialty subcontractor to provide a specialized product or service it does not provide itself (Holmes 1986). Firms may use capacity
subcontractors to meet demand above some stable, minimum level of production of a good
(or service) which is performed internally and can be sustained even during recessions.
That is, capacity subcontracting allows ‘production smoothing’ by the contractor which
subcontracts ‘surplus’ business during boom times and reduces subcontracting during
recessions (while maintaining its own production). In this way, contracting firms pass on
market risks to subcontractors. For large unionized firms, capacity subcontracting may
be a way of accessing the lower wage, non-unionized labour of SMEs. Specialty
subcontractors, who may or may not employ lower wage non-union labour, can provide
considerable production, technological and marketing expertise and exploit economies of
scale unavailable to firms relying solely on internal markets.

In the context of core firm dominated production systems, different views exist on
the role of subcontractors. On the one hand, subcontracting relationships are interpreted
as attempts by core firms to externalize costs and risks to SMEs and to indirectly exploit a
low wage labour force. Taylor and Thrift’s (1983) study of business segmentation, for
example, which is (implicitly) drawn from North American and British experience, give
particular emphasis to this view (also Holmes 1986). Such a view emphasizes the role of
SMEs as buffers against business cycles and as low wage reservoirs. An alternative view
interprets subcontracting networks as attempts to gain access to the expertise and
innovation potentials, as well as the efficiencies, of other firms (Patchell 1993a). In the
case of core firm dominated networks, production systems may be seen as attempts to gain
the benefits of both the internal and social divisions of labour while minimizing the
disadvantages. Fredriksson and Lindmark’s (1979) study of Volvo’s production system in
Sweden recognizes this interpretation of subcontracting which is also at the heart of
Sheard's (1983) and Asanuma’s (1987) models of production systems which are derived
from Japanese experience (see also Patchell 1993a and 1993b). In this view, SMEs play a
more dynamic role in wealth creation.
Fredriksson and Lindmark (1979) note that the internal and social divisions of labour offer different advantages and disadvantages as a form of governance (Table 13-1).

Table 13.1

<table>
<thead>
<tr>
<th>Internal and Social Divisions of Labour: Costs and Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benefits</strong></td>
</tr>
<tr>
<td>Internal Division of Labour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Social Division of Labour</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Thus, the primary advantage of the internal division of labour is that it allows for control and coordination of production while big firms also can exploit economies of scale, afford large scale R&D and exercise power in the market place. In Fredricksson and Lindmark’s (1979) terms, large firms enjoy high levels of external efficiency. On the other hand, big firms are bureaucratic which slows decision-making processes, weakens links between initiative and reward and can potentially create different interest groups, and costly in-fighting among members. The primary strength of the social division of labour is its entrepreneurialism - the focused search for competitive advantage, the close relationship between initiative and reward, and the short run flexibility of the small firm. In Fredricksson and Lindmark’s (1979) terms, the benefits of the social division of labour rest on the high levels of internal effectiveness of SMEs in using available resources. On the other hand, SMEs do not exploit significant economies of scale, their opportunistic
behaviour may threaten the stability of transactions and their power in the market place is limited.

Subcontracting potentially allows the advantages of the internal and social division of labour to be integrated while neutralizing their respective disadvantages. In this view, an ‘ideal’ type of production system is both stable (that is, coordinated and secure for all participants) and competitive (that is, committed to efficiency and quality improvement). Thus, stability, or cooperation, is important because it encourages long term thinking and investments in risky projects including R&D and innovation while competition is important because it ensures dynamism and helps regulate behaviour. At the same time, it is important to recognize that the process of defining and achieving an appropriate balance between the forces of competition and cooperation is problematical (Patchell 1995). Sheard (1983) believes, however, that a key dimension of the astounding success of Japanese industrialization relates to the development of production systems which have achieved, more effectively than elsewhere, this balance.

*International variations in subcontracting* - The international variation in the size distribution of firms (Table 8.1) is paralleled by, and indeed related to, international variation in subcontracting. In particular, the greater role of small firms in Japanese manufacturing is reflected in the greater importance of subcontracting in Japanese production systems. Such variation again reinforces the notion that to some extent production systems reflect choices, not simply mechanically defined technological imperatives.

In Japan, the percentage of small and medium sized firms that are subcontractors varies by industry (Table 13. 2). Between 1976 and 1986 this percentage has tended to decline in more industries than not. Even so, in 1986 in 11 of 22 industries, at least 60% of SMEs are subcontractors. In 1986, the average for manufacturing as a whole is 56%. The only industry where subcontractors are a small share of SMEs is food. There is also a
general tendency in Japan for exclusive subcontracting relations to decline as in most industries there has been an increase in the number of core firms supplied by individual subcontractors (Yaginuma 1993: 11).

Table 13.2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>17</td>
<td>15</td>
<td>8</td>
<td>-9</td>
</tr>
<tr>
<td>Textiles</td>
<td>80</td>
<td>85</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Clothing</td>
<td>74</td>
<td>84</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td>Wood and Wood Products</td>
<td>35</td>
<td>43</td>
<td>22</td>
<td>-13</td>
</tr>
<tr>
<td>Furniture and Furnishings</td>
<td>46</td>
<td>41</td>
<td>39</td>
<td>-7</td>
</tr>
<tr>
<td>Pulp and paper</td>
<td>51</td>
<td>45</td>
<td>41</td>
<td>-10</td>
</tr>
<tr>
<td>Publishing and Printing</td>
<td>46</td>
<td>51</td>
<td>42</td>
<td>-4</td>
</tr>
<tr>
<td>Chemical Manufacturing</td>
<td>40</td>
<td>37</td>
<td>22</td>
<td>-18</td>
</tr>
<tr>
<td>Petroleum and Coal</td>
<td>30</td>
<td>27</td>
<td>18</td>
<td>-12</td>
</tr>
<tr>
<td>Plastics</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Products</td>
<td>62</td>
<td>61</td>
<td>65</td>
<td>3</td>
</tr>
<tr>
<td>Leather</td>
<td>60</td>
<td>63</td>
<td>65</td>
<td>5</td>
</tr>
<tr>
<td>Ceramic, Stone and Clay</td>
<td>34</td>
<td>29</td>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>Steel</td>
<td>66</td>
<td>70</td>
<td>52</td>
<td>-14</td>
</tr>
<tr>
<td>Nonferrous Metals</td>
<td>67</td>
<td>69</td>
<td>62</td>
<td>-5</td>
</tr>
<tr>
<td>Metal Products</td>
<td>66</td>
<td>75</td>
<td>71</td>
<td>5</td>
</tr>
<tr>
<td>General Machinery</td>
<td>71</td>
<td>83</td>
<td>75</td>
<td>4</td>
</tr>
<tr>
<td>Electric Machinery</td>
<td>81</td>
<td>82</td>
<td>79</td>
<td>-2</td>
</tr>
<tr>
<td>Transport Machinery</td>
<td>67</td>
<td>86</td>
<td>80</td>
<td>13</td>
</tr>
<tr>
<td>Precision Machinery</td>
<td>72</td>
<td>72</td>
<td>70</td>
<td>-2</td>
</tr>
<tr>
<td>Other Machinery</td>
<td></td>
<td>56</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Total Manufacturing</td>
<td>53</td>
<td>61</td>
<td>56</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Yaginuma 1993: 9

Yaginuma (1993: 12) reports that in 1990, just 16% of SME subcontractors still had at least 90% of sales to one core company and a further 37% had at least 90% of their sales to two-five core companies. Since at least 1976 the general trend across most industries has been for subcontracting firms to supply more core companies. For the manufacturing
sector as a whole, and for individual manufacturing industries such as autos and electronics, Japanese core firms rely on subcontractors to a greater extent than US firms (Asanuma 1989; Fruin 1992; Shimokawa 1993; Yaginuma 1993). In the early 1980s, for example, a Japanese auto assembler in Japan relied on subcontractors for 75% of its production in comparison to 52% for an American auto manufacturer (Yaginuma 1993: 24). As will be explored in the next chapter, the nature of these subcontracting relationships also differ between Japan and the US.

