

THE LOCALLY EMBEDDED BRANCH PLANT?: A STUDY OF MATERIAL LINKAGE  
CHANGE IN THE NORTHERN REGION OF ENGLAND.

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## ABSTRACT

The post-war history of the older industrial regions of Britain has been one of the deficiencies of branch plant led economic development. The various deficiencies of these 'branch plant economies' are seen to derive from the integration of manufacturing industry into wider intra- and inter-corporate spatial divisions of labour. Such an entrenched understanding of the 'branch plant economy' has come into question as a result of recent theoretical and empirical work identifying changing intra- and inter-firm divisions of labour as part of contemporary industrial restructuring. This latter work identifies the role of fragmenting market demand and the deployment of 'flexible' process technology in engendering a re-synthesis of the technical and managerial divisions of labour within large corporations and hence the formation of more localised patterns of backward linkages.

This thesis re-examines the nature of the 'branch plant economy' in the light of these recent findings. It concentrates upon one aspect of contemporary change in the branch plant economy - namely contemporary changes in the degree of local embeddedness, in terms of spatial patterns of backward material linkages, of manufacturing industry in older industrial regions. The thesis provides a case study of material linkage change within one older industrial region in the U.K.; the Northern Region of England. Data from a postal survey provides evidence of the extent of externalisation and localisation of backward linkages. Company case studies explore the role of changing technologies, market demand and corporate structures and strategies in the precise forms of linkage change in the Northern Region.

Despite the presence of processes of externalisation and material linkage change more generally, Northern Region manufacturing industry does not display signs of becoming more locally embedded. The dominant forms of linkage change - externalisation and linkage proliferation - underlying the formation of 'flexible production systems' are not the dominant forms of linkage change within the peripheral region setting. Rather, a process of linkage simplification is one important manifestation of the continued integration of the region's manufacturing industry into an increasingly international spatial division of labour.

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Begin, ephebe, by perceiving the idea  
Of this invention, this invented world,  
The inconceivable idea of the sun.

You must become an ignorant man again  
And see the sun again with an ignorant eye  
And see it clearly in the idea of it.

Extract from: Notes Toward a Supreme Fiction  
by Wallace Stevens.

## CHAPTER 1

### INTRODUCTION

#### 1.1 INTRODUCTION

The success of British industry during the nineteenth century became synonymous with the nation's regional concentrations of industry. The economist Alfred Marshall (Marshall, 1932 ed.) looked to these regional economies or 'industrial districts' as models of economic growth. Marshall's 'industrial districts' were self-contained regional economies - having a favourable balance of trade by virtue of their export orientation and/or the large proportion of equipment, materials and intermediate inputs that were supplied locally - as the result of the development of external and agglomeration economies. The many years of subsequent industrial decline in Britain have witnessed the gradual replacement of this old spatial division of labour with a new spatial division of labour - one whereby there is regional specialisation according to particular parts or functions of the overall manufacturing process (Massey, 1979). With the rise of this new spatial division of labour the older or traditional industrial regions of Britain have been transformed from regional economies into 'branch plant economies',<sup>1</sup>.

Over the post war period the various deficiencies of branch plant led economic development have come to light. The frailties of such 'branch plant economies' were made apparent in the widespread industrial restructuring during the economic crisis of the late 1970's and early 1980's. However, such

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<sup>1</sup>The term 'branch plant economy' is used interchangeably with the terms 'older industrial region' and 'peripheral region' which in the U.K. context - to which this thesis applies - are largely synonymous.

has been the scale and nature of industrial restructuring since that, several academics have suggested that we may now be witnessing the re-emergence of regional economies and an old spatial division of labour within developed economies (Sabel, 1989; Scott, 1988). This thesis critically examines whether recent industrial restructuring is leading to the transformation of 'branch plant economies' back into 'regional economies'. It focuses upon one aspect of this possible transformation, namely the formation and changing spatial patterns of industrial linkages.

## 1.2 BACKGROUND

Our understanding of the relative failure of older industrial regions to generate self sustaining economic growth has derived, in the first instance, from a large body of work documenting the various deficiencies of 'branch plant' led economic development. Increases in the level of external control of manufacturing industry in several older industrial regions of the U.K. during the 1960's and 1970's confirmed the transition of these previously self contained regional economies into 'branch plant economies'. The problems of these 'branch plant economies' could be conveniently captured in a stereotyping of branch plants and indigenous enterprise. Thus, in contrast to indigenous enterprise, branch plants are commonly considered to provide unstable employment, less skilled (if not de-skilled) employment, to lack certain non-manufacturing functions (e.g. R&D, marketing, and certain decision-making responsibilities), to produce relatively 'mature' products with relatively 'mature' technology, and to be less well integrated, in terms of backward and forward linkages, into host economies (e.g. Townroe, 1975).

These various deficiencies of branch plants have been the subject of considerable empirical scrutiny. For the purposes of empirical investigation particular deficiencies have been considered in isolation. Only more recently



has it been explicitly accepted that the characteristic deficiencies exhibited by branch plants are interrelated (e.g. O'hUllachain, 1986).

An understanding of these various deficiencies of branch plant investments has been provided by theoretical work which treats them as one expression of the contemporary spatial division of labour (e.g. Dunford, Geddes and Perrons, 1980; Frobel et al, 1980; Massey, 1979, 1983, 1984; Perrons, 1981). This work suggests that the various deficiencies of branch plant led regional development are to be understood as a reflection of the division of labour within multilocal and multinational companies. The problems of 'branch plant economies' are, therefore, an aggregate expression of the position that individual establishments occupy within their respective corporate divisions of labour. In this respect, further work has provided a limited basis for identifying different roles that may be assigned to branch and subsidiary establishments within a corporate context (e.g. Dicken, 1986; Hood and Young, 1988).

These theories of the contemporary spatial division of labour have since been criticised for an overemphasis upon supply-side considerations (Schoenberger, 1988) and for assuming the economic superiority of vertically integrated forms of production over vertically disintegrated forms of production (Storper, 1985).

The bases of these theoretical accounts of contemporary spatial divisions of labour have been further questioned by recent work documenting and providing theoretical interpretations of current processes of industrial growth and restructuring. These processes involve an altered division of labour both within and between establishments and firms. Work has demonstrated the persistence and growth of vertically disintegrated agglomerations of production as far afield as Italy (Brusco, 1982) and California (Scott, 1983b, 1984; Storper and Christopherson, 1987). It is also suggested that several mass production industries have become more vertically disintegrated (Piore

and Sabel, 1984). More generally, a rash of studies has provided evidence of changes in the organisation of production including: the increased use of temporary and part-time workers; the renegotiation of work practices and the increased in the use of subcontractors (Atkinson and Meager, 1986; Manpower Ltd., 1985 [cited in Morris, 1988]; Marginson et al, 1988).

For some, these trends amount to a reorganisation of production into systems of 'flexible specialisation' (Piore and Sabel, 1984; Sabel, 1989) or 'flexible accumulation' (Scott, 1988) as part of a new long term movement in the development of capitalism. It is argued that changes in market demand and technology present new prospects for vertically disintegrated, non-mass production sectors, in the world economy. Conversely, the profitability of companies engaged in mass production of goods has been undermined by these developments.

According to the thesis above, it is vertically integrated companies engaged in mass production that ought to be exhibiting the most profound forms of restructuring. Accordingly, this restructuring ought to be evident at the level of branch and subsidiary establishments of such companies. We would therefore expect a set of new possibilities or problems for economic development in those regions dominated by branch and subsidiary establishments. Despite the implication, following from the above, that our understanding of 'branch plant economies' needs revising, there has, to date, been very little geographical work which has examined the changing organisation of production within such regional economies. This thesis addresses itself to this issue by way of a study of the changing organisation of production and material linkage patterns in an older industrial region - the Northern Region of England.

### 1.3 Aims of the thesis

Geographical accounts of current processes of industrial restructuring and vertical disintegration in particular have, in the main, been situated within regulation theory interpretations of contemporary change (Aglietta, 1987; Lipietz, 1987) or derivatives thereof (Piore and Sabel, 1984; Scott, 1988). Despite the fact that versions of regulation theory define the current reorganisation of production as one derived from a crisis facing companies engaged in the mass production of goods, and despite the observation that it is at the branches and subsidiaries of multilocal and multinational companies that mass production has frequently attained its greatest refinement, there have been no systematic studies of the implications of such contemporary restructuring for branch plant economies (although see Hudson, 1989).

Similarly, empirical work has concentrated upon either agglomerations of small firms said to be organised into systems of 'flexible specialisation' (e.g. Scott, 1983b, 1984; Storper and Christopherson, 1987) or upon those mass production sectors taken to exemplify the principles of mass production (Holmes, 1988; Schoenberger, 1987). There are very few examples of empirical work documenting the progress of restructuring in examples of branch plant economies.

This thesis aims to contribute to an understanding of the problems of older industrial region development by way of evaluating competing theoretical claims regarding the implications of contemporary industrial restructuring for such regions. This thesis examines contemporary changes in one aspect of the branch plant syndrome; namely the local embeddedness of branch plants in terms of backward material linkages. In particular, the thesis concentrates on the relationship between corporate restructuring and changes in material input linkages of manufacturing industry within the Northern Region of England; a

region which has long been considered to be a prime example of a branch plant economy.

In fulfilling this objective the thesis is concerned with providing an appropriate strategy for empirical investigation as well as an appropriate theoretical framework which can be used to inform the empirical work and interpret the detailed findings.

Theories of flexible production are, for our purposes, deficient in two important respects. Firstly, by virtue of their incorporation of regulation theory interpretations of the development of capitalism, they are particularly insensitive to important structural continuities with the past which are present in contemporary processes of industrial restructuring. Secondly, an analysis of corporate structures and strategies - which is of particular importance to understanding the organisation of production within the branch plant economy - is seriously neglected. The thesis, therefore, draws upon a qualified spatial divisions of labour approach to understanding the geographically uneven development of British capitalism. This approach is seen to offer, firstly, the prospect of a detailed historical account of contemporary industrial restructuring and, secondly, the scope for a proper analysis of the corporate organisation of production and its bearing upon contemporary linkage change in peripheral regions.

It is considered that both the extent and causes and nature of linkage change in peripheral regions will differ from that evident in the cases of contemporary 'industrial districts' or particular mass production industries. Two detailed aims of the empirical research can be identified.

- (1) To assess the extent and geographical implications of processes of externalisation of production by manufacturing establishments in the Northern Region.
- (2) To examine the causes and nature of processes of linkage change in the Northern Region.

There are two components to the empirical research. An extensive form of research design is used to address the question of the extent of aggregate linkage change in a peripheral region. A postal survey provides detailed information regarding linkage change among Northern Region manufacturing establishments. An intensive form of research design is used to address the question of the causes and nature of linkage change in peripheral regions. Case studies of four Northern Region manufacturing establishments of foreign multinationals provide a detailed understanding of linkage change in the older industrial region context. Case studies of two recent inward investments to the Northern Region complement the analysis of the contribution of new investment to linkage change presented in chapter 5.

The empirical investigation of the extent and causes and nature of linkage change in the Northern Region provides the basis for an understanding of the prospects for economic development in older industrial regions more generally.

#### 1.4 The structure of the thesis

Chapter 2 reviews the literature on the branch plant economy and concentrates upon the role of linkages within older industrial region development. It examines the received wisdom regarding the organisation of production in the branch plant economy in the light of recent theoretical and empirical work which call such an understanding into question. The chapter argues that both the extent and causes and nature of linkage change in older industrial regions will differ from that evident in industries and localities exemplifying flexible production. Several hypotheses regarding the extent of linkage change within peripheral regions are detailed in the chapter.

Chapter 3 introduces the Northern Region as an example of a 'branch plant economy'. This chapter details the growth in external control of the

region's manufacturing industry. Special attention is given to the role of material linkages in the contemporary problems of the region's economy. The chapter provides an important counterpoint to the abstract theoretical review of the branch plant syndrome provided in chapter 2.

Chapter 4 provides the methodological background to the original research findings presented in chapters 5, 6 and 7. Details of the precise forms of empirical investigation used and their relation to the issues for empirical research raised in the literature review are provided. The chapter describes, and briefly considers the relative merits of, the approaches used to elicit information regarding both the extent and causes and nature of linkage change in the Northern Region.

Chapter 5 is concerned with presenting evidence of the extent of aggregate linkage change within the Northern Region as provided by a postal questionnaire survey. The chapter examines, in detail, a set of hypotheses regarding the extent of linkage change in older industrial regions. In particular, the chapter examines the pervasiveness of processes of externalisation and the localisation of backward linkages within Northern Region manufacturing industry.

In keeping with the distinction between the contribution of new investment and in-situ reorganisation to processes of linkage change, the findings from case studies of six manufacturing operations in the Northern Region are presented in chapters 6 and 7. Changes in intra- corporate linkages and several forms of inter-corporate linkage change are detailed and their relation to changes in market demand, technology and corporate structures and strategies are explored by way of the four case studies contained in chapter 6. The linkage patterns of two recently arrived manufacturing operations are then examined in chapter 7.

Chapter 8 marks the conclusion of the thesis. The chapter begins by placing this work in its broader context of research effort devoted to

understanding the local embeddedness of manufacturing industry. The chapter then draws together the detailed empirical findings regarding linkage change in the Northern Region, provided by chapters 5, 6 and 7 and makes these the basis for a more general understanding of the implications of linkage change for the development of older industrial regions. It is argued that branch plants remain relatively weakly integrated into peripheral region economies and that this is a reflection of the continued integration of peripheral region industry into international intra- and inter-corporate divisions of labour. In light of this, existing and prospective policies to foster localised linkages in the older industrial regions are briefly considered.

## CHAPTER 2

### THEORIES OF THE BRANCH PLANT ECONOMY

#### 2.1 INTRODUCTION

Changed circumstances may necessitate the development of 'new' theories with which they can be interpreted. Much of the literature on the most recent forms of industrial restructuring, and the organisation of 'flexible production systems' in particular, is predicated on such an assumption (see Storper and Scott, 1986). An almost exclusive concern with problems of peripheral region development, imperfect competition and dependent development during the 1970's and early 1980's has given way to a primary concern with emerging growth points within the world economy. This shift of concern within industrial geography has resulted in the emergence of some 'new' concepts and theories as well as the reinstatement of some familiar to industrial geographers. It is not always the case, however, that 'new' concepts or theories are needed to explain 'new' or changed circumstances. So it is with contemporary processes of restructuring and theories of 'flexible production'. Theories of flexible production, it is suggested, are of more limited relevance to explaining the spatial organisation of industry than some of the theoretical approaches which, to an extent, they have superceded. More importantly, for the issue at hand, theories of flexible production can offer only a seriously deficient analysis of current restructuring in the branch plant economy.

The purpose of this literature review is two-fold. Firstly, to furnish a set of more or less detailed hypotheses regarding linkage change in branch plant economies. Secondly, to provide the basis for an appropriate theoretical approach to analysing contemporary linkage change in the 'branch plant



economy'. As far as the first is concerned, the following three sections of this chapter provide a review of literature to have contributed to a theoretical understanding of the 'branch plant economy'. Theoretical treatments of the branch plant syndrome are reviewed sequentially in order that hypotheses regarding organisational and linkage change in the branch plant economy can be derived. In the final three sections of the chapter the theoretical approach to the thesis is developed more fully. There is a theoretical review of the firm in its wider economic structure of upstream and downstream activities. Notions of flexible production as they apply to the branch plant economy are then qualified prior to a concluding statement where the theoretical approach and issues for empirical investigation are detailed explicitly.

## 2.2 'BRANCH PLANTS', LINKAGES AND REGIONAL DEVELOPMENT:

### THE BEHAVIOURAL APPROACH

A corpus of work, consisting primarily of empirical studies, recognising the distinct nature of branch plants and their unique contribution to regional development can be identified. The behavioural approach, at heart, rests upon a relaxation of the twin neoclassical assumptions of rational economic behaviour and perfect information (Simon, 1957; Cyert and March, 1963). The relaxation of neoclassical assumptions has been sufficient to produce several different strands within a broadly behavioural approach to industrial geography (e.g. see Carr, 1983). For our purposes, it is apparent that several empirical and theoretical studies of various aspects of the branch plant syndrome as it emerged in the 1960's and 1970's share a common theoretical perspective of branch plants as one of a number of distinct organisational types displaying distinct decision-making behaviour. As such, they share a broadly behavioural approach to understanding the contribution of branch

plants to regional development - although this is often only implicit within several of the empirical studies.