GEOGRAPHIC MULTIPLIERS

From the perspective of local development, a vital characteristic of business transactions, whether organized by market or hierarchy principles, is their geography. The relationship between business transactions, particularly as expressed by linkages of goods (and services), and local development is captured by the concept of the ‘geographic multiplier’ (Hewings 1977). Simply stated, a geographic or local multiplier defines how growth in an activity (for example, a particular factory or an entire industry) within a region stimulates growth in other activities within the region. Conventionally, the local multiplier is calculated quantitatively, usually on the basis of sales linkages (linkage multiplier), employment (employment multiplier) or income (income multiplier) although other variables are possible such as some measure of pollution. An important distinction in multiplier analysis is between the ‘short run’ and the ‘long run,’ a distinction which is based on whether or not structural change in the local economy is possible. In the short run, it is assumed that investment does not occur and a region’s industrial structure, defined as its mix of industries and the linkages between industries, remains the same. In the long run, investment (and divestment) in public and private sector facilities, and thereby structural change, is possible. Long run structural change is inherently complex and expresses how regions and societies ‘solve’ their problem of industrial transformation
(chapter 2). The multiplier process in the short run nevertheless reveals the fundamental importance of business transactions and linkage local development.

**Quantity (employment and income) multipliers**

Local or regional multipliers essentially measure the impacts of some initial growth or change in an activity in a region on total or aggregate level of economic activity within a region. Simply put, a (short run) multiplier \( k \) measures the ratio of initial growth to total impacts, that is:

\[
k = \frac{\text{total economic impacts within a region}}{\text{initial economic impact}}
\]

Because there are different ways to measure impacts (for example, sales linkages, employment and income) and because there are different definitions of ‘total impacts’ there are in fact a whole family of multipliers (Hewings 1977). The basic idea of the regional multiplier process, however, is that growth in one activity generates growth in other activities via industrial linkages. This idea can be simply illustrated (Figure 13.2).

**Figure 13.2**
The local (Short Run) Multipliers and Linkages: A Simplified Model
In this particular case, Factory A, which is part of industry A, has won an export order for $10 million. This export sale means that the region’s economy activity has been increased by this amount and as such it constitutes the ‘initial economic impact’ or multiplicand. The multiplier process concerns how Factory A’s new exports will ‘spillover’ and generate additional growth in other industries within the region. In this case, Factory A, to produce additional exports, needs to purchase inputs (component parts, raw materials, services) from other firms in the region, including firms in industries A, B and C. These purchases are the equivalent of additional sales for firms in industries A, B and C and constitute ‘direct impacts’ that arise from the initial growth in Factory A’s exports. In addition, these firms in order to increase their sales need to buy inputs from other firms so that another (second) round of sales increases (‘indirect impacts’) are generated. Indeed, additional rounds of sales increases (more indirect impacts) may be expected so that the initial increase in sales is now ‘multiplying’ as a result of these indirect impacts. It should also be noted that firms pay wages and salaries to employees, that is purchases from households in present terminology, and households may purchase from firms in the region generating further multiplier effects. These household generated effects are normally labeled ‘induced impacts.’

*Leakages and the size of multipliers* - The regional multiplier process is inevitably limited by ‘leakages’ of one kind or another. In this case (Figure 13-2), the main leakage is Factory A’s purchases from firms in industry D which is located in other regions so that these purchases represented imported goods and services. From the point of view of a local economy, imports are leakages which generate sales (and employment and income) elsewhere but not in the case study region. Given that firms in industries A, B and C also import with each successive round in the multiplier process additions to sales within the region become less and less. Ultimately, if the initial increase in export sales of $10
15

million generates total sales additional sales of $20 million then the sales multiplier, \( k = \frac{20}{10} = 2.0 \). That is, the multiplier is two which means that, in the short run, for every $1 increase in exports (or ‘final demands) for goods provided by factory $2 worth of sales are generated within the region.

This brief, simplified description the multiplier process nevertheless reveals a fundamental characteristic of geographic multipliers; the size of the multiplier depends upon the extent of purchases of local goods and services. The greater the linkages among local industries the bigger the geographic multiplier. Alternatively stated, the size of the multiplier is determined by the extent of the leakages to local inter-industry linkages and the more an industry imports the smaller its multiplier effects. Admittedly, industries in other regions, such as industry D (Figure 13-2), may themselves require purchases, known as ‘inter-regional feedback effects,’ from the case study region which will also generate multiplier effects. Nevertheless, the fundamental point is that leakages, that is removals of money from local circulation, dampen local multiplier effects. In this context, while imports are a significant form of leakage in practice, other types of leakages may be noted. Thus, savings, profits and dividends which are sent to other regions, and taxes paid to non-local governments are potentially other important forms of leakage which, in the long run, may or may not return to the case study region in the form of investment or transfer payments.

Employment and income multipliers are conceived in the same way. In the case of employment, for example, if to meet additional exports of $10 million, Factory A employs 100 people then this employment number represents the initial economic impact. As the multiplier process works it way through the system, that is by direct, indirect and induced impacts, other firms also increase their employment as they expand their sales. If the total number of jobs generated is 250 then the employment multiplier is 250/100 or 2.5. Similarly, an income multiplier can be calculated if information on wages and salaries, which under present terminology are purchases of labour from households (Figure 13-2),
is available. Thus, if the 100 people employed by Factory A were paid $4 million and total wages and salaries in the region expanded by $8.8 million the income multiplier would be $8.8 million/4.0 million or 2.2.

*Input-output multipliers* - The most sophisticated method of calculating income, employment and sales multipliers is provided by input-output analysis (Hewings 1977; Miernyk 1965). A brief, non-mathematical introduction to how input-output multipliers are derived is provided in Appendix 2. In addition, the 'gross flows' input-output table, the basis for input-output analysis, for Washington State in 1967 is partially presented (Table 13-3).

**Table 13.3**

Input-Output or Interindustry Gross Flows Table for Washington State, 1967 ($m)

<table>
<thead>
<tr>
<th>Sales to</th>
<th>∅</th>
<th>Agriculture</th>
<th>Food Products</th>
<th>Forest Products</th>
<th>Metals Machinery</th>
<th>Aerospace</th>
<th>Services</th>
<th>ALLWA Industries</th>
<th>Final Demands</th>
<th>Total Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>87</td>
<td>303</td>
<td>151</td>
<td>6</td>
<td>0</td>
<td>20</td>
<td>(585)</td>
<td>470</td>
<td>1055</td>
<td></td>
</tr>
<tr>
<td>Food products</td>
<td>34</td>
<td>72</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>28</td>
<td>(135)</td>
<td>1308</td>
<td>1442</td>
<td></td>
</tr>
<tr>
<td>Forest Products</td>
<td>2</td>
<td>26</td>
<td>343</td>
<td>3</td>
<td>2</td>
<td>159</td>
<td>(555)</td>
<td>1276</td>
<td>1836</td>
<td></td>
</tr>
<tr>
<td>Metals, Mach.</td>
<td>2</td>
<td>65</td>
<td>17</td>
<td>55</td>
<td>42</td>
<td>200</td>
<td>(414)</td>
<td>854</td>
<td>1268</td>
<td></td>
</tr>
<tr>
<td>Aerospace</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>59</td>
<td>5</td>
<td>(63)</td>
<td>2473</td>
<td>2536</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>77</td>
<td>85</td>
<td>164</td>
<td>87</td>
<td>62</td>
<td>1074</td>
<td>(1671)</td>
<td>5833</td>
<td>8895</td>
<td></td>
</tr>
<tr>
<td>ALLWA Ind.</td>
<td>(238)</td>
<td>(577)</td>
<td>(708)</td>
<td>(161)</td>
<td>(173)</td>
<td>(1878)</td>
<td>(3952)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td>130</td>
<td>400</td>
<td>298</td>
<td>578</td>
<td>1274</td>
<td>1503</td>
<td>(4787)</td>
<td>1699</td>
<td>8080</td>
<td></td>
</tr>
<tr>
<td>Value Added</td>
<td>687</td>
<td>465</td>
<td>830</td>
<td>559</td>
<td>1089</td>
<td>5514</td>
<td>(9955)</td>
<td>2870</td>
<td>12733</td>
<td></td>
</tr>
</tbody>
</table>


Notes: This table is a highly aggregated version of the original. The dotted line encloses the so-called intermediate sector although not all industries are identified. In this table, households are included in the value added and final demands sectors. In appendix 2 imports and value added are included in the payment sectors.
This table simply shows the 1967 dollar value of all business transactions for all activities in Washington State as a set of inputs (purchases) and outputs (sales), that is it is a form of double entry book keeping which reveals the 'actual' nature of inter- and intra-industry linkages for 1967. For example, firms in the aerospace industry, principally the Boeing Company, had total sales in 1967 of $2, 536 million including $59 million to other firms in the aerospace industry of Washington State, $495 million to governments and $1, 979 million worth of exports to private sector firms. All of these outputs must be balanced with inputs and the Table 13.3 shows that for aerospace firms these inputs included purchases of $59 million worth of inputs from other firms in the aerospace industry of Washington State, $1, 274 million worth of imports and value added payments, notably wages and salaries to households.

These gross flows data provide the basis for the calculation of different types of income multipliers (Table 13. 4). An important observation is that different industries generate different multiplier effects within the same region. The aerospace industry in Washington State, for example, has a smaller income multiplier than the forest product sector so that the same amount of export sales growth in the latter will create a bigger income impact than the former. Similarly, during recession, the downward or negative multiplier effects of the aerospace industry are less than that for the forest sector (Bourque 1969, 1971; Beyers 1972; Erickson 1974). The reason is that the forest sector has strong linkages with local suppliers while in the aerospace industry the Boeing Company subcontracts many of its requirements out of the State.

An input-output table, such as the Washington State 1967 table, defines regional industry structure at a point in time in the form of inter-industry linkages. These linkages ultimately depend on the decisions of individual organizations (in the public as well as the private sector). Thus, at a point in time, ceteris paribus, business decisions which favour local purchases of goods and services increase local multiplier effects. Over time, investments in new activities facilitates the process of regional industrial diversification.
Indeed, in regions that diversify over time, it is to be expected that income multipliers will increase a leakages will tend to decrease. In contrast, a feature of declining industrial regions is the fragmentation of industrial structures and declining multiplier effects.

### Table 13.4

**Income Multipliers in the Washington Economy: Selected Industries, 1963**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Direct Income</th>
<th>Direct and Indirect Income</th>
<th>Direct, Indirect and Induced Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field crops</td>
<td>$0.54</td>
<td>$0.67</td>
<td>$1.19</td>
</tr>
<tr>
<td>Vegetables</td>
<td>0.78</td>
<td>0.89</td>
<td>1.59</td>
</tr>
<tr>
<td>Livestock</td>
<td>0.34</td>
<td>0.52</td>
<td>0.92</td>
</tr>
<tr>
<td>Beverages</td>
<td>0.49</td>
<td>0.76</td>
<td>1.35</td>
</tr>
<tr>
<td>Logging</td>
<td>0.67</td>
<td>0.91</td>
<td>1.61</td>
</tr>
<tr>
<td>Sawmills</td>
<td>0.46</td>
<td>0.93</td>
<td>1.64</td>
</tr>
<tr>
<td>Petroleum refining</td>
<td>0.24</td>
<td>0.42</td>
<td>0.54</td>
</tr>
<tr>
<td>Aluminium</td>
<td>0.38</td>
<td>0.46</td>
<td>0.86</td>
</tr>
<tr>
<td>Electric machinery</td>
<td>0.62</td>
<td>0.69</td>
<td>1.22</td>
</tr>
<tr>
<td>Aerospace</td>
<td>0.52</td>
<td>0.56</td>
<td>0.99</td>
</tr>
<tr>
<td>Shipbuilding</td>
<td>0.67</td>
<td>0.76</td>
<td>1.35</td>
</tr>
<tr>
<td>Construction</td>
<td>0.41</td>
<td>0.65</td>
<td>1.18</td>
</tr>
<tr>
<td>Insurance</td>
<td>0.85</td>
<td>0.97</td>
<td>1.72</td>
</tr>
<tr>
<td>Business Services</td>
<td>0.76</td>
<td>0.89</td>
<td>1.58</td>
</tr>
<tr>
<td>Personal Services</td>
<td>0.66</td>
<td>0.85</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Source: Derived from Bourque 1969: 6-8

Note: In the terms of Appendix, the direct income effect is the technical coefficient for households; the direct and indirect income effect is the Type I income multiplier; and the direct, indirect and induced income effect is the Type II income multiplier.

### The quality multiplier

Relationships among firms are, or at least potentially are, more than simply the purchase and sale of goods and services. Firms also develop and exchange know how in the form of information, counseling, joint research and engineering initiatives, loans of employees.
including engineers, cooperative training ventures while firms can also observe the ‘best practice’ behaviour of other firms (LeHeron and Thomas 1975). This exchange of know-how among firms within a region defines the quality multiplier (Thomas 1969). In this regard, the quality multiplier rests on an interpretation of production systems as learning systems and the development and transformation of skills (Patchell 1993a). An important way industrial skills are created and developed is through personal relationships in which learning takes place by the exchange of ideas, direct observation and by practice ('doing') in which, for example, skilled workers teach unskilled workers and apprentices. Such personal interactions and skill formation processes are facilitated by the localization of related activities. Indeed, the most powerful geographical expressions of quantity and quality multiplier processes are found in industrial districts.

THE NATURE OF INDUSTRIAL DISTRICTS

Scott (1992: 266) defines an industrial district as "a localized network of producers bound together in a social division of labour, in necessary association with a local labour market" (Italics in the original). That is, industrial districts feature a) geographic concentrations of activities; b) populations of small and medium sized firms which are linked together in various ways; and c) appropriately skilled and accessible labour pools. The economic rationale for industrial districts is provided by localized external economies of scale (Scott 1992; Storper 1989; Sunley 1992; see also Phelps 1992). Thus, firms in an industrial district gain benefits which are internal to the district but external to the firms themselves. In addition, economies of scope, the ability to perform different tasks with the same resources, are also an inherent feature of the 'flexibly specialized' nature of industrial districts.

According to Piore and Sabel (1984), industrial districts are "flexibly specialized." Within industrial districts SMEs are individually highly specialized on a limited range of
products and processes and collectively flexible because each SME has ready access to
the (product, process and employment) specialisms of many other SMEs some of whom
compete and some of whom complement one other. In turn, this collective flexibility
implies rapid response to highly differentiated consumer demands, highly differentiated
input supplies, rapid absorption and diffusion of new technologies and market
information, as well as effective use, training and redeployment of labour. Indeed,
Morgan (1994) thinks of flexible specialization in terms of "collective entrepreneurship"
(see Cooke and Morgan forthcoming). In this view, high levels of market and supply
uncertainty encourage a disintegration of production among SMEs and a reliance on
external economies of scale and scope as a means of coping with constantly changing
demands. In fragmented and changing markets, for example, SMEs can 'shift promptly
from one process and/or product to another, and to adjust quantities of output up or down
over the short run without any strong deleterious effects on levels of efficiency' (Storper

Industrial districts as localized networks

A wide variety of products are manufactured in industrial districts which have existed in
various forms since the industrial revolution (Scott and Storper 1988, 1990; Scott 1992:
267). Industrial districts also vary geographically in terms of institutional structure
(Figure 13.3). A basic distinction is that between industrial districts solely comprising
SMEs and industrial districts in which SMEs are organized around core firms. There are
other possibilities related to these basic types. Inevitably a size distribution of firms exists
even in districts dominated by SMEs while in core firm dominated industrial districts
there may be several core firms of varying size and importance plus medium sized firms
which provide examples of secondary core firms. Piore and Sable (1984) note further
types of localized organization including the 'solar firm' which comprises multiple
branches of one firm or branches of affiliated firms. It should also be recognized that national and local government policy contexts vary in the degree of explicit support for industrial districts.