Many detailed findings from a series of empirical studies of industrial movement, the efficacy of regional policy and the effect of external control upon regional manufacturing industry have provided an initial understanding of the degree of integration of manufacturing establishments into older industrial region economies. For some, these studies have provided the most valuable contribution to an understanding of uneven development in the United Kingdom<sup>1</sup>. However, it is difficult to support such a claim in the light of some important criticisms of these empirical studies raised below. It is more reasonable to suggest that subsequent theoretical accounts of contemporary uneven development (see section 2.3) would have been far less authoritative and influential without the corroborative evidence provided by these studies.

Three general areas of criticism of this broadly behavioural approach to an understanding of 'branch plants', linkages and older industrial region development can be offered. Empirical studies of spatial patterns of backward and forward linkages of older industrial region manufacturing industry have been partially or else implicitly informed by behavioural theories of the firm. These empirical studies have been prone to the practical problems of defining 'external control'. In particular, the equating of ownership with control leads to an incomplete and, in some instances, a misleading understanding of how control is manifest through the organisation of production within and between firms. These empirical studies have also tended to isolate particular facets of the organisation of production, in this case linkages, rather than treating them as interrelated and, as such, a reflection

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<sup>1</sup>'The most useful work on growth and decline has been largely non-theoretical, and has instead consisted of detailed empirical studies of what actually happened. This work includes attempts to measure the impact of the government's regional policy, studies of the movement of factories between areas and, more recently, investigation of the urban and regional pattern of company ownership and control.' (Fothergill and Gudgin, 1982: 5).

of intra- and inter-corporate divisions of labour. Finally, particular problems are associated with those theories of the firm (the theory of the multinational and behavioural theories of the firm) which have contributed to a theoretical understanding of the problems of branch plant led regional development.

Studies of the effect of external control upon the spatial patterns of backward and forward linkages of manufacturing establishments are subject to the vagaries of any definition of external control. Ownership has, despite obvious problems (Firn, 1975), been equated with control in the many studies of the impact of external control upon regional development. This leads not only to a probable underestimation of the extent of external control of manufacturing activity in any regional economy (Dicken, 1976) but also, potentially, to a peculiarly geographical interpretation of how control affects regional development. The location of ultimate headquarters of an individual establishment is taken to determine whether that establishment is externally controlled and, if relevant, the nationality of control. Thus, there are examples (e.g. Lever, 1974) where location of head office forms part of a 'function of distance' explanation of the effect of external control upon, in this case, spatial patterns of establishment linkages. The counterpart to this 'function of distance' explanation of the impact external control upon regions is that the results of studies of the effect of external control upon the performance of regional manufacturing industry are crucially dependent upon the size and functionality of the region considered.

Several empirical studies have explored various aspects of branch plant led regional development from a broadly behavioural perspective (Britton, 1976; Lever, 1974; Townroe, 1972, 1979; McDermott, 1976; Marshall, 1979). These empirical studies have tended to equate ownership with organisational behaviour and hence control of regional manufacturing industry. These empirical studies have tended to examine the various deficiencies of branch

plants in isolation from each other. This in turn, stems from the research designs employed within these empirical studies which consisted primarily of 'controlled' experiments to examine by isolation the effect of ownership, plant size, industry etc., upon the organisation of production within populations of manufacturing establishments. These behavioural studies frequently argued the determinacy of industry sector and plant size etc. in the nature of peripheral region manufacturing establishments and since

Traditionally, urban and regional analysis has viewed the size of an investment and the sector in which it occurs as the paramount determinants of future spin-offs and regional multipliers. (O'hUllachain, 1985: 251)

they failed to produce new and distinctive findings regarding the problems of peripheral region development. Thus, industry and plant-size are considered to be important determinants of linkage patterns even in those empirical studies which privilege an understanding of the role of corporate organisation of production in regional development (e.g. McDermott, 1976). However,

The increase [in external control of particular regional economies] resulted primarily from changes in the organisational structure of manufacturing industry but until recently little attention was paid to the nature of organisations that generated manufacturing plants. Discussions took place in terms of industrial sectors rather than with reference to types of industrial organisations yet it is the organisation, not the sector, which makes decisions about industrial activities. (Watts, 1980: 1).

When an analysis of the corporate organisation of production has been privileged within empirical studies there has been little understanding of the very real inter-dependence between the characteristic deficiencies of branch plant investments; that is between, for example, the type of employment, the product and process technology employed, the presence or absence of particular non-manufacturing functions and spatial patterns of linkages of branch plant investments. As O'hUllachain (1986), regarding the impact of foreign ownership upon regional economic development, observes

Could it not be that these researchers have set themselves an impossible task which cannot be tested? Ownership characteristics do

not exist in isolation from a multitude of other variables which describe a manufacturing plant. .... Focusing on the ownership issue may in fact cloud the more important questions of how external control alters the industrial makeup of host economies. (O'hUllachain, 1986: 156).

In this way, particular facets of the organisation of production at individual manufacturing establishments are removed from their wider context - that is, the division of labour within and between corporations.

The gradual recognition that the effect of external control upon the performance of, and in this case the spatial patterns of linkages exhibited by, regional manufacturing industry could be informed by an understanding of the corporate organisation of production prompted the more explicit incorporation of elements of the theory of the multinational and of behavioural theories of the firm within studies of the branch plant syndrome. Both of these theoretical advances permitted some elaboration upon the connection between corporate divisions of labour and the various deficiencies of branch plant investments. Thus, with the work of Dicken (1976), Firn (1975) and Stewart (1976) a more explicit connection between corporate organisation and behaviour and potential control of regional manufacturing industry is in evidence.

Dicken (1976), in his discussions of the multilocal enterprise and regional development, draws upon behavioural theories of the firm to make a clear connection between control within the corporate context and the corporate division of labour.

different enterprises may be subject to the same degree of potential control but actual control will be dependent upon the specific organisational strategy pursued and, in particular, upon the kinds of interdependence between units of the enterprise which the strategy demands. (Dicken, 1976: 409).

Dicken places considerable emphasis upon intra-corporate interdependencies in the form of information and material linkages between establishments within multilocal corporations which he sees as an expression of the corporate organisation of production. Stewart (1976) draws upon elements of an emerging

theory of the multinational to provide a concise account of the relationship between corporate structure, intra-corporate trade and the lack of localised backward linkages exhibited by foreign owned establishments located in Ireland.

The integrated operations of multinational firms and the flexibility with which these companies may transfer resources from country to country may lead to quite a wide range of possible choice possibilities between developing backward linkages and value added, and for reasons of control, or a more advanced technology, these firms may prefer to maximise value added within the firm as a whole. (Stewart, 1976: 257).

Similar observations have been made in the more general case of multilocal firms (Hamilton, 1978).

In a review of priorities in industrial location research, Wood (1978a) considered that a 'good deal more thought is required about the relationship between industrial location change and the macro-economic conditions in which it takes place.' (Wood, 1978a: 20). Such a project is both empirically and theoretically ambitious. The former aside, behavioural theories failed to reconcile firm behaviour and economic structure on theoretical and conceptual grounds in the way Wood suggested was possible. Behavioural industrial location theory - including considerations of the branch plant syndrome - have, on the one hand, produced a series of accounts privileging corporate decision-making to the exclusion of structural or environmental (market structure, market demand, technology) considerations (Carr, 1983). Otherwise, the application of these theories - particularly 'structural-contingency' theory (McDermott and Taylor, 1982) - have treated corporate structures and strategies as being dependent upon exogenously given structural or environmental conditions (Hayter and Watts, 1983).

A similar problem is evident with the theory of the multinational and its application within studies of the development and nature of the branch plant syndrome. The theory of the multinational and its central tenet of internalisation provide a rather incomplete account of firm behaviour and organisation and regional development. Hymer's original work on foreign direct

investment identified two aspects of market failure that would lead to foreign direct investment. These have since been referred to by Dunning and Rugman (1985) as cognitive and structural market imperfections where

the imperfections in structure may be created strategically (endogenously) by firms in order to exploit rents on monopolised assets; with the [cognitive imperfection].... the firms act in response to existing (i.e. exogenous) market imperfections (missing or inefficient markets), circumventing these by creating internal markets. (Clegg, 1987: 17).

The structural imperfections and their relation to corporate strategy were stressed by Hymer but it is the cognitive imperfections which have dominated in the theory of the multinational. As such, the theory of the multinational (as formulated over the last 20 years or so) treats corporate structures and strategies as being determined by given market structures.

Both theoretical treatments of the branch plant syndrome display an inability to link agency, in the form of corporate strategy (and structure), to historical developments in wider economic structures, in the form of some meaningful aggregation of organisations, of which they are a part (Massey and Meegan, 1979: 159). Taking such a project seriously would have meant 'taking industrial location theory out of its ahistorical purity and integrating it into studies of "contemporary economic history".' (Sayer, 1982: 79).

To summarise, many empirical studies of the branch plant syndrome failed to provide an adequate understanding of the relationship between the development of corporate divisions of labour and the particular deficiencies of branch plant investments. As such, linkages were not analysed within their wider intra- and inter-corporate context. This led, in turn, to problems regarding the role of linkages in peripheral region development. Empirical studies produced only fragmentary evidence of the connection between corporate organisation of production and potential control of regional manufacturing industry and continued to stress industry and plant-size as the prime determinants of the organisation of production. Problems of external control and dependent development were analysed in terms of ownership characteristics

rather than seen to be manifest within intra- and inter-corporate divisions of labour. These theories provide little elaboration upon the organisation of production internal to the firm and hence provide few indications of how linkages can be situated within wider intra- and inter-corporate divisions of labour.

The adoption of behavioural theories of the firm and the theory of the multinational within studies of the impact of external control upon particular regional economies has provided an initial understanding of the branch plant syndrome as one expression of the development of corporate divisions of labour. However, these particular theories provide an incomplete account of branch plant behaviour and organisation since there is an inadequate linkage established between corporate structures and strategies and the wider economic structures of which they are a part<sup>2</sup>.

### 2.3 'BRANCH PLANTS' AND THE CONTEMPORARY SPATIAL DIVISION OF LABOUR

A more influential set of theoretical accounts of contemporary peripheral region development have been provided by three bodies of work, within the Marxist tradition, to have elaborated upon the spatial implications of the development of the division of labour. These accounts developed out of a primary consideration for the development of the technical division of labour or, more particularly, the labour process. Despite the rather incomplete conception of the principle of the division of labour evident in

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<sup>2</sup>The problem of reconciling structure and agency in economic/industrial geography is one which has remained unresolved. Recent theories of 'flexible production' display signs of overreaction to the privileging of agency - in the form of corporate structures and strategies - within behavioural and structuralist approaches (e.g. Scott, 1988; Walker, 1989). This problem is returned to in section 2.5 and in the conclusion of this chapter where it is argued that an analysis of corporate structures and strategies must be properly situated with regard to wider (market and technological) structures.



these studies they have been quite successful in relating the development of the division of labour, and consequently particular forms of corporate organisation, to the historical development of capitalism in general. 'Branch plant' led peripheral region development is the contemporary, but also an historically contingent, form of the geographically uneven development of capitalism.

Three separate bodies of work can be identified as having analysed the spatial implications of the development of the division of labour. They are by no means entirely distinct from one another since they share a common philosophical tradition and theoretical concern. However, there are some very real differences in how historical changes in the division of labour are conceived. There are further differences in the potential ability of each of the accounts to accommodate the particular criticisms (detailed at the end of this section and, more fully, in the next section) of this work as a whole.

#### 2.3.1 The industrial geography of capitalist Britain: an application of Regulation theory

Drawing upon the work of Aglietta (1984 [first published in 1974]), Dunford and Perrons (1983), Dunford, Geddes and Perrons (1981) and Perrons (1981) have elaborated the patterns of industrial location and regional inequalities from considerations of the capitalist labour process. In Aglietta's (1984) exposition of a regulationist theory of capitalist development, four periods of development are identified (manufacture, machinofacture, Fordism and neo-Fordism) and associated with distinct forms of the labour process. The spatial organisation of production under these four periods of capitalist development are only briefly alluded to. Dunford and Perrons (1983) make the four periods of development in capitalism the basis for a review of changing patterns of industrial location in capitalist

Britain. Distinct patterns of industrial location being associated with the distinct forms of the labour process in each regime of accumulation.

Such work has been extensively criticised. This work can be seen as a particularly crude example of the 'reading off' of spatial outcomes from a theoretical periodisation of capitalism (Sayer, 1985). Massey, (1984) in criticism of this body of work but in defence of 'contrasts in the labour process' as a means of disaggregating the British economy, argues that

At any given point in history a number of different labour processes will coexist: it is this coexistence which enables 'labour process' to be a basis for disaggregating the economy, for characterising different parts of capital. (Massey, 1984: 24).

Accordingly,

Simply to classify by labour processes is not to take account of the historical conditions in which they emerge. For that reason the actual way in which the criteria of labour process is used in the definition of major divisions within the economy must be an empirical question. (Massey, 1984: 25) (emphasis added).

The periodising of the development of capitalism according to the dictates of abstract theory can lead to very misleading analyses of the spatial organisation of production. Much of the perceived changes in the spatial organisation of production over time may be inherent in the theoretical periodisation of capitalism itself<sup>3</sup>.

These two major criticisms of the application of regulation theories of the development of capitalism to studies of industrial location are as pertinent to the more recent elaborations of these same theories (Piore and Sabel, 1984; Scott, 1988) which are discussed later. It is sufficient, at this stage, to note that much of the hypothesised degree of change in particular

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<sup>3</sup>Wallerstein (1985: 7) makes the point well when distinguishing between two approaches to Marxist analyses of the historical development of capitalism: 'One variety were basically logico-deductive analyses, starting from definitions of what capitalism was thought to be in essence, and then seeing how far it had developed in various places and times. A second variety concentrated on presumed major transformations of the capitalist system as of some recent point in time in which the whole earlier point of time served as a mythologised foil against which to treat the empirical reality of the present.' (emphasis added).

regional economies may be embodied within such a theoretical periodisation of capitalism. A major argument of this thesis is that an evolutionary view of the development of capitalism is more successful than 'stages of growth' theories of capitalism in highlighting the precise extent and nature of change in regional economies.

### 2.3.2 The 'New International Division of Labour'

At a different level of abstraction there has been a contribution to development theory based largely upon labour process considerations (Frobel, Heinrichs and Kreye, 1980). Whereas, regulation theory was developed from a consideration of the particular development of capitalism in the U.S. (and subsequently applied to Britain), the New International Division of Labour (NIDL) thesis is one which abstracts from the organisation of production within transnational corporations in a theory of supranational uneven development.

Contemporary patterns of regional uneven development (where those regions are defined at a supranational scale) is seen to be a reflection of processes of unequal exchange operating, primarily, through the internal transactions of transnational corporations. Frobel et al's analysis draws upon the examination of the division of labour provided by Adam Smith, Charles Babbage and, more recently, Braverman (1974). The potential for the labour process to be decomposed and the historical tendency for this to be the case leads the authors into positing the existence of a historical, unilinear trajectory of the geographical separation of parts of the production process under capitalism. The contemporary situation is construed as one whereby the dominance of transnational corporations has led to those parts of the labour process having been geographically separated, frequently at an international scale, within global market factories [see also Grunwald and Flamm eds. (1985)

and Ernst ed. (1980)]. The affinities between this work and Hymer's (1979) discussions of the development of multinational corporations are obvious. Under what Hymer terms the 'law of uneven development', the contemporary situation is one where

Multinational Corporations would tend to produce a hierarchical division of labour between geographical regions corresponding to the vertical division of labour within the firm. It would tend to centralise high-level decision-making occupations in a few key cities in the advanced countries, surrounded by a number of regional sub-capitals, and confine the rest of the world to lower levels of activity and income.... (Hymer, 1979: 55).

Deskilled, routine branch plant operations have been decentralised to lesser developed countries where labour costs are lower. More skilled, capital intensive operations as well as corporate control functions (e.g. corporate headquarters and research and development) have been retained in the more developed countries. A process of unequal exchange through repatriation of profits and limited externalities (in the form of technology transfer and multiplier effects) accounts for continued uneven development at this spatial scale.