Figure 13.3
Industrial Districts as Localized Networks

It has long been recognized that core firm and SME dominated industrial districts, and related alternatives, create localized external economies of scale and economies of scope (Figure 13.3). As Sunley (1992) notes, Marshall's (1890) characterization of industrial districts of 100 years ago, emphasized three main forms of localized external
economy, namely pools of skilled labour, the growth of subsidiary industries and the exchange of information. By agglomerating in particular places, firms in the same and related industries allow the development of pools of appropriately skilled and interested workers in which traditions and skills are transferred within families as well as through on-the-job training and specialized educational and training programmes, themselves made economic by the concentration of local demand. Second, a concentration of activity among a population of SMEs creates a range of economically viable demands for common, specialized suppliers of components, processes, machinery, wholesaling, business, marketing, research and development, financing and transportation services. Third, a geographic concentration of activity facilitates person to person contact through informal as well as informal channels and thereby the flow of information on all kinds of matters related to the industry. Marshall emphasized the importance of such information exchanges to the diffusion of ideas and innovations (Sunley 1992: 307).

The particular ways that external economies of scale and scope are realized depends on the specific nature of the interrelated entrepreneurial networks and labour market networks that exist within industrial districts and how these networks are organized for learning and innovation (Figure 13.3). With respect to entrepreneurial networks, an important characteristic is the degree of ownership, that is the extent to which production is distributed among an independent social division of labour or, conversely, the extent to which production is concentrated within an internal division of labour. In a general sense, competition increases with the number of firms and independent decision makers. Indeed, the flexibility of industrial districts as agglomerations of specialized activity rests to a substantial degree on the internal competition that exists among subcontractors for business with contracting firms and among firms competing for related final product markets inside and outside the region.

But the flexibility of industrial districts also rests on coordination among firms, that is the complementary behaviour required between contractors and subcontractors to
manufacture products of the right quality, in the right quantity and on time, and among rivals who wish to develop external economies of scale (Storpere and Scott 1988).

Indeed, an important institutional question facing firms (and labour) in industrial districts is how to balance the forces of competition and the forces of cooperation. If competition drives efficiency, quality improvements and innovation, hyper- or cut-throat competition can lead to degraded labour conditions and reduce incentives to learn and innovate. Some degree of stability and cooperation in business transactions is important for firms and employees to invest in innovative and learning processes. In general terms, the degree of coordination within an industrial district is defined by industry associations, firm-level cooperatives, bi-lateral exchanges of know-how and financing arrangements and by subcontracting arrangements (Figure 13.3).

**cooperation and competition** - In practice, social divisions of labour are bound together by custom and tradition as well as by formal economic ties and contracts. Thus trust and cooperation are potentially important features which help bind industrial districts together including among firms who are rivals for particular product markets. Indeed, according to Lorenz (1992: 195-6) the most prominent characteristics of industrial districts are:

- a particular balance between cooperation and competition among the firms within them...Cooperation has two principal aspects. It takes the form of the provision of collective goods, notably training or education and research and development, but also medical care and unemployment insurance...through the auspices of some local institution. Cooperation also takes the form of adherence by producers to a set of norms of competition...their being embedded within 'communities,' and the high level of trust among producers within them.

While the potential range of cooperative behaviour is considerable, some general points can be made. Thus, industry-wide cooperation is represented by the creation of
associations by all or many of the companies in an industrial district to undertake responsibilities on behalf of all the members who provide funding. Industry associations provide goods and services, such as R&D, marketing, lobbying and representation, labour bargaining, forums for discussion and information on industry matters, which are either beyond the abilities of individual firms or, if paid for by an individual firm, would be readily available to others. Typically, membership in industry associations is voluntary and an important task of associations is to ensure each member feels that participation is worthwhile. Cooperative consultation and coordination also occurs in a wide variety of other ways involving two or a few firms more limited ways, for example, involving two firms in the exchange of know-how and opinions or in the provision of a variety of services by contractors to subcontractors, such as help with financing, space, and planning (Leung 1993).

Moreover, as Lorenz (1992) indicates, firms within an industrial district typically share values as to the 'norms of competition.' While these norms are shaped by local culture, there are always possibilities for opportunistc behaviour in which firms seek to gain economic advantage over others by violating traditional, if not the legal bounds of behaviour, or the obligations of unwritten understandings. In all cultures, opportunism is at least informally constrained by the threats of loss of future business, loss of reputation and exclusion from exchanges of information and offers of help. That is, trust is motivated by economic incentives and beliefs that 'anticipated benefits of future mutual cooperation are valued higher than the one-time rewards of defecting while others cooperate' (Lorenz 1992: 197). Opportunism, it might be noted, is not limited to western societies which emphasize individualism but exists in Chinese and Japanese contexts where Confucianism is present (Asanuma 1989; Leung 1993). Indeed, as will be discussed in the next chapter, industrial districts in Japan are strengthened by powerful incentives rewarding reliability and trustworthy behaviour.
According to Takeuchi (1992), the resilience of industrial districts in Japan, including those organized by SMEs in the dynamic, high cost environment of Tokyo, is greatly aided by high levels of inter-enterprise cooperation and trust, particularly with respect to the exchange of technological know-how and other forms of information exchange. For example, in Tokyo knitting, tool making and machinery manufacturers formed associations in the 1980s to collectively promote ways to improve the quality of their products, given that low value items were relocating elsewhere in Japan or to foreign countries. Takeuchi (1992: 287-8) argues that the evident success of these associations lay in frequent meetings, in some cases on a nightly basis, a high level of trust among members "and a strict adherence to the main goal" while also noting that "Absentees failing to provide notice to meetings are ousted. [and] Companies which are incapable of making suggestions or who fail to contribute to other companies must also withdraw." In this way, trust relations among rivals in the same industry are sanctioned in the form of 'norms of cooperation.'

Cooperation involving joint learning, technology transfer and the development of new business requires face to face contacts and levels of trust that are facilitated by geographic proximity. Takeuchi (1992: 291) notes, for example, that in Tokyo "it is said that the necessary conditions for cooperation is that the parties involved should not be more than 15 minutes from each other for effective mutual exchange." In an interesting experiment, MITI and local governments in Japan began to offer financial support for cooperation regarding new business ventures and technology transfer among SMEs in different industries throughout Japan. Thus, from 1987 to 1989, the number of such groups increased from 700 to 1527, and the respective number of enrolled companies from 20,000 to 52,149 (Takeuchi 1992: 285). Typically, such groups meet monthly, much less than permitted by firms in close proximity to one another.
Employment perspectives - Principles of competition and cooperation similarly shape employment networks within industrial districts. In general terms, the nature of labour markets networks are based on the employment relation, including with respect to forms of training, negotiated between management and labour which over time reflect and develop particular cultures, traditions 'norms of bargaining.' In this regard, unions provide a formal institution binding the interests of employees together across industrial districts, by bargaining and in other ways. There is, for example, high union densities in the industrial districts of northern Italy. Whether or not union representation exists, labour characteristics can evolve in many different ways, according to skill, degree of job demarcation, productivity, wages, non-wage benefits and there may or may not be industry wide bargaining including with respect to funding labour training associations, pensions and apprenticeship schemes. On the one hand, there may be commitment to linking productivity with improving wages and working conditions. On the other hand, bargaining may be more inherently antagonistic and directed towards keeping wages and training costs low and workers in competition with one another. Alternatively put, employment networks may emphasize principles of functional flexibility and the development of core, stable, well paid and multi-skill workers or they may emphasize numerical flexibility and the entrenchment of a peripheral, low paid, unskilled and easily replaced workforce.

The reality of local employment networks within industrial districts, however, are often complicated, combining elements of both functional and numerically flexibility. On the basis of detailed case studies, for example, Rees (1994) found that in the newly emerging wood remanufacturing industrial district of the Vancouver metropolitan area of British Columbia employment bargains are highly varied (Table 13.5). Thus, there are examples of firms employing highly paid, stable and multi-skilled workforces producing high value goods, examples of poorly paid, high turnover workforces producing low value goods and examples of firms employing workforces with mixed characteristics. The
range in employment characteristics also seems to be a feature of the film industry industrial district in California (Storper and Christopherson 1987).

Table 13.5

Employment Characteristics of Remanufacturing Firms in the Vancouver Metropolitan Area

<table>
<thead>
<tr>
<th>Firm</th>
<th>Full-time (temporary) Employment</th>
<th>Entry Wages: $ per hr.</th>
<th>Non-wage Benefits</th>
<th>Flexibility Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>13 (3) 28 (10) 40 (10) Union No</td>
<td>12.75</td>
<td>Full med, dental &amp; pension</td>
<td>Job rotation among skilled tasks. Training. Preference for qualified graders</td>
</tr>
<tr>
<td>B</td>
<td>6 10 15 No</td>
<td>8.00</td>
<td>Full med, 80% den, no pen</td>
<td>Job rotation but work unskilled. No qualifications. Unstable workforce.</td>
</tr>
<tr>
<td>C</td>
<td>16 (20) 10 (25) 11 (22) No</td>
<td>14.50</td>
<td>Full med, 50% den, no pen</td>
<td>Strong job demarcation. Temporary workers relatively old. Limited training.</td>
</tr>
<tr>
<td>D</td>
<td>74 72 54 No</td>
<td>17.81</td>
<td>Full med+, 80% den, 80% pen</td>
<td>Job rotation among skilled tasks. Extensive training and qualifications.</td>
</tr>
<tr>
<td>E</td>
<td>- - 24 Yes</td>
<td>17.00</td>
<td>Full union package</td>
<td>Union sub-agreement permits shift scheduling and job rotation, extensive training.</td>
</tr>
<tr>
<td>F</td>
<td>- - - - - - -</td>
<td>-</td>
<td>-</td>
<td>All work is subcontracted.</td>
</tr>
</tbody>
</table>

Source: Rees 1994. Notes: Virtually all employees, apart from clerical, are male and white. Firm C’s full-timers (but not temps) are mainly Indo-Canadians. med: medical; den: dental; pen: pension.

A: medium value independent producer  B: low value contractor
C: low value capacity subcontractor  D: high value specialty contractor
E: high value branch plant  F: low value branch 'middleman'
There is an ongoing debate about the implications of flexibly specialized industrial districts for employment. Based largely on the experience of Little Italy (Brusco 1986; Goodman et al 1989; Pyke et al 1990; Sable 1989), Piore and Sable (1984) stress the potential of industrial districts for mutually reinforcing and progressive relationships between entrepreneurial and employment networks. Others have raised issues of exploited and even degraded labour conditions and stress that flexible specialization simply provides a new regime for capital accumulation (Harvey 1990). In this view, women are seen as especially vulnerable. Thus, Jensen (1989) argues the conception of skill emphasized in flexible specialization is biased towards men in part because machines are designed by men for men, while Lever-Tracy (1988) and Walby (1990) emphasize the role played by women in part-time work.

Fujita's (1991) study of women workers in flexibly specialized industries in Tokyo since 1985 modifies these views. She suggests that it is inappropriate to conflate the general shift towards more female part-time work that has occurred since 1950 in the US and UK with flexible specialization, a trend only just beginning in these countries. Thus, Japan, where flexible specialization is most advanced, has the lowest rate of women part-time workers (Fujita 1991: 263). In addition, Fujita recognizes that the concern for ergonomics in Germany, Sweden and Italy, as well as Japan, has led to close design attention to the social aspects of machinery ('humanware relations'), that is to meet human needs of all workers, including female workers. Empirically, Fujita's (1991: 275) analysis of Tokyo's information industrial district reveals a rapid growth of female professionals many of whom prefer high wage part-time work over full time work in order to maintain a wider range of family and community roles. Women have also been increasingly active in developing the skills and networks necessary to create their own businesses. Given that in Tokyo, as elsewhere, 'child bearing and child care persistently hamper and interrupt women's continuous employment' Fujita (1991: 275-6) nevertheless argues that an
increasing number of professional women working in a high tech environment have achieved some autonomy over career paths while resisting patriarchal and traditional work roles. Women factory workers in Japan, on the other hand, remain in low wage, low skill jobs (Sosa 1990).

Workers, male and female, can also achieve more autonomy by forming workers' cooperatives. Workers' cooperatives have developed especially rapidly in Italy and Spain, where by the early 1990s they numbered around 10,000 and 20,000 respectively (Bartlett 1993: 57). Workers' cooperatives are typically small, specialized organizations and in some cases they comprise important elements of local industrial districts. In the Basque region of Spain, for example, the Mondragon system of industrial cooperatives began in 1956 and by 1990 this group comprised 97 cooperatives employing 22,000 workers (Bartlett 1993: 63). For workers' cooperatives, it is efficiency, rather than worker exploitation that is debated. A related question might well be how effective cooperatives with respect to innovation.

The importance of innovation - In Piore and Sable's (1984) terms the defining characteristics of industrial districts are the flexibilities provided by specialist firms in the form of speed, cost and quality of responses to highly variegated consumer demands and uncertain supply situations. In turn these flexibilities are rooted in external economies of scale and economies of scope. Yet, flexible specialization is by itself no guarantee of long term survival (Hayter and Patchell 1993: 1430). While Piore and Sable (1984: 17) associate flexible specialization with a commitment towards innovation, they hint that innovative is not an inevitable result of specialization. Yet, the social division of labour underlying industrial districts is dynamic and, in most cases, firms in industrial districts need to innovate to survive (Ide and Takeuchi 1980). In general terms the supply of innovations, which may be organizational or technological and cooperatively introduced or originated by individual firms, is shaped by the skill of workers, entrepreneurial
ingenuity and by more formal research, development and design activities (Figure 13.3).

Industrial districts vary in terms of the organization of worker training and innovation. Several studies, for example, have reported on the varying roles of local political parties, churches, local governments, trade associations, trade unions and chambers of commerce in supporting innovation in northern Italy (Brusci and Righi 1989; Zeitlin 1989), Baden-Wurttemberg in Germany (Herrigal 1989; Sabel et al 1989) and various small scale industries in Japan (Friedman 1988; Ide and Takeuchi 1980). In some instances markedly different attitudes towards worker training and innovation are evident. A case in point is provided by the cutlery industry districts of Solingen, Germany and Sheffield, UK (Lloyd 1913; Hayter and Patchell 1993: 1442). Both districts developed as an export oriented social division of labour and by 1900, the 12,000 workers in Solingen were almost three-quarters of the number in Sheffield, the leading centre of the 19th century. Yet, by 1900 Lloyd (1913: 374) reported that in Solingen cutlers were technologically more advanced than their deeply conservative Sheffield counterparts and that the workforce was better organized, had more influence and were more supportive of technical change than in Sheffield where cutlers were even slow to use stainless steel which was invented in Sheffield in 1913. In addition, the apprenticeship system in Sheffield relied entirely on on-the-job training by existing craftsman who were not paid for this responsibility (and apprentices paid very little) in contrast to the much greater level of support given to training in Solingen. Moreover, these differences have continued to the present day and a much fragmented Sheffield industry survives by emphasizing low costs (especially wages) and virtually no investment in new equipment, R&D or training. While Solingen's cutlery firms have also declined in number, the survivors are highly automated, high quality manufacturers who pay high wages and maintain a strong apprenticeship and training system. A similar point can be made regarding the Tsubame cutlery district in Japan - its vitality relates directly to its strong commitment to innovation (Hayter and Patchell 1993).
Types of Industrial Districts

There is a large array of products and services that are produced in industrial districts. To select a few well known examples there are industrial districts that produce autos, such as Toyota Town in Japan, numerically controlled machine tools in Nagano, Japan, machine tools in Baden-Wurttenburg, Germany, shoes and knitwear in northern Italy, cutlery in Solingen, Sheffield and Tsubame, semi-conductors in Silicon Valley, and aerospace manufacture in Los Angeles. In metropolitan areas such as London, New York, Tokyo and New York multiple industrial districts exist. A recent paper by Scott (1996: 312), for example, discusses five different types of production and service industrial districts (advertising, clothing, entertainment, furniture and jewelry) in the craft, fashion and cultural products industries of Los Angeles. In Japan, industrial districts are widely prevalent and have consistently provided the dominant framework for industrialization in the 20th century to a greater degree than in the west including with respect to SME dominated industrial districts.