Frobel et al's (1980) original work has enjoyed considerable influence within industrial geography and has spawned a series of similar studies (e.g. Cohen, 1981; Henderson and Cohen, 1982 [cited in Cohen, 1987]; Sklair, 1988). Nevertheless, this use of the labour process in generalisations concerning the organisation of production and consequent regional uneven development has been extensively criticised along with other aspects of the thesis (Cohen, 1987; Henderson, 1989). The work of Perrons (1981) and Frobel et al (1980) defined the industrial structure of particular regions as the aggregate reflection of the position that individual manufacturing establishments within that region occupy within the international division of labour. Any sense of the particular of different corporate structures or strategies was lost as these were forced to conform to certain immutable principles concerning the evolution of the division of labour. The NIDL thesis presented an essentially

static 'reading off' of spatial outcomes from these timeless principles of the division of labour under capitalism. As such

The geographical outcome [from the NIDL thesis], then, is analysed largely through the optic of production and spatially differentiated factor supply conditions while questions related to markets for output and strategies for defending or expanding them are left aside. (Schoenberger, 1988: 106).

Just as Weberian analysis forced the location of industry into a rigid framework centred on transportation costs and fixed factor locations, so too does the NIDL thesis, with the exception that only the factor of labour is seriously considered.

Within geographical analyses of the internationalisation of production Vernon's (1966) 'product life cycle' thesis holds a curious place. Its most significant use has been as an adjunct to otherwise static theories of the organisation of production (see also its deployment within behavioural analyses of the branch plant syndrome). Thus, product life cycle considerations provide the NIDL thesis with a dynamism that is otherwise lacking. By this means, the demand-side considerations in production that Schoenberger finds to be neglected are incorporated into the NIDL thesis. However, it is doubtful, even with this crude incorporation of demand-side considerations, that the NIDL thesis attained the status of an historically contingent explanation of regional uneven development as by 1979 Vernon (1979) had recognised many of the limitations with his product life cycle model and in particular the narrowing of international wage differentials. Furthermore, Gordon (1988) can find no evidence to confirm the geographical spread of production at a world scale to which the NIDL thesis attests.

### 2.3.3 The spatial divisions of of labour approach

Several authors have shared an approach, best described as the spatial divisions of labour approach, to analysing aspects of contemporary regional

development in Britain. The basis of this approach has been most clearly and consistently outlined by Massey (1979, 1983, 1984) and Massey and Meegan (1979) but has been present in large measure in the theoretical perspectives and empirical work of others addressing the contemporary regional problem in Britain (e.g. Cooke, 1983; Hudson, 1986, 1988; Regional Studies Association, 1983; Morgan and Sayer, 1988) and the U.S. (Clark, 1981).

In order to elaborate upon the contemporary spatial division of labour in the U.K., Massey (1984) presents a three-fold classification of capitalist enterprise: that of indigenous enterprise, 'cloning' organisations and 'part-process' organisations (the latter two describing the organisation of production in multilocal firms). These different forms of corporate organisation have a spatial expression implying variable prospects for economic development in particular regions. Massey has extended an examination of the nature of the capitalist enterprise beyond simply labour process considerations. An analysis of the corporate organisation of production is then situated within a broader understanding of 'place in economic structure' (i.e. some meaningful aggregation of firms, e.g. an industry a department) and the 'the organisational structure of capital' (i.e. the nation-specific form of competition and economic organisation).

It is an analysis of this wider context, within which the corporate organisation of production is situated, that has been relatively underdeveloped within the spatial division of labour approach (Storper, 1986; Wood, 1980). As with the NIDL thesis, there is considerable emphasis upon supply-side considerations (Cooke, 1983; Hudson, 1986, 1988; Massey and Meegan, 1979) following from a primary concern with the development of the technical division of labour but relatively little understanding of the role of demand-side factors that would follow from a fuller consideration for the wider market circumstances within which companies operate - i.e. of 'place in economic structure'.

Massey conceives of the labour process as a series of sequential activities which can also potentially be organised hierarchically. In the capitalist enterprise this sequential or hierarchical set of activities of the technical division of labour is combined with a managerial division of labour which is inevitably organised in an hierarchical fashion<sup>4</sup>. In the indigenous, single site firm there exists the complete managerial division of labour as well as the complete technical division of labour concentrated at one site. With multilocal firms, however, there is the potential for both parts of the managerial division of labour and the technical division of labour to be separated in space (among different company sites) giving rise to an acknowledged spatial-functional division of labour.

In the cloning organisations there may be separation of parts of the managerial hierarchy among several locations but the technical division of labour remains relatively complete at each company site. In the part-process organisation, individual manufacturing sites may have only part of the managerial hierarchy and potentially only part of the technical division of labour. In both cases, the potential for development of local linkages and hence multiplier effects is attenuated. In the former case, most of the total manufacture of the finished product is retained in-house at individual sites in order that economies of scale may be gained. In the latter case, intra-corporate transfers of semi-finished products may form the bulk of input requirements.

Massey draws upon Hymer's (1979) analysis of the evolution of the multinational firm (described above). In this way, the potential to associate each of Massey's types of capitalist enterprise with a particular stage of the development of capitalism is clear. This is certainly explicit in Hymer's

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<sup>4</sup>Wickham (1988) has since criticised this assumption regarding the inevitability of an hierarchical organisation of the managerial division of labour in describing the relative autonomy of branch plants in Northern Ireland.

analysis, however, Massey stresses that the complexity of spatial structures cannot be understood simply by considering the stage of development of capitalist relations (Massey, 1984: 81). In this sense the analysis is not prone to the severe conceptual difficulties of 'stages of growth' theories of capitalism (for example regulation theory) noted above.

If the dynamism of this approach is not to be found in a periodising of the development of capitalism, how can an historical analysis of regional uneven development be afforded? Massey describes the process of capitalist accumulation as one whereby layers of investment (corresponding to potentially qualitatively different economic activities) are successively deposited in space much like layers of sediment which form layers of rock at the earth's surface. It is the combination of these different layers in different localities which is of particular relevance to understanding regional uneven development. Thus

if a local economy can be analysed as the historical product of the combination of layers of activity, these layers also represent in turn the succession of roles the local economy has played within wider national and international spatial structures. (Massey, 1984: 118).

If the deposition and combination of layers of investment helps create a distinctive industrial structure to a particular region then it is such an industrial structure which then shapes future layers of investment.

it is not only that 'the different stages of the technical division of labour are distinguished by locationally relevant characteristics' and therefore spread out in different locations. It is also that the very existence of such differences between locations may be a stimulus to the development of a technical division of labour which enables advantage to be taken of them. (Massey, 1984: 74).

This approach, therefore, has a fuller conception of the role of geography as a part of the analysis of regional uneven development. Massey is aware of the limitations of an 'economistic' approach which would only be capable of considering the spatial implications of primarily aspatial processes.

This geological metaphor is intuitively appealing and one which makes a useful distinction between the relative (spatial) fixity of capital in the



short-run and the relative (spatial) mobility of capital in the long-run. However, this aspect of Massey's approach is also relatively underdeveloped. Warde (1985) points to the need to distinguish between the different 'logics of location in each layer', although these qualitative differences between layers of investment are necessarily the domain of empirical study with regard to particular regional economies.

#### 2.3.4 Reflections on theories of the contemporary spatial division of labour

At their worst, the above analyses of the contemporary spatial division of labour present rather crude caricatures of regional economies (e.g. see Henderson, 1989; Morgan and Sayer, 1988; Sayer, 1985). Much of the specificity of 'place' (i.e. particular regional economies) and corporate strategies and structures is subsumed within a simplified account of the underlying logic to the development of capitalism.

An understanding of the development of the technical division of labour and, more particularly, the labour process represents the theoretical centre-piece within each of the three bodies of work within the spatial divisions of labour tradition. Massey (1984) makes an additional distinction between the managerial and technical divisions of labour. However, the stress placed upon the technical division of labour as the major determinant of the organisation of production, and consequently of the geographically uneven development of capitalism, has led to an overemphasis upon supply-side considerations in production (Schoenberger, 1988). In particular, the analysis of the geography of production provided by these accounts of spatial divisions of labour can virtually be reduced to considerations of geographical variations in the cost of labour. Demand-side considerations in production (i.e. market locations and marketing strategies) are, in contrast, virtually ignored.

The incomplete conception of the division of labour apparent in these three bodies of work within the spatial divisions of labour tradition is also a reflection of rather gross assumptions regarding the historical development of the division of labour. Work in the spatial divisions of labour tradition has tended to assume an inevitable historical tendency toward vertical integration and capital concentration under capitalism (Storper, 1985; Storper and Christopherson, 1987). In making such an assumption these accounts have failed to give adequate consideration to inter-firm divisions of labour - i.e. linkages (Storper, 1986). Correspondingly, they have ignored the persistence of vertically disintegrated forms of production (Brusco and Sabel, 1981) and are otherwise poorly disposed to analysing more recent forms of industrial restructuring involving a deepening of the social division of labour.

These two major deficiencies are relevant to each of the three bodies of work outlined in this section. They are particularly pertinent in the cases of the NIDL thesis and regulation theory accounts of the contemporary spatial division of labour. Of the two deficiencies raised above, the latter has been most fully exposed in recent theoretical and empirical work which has suggested a reversal in historical trends toward vertical integration and capital concentration involving a re-synthesis of the technical division of labour and an increasing division of labour between firms. It is to a discussion of this recent body of work that this chapter now turns.

## 2.4 FLEXIBLE PRODUCTION AND THE BRANCH PLANT ECONOMY:

### THE RE-EMERGENCE OF REGIONAL ECONOMIES?

The work within the spatial divisions of labour tradition construed the contemporary regional problem as a reflection of the existence of a spatial-functional division of labour arising out of processes of capital concentration and the hegemony of multilocal and multinational companies.

The division of labour is increasingly no longer contained within any one region but, rather, spread across space and among regions. In peripheral region economies the division of labour is more or less incomplete with the absence of certain corporate functions, the retention of value-added within the corporation (either at individual sites or within the company as a whole) and a relative lack of local material and information linkages. The relative mobility of manufacturing investments and the consequent spatial dispersal of corporate functions (be they manufacturing or non-manufacturing) is commensurate with relatively centralised forms of control and decision-making within corporations. This spatial division of labour has more recently come to be regarded as one associated with a 'Fordist' regime of accumulation (Aglietta, 1986; Lipietz, 1987; Schoenberger, 1987; Scott, 1988).

#### 2.4.1 Background

The deepening of the recession in developed economies during the late 1970's and early 1980's has prompted much theoretical literature concerned with the causes and nature of contemporary processes of industrial restructuring as well as a considerable body of empirical work documenting the precise form of contemporary processes of restructuring. Empirical studies of particular growth points within developed economies (be they 'new' industries or 'new industrial districts') as well as the restructuring of mass production ('Fordist') industries have either been explicitly informed by, or subsumed within, a theoretical approach which defines contemporary restructuring as a transition from one regime of capital accumulation ('Fordism') to another ('Flexible specialisation' or 'flexible accumulation').

Most attention has been paid to documenting and analysing the emergence of growth based upon regional specialisms (agglomerations of manufacturing firms). Most notably, examples of vertically disintegrated agglomerations of

production within Italy (Brusco, 1982; Lazerson, 1988) and within California (Scott, 1983b, 1984, 1986; Storper and Christopherson, 1987) are taken to exemplify the characteristic spatial organisation of production within an emerging regime of 'flexible specialisation' (Piore and Sabel, 1984) or 'flexible accumulation' (Scott, 1988). In more recent literature many more of these new industrial districts have been enumerated (Sabel, 1989: 22-23), however, no attempt to assess the significance in terms of world manufacturing employment or output of these contemporary industrial districts have been made. The extent of restructuring of production into such industrial districts, therefore, remains in question.

Rather less attention has been paid to analysing the forms of restructuring within mass production industries, the exceptions being the consistent observation of processes vertical disintegration in the automotive industry (Holmes, 1988; Oberhauser, 1987; Schoenberger, 1987 - although even here there are alternative interpretations of the processes of restructuring (e.g. Amin and Smith, 1990) - and the motion picture industry (Storper and Christopherson, 1987; Storper, 1989). The fact that relatively few other mass production industries have been numbered among those displaying signs of vertical disintegration - Piore and Sabel (1984) and Schoenberger (1988) cite the examples of the chemicals and steel industries - has been justifiably criticised (Gertler, 1988). Consequently a more equivocal literature pertaining to the more general trends in the use of subcontractors, particularly in the U.K. context (Atkinson and Meager, 1986; Manpower, 1985 [cited in Morris, 1988]; Marginson, 1988), has been taken as evidence of the more widespread and systemic reorganisation of production under a new regime of accumulation (Morris, 1988). However, this work lacks sufficient context for such trends to be interpreted as necessarily long-term and systemic rather than short-term. In the case of mass production industries there is also a lack of agreement upon the extent of vertical disintegration.

Although most attention has been paid to these new regional specialisms or to the restructuring evident in a rather limited set of mass production industries, all accounts of a new regime of accumulation define contemporary restructuring as one of crisis and restructuring of mass producers. In accounts of 'Fordism' as a regime of accumulation (Aglietta, 1987) mass production reached its zenith in the peripheral region branch and subsidiary plants of multilocal and, in particular, multinational firms (Lipietz, 1987). If processes of contemporary restructuring, and vertical disintegration in particular, are in evidence in the reorganisation such multinational and multilocal firms, then such restructuring ought to be in evidence in the peripheral region branch and subsidiary establishments of such companies.

There are few documented cases of 'flexible production' having taken root in older industrial regions. Examples here might be the restructuring of the machine tool industry in Baden-Wurtemberg (Sabel et al, 1989) and the Steel and Chemicals industries in the Rhur and Rhine/Main areas (Grabher, 1989) of Germany. Otherwise, studies of the implications of a possible new regime of accumulation for peripheral region economies have been made with regard to the North East of England (Hudson, 1988) and Wales (Cooke and Imrie, 1989). Consequently, evidence of the likely extent and causes and nature of restructuring in branch plant economies must be gathered from the more general literature pertaining to industrial districts, Japanese production techniques and the restructuring of mass production industries.

Sabel (1989) describes how

Many of the largest multinationals have shifted strategy. Often without explicitly reproducing the mass production model, they have begun to organise production on the basis of flexible specialisation. They have moved to this by their previous failures, by the exemplary success of the new industrial districts, and by their fear of Japanese competitors - who are themselves perfecting systems of flexible production. (Sabel, 1989: 31).

We would expect, therefore, this restructuring to have implications for the peripheral region branches and subsidiaries of such multinational companies,

and, in particular, there to be significant in-situ restructuring in such peripheral region establishments. Further details on the extent of restructuring would have to be gleaned from considering the organisation of production in the exemplary industrial districts and the domestic operations of Japanese firms (see below). However, at this point, we can summarise such in-situ restructuring as follows.

Producers in many of these [mass production] sectors have been experimenting on a major scale with such aids to flexibility as robotized equipment, workers quality circles (and other neo-fordist labour practices), increased subcontracting activity and just-in-time delivery systems. (Scott, 1988: 178).

However, restructuring in peripheral region economies is also likely to be engendered 'directly' through foreign direct investment by Japanese and Far East companies as well as 'new' investments by domestic or other Western companies. In this way, peripheral region economies may be benefiting from more vertically disintegrated 'new' inward investments. However, it is not clear to what extent the domestic system of manufacture of Japanese producers is being replicated through foreign direct investment. Nor is it clear whether Western manufacturers' new investments are also characteristically vertically disintegrated.

An examination of the likely extent of processes of externalisation and linkage change within the peripheral region setting must then consider the contribution of in-situ restructuring (by existing manufacturing operations) and new, possibly 'flexible', greenfield inward investments<sup>5</sup>.

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<sup>5</sup>The brief critique of regulation theory interpretations of contemporary industrial restructuring contained in appendix i, informs the structure to this review of literature upon flexible production and the branch plant economy. In particular, there is a conceptual separation between Japanese manufacturing techniques - as these represent a model that Western manufacturing companies may be adopting - and the actual nature of contemporary greenfield investments in peripheral regions - which may not necessarily represent a reproduction or transplantation of Japanese manufacturing techniques into Western economies. Such a distinction has not been made in the literature but adds considerable clarity to an analysis of the origins of contemporary organisational and linkage change.

#### 2.4.2 In-situ linkage change in peripheral regions

New investment in productive capacity is likely to represent only a fraction of a company's total output in the short run. If there is a radical transformation in the organisation of production - and in particular, increased externalisation of activities and the localisation of linkages - then it must derive, in large measure, from the in-situ restructuring of existing manufacturing capacity. This section briefly considers Japanese manufacturing techniques and contemporary industrial districts - as these represent a model of 'flexible production' to which contemporary in-situ restructuring is dedicated to reproducing. It also considers the rather fragmentary evidence relating specifically to the reorganisation of corporate structures and strategies.