Within the western literature, small firm dominated industrial districts have long been regarded as relic forms of industrialization. Over 80 years ago, for example, Lloyd (1913: ix) studied the Sheffield cutlery industry as a SME dominated industrial district because it comprised "rapidly disappearing features which appear to be survivals from an earlier industrialization." In practice, even in the west, such districts proved more resilient than anticipated and in support of Piore and Sabel's (1984) advocacy of flexible specialization there has been much celebration of the Emilia Romagne region of northern Italy, with its populations of SMEs manufacturing a wide range of products in the ceramics, clothing and footwear industries within flexibly specialized industrial districts (Brusco 1986 and 1989; Goodman, Bamford and Saynor 1989). It is in Japan, however,
where SME dominated industrial districts are particularly prevalent (Ide and Takeuchi 1980; Yamazaki 1980).

In Japan, the term jiba sangyo or community based industries (cbis) was introduced in the 1960s to refer to localized concentrations of small, owner managed firms which employ a refined division of labour to manufacture specific types of products for sale, in many cases for export (Ide and Takeuchi 1980: 299). Ide and Takeuchi counted over 330 cbis located in both major metropolitan areas and in small, isolated rural communities which collectively accounted for about 10% of all small businesses in Japan (Yamazaki 1980). In Tokyo, in the early 1970s cbis accounted for about 60% of its factories and 50% of manufacturing value added, the most important of which were in printing, metal pressing, book binding, metal molding, household furniture, paper goods, apparel for women and children, handbags, flat knitting, accessories, leather footwear, men's clothing, toys, circular knitting, precious metals, brief cases, cigarette lighters, rubber products and medical equipment. Other types of cbi, for example, in lacquer ware and metal working are found throughout Japan (Figure 13.4).
Traditional and modern industrial districts

Among OECD countries, there is an incredible variety of products and processes that characterize industrial districts. The extent of this variety is illustrated by reference to
the Wajima *Shikki* industry in Japan (Figure 13. 5) and the Los Angeles aerospace complex (Figure 13. 6).
Figure 13.5
The Wajima Shikki Industry

Figure 13.5a
Distribution of Shikki Firms, 1988

Figure 13.5b
Subcontracting Patterns of a Nushiya Firm

Source: Suyama 1996: 69478
Wajima Shikki is a handicraft industry producing wood products which are varnished and decorated, especially by lacquer and inlaid gold. Wajima shikki involves about 60 processes which are dependent on artisan skill and experience and performed within 11 categories of firms, including organizers (nishiya), subcontractors, decorators, joiners, hollowing makers, turners, board rounders, chopstick makers and box makers (Suyama 1996: 66-7). By 1989, there were 869 firms employing 2,869 workers in the Wajima Shikki industry; almost 90% of the firms employed less than 5 workers and only three of the nishiya had more than 51 employees (Figure 13.5a). These firms are involved in complex inter-firm relations. Nishiya B, for example, a small organizer employing 15 people which concentrates on varnishing and sales, relies on 26 outside firms within the region for a range of highly specialized processes including differing types of surface decorating (polishers, lacquerers and gold in-fillers), wood body making (joiners, board rounders, hollowware, specialists turners) and for other types of varnishing, especially priming and middle varnishing (Figure 13.5b). The firms of Wajima Shikki have also formed associations to purchase specialized inputs not available locally, such as brushes and gold foil and powder, and to mine jinoka, a material vital to the varnishing processes. Other materials, such as wood, are bought independently or by groups of firms and sales are primarily handled by the nishiya who sell to wholesalers and retailers.

As Suyama (1996) emphasizes, the technology and methods underlying the production of Wajima Shikki are essentially those established in the 18th century when it appears the industry began in the region. The size and organization of the industry has changed considerably over the last 30 years, however. Thus between 1967 and 1989 the number of firms and employees doubled, as did production. As the shikki industry in many areas of Japan collapsed, Wajima concentrated on high value goods for which demand remained strong. In turn, the industry's expansion required organizational restructuring, notably by increasing the number of independent subcontractors, by the diversification of the sales links organized by the nishiya, notably by contacting dealers.
and department stores and by the organization of cooperatives to purchase materials. As a result, as Suyama documents, the Wajima *Shikki* industry has expanded and complicated its social division of labour while maintaining traditional methods of production.

Figure 13.6
Large 'High Technology' Factories in Southern California

A very different, technologically sophisticated and dynamic industrial district is provided by the aerospace complex in Los Angeles (13. 6). Scott (1992) suggests that in several high tech industries, including aerospace, industrial districts are organized by large factories which he labels ‘systems houses.’ According to Scott, systems houses are complex organizations which operate R&D intensive production processes which exploit various internal economies of scope in manufacturing a range of high value products in small batches, often over a length production period. While systems houses are internally extremely versatile (in terms of technology and worker skills, for example), they create
highly articulated and geographically concentrated networks with other specialized, R&D intensive producers and suppliers. In particular, the systems houses of various high tech industries generate huge, localized demands for highly specialized, customized inputs.

While Scott recognizes that many of these inputs are supplied from distant sources, he offers evidence, specifically with respect to the subcontracting patterns of NASA prime contractors, of a "remarkable intra-regional network of economic transactions focused on large producers" (Scott 1992: 273). Thus, in 1989, five major contractors (California Institute of Technology, General Dynamics, McDonnell Douglas, Rockwell International, and TRW) held 20 NASA prime contracts at eight factories (systems houses) in southern California. They awarded over half of the 4,787 first tier subcontracts of at least $10,000 to other firms also located in southern California while those first tier subcontractors that engaged second tier subcontractors found almost one-third of their suppliers in southern California (see also Scott and Drayse 1991; Scott and Mattingly 1989). With respect to subcontracting structure, while at least two tiers of subcontractors are recognized, the first tier has more members and therefore conforms more to the lateral model of subcontracting, rather than the hierarchical model (Figure 13.1).

Towards a classification of industrial districts

It is not easy to simply classify industrial districts by products. If cutlery evolved largely in the industrial districts of Sheffield, Solingen and Tsubame, in the US and Korea cutlery is manufactured within internal divisions of labour. Similarly, autos, electronics and shoes are produced in industrial districts and in geographically dispersed production systems around the globe. In addition, industrial districts themselves not only vary by product but in terms of how entrepreneurial and labour market networks are organized and integrated. Potentially, industrial districts can be classified on the basis of the manifold
characteristics of these networks and how these characteristics evolve over time. A more partial and simpler alternative, which nevertheless illustrates the point that industrial districts vary in terms of their organization, is to classify industrial districts, and other forms of production system, according a two dimensional framework comprising the degree of ownership and degree of coordination (Figure 13.7).

Thus, on the vertical axis of Figure 13.7, increasing degrees of ownership imply increasingly stronger roles for core firms (and for the internal division of labour) as fewer firms are in control of total production. Along the horizontal axis, increasing degrees of coordination imply stronger forms of cooperation among firms. While it may be possible to systematically measure these dimensions no such attempt is made here. Rather, the framework is presented as a heuristic device designed to illustrate the institutional basis of industrial districts (Langlois and Robertson 1995). Needless to say, the allocation of industrial districts and other forms of production system within the two dimensional space of ownership and coordination is judgmental, but not arbitrary.
Thus, SME dominated industrial districts share low degrees of ownership integration but vary according to coordination. Sheffield cutlery, at least until the 1960s, for example, represents a classic 'Marshallian' industry district which comprises large numbers of SMEs engaged in highly competitive relations and weak forms of coordination. Indeed, in Sheffield, even rival industry associations were established to lobby governments to support completely different trade policies! (Hayter and Patchell 1993). Collective support for R&D and labour training is weak to non-existent and innovation is ad hoc, dependent on the initiatives of individual firms. In contrast, the various consumer goods' industrial districts found in Third Italy, and the Tsubame and Solingen cutlery districts comprise populations of SMEs which both compete and engage in coherent forms of coordination. Relationships between contractors and subcontractors are relatively stable, bilateral cooperation is common, firm level cooperatives exist and effective industry wide associations promote export marketing, R&D and information diffusion. Firms in these districts typically strongly support skill enhancement and innovation.