##### (i) The demonstration effect of Japanese manufacturers

The success and growth of Japanese companies in many industries has prompted the widespread adoption of several manufacturing practices pioneered by these companies. Such manufacturing practices consist of a reintegration of the technical division of labour (with workers being trained and deployed to do several tasks rather than one) under new work practices and a different inter-firm division of labour based upon 'just-in-time' delivery systems.

The system of manufacture in the home economy of these Japanese manufacturers has been the source of these organisational innovations. Within the domestic context Japanese manufacturers are characterised as being vertically disintegrated as opposed to being vertically integrated or horizontally disintegrated as in Western economies (Trevor and Christie, 1988). In fact, given the inadequacies of defining the 'firm' on the basis of ownership, the Japanese manufacturing system is best described as one of

quasi-vertical integration (Blois, 1972). Under such quasi-vertical integration an extended division of labour between firms is characterised by hierarchical control. This system has, therefore, been seen to embody elements of both flexibility and rigidity (Dore, 1986). It is these properties of flexibility under relatively vertically disintegrated forms of production, which are stressed, to the exclusion of considerations of the rigidities within accounts of the restructuring of mass producers under a new regime of accumulation.

Early adopters of both the 'new' work practices and inter-firm divisions of labour have been automobile producers and electronics companies although this is hardly surprising given that Japanese automobile and electronics companies have been the archetypal examples of those organisational innovations being adopted. Thus, Japanese manufacturing techniques are in evidence in the case of European automotive manufacturers (Oberhauser, 1987) and North American manufactures (Holmes, 1987; Schoenberger, 1987). Western manufacturers of electronic goods are also following the example set by Japanese manufacturers (Milne, 1990). Other work has noted the more general adoption of new work practices and increased outsourcing (Atkinson and Meager, 1986; Marginson et al, 1988; Manpower, 1985 [cited in Morris, 1988]).

'Just-in-time' buyer-supplier relations are often idealised or caricatured when compared with 'orthodox' purchasing practices (Sayer, 1986). Industrial geographers have been inclined to examine the spatial ramifications of just-in-time delivery systems in terms of transport/transaction costs (e.g. Estall, 1985; Sako, 1987). Despite this, there is little in the way of consensus regarding the spatial implications of the adoption of these Japanese manufacturing techniques. The work of Estall (1985) and Sheard (1983) suggests that 'just-in-time' systems of component and material delivery engender the localisation of backward linkages. However, the question of geographical scale is important to an understanding of the precise degree of, and reasons for,



any such localisation of linkages. Thus, Schoenberger (1987), Mair et al (1988) and Reid (1989) provide evidence of the agglomeration of suppliers around automotive assemblers only at a broad geographical scale.

However, in terms of Taylor's (1978) eight dimensions of linkages, just-in-time systems do not merely change the frequency of, and transport/transaction costs associated with, linkages but also, on balance, the scale of linkages. Just-in-time delivery systems place a premium upon close working relationships between buyer and supplier. There is, thus, a strong connection between the introduction of just-in-time supplier relations and reductions in the number of suppliers. In this way, the simplified backward linkage structure that results has as much to do with the search for pecuniary external economies as it does with the imperative to economise upon transportation/transaction costs. Seen in this light, just-in-time systems are not necessarily associated with the localisation of linkages since the search for pecuniary external economies may override erstwhile attempts to economise upon transport/transaction costs.

#### (ii) Exemplary industrial districts

The contemporary versions of Alfred Marshall's 'industrial districts' come in many forms. Initially the term 'industrial district' was redeployed to describe examples of regional specialism in various parts of Italy but has since come to encapsulate regions previously noted for concentrations of small firms (where those firms are not necessarily functionally linked), for example, 'Silicon Valley' (Saxenian, 1984) and the M4 corridor (Hall et al, 1986) as well as agglomerations of industry within particular urban conurbations (Scott, 1983b, 1984, 1986; Storper and Christopherson, 1987). What then is the characteristic organisation of production in these industrial districts?

According to Scott and Storper (1987) industrial complexes grow

in the first instance by the creation of external economies (a non-spatial, organisational phenomenon) via the social division of labour, and these are then translated into agglomeration economies (a strictly spatial phenomenon) via the proliferation of structures in the complex. (Scott and Storper, 1987: 227).

The process of agglomeration of activities is best understood in terms of a sequence of events beginning with the initial location and subsequent externalisation of activities by companies. In many instances the process of externalisation might be initiated for locally specific reasons and, as such, engender the circular process of cumulative causation responsible for the continued spatial polarisation of economic activity (Myrdal, 1957).

However, there are several instances in which the process of externalisation may, in the first instance, be independent of locality. It is precisely such instances which several authors (Sabel, 1989; Scott, 1988; Storper, 1989) see as leading to the prospect of the widespread re-emergence of such agglomerations of industries under a new regime of accumulation. Scott (1989), for example, describes the emergence of agglomerated forms of production under a new regime of 'flexible accumulation' thus;

when changes in economic conditions bring about intensified uncertainty and instability in production and increased competitiveness in final markets, then internal economies of scale and scope within the firm begin to break down so that the entire production system is liable to display strong symptoms of horizontal and vertical disintegration. (Scott, 1988: 176).

More specifically, it is argued that saturation of particular markets leading to fragmentation of final demand for many products coupled with the emergence of new 'flexible' process technologies (for example, reprogrammable machine tools) will engender the increased externalisation of activities by companies and consequently the agglomeration of production through the proliferation of localised backward linkages.

At least two major problems with these accounts of the logic of contemporary agglomerations are apparent and have been more fully explored

elsewhere (Phelps, 1992). Together, these two major deficiencies with the flexible production theses point to the particular rather than the general significance of contemporary instances of agglomeration.

Firstly, there appears to be a paradox or ambiguity regarding the role of processes of cumulative causation within the formation of agglomerations said to exemplify the principles of flexible production. Agglomerations in existing and 'new' industrial spaces are numbered among those exemplifying flexible production. However, the flexible production theses provide little indication of those instances in which flexible production is allied to existing place-specific forces of agglomeration and those in which it is an expression of a 'clean-break' with past centres of urbanisation and accumulation. As such, it is unclear whether the increasing number of agglomerations identified and taken to exemplify flexible production are in fact the product of the same general forces (market fragmentation and diffusion of 'flexible' technologies).

Secondly, detailed accounts of the logic of agglomeration under flexible production are based upon a partial analysis of processes of externalisation and the creation of external economies. This in turn is due to explicit or implicit assumptions of near perfect competition or the neglect of considerations of differential economic power embodied in inter-firm linkages apparent in much of this literature. The analysis of agglomeration of industry provided by Scott (1983a, 1986) and subsequently taken up in more general accounts (Scott and Storper, 1987; Storper and Scott, 1989), for example, is developed with respect to single plant firms and presumably applies within a context approaching that of perfect competition. Within such a context, the motive force to processes of externalisation appears to be an imperative to economise upon transaction costs. On the other hand, a more diverse literature views the peculiar success of agglomerated forms of production in the contemporary setting as a reflection of co-operative inter-firm relations

(Dore, 1983, 1986; Piore and Sabel, 1984; Pyke, 1988; Sabel, 1989; Sayer, 1990). A situation approximating to perfect competition is again implied due, in turn, to the assumption that any real differences in economic power embodied in linkage structures are minimal.

(iii) Corporate organisation and vertical disintegration

In the previous section (2.3) accounts of the contemporary spatial division of labour detailed how the development of localised backward linkages was attenuated in peripheral regions as a result of corporate divisions of labour which ensured that production at branch and subsidiary establishments in peripheral regions was relatively vertically integrated. It is now worth considering how these corporate divisions of labour are being redefined, engendering a new potential for regional development through the proliferation of localised backward linkages.

Aglietta (1987) provides some brief examples of the kinds of organisational changes occurring under a new regime of capitalist accumulation:

At the present time corporations are in the process of undergoing an organisational transformation just as radical, if not more so, as that from the centralised functional structure to the decentralised divisional structure. This transformation leads back in the direction of centralisation, but on a completely new principle. .... The new centralisation rests on the principle of information. (Aglietta, 1987: 257).

The terms centralisation and decentralisation are relative and, generally speaking, both the centralised functional and decentralised divisional structures that Aglietta refers to have reasonably centralised management structures (i.e. limited delegation of decision-making to individual plants). Furthermore, the terms centralisation and decentralisation refer to management structure and not necessarily to the overall structure, the technical division of labour within, or the spatial structure of control in the corporation. The

emerging managerial structures are clarified thus:

If the divisional structure topped by a general office had the form of a pyramid, the new managerial structure takes the form of star. (Aglietta, 1987: 258).

Thus, both the centralised functional and the decentralised divisional managerial structures were organised hierarchically. However, the new managerial structure is one which is not organised hierarchically. This would tend to confirm (Wickham's, 1988) critique of Massey's (1984) conception of the managerial division of labour as inevitably hierarchical (see section 2.3). In practice, this could mean that greater degrees of decision-making autonomy are exhibited by individual company sites although this is not the impression left from Aglietta's discussions concerning corporate organisation<sup>6</sup>. Increased autonomy at individual sites would increase the potential for vertical disintegration and, hence, the geographical patterns of backward and forward linkages of these individual manufacturing sites.

Aglietta's discussions concerning the changing managerial structure of corporations rests on a consideration of 'enabling' communications technologies which permit reorganisation on the basis of a principle of information and establish the ambiguous dualism of tendencies toward centralisation and decentralisation. However, the potential for a reorganisation of the managerial division of labour (as well as the technical division of labour) under a new regime of accumulation derive also from what is perceived to be greater uncertainty in markets for final demand which have repercussions backward through value added chains.

In this way,

... Spatial linkages will be strengthened as intensified flexibility and adaptability require much tighter co-ordination of all phases of the manufacturing process from design and engineering through final assembly. (Schoenberger, 1987: 204).

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<sup>6</sup>Aglietta speaks of a 'far more advanced centralisation of production becom[ing] compatible with geographical decentralisation of the operating units (manufacturing and assembly).' (Aglietta, 1987: 127).

Just as in behavioural theories of the firm (particularly structural contingency theory), organisational structure comes to reflect exogenously given environmental conditions. Under a new regime of accumulation within which markets are observed to be becoming more fragmented and uncertain, organisations take on a more simplified, less bureaucratic and less hierarchical organisational, structure in order to become more adaptable. Without further elaboration of corporate strategy, expositions of corporate organisation under a new regime of accumulation amount to little more than a theory of environmental determinism.

With increased uncertainty and fragmentation of final demand companies are observed to be widening their product ranges. The significance of what amounts to increased product differentiation is questionable (Williams et al, 1987). However, this does beg questions regarding the prospects for externalisation and vertical disintegration in peripheral region economies. Vernon's product life cycle theory has been conjoined with behavioural theories of the firm (Dicken, 1976) and accounts of a new international division of labour (Perrons, 1981) to incorporate considerations of corporate strategy into otherwise static analyses. The establishment of peripheral region branches and subsidiaries was seen to be associated with the production of a single 'mature' product. With strategies of product differentiation and market segmentation it is possible that

The life cycle of a plant is thus partially delinked from the life cycle of a single product. (Leborgne and Lipietz, 1988: 267).

This may result from the allocation of additional product responsibilities to particular sites in the wake of rationalisation of capacity. In this case there would be a process of 'linkage adjustment'; a modification of the existing supplier base associated with the company plant from which that particular product responsibility had been re-allocated. It may be that there are opportunities for the consolidation of purchases for

existing and newly allocated product responsibilities. Alternatively, the additional complexities (particularly where there are few complementarities that can be exploited internally) of producing an increased range of products may lead to a proliferation of linkages. On the other hand, an increased range of products may reflect the increased development of new products locally or the allocation of additional product responsibilities direct from localised or centralised research and development facilities. In this case, there is no inertia in backward linkage structures associated with inherited supply sources, though the potential for vertical disintegration and proliferation of backward linkages will still depend, significantly, upon any complementarities between products that can be exploited.

Changes in product responsibilities and their wider implications for the organisation of manufacturing activities have been understudied within industrial geography in general and in the study of peripheral region branches and subsidiaries in particular (two notable exceptions are Hayter and Watts, 1976 and Healey, 1980). However, the suggestion that possible market fragmentation is leading to an increased product responsibilities for manufacturing sites of multilocal and multinational firms highlights the need for such considerations to be investigated more closely.

Also of significance is whether a new technical division of labour within the corporation is fostering more widespread changes in the organisation of the corporation. One is left to infer that both information and material linkages organised hierarchically under divisional managerial structures will be broken down with the emergence of the new form of managerial structure. With the emergence of new process technologies and the uncertainties in final demand coupled with increased product differentiation/market segmentation practised by companies, Sabel (1989) identifies a re-synthesis of the technical division of labour and, in particular, a reintegration of conception and execution. The degree of re-synthesis of the

technical division of labour hypothesised as part of a new regime of accumulation is likely to have some particular organisational effects. Schoenberger's study of the automobile industry indicates that

as flexible automated systems are progressively introduced, there are reasons to believe that spatial linkages that had previously been broken down will be recomposed, both at the level of ties among skill levels within the firm and ties between the final assembler and its suppliers. (Schoenberger, 1987: 204).

This being the case, we should expect there to be the potential for a corresponding reintegration of corporate functions previously spread across space under a spatial-functional division of labour and, as a result, the potential for increased vertical disintegration at individual manufacturing sites as hierarchical interdependencies among plants are broken down. And indeed, Sabel (1989) argues that there is

The reorganisation of large multinational firms. Product lines are being consolidated in single operating units which have increased autonomy to organise their own sales, subcontracting and even research. (Sabel, 1989: 18).

He goes on to identify processes of vertical disintegration as an example of large firm - small firm alliances which are leading to the re-emergence of regional economies. Thus

One form such alliances take is the long-term subcontracting relation between the newly consolidated operating unit of a multinational and a nearby network of flexible subcontracts. (Sabel, 1989: 19).

Taking these two assertions together, Sabel clearly sees some very profound changes in corporate-wide divisions of labour. In particular, and this is an important claim, he appears to be suggesting that there is the reintegration of the stages of production into single (rather than several) manufacturing establishments, and hence a decrease in the degree of intra-corporate trading. Furthermore, he suggests that those manufacturing establishments at which the technical division of labour has been re-constituted are subsequently subcontracting many of the newly acquired stages of production. In this way, Sabel clearly expects the prospects for vertical disintegration at branches and subsidiaries of 'part-process' organisations to be considerable, and



presumably greater still at those non-independent establishments where the technical division of labour has always been relatively complete (Massey's 'clones') and in the case of independent firms.

The spatial implications of any such re-composition of corporate divisions of labour are less clear. The suggestion must be, primarily drawing upon literature regarding industrial districts and Japanese manufacturing techniques, that agglomeration of production results from processes of externalisation and vertical disintegration. However, as Schoenberger notes,

although.... the new forms of organisation of production will tend to foster the spatial reintegration of production and strengthen input-output linkages within a given region, the boundaries of this region may be relatively broadly defined. (Schoenberger, 1987: 209).

The geographical implications of such processes of corporate restructuring and externalisation, at least, are open to debate.

### .3 New 'flexible' manufacturing investment

Inward investment may be directly transforming regional economies if it is qualitatively different from inward investment of the past and if it is occurring on a sufficient scale. In this respect, a disproportionate attention has been paid to the increase in Japanese and Far East Foreign Direct Investment (FDI) in Western economies. Such FDI is seen to be qualitatively different from U.S. FDI (which until recently dominated in world flows of FDI) and from the greenfield branches and subsidiaries of national producers.

There has undoubtedly been a decline in the flow of U.S. FDI in manufacturing industry into the U.K.. In 1956, 58% of total U.S. manufacturing FDI went to the U.K., however, this has declined to 42% in 1966 and to 27% on the eve of the recession of the early 1980's (Dicken, 1980). On the other hand, the U.K.'s share of the total number of Japanese manufacturing sites in Europe increased slightly from 11.2% in 1976 to 12.8% in 1986 (Dunning, 1986).

The Japanese have been reluctant to produce outside of the domestic and Far Eastern arena. The vast bulk of Japanese investment in manufacturing has been made within the Far East where a complex intra-firm division of labour has developed between the more central, skilled work and R&D work retained in Japan and the labour intensive, volume manufacturing operations being found in the branch plants within other Far Eastern countries. It is within this context that Japan's success in manufacturing has been perpetuated outside of purely domestically based manufacture.

Although the bulk of Japanese FDI in Western economies has been in the service sectors, with regard to manufacturing

Japanese firms are attempting a fundamental change of management orientation in the direction of multifaceted internationalisation. There is a qualitative change in the way businesses are dealing with the yen's current appreciation as compared with their response during the strong yen period of 1977-78. At that time, many companies sought to shore up exports with a mix of strategies that included raising the dollar price of exports, calling on subsidiaries to lower prices, strengthening competitiveness in areas other than price, and reducing in-house production costs. Now, however, fewer firms are adopting such policies, preferring instead a course of diversification away from exports through such means as shifting to overseas production, increasing overseas procurement of parts and materials and stepping up domestic sales. (M.I.T.I., 1986: 66 [quoted in Dicken, 1988: 645] Dicken's emphasis).

Whilst this is the case 'all the evidence suggests that most Japanese firms would have preferred to serve markets in industrialised countries by exports from Japan or the East on a continuing basis.' (Dicken, 1988: 648). Indeed, a study of sourcing strategies of European and Japanese multinationals into U.S. markets found that the latter were more oriented toward serving the U.S. market indirectly (export) than directly (local manufacture) than the former (Kotabe and Omura, 1987: 121).

Only more recently have Japanese and Far Eastern firms established localised manufacturing for particular regional markets in Europe and North America not least because of anti-dumping levies imposed by the E.C. and the U.S. Government. In the case of electronic goods in particular, rulings on 'local' content mean that degrees of 'local' sourcing by branches or

subsidiaries of Japanese or Far Eastern manufacturers directly reflect such legal requirements.

There is little to suggest that the degree of localised sourcing exhibited by Japanese FDI will greatly exceed these legal requirements. Three consecutive reports by the Japanese External Trade Relations Organisation (JETRO) have made it clear that branches and subsidiaries of Japanese companies established in the U.K. have experienced continuing problems with finding adequate suppliers for materials and components in terms of price, delivery and quality (Trevor and Christie, 1988). despite the difficulties with finding adequate suppliers, a large proportion of E.C. based branches and subsidiaries of Japanese companies predicted that local procurement of material inputs would increase.

The main reasons for increases in local procurement by Japanese branches and subsidiaries in the E.C. were because of either retention of value-added within the company at the E.C. manufacturing site (Milne, 1990; Inter-Matrix Ltd., 1991) rather than from other company plants outside the E.C. or through the use of invited Japanese suppliers (Trevor and Christie, 1988). In this last respect, the significant degrees of inter-trading between different U.K. based Japanese branches and subsidiaries has been interpreted as one means of circumventing requirements for local content (Morris, 1989). Japanese foreign direct investment may exhibit reasonably high degrees of U.K. (and even more localised) sourcing but still be relatively unintegrated into the U.K. economy. This was also found to be a feature of U.S. involvement in the Scottish electronics industry (McDermott, 1976).

Given the inordinate attention paid to Japanese and Far East FDI in Western economies, the evidence regarding the nature of new greenfield investments by Western manufacturers is extremely limited. In general terms, it seems likely that the continuing flows of U.S. FDI into Western Europe will be composed of investments of a rather different nature to those of earlier

years by virtue of the imperatives of producing for the emergent single European market (e.g. see Schoenberger, 1990). Examples of new, conceivably 'flexible', greenfield investments by Western manufacturers are virtually confined to the single documented case of General Motors' Saturn plant in Kentucky, U.S.A. (Meyer, 1986, 1986).

#### 2.4.4 Summary

The preceding review of literature describing changes in the organisation of production, and in particular increases in the extent of vertically disintegrated forms of production, under a new regime of accumulation has implicitly identified the participation of 'branch plant economies' within such industrial restructuring. In contrast to our existing understanding of the organisation of production in peripheral regions, the recent literature points to renewed potential for regional development in such regions and in particular to the prospects of a proliferation of backward material linkages. As established peripheral region manufacturing investments are restructured a re-synthesis of the technical division of labour - following from increasingly fragmented demand and the deployment of 'flexible' technologies - means that branch plants are becoming more locally embedded through, among other things, the proliferation of localised backward linkages. In part, peripheral regions are currently being transformed by the arrival of new 'flexible' greenfield investments - less 'truncated', more locally embedded - representing a 'breed apart' from the branch plants of previous rounds of investment. Flexible production is associated with the re-emergence of an 'old' spatial division of labour; one based upon regional industrial specialism.

This chapter now turns to a consideration of theories of internalisation and externalisation by firms as a necessary prelude to a

qualified account of the principles of flexible production as they might apply in the peripheral region context.

## 2.5 THE LOCUS OF THE FIRM: THEORIES OF INTERNALISATION AND EXTERNALISATION

Neoclassical theory of the firm takes as its starting point the notion of the firm as an institution involved exclusively with production; that is, the transformation of inputs into outputs. On the other hand, a resurgent school of thought, following Coase (1937), views the firm as an institution composed of a series of transactional activities. The production function of the neoclassical firm, however, clearly encapsulates costs which can be attributed to both transformation and transactional activities (Goldberg, 1983). Similarly, transaction costs have been so ill-defined as to be partially or fully reducible to ordinary transformation costs (Dow, 1986; Goldberg, 1983; Wallis and North, 1986). Neither neoclassical theory nor transaction cost economics are, of themselves, adequate for the purpose of defining the locus of the firm. That is, whilst some firms are engaged exclusively in transactional activities, no firm is engaged in purely transformational activities while most firms are engaged in a series of transformational and transactional activities (Dietrich, 1991). In order to examine the locus of the firm we need therefore to examine the various theories of vertical and horizontal integration in relation to both transformational and transactional activities.

There are, however, three problems in examining the various theories of internalisation and externalisation. Firstly, following from the above, theories of internalisation and externalisation pertaining to transformational and transactional activities are not always distinct. The review below (section 2.5.2), therefore, makes no attempt at such a distinction. Secondly, the fact that the division of labour is constantly evolving with the

organisation of production becoming ever more complex and 'roundabout' (Young, 1928) in nature means that theories of internalisation and externalisation are indeterminate, or at least only determinate with respect to the particular stage of evolution of the division of labour. Stigler's (1950) elaboration of Adam Smith's famous dictum - the division of labour is limited by the extent of the market - provides an illustration. His work suggests that there is an industry 'life cycle' in terms of the degree of vertical integration of activities of firms. From this it is clear that economies of scale can be exploited internal to the firm or external to the firm depending upon the stage of evolution of the division of labour. However, a second implication of the evolution of the division of labour is that there are likely to be quite protracted periods when there is considerable scope for choice between internalisation or externalisation. That is, it takes time for 'markets' and hence price norms for externalised activities to emerge. And since,

the function of the firm is.... not simply to minimise transaction [or for that matter, transformation] costs, but to provide an institutional framework within which, to some extent, the very calculus of costs is superceded. (Hodgson, 1988: 207)

it may still be economically feasible for firms to retain certain activities in-house long after these have been externalised by many other firms in an industry<sup>7</sup>. Thus, thirdly, virtually all formal economic theories of vertical and horizontal integration, which are based upon the relative costs of internalisation or externalisation, assume the existence of price norms and of quantifiable costs and revenues for all transformational and transactional activities. Some of the advantages of internalisation or externalisation are however intangible and non-quantifiable in terms of costs or revenues and stem from the social nature of production.

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<sup>7</sup>Hodgson's rationale for the firm should be qualified somewhat, since most manufacturing firms with complex intra-corporate divisions of labour attempt to create internal markets of some sort to facilitate exchange between different factories, between factories and sales organisations and increasingly between separate 'businesses' within factories.

### 2.5.1 Transaction costs and the locus of the firm

Coase (1937) first made a coherent attempt to define the firm in terms of the costs associated with transactions which he considered to be the most fundamental unit of analysis. He identified several costs associated with transactions.

1. The costs of discovering prices.
2. The costs of negotiating and concluding separate contracts.
3. The costs associated with the duration of the contractual arrangements under conditions of uncertainty.
4. The costs associated with different taxation regimes for market and intra-firm transactions.

The first set of costs have been more precisely captured in the terms 'search' and 'signalling' costs (Stigler, 1963). Similarly subsequent work by Williamson (1975, 1979) has further elaborated upon the second and third sets of costs described by Coase. The costs of negotiating and concluding contracts are replaced in Williamson's scheme by the costs of 'bonding' and of 'haggling'. These in turn fall into the more general category of what Alchian and Demsetz (1972) term 'metering' costs - the costs of measuring performance of contracted parties.

In what circumstances would the transaction costs framework predict vertical integration or disintegration? To answer this question we need to introduce several 'dimensions' of transactions which have a bearing upon the costs associated with transactions. The uncertainty associated with, the frequency and nature (specificity) investments associated with particular transactions are three such dimensions identified by Williamson (1979). The last dimension can be subdivided into three; the capital asset, human asset and locational specificity of transactions. Williamson concentrates on the latter two of these three dimensions since 'uncertainty' has already been

incorporated into the transaction cost framework at an earlier stage.

Figure 2.1 shows that when assets are non-specific there will be markets (vertically disintegrated forms of production) composed of large number of firms. Only when investments associated with transactions become specific and exchanges become frequent is there an incentive to internalise activities (vertical integration). By reversing the logic of this framework we can see that vertical disintegration is likely to occur when the investments associated with transactions become less specific. Malone et al (1987) follow this reversal of logic to argue that the adoption of current technologies (especially, process and communications equipment embodying microprocessor technology) that are presumed to offer economies of scope will lead to a relative increase in 'markets' at the expense of 'hierarchies'. Cibborra (1983), again following this line of argument, is rather more qualified in pointing to the emergence of 'intermediate governance structures'. These two accounts are in keeping with the discussions of contemporary industrial restructuring, industrial organisation and agglomeration based upon transaction costs considerations provided by Allen Scott.

However, there are some important limitations to transaction cost economics and its analysis of vertical and horizontal integration. One such limitation has already been raised; that of the difficulty in distinguishing between transaction and transformation costs. Secondly however, there are several internal inconsistencies evident in transaction cost economics - of which the most notable is the fact that management is assumed not to be opportunistic (Francis, 1983) - which biases the framework toward predicting vertical integration. Thirdly, transaction costs are essentially the costs of discovering and using information involved with exchange and production (Dahlman, 1979) but transaction cost economics provides only a very limited analysis of the impact of information costs upon processes of internalisation and externalisation by virtue of its impoverished 'positivistic' (Hodgson,



FIGURE 2.1

APPROPRIATE GOVERNANCE STRUCTURES UNDER GIVEN FREQUENCIES OF, AND ASSET SPECIFICITY ASSOCIATED WITH, TRANSACTIONS.

		Investment Characteristics		
		Nonspecific	Mixed	Idiosyncratic
Frequency	Occasional	<div> <div>Market Governance</div> <div>(Classical Contracting)</div> </div>	<div> <div>Trilateral Governance</div> <div>(Neoclassical Contracting)</div> </div>	
	Recurrent		<div> <div>Bilateral Governance</div> <div>(Relational Contracting)</div> </div>	<div> <div>Unified Governance</div> </div>

Reproduced from Williamson (1979)

1988) conception of information as something objective (Phelps, 1992). Fourthly, and finally, transaction cost economics provides an analysis of market failure, and hence internalisation and the changing locus of the firm, on the basis of only 'cognitive' imperfections; that is, market imperfections which are not created endogenously by firm strategic behaviour. This can be contrasted with, for example, contemporary theory of the multinational which does make a distinction between such strategic imperfections ('ownership advantages') and cognitive imperfections ('internalisation advantages') (Dunning, 1979). The point here is that it is not always necessary for a firm to internalise activities which compose its 'ownership advantages'. This is particularly the case when that firm can effect and exploit asymmetries of economic power over its upstream suppliers and downstream customers. Such considerations underly one recent elaboration of the theory of the multinational (Cowling and Sugden, 1987). In this case, transactions and contractual relations between firms can be characterised by asymmetries in economic power; a fact which is now widely acknowledged in the literature on industrial linkages but is inadequately dealt with in transaction cost economics.

#### 2.5.2 Theories of vertical and horizontal integration and the locus of the firm.

Most formal economic theory pertains to the long-run over which the input and output mix of a firm's activities are assumed to be fixed. Thus, it is as well to remember that changing output mixes may have implications the degree of vertical and horizontal integration of a firm in the short term. For example, a short-run change in output mix in favour of a product for which the firm has greater in-house intermediate manufacturing capacity would result in the firm becoming more vertically integrated.

Certain industries - e.g. steel and chemicals - by virtue of the technical nature production process involved are composed of firms which are highly vertically integrated. The existence of such 'technological inseparabilities' which necessitate vertical integration has been a staple of industrial economics.

Within the context of uncertainty regarding related markets, transaction cost economics presents a theory of vertical integration based upon the relative costs of controlling or administering a series of transactional and transformative activities. However, uncertainty itself provides an important motive to vertical integration. Thus, backward vertical integration can result from a desire to control the cost of inputs to a firm's production process when asymmetries of information deriving from upstream market failure are apparent (Arrow, 1975). More generally, a desire to ensure the stable supply of inputs may also result in backward vertical integration.

One aspect of the nature of the firm which can often be unhelpfully subsumed within theories of vertical and horizontal integration based upon transaction cost considerations, is that of the 'ownership advantages' of firm specific technology or knowledge. In some senses such ownership advantages, which may translate into cost advantages, are often qualitative. Thus one important motive to internalisation by firms is the desire to ensure the quality of some transformation or transactional activity, often some intermediate input (Casson, 1985). The maintenance of quality of an activity or set of activities could be reduced to the costs of administering or controlling a firm's activities as in transaction cost economics. In this way, the distinction between the 'ownership advantages' and 'internalisation advantages' of the theory of the multinational is not clear.

One of the arguments of this section is that the motives to vertical and horizontal integration by individual firms cannot be reduced solely to cost considerations. Imperfections in markets and the constantly changing division

of labour mean that true price norms do not exist for many of the outputs of firms in various industries. Moreover, the fact that 'make or buy' decisions by firms involve a consideration of intangible or only imperfectly costed benefits or disbenefits is related to the fundamentally social nature of production. One aspect of this is the relationship between industry and labour in particular localities.

Thus, as Scott (1986) in his further elaborations upon industrial organisation, processes of externalisation and the formation of agglomerations notes,

any prospective post-Weberian theory of location must take very seriously indeed not just the logic of industrial organisation as an abstract system of transactional activities but also its many intricate ramifications with the employment relation. (Scott, 1986: 228).

Many decisions concerning the internalisation or externalisation of activities revolve around considerations of the labour market conditions in the locality in which a firm is operating. Thus, for Friedman (1977) the asymmetries in economic power manifest in dualistic competition present opportunities for effecting changes in the social nature of production.

Large firms are able to bypass or forestall internal technical reorganisations to some extent when adjusting to changed product demand by increasing or decreasing their co-operative relations with smaller firms. Similarly they are able to bypass the disruptive consequences of central worker lay-offs by reducing co-operative relations in times of adversity. (Friedman, 1977: 114).

Other work confirms the two potential causes of processes externalisation and internalisation noted by Friedman (1977). Rubery and Wilkinson's (1981) and Rubery, Tarling and Wilkinson (1987) also emphasise the fact that outsourcing of work by firms is in some instances related to changes in process technology and the accompanying re-organisation of work. Similarly, Sengenberger (1981) suggests that subcontracting and outsourcing of work by firms are related to cyclical changes in economic activity and levels of competition in labour markets. More generally, labour market segmentation and the existence of

asymmetries of economic power between sectors of firms is noted as a feature of industrial agglomerations (Angel, 1991; Scott, 1986) and linkages between firms more generally (Taylor and Thrift, 1982 a,b).

#### 2.5.4 Summary

This section has been concerned with placing the firm - as a changing set of transactional and transformative activities - within its wider economic context. The section suggested that the firm needed to be placed within a wider set of upstream and downstream sequentially related activities if one was to appreciate processes of externalisation and internalisation initiated by firms and present within industries. This chapter now returns to the debate regarding contemporary linkage change in peripheral regions in order to qualify the features of flexible production as they might apply to manufacturing industry in older industrial regions.

### 2.6 FLEXIBLE PRODUCTION AND THE 'BRANCH PLANT ECONOMY': A RE-APPRAISAL

The section provided a review of theories of internalisation and externalisation in order that the firm could be situated within wider economic structures. This section takes up some of the points raised in that review to further explore linkage change within peripheral region economies under a new regime of accumulation. Several doubts concerning both the extent and causes and nature of linkage change in peripheral regions were raised in section (2.4). In the following section, therefore, a re-interpretation of the likely extent and causes and nature of linkage change in peripheral regions is offered.