With respect to industrial districts, such as Silicon Valley, the Los Angeles aerospace complex and Toyota city, which contain large core firms as well as populations of SMEs, the degree of ownership integration is higher than in SME dominated industrial districts. Degrees of coordination in these districts, however, can be as high and, arguably in the case of districts like Toyota Town, even higher than that achieved in Third Italy. Thus, in Toyota Town, there is one dominant core firm which literally orchestrates the operation of the industrial district by closely coordinating and controlling its suppliers within its own cooperatives, kan ban arrangements and long term, stable relationships. This industrial district is analyzed in the next chapter. Silicon Valley and the Los Angeles aerospace complex define less well controlled and stable districts but coordination and cooperation is evident, even if Silicon Valley cooperation is a matter of controversy. Another type of industrial organization which combines a high level of coordination with
total control is provided by Magma, the Canadian based auto parts giant, which has created several localized 'campuses' each of which comprises several, relatively small and specialized branch plants. Since a social division of labour does not exist, however, these campuses do not have all the attributes conventionally associated with industrial districts. Similarly, the companies that exist within holding companies may be localized but there is a common parent so that such groupings do not reflect industrial districts while the geographically dispersed branch plant enclave is the antithesis of an industrial district.

The social division of labour as a source of dynamism

The social division of labour, including in SME dominated industrial districts, constantly evolve, and it is the flexibility of specialized firms that provides the potentials to adapt to changing circumstances. In so doing the nature of the social division of labour itself can change. In this regard, the literature has rightly emphasized the ability of firms within a social division of labour to cope with rapidly changing market and supply conditions. The social division of labour can also be a source of long run structural adjustment. A 'small scale' example is provided by Tsubame and its creation and development of a cutlery indistrial district.

Cutlery manufacture in Tsubame - Traditionally, the Japanese people have not used knifes and forks and the chances are that in remote Tsubame, situated in Niigata Prefecture on the Japan Sea, local farmers and metal workers engaged in (Japanese) pen, pipe and nail manufacture at the beginning of the 20th century had not seen western cutlery (Figure 13. 4). Existing (hand made) metal working activities, however, were undermined by imported machine made goods and the search for diversification focused on western cutlery, probably after a Tokyo based wholesaler had provided samples (Patchell and
Hayter 1992). In any event, the experiments in Tsubame with cutlery manufacture began in the first decade of the 20th century and by the 1920s the region was an important cutlery exporter, albeit of low value products, primarily to Asian markets. Following World War 2, cutlery in Tsubame grew rapidly and the district became the leading world cutlery exporter by the 1960s. Even after the rapid growth of lower cost cutlery manufacture in South Korea and the high value of the Yen, cutlery in Tsubame remains vibrant and export oriented.

In Tsubame, the creation, growth and adaption of cutlery manufacture is intimately involved with an evolving social division of labour. Initially, the existing social division of labour used existing forging, sawing, hammering, filing and engraving expertise to learn by a slow (part-time) process of trial and error how to make cutlery. One estimate is that it took an household six years to learn how to make spoons (Patchell and Hayter 1992: 206). Once established, cutlery manufacture was organized around an increasingly highly diverse group of specialist firms integrated by a dense network of input-output linkages, common labour pools and information sharing (Figure 13.8). The largest firms have rarely employed 500-600 workers, usually less. Typically, close marketing and purchasing linkages have not been formalized as actual contracts and both capacity and specialized subcontracting, involving activities such as grinding, polishing, plating, molding and sharpening, were extensively developed. Linkages were often maintained on a daily basis and during the 1950s were facilitated by motorized vehicles.

In Tsubame, the social division of labour was originally controlled by wholesalers and featured exclusive supply links between contractors and subcontractors. Gradually, a group utilization system emerged whereby subcontractors supply several contractors and in 1935 an Export Association was created; since the 1950s this Association has been primarily responsible for organizing exports to the US which has imposed various voluntary export quotas. In addition, the rationale for the utilization of the social division of labour changed from an emphasis on its buffer role and small lot, high variety capacity
(for a limited product range) to a focus on the rapid mobilization for high quality production characterized by both variety and increasing product diversity. By the 1980s (Figure 13.8), the social division of labour in Tsubame remained intact. In 1988, for example, there were over 10,000 workers employed by over 2,000 firms, down modestly from the situation in the 1970s (Ika 1988: 11-15). The largest of these firms ('general contractors') employed 150-300 workers and either relied extensively on subcontracting or partially on subcontractors.

In Tsubame, cutlery manufactures have consistently and comprehensively invested in skill formation in the labour force, new equipment and R&D in order to move up the value added ladder within cutlery and related products. The record of the cutlery industry is one of continuous learning and innovation since its rapid adoption of western methods of production in the 1920s when cutlery was one of Japan's first light industries to be mechanized. In the rebuilding of the industry in the 1950s firms constantly sought information on new techniques including by regularly visiting other cutlery districts and
then rapidly investing in new equipment such as automatic grinding and polishing machines. This behaviour has continued in the 1980s when firms adopted hydraulic presses, hard-steel presses, new dies and resistance welding involving use of lasers, ion beams and other advanced technologies (Patchell 1991). In Tsubame, as in Solingen, automation is associated with a shift towards high waged design intensive production. In contrast to Solingen, where firms argue that an internal division of labour is more appropriate to quality control and to justify investments in machinery, R&D and labour training, in Tsubame, the shift towards value added production still relies on the social division of labour. Moreover, there are signs that in the 1990s, Tsubame firms are using the specialist expertise available in the social division of labour to diversify into new kinds of products (for example, golf clubs, road side mirrors, tools).

**Silicon Valley: a contested ideal**

Arguably the most dynamic and best known industrial district in the world is Silicon Valley (Figure 13. 9). The district grew rapidly after 1950 and between 1968 and 1978 27, 000 jobs were created in electronics components in Santa Clara County. Initially, the region's structure was dominated by large firms and their R&D and manufacturing activities, including those of IBM, ITT, Hewlett Packard and Fairchild (Saxenian 1983, 1994; Angel 1994). During 1970s there was a rapid growth of SMEs and as a result the average size of establishment in Silicon Valley in 1990 is much less that in early 1960s (Figure 13. 10). For national and local governments around the world, including Japan, Silicon Valley is a high tech ideal which represents the appropriate form of leading edge industrialization at the end of the 20th century. Attempts to clone Silicon Valley are many, although an equivalent rival is yet to appear. Yet, Silicon Valley, in its own terms, is a contested ideal.
On the one hand, the agglomeration of electronic firms that have concentrated there since the early 1950s are anchored by a few large firms, notably Hewlett Packard and Fairchild (Saxenian 1994). These large firms provided employment opportunities, markets for smaller firms and spin-off opportunities. Saxenian (1994: xx), for example, argues that Silicon Valley features "splinter entrepreneurialism" in which new firms are continually created by employees leaving existing firms, especially the large ones. "A poster of the Fairchild family tree, showing the corporate genealogy of the scores of Fairchild spin-offs, hangs on the walls of many Silicon Valley firms... the tree traces the common ancestry of the region's semiconductor industry and remind engineers of the personal ties that enable people, technology, and money to recombine rapidly into new ventures" (Saxenian 1994: 31). During the 1960s alone, 31 spin-off semi-conductor firms were created mainly from Fairchild and mainly to provide inputs to established firms in the park. A common labour pool, largely based on the supply of engineering graduates from Stanford University, is a vital feature of Silicon Valley. Moreover, in addition to spin-off firms there is frequent movement of employees among firms in Silicon Valley.
On the other hand, questions have been raised from the perspective of local development about how the forces of competition and cooperation are mediated in Silicon Valley. It is generally agreed that competition is driven by continuous innovation and that "The new semiconductor firms that chose to manufacture pioneered the use of low-cost, low volume flexible 'mini-fabricators' that could quickly process short runs of different designs on a single line" (Saxenian 1994: 20). For Florida and Kenney (1990), however, Silicon Valley's emphasis in continuous innovation and 'short run' manufacturing is motivated by a desire for 'super-profits' available in the early stages of product life cycles and a lack of willingness to fully pursue all manufacturing and marketing opportunities through entire life cycles thus widening job opportunities, even if profits are less as products mature. Florida and Kenney (1990) contrast this attitude of 'hyper competition' with the more cooperative approaches evident in Japanese production systems which seek flexibility while also achieving mass production.