### 2.6.1 The extent of linkage change in peripheral regions

The literature reviewed in section 2.4 provided some considerable support for the idea that the reorganisation of production by multilocal and multinational companies has led to improved prospects for the development of more localised backward linkages in peripheral regions. Indeed, such a line of argument appears to form the basis of claims of the widespread re-emergence of regional economies (Sabel, 1989).

However, as Scott (1986) observes,

we may ask why these branch plants with their routinized labor processes and standardised outputs do not become vertically disintegrated as well as spatially dispersed. In point of fact, some vertical disintegration does occur, as, for example, in the case of subcontract electronics assembly services in peripheral areas. But there are also significant impediments that limit the amount of vertical disintegration in such cases. (Scott, 1986: 226).

It is specifically argued, here, that an understanding of the likely extent of processes of externalisation of manufacturing activities and of consequent changes in aggregate geographical patterns of backward linkages of peripheral region branch and subsidiary establishments must take account of the inertia inherent in existing corporate structures and strategies. It is these corporate structures and strategies which are likely to constrain the prospects for the proliferation of industrial linkages in peripheral regions.

To be more specific, it is argued that the various motives to internalisation of productive activities, the extent to which peripheral region branches and subsidiaries fit into their respective corporate-wide managerial and technical divisions of labour and the long term impoverishment of the local industrial structure, that constrain the extent of proliferation of localised backward linkages in peripheral regions.

At what types of establishments will the prospects for vertical disintegration be greater or lesser? The greater the corporate division of labour the less the potential for vertical disintegration at individual

establishments. The potential for vertical disintegration is greatest in independent companies where the division of labour is complete, will be somewhat less at establishments of multilocal companies organised on, in Massey's terms, a 'cloning' basis, and less still at those establishments of companies organised on something approximating to a 'part-process' basis. In the latter types of company, of course, vertical disintegration at individual sites is constrained by inter-plant interdependencies and, in particular, intra-corporate trading of materials and components.

Irrespective of whether there are any interdependencies in the form of material linkages between various company sites, branch and subsidiary establishments will be part of a managerial division of labour and hence be subject to some degree of external control. The likely extent to which individual company sites will externalise production and do so within the local (regional) economy is likely to have a direct or indirect relation to the degree of decision-making autonomy evident at those individual sites.

On the other hand, the existence of material interdependencies in the form of intra-corporate trade in materials and components is likely to present a significant impediment to the externalisation of activities at individual company sites. That is

branch plants commonly function within a national or global assembly line, and this imposes on them the need to conform narrowly to highly synchronized firm-wide production schedules. .... vertical disintegration is [also] hampered wherever these plants embody firm specific human and physical capital. In spite of their streamlined labour processes, they often do embody such capital as a result of the uniqueness of the tasks they perform within the firm-wide system of production. (Scott, 1986: 226).

An appreciation of corporate structures and strategies is, then, important to an understanding of the likely extent of processes of externalisation and any consequent localisation of backward linkages of manufacturing establishments in peripheral regions.

## 2.6.2 The causes and nature of linkage change in peripheral regions

The twin causes of contemporary restructuring within accounts of a transition to a new regime of capital accumulation are those of technological change and changes in market structure deriving from fragmenting markets for final demand. Developments in technology and changes in market demand are seen to complement one another. Thus, according to this thesis,

Ahead lies the factory of the future. Many of its components will come from external suppliers. It will use interchangeable teams of skilled workers and flexible computer-controlled machinery to produce smaller batches of customised products for shifting international markets. (Leadbeater, 1989).

The indeterminacy of explanations of contemporary restructuring based upon the twin causes of technological change and changed market demand has been noted elsewhere (Williams et al, 1987). The following sections offer a reinterpretation of contemporary processes of vertical disintegration which stress the role of corporate strategy in inducing technological change and changed market demand.

### (i) Technology and linkage change

Accounts of industrial organisation under a new regime of capital accumulation are based on an understanding of the potentialities of new technologies. In stressing the potentialities of process technologies authors are removing technologies from the social context in which they are applied. Organisational and spatial implications are extrapolated from an understanding of the abstract properties of particular technologies without regard for how such technologies are actually deployed. This is most clearly seen in ideas concerning the role of so-called 'flexible' process technologies (reprogrammable machine tools and robotic assembly equipment) in engendering



organisational change. Such process technology is argued to obviate the need for economies of scale. Correspondingly, their adoption in manufacturing is argued to lead to a resynthesis of the division of labour within companies and the potential for increased outsourcing at individual establishments.

However, several authors have by now questioned this interpretation of the role of process technology in engendering vertical disintegration and the proliferation of linkages (Gertler, 1988; Sayer, 1990; Solo, 1987; Williams et al, 1987). Each of these authors has observed that such new process technology is, in practice, rather less flexible than in theory. Thus, for example, Solo (1988: 835) notes that such 'flexible' process technologies 'operate under the same constraints, and have the same need for futures certainty, as investment for mass production.' whilst Williams et al argue that there are several dimensions (batch size, duration of run, rate of utilisation of workers and equipment) to volume production, only one of which is potentially undermined by such 'flexible' technologies. Indeed, successful application of flexible process technology appears, in practice, to be crucially dependent upon high rates of utilisation (see, for example, Jaikumar's, 1986 extensive study of flexible manufacturing systems in operation in the U.S. and Japan).

If such process technology is, in practice, less flexible than in the theory, then the prospects for vertical disintegration and proliferation of linkages identified within the literature reviewed above may be exaggerated. Furthermore, the rather limited application of such flexible process technology would suggest that, for the time being at least, the prospects for vertical disintegration in 'branch plant economies' are minimal.

Several authors have questioned whether current uncertainty in market demand and changes in market structure amount to market fragmentation. Williams et al, argue that product differentiation is consistent with the principles of mass production and has been wrongly interpreted as market

fragmentation. Product differentiation is frequently superficial and conceals attempts to simplify the basic products and, hence, the manufacturing process. Underlying such product differentiation lies a reduced number, and increased standardisation, of component parts. Thus, Schoenberger (1987) notes the attempts to reduce the total number, and increase the commonality of components across a range of different models of automobiles. Milne (1990) provides evidence of similar reductions in numbers of components composing electronic consumer goods. Modularisation is one notable development in product design which has led to a simplification of the manufacture/assembly process. In this way, product technology has significant implications for backward linkage structures of firms but they are unlikely to be the same as those associated with genuine market fragmentation. Rather than the proliferation of many idiosyncratic agglomerated linkages reflecting changing product mixes, the product differentiation based upon such standardisation and simplification is associated with a simplification of backward linkage structures and the search for pecuniary external economies.

Aglietta's brief discussion regarding the reorganisation of corporate structures was based upon the potentialities of enabling communications technologies. If the new organisation is one based upon the principle of information the association between the new corporate structures and communications technologies is an obvious one. However, there is, once again, a confusion between the potentialities and the practicalities of these communications technologies. It is possible to argue on a priori grounds, that communications technologies permit both the centralisation or decentralisation of production. As yet, there have been relatively few empirical studies of intra- (Bakis, 1980; Hepworth, 1989; Langdale, 1989) or inter-corporate (Emmelhainz, 1987) communications networks upon which one can begin to generalise. Although, as Hepworth (1986; 1989) has demonstrated, it is quite possible for communications technologies, once in place, to create enormous

potential for the redefinition of corporate structures and strategies, an understanding of the organisational and spatial implications of such technologies must, in the first instance, be derived from considerations of existing corporate structures and strategies which set the context for their application.

(ii) Market demand, market structure and linkage change

Schoenberger (1988) has eliminated a degree of indeterminacy regarding the origin of fragmenting market demand within regulationist accounts of contemporary processes of industrial restructuring by incorporating considerations of corporate strategy and competition. She argues that

the eventual vulnerability of the fordist regime of accumulation lay not only in the sphere of production and the capital-labour relation. The forms of competition were also deeply implicated in the growing tendency to crisis. (Schoenberger, 1988: 252).

Schoenberger, therefore, identifies the role of corporate strategy in initiating product differentiation and the rise of market fragmentation. (Schoenberger, 1987: 202). However, forms of competition and corporate strategies are still subordinated to the homogeneous logic of particular regimes of accumulation. Corporate structures and strategies are simply a reflection of the imperatives for capital accumulation under a particular regime of accumulation.

Alternatively, others argue that there is no necessary relationship between intensified international competition and market fragmentation. Sayer (1990) argues that the crisis engendered by the recent entry of new manufacturers into certain markets under conditions of intensified international competition has been mistakenly perceived as a crisis derived from market fragmentation. Luria's (1990) findings, that increases in the numbers of models of cars being produced for the U.S. market have come almost entirely from the recent entry of Japanese and other Far Eastern auto

manufacturers in to the market, provides support for this suggestion.

Several authors have questioned the assumption in much of the work detailing a spatial-functional division of labour that vertical integration and capital concentration represent some form of natural tendency within the development of capitalism (e.g. Storper, 1985; Storper and Christopherson, 1987; Piore and Sabel, 1984). Rather, vertically disintegrated forms of production persist (Brusco and Sabel, 1981) and are deemed to be the characteristic form of organisation under a new regime of capital accumulation (Sabel, 1989; Scott, 1988). However, it is quite apparent that much of this work makes the reverse assumption that vertical disintegration and capital deconcentration are associated.

Interpretations of the causes and nature of contemporary vertical disintegration take little account of differential market structure in sequentially related industries. Such variations in industry structure are vital to understanding the erosion and failed development of localised linkages throughout much of the economic landscape of Western economies including many instances of agglomeration (see also Phelps, 1992). The development of localised linkages is unlikely in the long-term, let alone the short term, where there are imperfections and considerable barriers to entry in materials and other input markets.

Furthermore, theories which define the firm on the basis of control as opposed to ownership can more adequately capture such relations of asymmetric economic power which exist between firms in particular industries. Thus, one exception to interpretations of processes of vertical disintegration is that of Leborgne and Lipietz (1988). They argue that

the present crisis (and tendencies toward more unpredictable business cycles and a shorter life-time of products) strengthens the importance of collectivising the risks on R&D, high technology assets, and fixed assets generally, between various capital areas, the vertical disintegration of large firms into networks of specialised firms may be an answer to this challenge. But this deepening of the social division of labour.... does not entail a parallel deconcentration of capitalist control and hierarchy. (Leborgne and Lipietz, 1988: 274) (emphasis

added).

Leborgne and Lipietz arrive at the conclusion that vertical disintegration of large firms amounts to 'quasi-vertical integration'. In this section it is argued that the externalisation of production by large firms (and hence the bulk of externalisation within branch plant economies) occurs in the context of imperfect competition. Whereas interpretations of vertical disintegration and the externalisation of production within contemporary industrial districts are formulated with explicit or implicit regard to conditions perfect competition, an understanding of vertical disintegration of branches and subsidiaries of multilocal firms must take account of these firms' oligopolistic or monopolistic positions with regard to their markets and some of their suppliers. In particular, an understanding of upstream and downstream market structures is crucial to analysing the nature of vertical disintegration initiated by such firms.

Following Shutt and Whittington (1987), we can discern dependent and independent forms of externalisation. Howells' (1989) discussion of new firm formation resulting from processes of externalisation by large companies might be one example of independent vertical disintegration. However, in Rainnie's (1984) account of 'combined and uneven development' in the clothing industry and in Shutt and Whittington's (1987) account of large-firm fragmentation, in Friedman's (1980) account of the U.K. car industry and in Susman and Schutz's (1983) account of monopoly-competitive firm relations, vertical disintegration takes the form of dependent externalisation. And indeed, one of the most recent reviews of literature upon contemporary processes of externalisation is inclined toward such an interpretation (Harrison, 1989).

Within the 'branch plant economy', populated by multilocal firms frequently with oligopolistic or monopolistic market shares in one or more industries, processes of externalisation and linkage change more generally will take place in the context of imperfect, dualistic or segmented (Taylor

and Thrift, 1982a,b) competition and will frequently be characterised by dependence rather than independence.

(iii) Corporate structure and strategy and linkage change

We saw earlier how precise forms of corporate organisation may restrict the potential for externalisation of production at particular manufacturing establishments. It is also the case that corporate structures and strategies will determine the type of activities likely to be externalised and hence the nature of processes of linkage change at particular establishments.

There are several powerful motives to internalisation. Manufacturing activities considered to embody proprietary knowledge or technology are unlikely to be externalised under any circumstances. Similarly, those manufacturing activities which are critical to the quality or performance of a product are among the least likely to be subject to outsourcing. Additionally, those components or activities for which there are great economies of scale relative to outside sources are also likely to remain in-house. Such activities form a 'core' of activities which are unlikely to be externalised. Furthermore, as Milne's (1990, 1991a,b) studies of the electronic consumer goods industries indicate, decreasing product lead-times and the re-integration of corporate functions at individual sites can lead to the internalisation rather than the externalisation of activities. Internalisation and externalisation represent alternative responses to changing upstream and downstream market circumstances.

Even among the set of activities subject to 'make or buy' decisions, however, corporate strategy may dictate the precise form that externalisation takes. Strategy may dictate, for instance, that similar input requirements of individual company establishments be placed with a favoured supplier. This is particularly likely to be the case when there are opportunities for

consolidating the component and materials requirements common to the production process at several manufacturing establishments with a particular supplier with which pecuniary external economies can be gained. Similarly, strategic alliances (e.g. joint ventures, joint R&D etc.) may involve or mediate inter-firm linkages at the level of input requirements.

Moreover, there is no necessary connection between the search for 'flexibility', processes of externalisation and the localisation of linkages as presumed in the various flexible production theses. One enduring lesson of literature pointing to the internationalisation of production has been that multinationals, by virtue of their geographical spread of operations, enjoy a measure of flexibility in production and sourcing. Strategies of international sourcing are thus not confined to considerations of input cost (Carter and Narasimhan, 1990; Davis et al, 1974).

## 2.7 CONCLUSION

The received wisdom regarding those regional economies taken to exemplify the term 'branch plant economy', has been that one aspect of the failure to generate self sustaining growth has been the lack of integration of manufacturing industry into the local economy. The preceding review of literature has considered the various contributions to a theoretical understanding of the impediments to, and prospects for, the proliferation of localised backward linkages in peripheral region economies. This review gives reason to believe that a measure of linkage change within older industrial regions will be in evidence as a result of contemporary industrial restructuring. However, both the extent and the causes and nature of any such linkage change within such regional economies remain in question. An empirical study of linkage change in the older industrial region setting can, therefore, contribute to an understanding of the extent and causes and nature of linkage

change in such regions.

### 2.7.1 Theoretical framework

The adoption of a selectively enhanced and qualified spatial divisions of labour approach arises out of a problematic concerning the nature of contemporary linkage change in peripheral regions identified from the existing theoretical and empirical literature. Central to this problematic are the questions of the extent and causes and nature of linkage change within peripheral regions. These questions, in turn, suggest the need for a more disaggregated view of the extent of linkage change and a need to situate an analysis of corporate organisation of production within an understanding of the broader market and technological circumstances.

There are consequently some important qualifications that are desired of any theoretical framework used to inform empirical analysis and interpret the results of that analysis with regard to the issue at hand. Firstly, any prospective theoretical framework adopted should be capable of informing and interpreting a detailed empirical analysis of the process of linkage change in a peripheral region economy. The review above identified the relationships between changing market demand and structure, changing technologies and evolving corporate structures and strategies in an understanding of linkage change in peripheral regions. A second requirement, therefore, is that any prospective theoretical framework must be capable of situating an understanding of the corporate organisation of production within the wider (market and technological) structures of which they are a part.

It is argued here that theories of 'flexible specialisation' and 'flexible accumulation' are not well suited to analysing, in any detail, processes of change in regional economies and are particularly insensitive to any continuities that exist through such a process of change (see appendix i).



It is also apparent that such accounts, although they have privileged an understanding of changing market circumstances and technologies, have virtually discounted the role of corporate structure and strategy within contemporary industrial restructuring.

On the other hand, Massey's (1984) spatial divisions of labour approach, with its 'geological metaphor' of successive rounds of investment, can provide the basis for a detailed historical account of how recent corporate restructuring has affected particular regional economies. It is hoped that such a detailed historical account of the impact of corporate restructuring upon the Northern Region of England can be facilitated by the identification of several 'components' of linkage change. Thus, an understanding of the extent to which aggregate linkage change is a reflection of wholesale rationalisation of 'Fordist' capacity, of in-situ restructuring, and of differences in the 'vintages of capital' can inform a detailed assessment of the origins of recent restructuring of the region's manufacturing industry. The contribution of the latter two of these components of aggregate linkage change within the Northern Region is explored with the use of *primary survey* data in chapter 5. The contribution of wholesale rationalisation of 'Fordist' manufacturing capacity to aggregate linkage change in the Northern Region will, as far as is possible, be examined in chapter 3.

The review of literature above reasserted the importance of an understanding of corporate structures and strategies to an appreciation of contemporary linkage change in peripheral regions. Recent work detailing the rise of flexible production systems has served to illustrate the need for an analysis of the corporate organisation of production to be situated within a wider market and technological setting. However, theoretical accounts of 'flexible accumulation' and 'flexible specialisation' have virtually ignored the unique way in which market circumstances and technological change come to bear upon, and have an expression through corporate structures and strategies.

The spatial divisions of labour approach contains the basis for situating the corporate organisation of production in a wider context. In an empirical setting, an appreciation of the 'place in economic structure' of particular companies can be enhanced with proper consideration for upstream and downstream market conditions. In theoretical terms, the corporate organisation of production, and corporate strategy in particular, has a place in economic structure which can be understood within the wider competitive context of the value chain or filiere (e.g. Porter, 1985).

A modified spatial divisions of labour approach is the most suitable vehicle for informing and interpreting the empirical research within this thesis. The conceptual separation between the contribution of different 'vintages of capital' or rounds of investment and in-situ restructuring and their respective contributions to linkage change within the peripheral region setting, fits comfortably with the 'geological metaphor' of regional industrial change contained within the spatial division of labour approach. Additionally, the spatial division of labour approach, unlike the 'flexible accumulation' or 'flexible specialisation' theses, is able to inform and interpret an empirical analysis of corporate structure and strategy, market circumstances and technological change - each of which was considered indispensable to an understanding of contemporary organisational and linkage change.

#### 2.7.2 Issues for empirical research

The extent of linkage change within the branch plant economy is likely to be less than that suggested in the literature on flexible production systems. Nevertheless, an empirical study can serve to clarify the origin of aggregate linkage changes in such regional economies. It is possible to identify components of aggregate linkage change within the regional setting

from the literature review above. In particular, an empirical study can provide evidence as to what extent linkage change is a reflection in-situ restructuring or of differences between 'vintages' of capital.

We can therefore, state several hypotheses regarding the extent of processes of externalisation and localisation of linkages in 'branch plant economies'.

**There is significant in-situ externalisation of manufacturing activities by independent firms, branches and subsidiaries in peripheral region economies.**

**There is significant localisation of backward linkages attending the in-situ externalisation of production within peripheral region economies.**

**New greenfield inward investments to peripheral region economies externalise more of their manufacturing activities than previous greenfield inward investments.**

**New greenfield inward investments to peripheral region economies have significantly more localised backward linkages than previous greenfield inward investments.**

The causes and nature of linkage change in peripheral regions were argued in the review to be different from those pertaining to the formation of agglomerations of industries. Again, therefore, an empirical study can serve to clarify the causes and nature of linkage change in a peripheral region setting. Such an empirical investigation would need to trace the influence of changes in market demand and technology upon the form of linkage change in peripheral regions. An empirical study ought, additionally, to examine the impact of corporate structures and strategies upon the causes and nature of linkage change.

No detailed hypotheses regarding the causes and nature of linkage change in peripheral region economies have been developed. However, a reinterpretation of the causes and nature of linkage change in peripheral

regions was offered in section 2.5 above and can be more fully developed in chapter 6.

### CHAPTER 3

#### THE NORTHERN REGION: FROM REGIONAL ECONOMY TO 'BRANCH PLANT ECONOMY'

##### 3.1 INTRODUCTION

Each of the various deficiencies of branch plant led regional development have been manifest, to an extent, within the Northern Region. Manufacturing investments attracted to the region under regional Policy have displayed rather limited decision-making autonomy (Allen et al, 1957) whilst formerly indigenous enterprise has lost non-manufacturing functions (e.g. R&D and marketing) and a degree of decision-making autonomy in the wake of acquisition (Smith, 1981). Northern Region branch plants have been found to be only weakly integrated into the regional economy through localised backward linkages (N.R.S.T., 1977a; Morley, 1974, 1976; Marshall, 1979). The record of the region's manufacturing industry in terms of product and process innovation has also been found to be poor in comparison to other regional economies (Oakey, Thwaites and Nash, 1982). These findings reveal much about the type of production activities and the organisation of production within much of the region's manufacturing industry and are reinforced by the findings regarding the poor quality of jobs attracted to the region under Regional Policy assistance (Allen et al, 1957).

Correspondingly, growth of indigenous manufacturing industry has been stunted (N.R.S.T., 1977b; Thwaites, 1977), with the North experiencing low rates of firm formation relative to other regions (Daly, 1990; Storey, 1982).

The limited externalities or spin-off effects of the dominant external sector of manufacturing industry in the region have continued to constrain the technological and market opportunities for indigenous industry (Johnson and Cathcart, 1979). Despite considerable progress towards diversification, Northern Region manufacturing industry remains extremely fragile. The region has had one of the worst records of manufacturing employment growth in the post war period (Fothergill and Gudgin, 1982) and as such provides an example of the unstable nature of employment associated with branch plant led regional development.

The material presented in this chapter therefore provides a concrete example of the branch plant syndrome. It provides an empirical counterpoint to the abstract theoretical understanding of the problems faced by branch plant economies reviewed in chapter 2 above. As such, the chapter is also concerned with stressing the uniqueness of the region's industrial development and hence with qualifying the notion of the 'branch plant economy' as it applies to the Northern Region. The chapter demonstrates that stereotypical notions of branch plant and 'Fordist' manufacturing investments are strictly applicable to only a fraction of the region's manufacturing industry. Thus, the chapter should serve to reinforce the point made in chapter 2 regarding the reductive nature of regional stereotypes embodied in much of the theoretical work upon contemporary peripheral region development.

The following sections illustrate that the nature of linkage change within Northern Region manufacturing industry will to an extent be specific to the region. The region's particular industrial structure and development ensure that the general forces of market and technological change as these are reflected through evolving corporate structure and strategy will produce rather unique outcomes in terms of both the extent and causes and nature as well as the geographical patterns of linkage change within the region.

The chapter first briefly outlines the rise of external control and the

branch plant syndrome within Northern Region manufacturing industry. It then concentrates on the evidence regarding the increasing lack of localised linkages of the region's industry through much of the post war period. Recent findings on organisational and linkage change in the Region during the 1980's are examined for evidence of an increasing local embeddedness of the region's manufacturing industry. The review of such findings provides an important benchmark for the results presented in chapters 5 and 6.

### 3.2 FROM REGIONAL ECONOMY TO 'BRANCH PLANT ECONOMY'

The rapid economic and population growth in the Northern Region during the 1800's was based upon the exploitation and export of coal to London and elsewhere in the U.K. and abroad (Bullock, 1974) as well as the specialisation in iron and steel production and heavy engineering (Evans, 1989; McCord, 1979). These three traditional industries have historically been closely related in terms of purchasing from and selling to one another - with local coal being used in iron and steel production and with a concentration upon the more basic iron and steel products needed in shipbuilding and heavy engineering. In the latter half of the nineteenth century these inter-industry linkages were made explicit through common ownership (Carney et al, 1976; McCord, 1979). However, these three traditional industries in the region have since been in long-term relative and absolute decline. The decline of the traditional industries has been felt widely as a result of the gradual diminution of the considerable indirect employment associated with these industries. Conversely, whilst the cyclical problems of dependence upon a limited number of industries has been ameliorated by industrial diversification, newer industries have not created the considerable multiplier effects associated with the traditional industries.

### 3.2.1 1900-1945: structural decline and the need for diversification

Many of Britain's traditional industries had experienced relative decline during the latter decades of the nineteenth century. The opening of the new century saw an intensification in international competition and eventually the onset of absolute decline in these traditional industries. The crisis of the late 1920's affected the North East severely. The degree of specialisation in just three major industries in the region meant that the world economic depression precipitated massive unemployment in each of the region's major urban areas.

At this time, shipbuilding was around four times as important, in terms of employment, in the North East than nationally. There were dramatic drops in employment and output of North East shipyards the severity of which was also linked to specialisation in ships of relatively standard specifications. Shipyards at Barrow-in-Furness however survived this period well, managing to invest and improve techniques in the more skilled shipbuilding work in which they specialised (Parkinson, 1979). The slump in shipbuilding carried over into the steel plate making operations in the North East. Again, the region's specialisation in rather low value added iron and steel products, rather than the higher value added products that would have been in keeping with the economically poor locations of the region's iron and steel operations, contributed to the severity of unemployment in this industry (Warren, 1979, 1990).

On the other hand, the early part of the 20th century was a period of organic growth in the region's chemicals and electrical engineering industries (McCord, 1979). For much of the 18th and 19th centuries Tyneside had been pre-eminent in the production of basic chemicals but by the 20th century production and organic growth in the industry was centred on Teesside (Elliot, 1962; Warren, 1980).



Despite the recognition of the need to diversify several of the country's regional economies in the wake of the crisis of the late 1920's and despite the institution of policies prefiguring post-war regional policy, little diversification of the Northern Region economy did in fact take place before the war. During the inter-war years the Northern Region's share of foreign direct investment to the U.K. was tiny (see Table 3.1) and was associated primarily with the establishment of factories by refugees from Nazi Germany. The Team Valley Trading Estate, through which the Government's pre-war 'regional policy' of diversification was focused, produced only a marginal effect in terms of altering the region's industrial structure during this time. Thus

The importance of the Team Valley Trading Estate was neither in the actual employment provided by the tenant firms nor in the contribution they made to structural change in the short run. What mattered was that a procedural mechanism had been demonstrated for creating employment by public investment in factories. (Loebl, 1988: 182).

Many of the activities based on the trading estate at this time were concerned with distribution and warehousing, with progressively smaller shares in food manufacture and general engineering. Out of eight fast growing industries in the U.K. identified by the Barlow Commission only two (motor vehicles, cycles and aircraft and electrical cable, apparatus and lamps) were of any significance upon the trading estate (Loebl, 1988: 180-182).

### 3.2.2 1945-1960: diversification and the rise of the branch plant syndrome

The period immediately after the war was one of a rather limited diversification of the industrial structure of the Northern Region. The war had the effect of bolstering, for a time, the region's traditional manufacturing industries. Thus,

During the war a certain amount of much needed modernisation was carried out in some of the region's iron and steel plants and

TABLE 3.1

LOCATION OF INITIAL FOREIGN INVESTMENT IN BRITAIN  
(% SHARE OF EMPLOYMENT).

	1918-44	1945-51	1952-59	1960-65	1966-71	1972-75
North	0.1	2.7	5.4	8.2	18.5	5.8
South East	65.2	4.7	27.2	16.3	21.6	17.5
E. Anglia	2.0	---	2.5	1.7	1.3	---
South West	---	n.d.	3.7	7.3	3.5	---
W. Midlands	18.4	---	n.d.	n.d.	n.d.	---
E. Midlands	0.5	n.d.	9.9	0.4	1.3	1.9
Yorks & Humb.	3.8	---	n.d.	4.3	n.d.	1.0
North West	8.2	8.3	10.9	6.0	8.4	4.9
Wales	1.2	14.3	5.2	1.7	n.d.	9.7
Scotland	0.7	65.8	25.9	27.0	23.8	50.5
N. Ireland	---	2.5	4.0	27.0	n.d.	5.8

Source: Law (1980: 175); Smith (1980: 14).

shipyards, and to that extent the competitive position of the North East had been improved. But partly because of the methods adopted in the placing of government contracts, many of the smaller firms, particularly in the engineering and metal trades, found themselves at the end of the war in a relatively worse position than at the beginning, with older plant, little accumulation of capital with which to re-equip themselves, and often no special lines of manufacture on which to start again. (Allen et al, 1957: 6).

As a result of such new investment and the growth generated by post-war reconstruction, employment in the region's iron and steel and shipbuilding industries grew until the end of the 1950's after which decline once again set in (N.R.S.T., 1975).

The impact of inward investment upon the region's industrial structure was extremely limited in the period immediately after the war due to the shortage of new factory space. The conversion of Royal Ordnance factories provided much of what little factory space was available and was primarily suitable for light engineering purposes. Foreign direct investment to the region continued to be of little overall importance although was steadily increasing upon pre-war levels. Inward investment occurred mainly in the chemicals industry, thus compounding the the pre-war organic growth in this, by now, important industry in the region. Perhaps the main contribution to diversification of the region's industrial structure during this period was in terms of the inward investment by British companies in textiles production (see Allen et al, 1957).

As early as 1944, concern had been raised regarding the wisdom of an unplanned policy to diversify the region's economy. Colonel Methven, general manager of the Team Valley Trading Estate Ltd. at that time questioned whether sustained economic growth would be generated as a result of the attraction of a 'heterogeneous mass of sundry and unrelated industries' (quoted in Loeb1, 1988: 282, emphasis added). The many problems associated with attracting to the region sets of manufacturing activities unrelated to oneanother had become apparent in the lack of local embeddedness of newer industry and other problems with branch plant led regional development found in the first

appraisal of the impact of Regional Policy upon the North East (Allen et al, 1957). Similar sentiments were therefore apparent in Allen et al's (1957) defence of the role of external economies and inter-industry linkages in generating economic growth against the evidence regarding the progress of diversification of the industrial structure of the North East.

### 3.2.3 1960s-1970s: the partial incorporation of 'Fordist' elements into the regional economy

The 1960's was a period of very gradual decline in the traditional industries. With shipbuilding experiencing a decline in employment of just 1% per annum during the 1960's (N.R.S.T., 1975: 12-18). However, with the results of the immediate post war inward investment to the region becoming apparent (e.g. Allen et al, 1957) and the increasingly rapid increases in industrial movement to the region and acquisition of the region's manufacturing industry during the 1960's, there was the recognition that the region should not become a location for 'branch factories engaged in assembly work. It [the region] must have its proper share of research and development and of administration.' (Northern Economic Planning Council, 1966, quoted in Hudson, 1989:). Despite this recognition of the many failings of branch plant led economic development and, as Hudson suggests, the recognition of the region's role within an emerging spatial division of labour, the 1960's and 1970's were a period in which the evidence of the region's transformation into a 'branch plant economy' became incontrovertible. This was a period in which external control of the region's manufacturing industry increased most rapidly and in which many of the seeds of later crisis were sewn.

During the 1960's there was the continued diversification of the region's economy initiated in the immediate post-war period. The food, drink and tobacco and footwear and clothing industries grew during the 1960's with

several large, classic, branches in both industries being set up. The chemicals, metal manufacture, brick and pottery and shipbuilding industries all experienced a relative decline during this period. Toward the latter half of the 1960's and into the early 1970's there was a further diversification with the growth of engineering (predominantly light engineering and vehicle and vehicle component manufacture) and paper, printing and publishing and electronics industries (electric appliances and other electronic goods and telegraph and telephone apparatus) (N.R.S.T., 1976: 25-26). Various subsectors of electronics grew most rapidly in employment terms in the region as a result of inward investment with

the outstanding example of relative growth being that of 'telegraph and telephone apparatus'. From a comparatively insignificant national position in 1961 this industry almost trebled in size in the region, thus establishing the area as one of the four main producing areas in the country. (Frost, 1976: 156).

These new industries were, however, far less integrated into the regional economy, through localised backward linkages, than the declining traditional industries. Thus,

although ex-regional moves brought jobs that were vitally necessary in the period and remain so today, they have so far contributed rather less in other ways to the development of the long-term industrial strength of the Region. (N.R.S.T., 1976: 59).

Along with the establishment of several large branches in the food and clothing and footwear industries the factories in the electronics sectors epitomised the branch plant syndrome within the region. These investments represent perhaps the closest that any part of the region's manufacturing industry has come to conforming to any archetypal 'Fordist' organisation of production. For these industries

what the north-east in this period provided was an environment that was particularly attractive to capitals in those branches which, because of a growing tendency to centralisation and concentration, allied to technical progress and changes in labour processes associated with Taylorist and Fordist techniques of scientific management...., could literally profit from it by locating in branch plants there those parts of their overall production processes which required de-skilled labour

power. Thus the north-east became, for a time, simply one link in chains of corporate production and restructuring that were, and are, increasingly globally rather than nationally based. (Hudson, 1986: 196).

The degree of external control of the region's manufacturing industry increased dramatically in this period. Manufacturing employment in establishments headquartered outside the region grew from 54.1% to 79.3% from 1963 to 1973 (Smith, 1979). Smith also found that acquisition was as important a component of change as 'greenfield' investment during this period. During and since this time acquisition has continued to play an important role in increasing the integration of the region's manufacturing industry into inter-regional and international divisions of labour.