Saxenian suggests that a cooperative culture has at least developed within the context of continuous innovation and relatively short product life cycles.

"Loyalty grew out of reciprocal decisions to honor unwritten obligations as well as contracts and not to take advantage of one another when market conditions changed. Some firms even supported suppliers through tough times by extending credit, providing technical assistance, equipment or manpower, or helping them find new customers (Saxenian 1994: 147)

At the same time, to offset suppliers (or consumers) becoming too dependent (and vulnerable) on one customer (or supplier) several firms have developed a "20% rule" and prevented their business from exceeding 20% of the sales of a supplier or 20% of the purchases of a consumer. In more general terms, the interdependencies that have developed among specialized, high tech firms in Silicon Valley reflect, in Scott's terms, highly specialized, uncertain relationships in which transaction costs can be reduced by relying on the social division of labour. Clearly, the maintenance of such difficult transactions are facilitated by personal contact and geographic proximity. In turn,
geographic proximity allows the realization of other forms of external economy, notably access to appropriately skilled labour, the expertise of nearby universities and so on.

Florida and Kenney's (1990; 1993) criticism is that cooperative tendencies and norms are continually threatened in Silicon Valley (to a greater degree than in Japan) strident competition among firms to become the first in the market place and by short term attitudes which undermines potentials to extend possibilities for manufacturing. Consequently, in their view, the mediation of the forces of competition an cooperation within Silicon Valley does not extend the benefits of technological leadership throughout society, particularly to US-based manufacturing workers. Within Silicon Valley, for example, firms have effectively opposed the establishment of unions and mass produced components have often been re-located off-shore. At the same time, Silicon Valley has emerged as a flexibly specialized industrial district that has developed significant localization economies of scale and continues to thrive at a time when other high tech complexes, such as Boston 128 (Norton 1992), have experienced considerable problems.

CONCLUSION: DIVERSE TRENDS IN PRODUCTION SYSTEMS

Piore and Sable's (1994) Second Industrial Divide is based on the revival of industrial districts and especially of SME dominated industrial districts. Many examples of contemporary industrial districts have been examined and knowledge of such districts in California (Angel 1994; Saxanian 1994; Scott 1992, 1996) and northern Italy (Brusco 1986) has been supplemented by a better awareness of the particular role of industrial districts in Japan's industrialization (Patchell 1993a, 1993b). A few studies have also linked vertical disintegration with a stronger role for small firms and a tendency to spatially agglomerate (Storper and Christopherson). Yet, trends towards SMEs, vertical disintegration and industrial districts are not unequivocally linked. Leung (1993), for example, demonstrates how the development of subcontracting linkages by Hong Kong
firms is associated with geographical dispersal of facilities within China. In addition, some established industrial districts, such as cutlery in Sheffield and Solingen have shifted from a social division of labour towards an internal division of labour (Hayter and Patchell 1993). Even in Third Italy, Harrison (1993) argues that the intrusion of corporate hierarchies by take-over and merger is beginning to displace cooperative behaviour patterns developed by SMEs over long periods of time.

Moreover, firms that exist in vibrant industrial districts have chosen to disperse some elements of production. The most celebrated case is Silicon Valley whose firms have established extensive in late stages of the product life cycle in Asia. Indeed, firms in Japanese industrial districts, ranging from the small scale case of Tsubame to the world scale case of Toyota Town, have experimented with dispersing some aspects of production to lower cost locations. In still other cases, firms in 'rival' industrial districts are linked by joint ventures, cross licensing and strategic alliances. While strategic alliances are typically thought of as arrangements made by already large international firms in research intensive industries, SMEs have also participated (Ahern 1993b). The strategic alliance between Madge Networks of the UK (Exhibit 9. 1) and the Silicon Valley based Cisco Systems of the US is an example.

In other words, industrial districts and globally dispersed production systems are in constant tension. How this tension is played out has important implication, if contentious implications for local development. In Piore and Sabel's view, flexible specialized industrial districts are a desirable form of development which is democratic, progressive and oriented to continual improvement in working conditions as well as profitability. Others reject this view. An important question is this regard, concerns the direction in which the district is moving, for example, whether towards greater or lesser use of low cost low skilled labour or higher cost higher skilled labour. The latter may require greater investment and ingenuity but is socially more sustaining.
Strategic alliances - Strategic alliances are another option of internationalization which principally comprise agreements among firms to collaborate over particular programmes of innovation from R&D to manufacturing. Strategic alliances are found particularly in research intensive industries and are an emerging feature of the current phase of globalization of the fifth Kondratiev (Malecki 1991: 193-7). Strategic alliances are essentially forms of joint venture which involve cooperation among two or more companies in an investment to pool complementary expertise and to share financial and marketing uncertainties. While traditional forms of joint ventures often involve agreements to invest in a particular processing operation, strategic alliances typically feature attempts to innovate and involve R&D cooperation or at least agreements on how to market new technology.

Over the past decade or so, led by such firms as IBM, leading international firms have increasingly internationalized their R&D efforts (Kenney and Florida 1995). Moreover, especially in the more research intensive industries, as technology development
has become more rapid, complex, in some ways more uncertain and in many ways more expensive, leading edge international firms have negotiated strategic alliances which cross national boundaries and which involve liaisons between subsidiaries, domestic firms and parent companies. These alliances are typically occurring within the North America-Europe-Japan triad and they are occurring in a variety of industries, including autos, biotechnology, electronics, steel, and robotics. For example, four different computer companies (Sun, Hewlett Packard, IBM and MIPs) have organized their own strategic alliances to promote RISC (Reduced Instruction-Set Computing) and while the four core companies have been primarily responsible for R&D, each alliance has spawned formal and informal agreements to use and market the technology and to provide equity capital (Gomes-Cassers 1994).

At the same time, it is recognized that for both SMEs and large corporations strategic alliances are uncertain ventures, notably in terms of precisely defining how 'know-how' is to be shared and how the benefits of cooperation are to be shared and controlled.

The sogo shosha model - Another departure from market or hierarchy based transactions is provided by the sogo shosha model. Sogo shoshas are general trading companies that continue to play a significant role in the organization of Japan’s trade and internal distribution systems, especially with respect to commodities. Sogo shoshas are not conventional traders which buy goods from suppliers and sell to consumers; this kind of trading is a version of market based transactions. Rather the sogo shoshas have traditionally acted as agents acting on behalf of buyers and sellers. Their competitive advantage lies in their deep knowledge of worldwide markets and sources of supply and their ability to negotiate all aspects of transaction costs, including the extension of credit and the delivery of small volumes to highly dispersed SMEs. The sogo shoshas have built massive information networks which would be extremely expensive to duplicate but which mean that the incremental cost of updating information is relatively low (Parker 1992). In a variety of commodity markets, sogo shoshas offer Japanese firms, large and small, a relatively cheap means of accessing highly diverse sources. While in recent years, their role has begun to change, they offer another model for reducing transaction costs.

Under Fordism and scientific management, however, the role of industrial districts in the skill formation process became more ambivalent. Thus, tendencies towards strict job demarcation, the replacement of labour skill with technology, and the separation of "basic
work processes' from highly skilled 'professional' R&D were associated with planning system firms exploiting internal economies of scale. In addition, the compartmentalization of internal divisions of labour and the dispersal of branch plants in search of appropriate location conditions further served to undermine established industrial districts. The emergence of the IC techno-economic paradigm and the confrontation of fordism with flexibility, however, has led to renewed appreciation for the role of industrial districts.

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