#### 3.2.4 1980's: crisis and beyond

During the crisis, beginning in earnest in 1979, 'both the historic landmarks of the region's technological evolution and the growth sectors of post-war planning fell prey to the reduction in employment.' (Townsend, 1983: 103).

It is an indication of the once dominant position and the very gradual decline of the traditional industries in the region during the the post-war period that they accounted for many of the largest employment losses during the economic crisis of the late 1970's and early 1980's.

Between 1977, the time of nationalisation of shipbuilding and repair activities in the U.K., and the early 1980's, the employment in the region's shipbuilding industry was halved (Stone, 1984). Several yards experienced large in-situ contractions in employment whilst others were closed (see also Hudson, 1986 and Peck and Townsend, 1985). The rationalisation of the U.K. shipbuilding industry has continued to such an extent that shipbuilding in the region is now confined to the two naval vessel producing yards; Swann Hunter's

yard on the Tyne and Vickers Shipbuilding and Engineering at Barrow, shipbuilding on the Wear having been eliminated with the closure of North East Shipbuilders Ltd. in 1988. Expansion plans for the nationalised U.K. Iron and Steel industry, which were drawn up during the late 1960's and which included substantial investment programs, were eventually abandoned in the face of the world economic crisis. As a result there was the closure of Consett Iron and Steel works and Jarrow Mill as well as large contractions in employment at B.S.C. sites on Teesside and at Workington. Between 1978 and 1981 B.S.C. had shed or had announced the shedding of over 20,000 jobs in the Northern Region (Hudson, 1986). Rationalisation of the coal industry which had proceeded reasonably steadily during much of the post-war period was not to proceed until the defeat of the miners in the 1984/85 strike. These massive and irrevocable reductions in employment in the region's traditional industries in the late 1970's and early 1980's have been dealt with at length elsewhere (e.g. Hudson, 1989).

The crisis also affected a much wider set of industries than merely the traditional industries. Detailed evidence available for the period 1979-1985 suggests that there was large scale rationalisation of the region's long-established mechanical engineering industries. Various subsectors of mechanical engineering contracted in the region at a faster rate than nationally. Most notable, was the rationalisation which occurred in various subsectors of the region's electronics industry. The radio and electronic capital goods industry, which had been attracted to the region as recently as the early 1970's, experienced marked reductions in employment as a result, in most cases, of the complete closure of factories. The electronics industry was among many others experiencing a decline in employment in the region against a national growth in employment (R.I.R.U., 1988).

The period 1979-85 witnessed a bifurcation, in terms of absolute and relative employment growth in the region, into either capital intensive (such

as certain chemicals and iron and steel) basic processing (such as food processing) industries or labour intensive, low technology industry (such as clothing and footwear and furniture) (R.I.R.U., 1988).

Inward investment to the Northern Region during the 1980's has not greatly altered the industrial structure of the region. With the exception of the large Nissan investment and its associated suppliers which marked a dramatic rise in employment in the vehicle and vehicle component manufacture industry in the region, and some growth in the rubber and plastics industries as a result of inward investment primarily on the part of U.K. companies, recent inward investment has not changed the industrial structure of the region (see Peck and Stone, 1991).

The region now exhibits a considerable reliance upon sources external to the region for its future economic growth. Table 3.2 shows that the largest number and proportion of respondents to a C.B.I. (Northern Region) survey into 'Prospects for business in the North' felt that the region was reliant upon sources external to the region for future economic growth.

Furthermore, the region is now quite heavily reliant upon foreign direct investment both as a source of new employment and as an agent of change in its industrial structure. Table 3.4 shows that during the 1960's the Northern Region was not a particularly important destination for foreign direct investment in the U.K.. But its importance has gradually grown until in recent years the location quotient of foreign owned manufacturing employment in the region has exceeded unity and to the point that the region now takes the largest regional share of jobs resulting from foreign manufacturing direct investment. The dependence upon foreign direct investment as a source of employment growth within the region is highlighted in table 3.3. The large majority of respondents to the survey perceive that most future economic growth in the region will result from investment by foreign companies.

Manufacturing employment change in the foreign owned sector in the



TABLE 3.2

PERCEPTIONS REGARDING THE PROPORTION OF TOTAL INVESTMENT IN THE NORTH  
ARISING FROM OUTSIDE THE REGION.

	More	Less	Don't Know
Manufacturing	88 (69.3)	11 (8.7)	28 (22.0)
Services	49 (72.1)	3 (4.4)	16 (23.5)
Total	137 (70.3)	14 (7.2)	44 (22.6)

TABLE 3.3

EXPECTATIONS REGARDING TYPES OF COMPANIES MOST LIKELY TO  
GROW WITHIN THE NORTHERN REGION ECONOMY.

	Foreign owned multinationals	British owned multinationals	Large British nationals	Small firms
Manufacturing	95	3	4	57
Services	47	6	4	28
Total	142	9	8	85

Source: Phelps (1989)

TABLE 3.4

NORTHERN REGION SHARE OF FOREIGN MANUFACTURING EMPLOYMENT.

	Foreign owned share of of tot. N.R. emp.	Location quotient of foreign owned emp. in N.R.
1963	2.1	0.31
1971	5.5	0.59
1973	7.3	0.64
1975	9.2	0.74
1977	11.6	0.83
1979	11.8	0.84
1981	12.6	0.85
1983	12.8	0.88
1984	13.8	0.97
1985	13.1	0.96
1986	13.4	1.06

Source: Smith (1979); Business Monitor PA 1002, various years.

period 1978-1989, including the substantially increased presence of Far East manufacturers, has, with the exception of the Nissan investment, left the region's industrial structure largely unaltered. Japanese manufacturers have risen to dominate industries once dominated by U.S. or other Western manufacturers and hence within the Northern Region Japanese foreign direct investment has been largely within the same industries as have experienced rationalisation by U.S. companies (Smith and Stone, 1989).

### 3.3 BRANCH PLANTS AND LINKAGES: THE NORTHERN REGION A

#### CASE IN POINT

As the Northern Region economy has evolved from a reasonably self contained regional economy based upon coal, steel and shipbuilding to a prime example of a 'branch plant economy' so the importance of indirect growth effects within the region have diminished. Thus, whilst diversification has removed the prospect of reliance upon a few industries in structural decline, it has also been associated with the diminution of indirect growth effects in the region.

Indirect growth effects, as captured in the multiplier concept, can be broken down into several distinct components<sup>1</sup>. Export base theory then provides an indication of the origin of the initial stimulus to such indirect growth, in that

economic growth for any area can be advanced only in two ways, by increasing the rate of the area's exports and/or increasing the level of import substitution....

It is in the context of import substitution that inter-industry linkages are important, for increasing the flows of goods and services between firms in the North is one means of raising the degree of import

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<sup>1</sup>There are the indirect effects - where an expansion in output (from, for example, in-situ expansion or the arrival of new investment) leads to increased purchases of material and service inputs from upstream suppliers - and there are the induced effects - where the increases in incomes (salaries and wages) following from the initial expansion in output then lead to increased expenditure on goods and services.

substitution. (N.R.S.T., 1977a: 1).

In this way, the regional problem has been construed as a balance of payments problem (Thirwall, 1980). In the case of the Northern Region there is evidence that

regional multipliers are on the whole low in the region, mainly as a consequence of limited inter-industry linkages.

and that

the greatest part of the multiplier effect in the Region is due to the induced effect. (N.R.S.T., 1977a: 3).

That is, the main form which indirect growth effects take in the Northern Region is that of the increased expenditures upon goods and services in the Region as a result of increased wages and salaries. This highlights the essential weakness of the region's economy in that the major spin-off effects of the region's industry are increasingly in terms of the wages and salaries they generate directly and indirectly. Since these constitute only a small proportion of the total indirect growth effects potentially available

The value added within the region, and the corresponding income available is only a small proportion of the revenue received from the output. (Morley, 1976: 114).

The low levels of local sourcing and hence the low levels of inter-industry linkage within the region appear to greatly constrain the growth prospects of the Northern Region economy.

The decline of traditional industries and the rise of newer industries in the Region have both contributed to the diminution of indirect growth effects in the region. On the one hand considerable local multiplier effects have been diminished since the declining traditional industries had by far the highest local multiplier effects, supporting considerable employment in dependent trades and industries in the region. On the other hand, the local multiplier effects of newer industries, due to the lack of localised linkages, have been very much lower (see Table 3.5).

TABLE 3.5

EXAMPLES OF LOCAL MULTIPLIER EFFECTS FOR INDUSTRIES IN  
THE NORTHERN REGION 1963.

Coal mining	1.46
Shipbuilding	1.02
Electrical machinery (mainly heavy)	0.86
Industrial plant and steel work	0.85
Construction	0.84
Furniture	0.76
Clothing	0.67
Pharmaceuticals and toilet preparations	0.66
Food, other than confectionery	0.60
Other chemicals and allied industries	0.58
Synthetic resins and plastic materials	0.55
Production of man-made fibres	0.53
Mineral oil refining	0.21

Source: Deacon (1974, reproduced in Morley, 1976).

### 3.3.1 The contribution of traditional industries

With the severe contractions in the traditional industries during the 1970's and 1980's the gradual loss of indirect growth in the region became visibly manifest with the large scale reductions in workforces in shipbuilding and the closure of steelworks. The continued decline in the shipbuilding industry during the 1970's was sufficiently severe, in terms of indirect consequences, for the industry to be considered an example of the growth pole concept operating in reverse (Rabey, 1980).

Similarly, the negative multiplier effects of the rationalisation and closure of some of the region's steel industry have been apparent. The rationalisation of steelworks at Hartlepool during the 1970's was estimated to have associated negative output and employment multiplier effects of 1.133 and 1.300 respectively (B.S.C., 1974; Smith, 1977a, cited in Slowe, 1981: 59). At the end of the 1960's two impact studies estimated that the total employment lost in the region as a result of the closure of Consett Iron & Steel works would be 12,520 (Atkinson, 1968, cited in Warren, 1990) and over 14,000 (Roberts, 1970, cited in Warren, 1990). In the event, Consett had already experienced large reductions in employment before its closure in 1980 although the negative local multiplier effects were considerable and continue to be apparent at the 'Jarrow of the eighties'.

The coal industry has historically had considerable local multiplier effects, indeed the highest of the traditional industries. The accelerated rationalisation of the region's and the U.K.'s coal mining industry has had quite substantial negative effects in terms of indirect employment in the region's power plant, mining machinery and switchgear industries (Grundy-Warr, 1990).

### 3.3.2 The contribution of newer industries

The newer industries, such as clothing and footwear, textiles, light engineering and electronics, which have become established in the post-war period have had very low local multiplier effects compared to the declining traditional industries.

Studies of the impact of external control of the region's manufacturing industry and industrial movement to the region provide rather contradictory evidence as regards patterns of sourcing and of linkage adjustment. All point to the problems that the region faces as a result of low levels of local sourcing however various studies provide differing results as regards the severity of the problem.

A major government survey of the opening and transfer of manufacturing operations during the period 1964-1967 (D.T.I., 1973) provides some evidence regarding the sourcing patterns of such factories according to region of establishment. The I.L.A.G. survey, as it is known, found that of those factories moving to various regions in the U.K., those moving to the Northern Region were more likely (37%) to change the source of their material inputs from factories moving to any other region, including Scotland (31%). Furthermore, a higher proportion of moves to the Northern Region than moves to any other of the U.K. regions indicated that they intended to increase their use of local suppliers. However, other studies (Morley, 1974; Morley and Townroe; Moseley and Townroe, 1974) based upon a more limited study of industrial movement to E. Anglia and the Northern Region, have found that there has been little in the way of backward linkage adjustments following movement to the Northern Region. Only those firms engaged in relatively non-routine (batch) production had experienced an increase in the use of local suppliers (Morley, 1974: 24). '.... that local linkages are unimportant to, and not developed by, firms which have moved' was confirmed by Slowe's

(1981:97) study of firms occupying advance factories in several regions - including the Northern Region - in Britain. The same study found the estimated local multiplier effects of firms occupying advance factories in the Northern Region to be 'relatively small' (Slowe, 1981: 222).

Studies by Morley (1976) and by the Northern Region Strategy team (N.R.S.T., 1977a) found an inverse relationship between age of manufacturing establishment and the degree of localised backward linkage. This is in contrast to several other studies of manufacturing industry in other regions which find a positive relationship between age of an investment and degree of local sourcing (McAleese and McDonald, 1978). The latter studies argue that the inverse relationship reflects the fact that a process of linkage 'adjustment' takes time to complete before new 'greenfield' investments can achieve fully localised manufacture. The findings regarding age of investment and degree of local sourcing among Northern Region manufacturing establishments are even more surprising in that both find that plants established during the 1960's and 1970's have more localised linkages than those established in previous decades<sup>2</sup>.

The levels of local sourcing revealed in the several linkage studies of manufacturing industry in the Northern Region over the post-war years are generally low. Those studies with survey samples representing newer industries have generally found levels of local sourcing to be low. The I.L.A.G. survey of industrial movement, for example, found that 69% of factories moving to the Northern Region sourced less than 20% of their material inputs from within 40 miles of their site as compared to 63% for all moves to all regions. Morley's (1976) study of manufacturing industry in the Northern Region confirms such low levels of local sourcing, with 45% of establishments sourcing just 5% or

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<sup>2</sup>This finding is at variance with the intuition that the 'classic' branch plants established during this period (see section 3.2.3) would be weakly integrated into the regional economy. This finding is confirmed, to an extent, in chapter 5 and serves to remind one of the symbolic rather than quantitative importance of these 'classic' branch plants.



less of their material inputs from the Region. However, the results of two other studies, whose survey samples include the traditional industries, have found rather higher levels of local sourcing. Thus, in comparison to Morley's (1976) study a survey of industrial linkages by the Northern Region Strategy Team (N.R.S.T., 1977a) found that only 13% of manufacturing establishments sourced 5% or less of their material inputs from within the region. Marshall's (1979) study also revealed relatively reasonable levels of local sourcing with independent firms, subsidiaries and branch plants sourcing on average 41.8%, 35.5% and 32.9% of their material inputs from the Northern Region respectively.

The suitability of the region's industrial structure in terms of supplying new industry with input requirements is also unclear. The I.L.A.G. survey, for example, found that a high proportion of factories moving to the Northern Region in comparison to those moving to other regions suggested that local sources of supply were cost competitive.

The importance of intra-corporate trade to branch and subsidiary establishments in the Northern Region was recognised as early as the first appraisal of the success of regional policy in the North East (Allen et al, 1957). This study included a large number of establishments within the textiles industries and these were found both to take semi-finished inputs from, and send much of their output to, other company factories. The importance of intra-corporate transfers has been repeatedly observed in subsequent studies. The I.L.A.G. study of industrial movement during the period 1963-1967 found that a higher than average proportion of those factories being set up in the Northern Region (29%) were purchasing 50% or over of their material inputs from other company sources. Whilst intra-corporate trade is not of importance to all manufacturing establishments in the region a considerable proportion (37%) of factories moving to the Northern Region in the I.L.A.G. survey were found to take 20% or more of their material

input requirements from other company factories. The evidence from that particular survey would suggest that intra-corporate purchases are of some importance to a very large minority of Northern Region manufacturing establishments. The role of intra-corporate trade in constraining the development of localised backward linkages of Northern Region manufacturing industry is only implied in these two studies. Marshall's (1979) study of linkage patterns of different types of manufacturing establishment within the region, however, made the connection explicit.

Since the region has come to be considered as a 'branch plant economy' several studies in the post-war period have documented the various problems of branch plant led economic development in the region. Considerable attention has been paid to the lack of indirect growth effects resulting from inward investment to the region. Levels of local sourcing of 'branch plants' has been found to be very low. On the one hand, studies have raised concern regarding the ability of the regional economy to supply the input requirements of newer industries. This in turn is seen to be a function of the unplanned attraction of investments in various unrelated industries and the dominance of heavy engineering and other traditional craft skills in the region. In several studies, however, the lack of local sourcing by new industry has been recognised as a function of the organisation of production at 'branch plants' and within their respective corporate contexts. Such are the corporate divisions of labour that Northern Region manufacturing establishments are a part of, that local sourcing is constrained by lack of managerial autonomy and intra-corporate trade.

The Northern Region provides a clear example of a branch plant economy, albeit one with its own unique historical development. It is also a branch plant economy currently undergoing considerable change. With flows of foreign direct investment picking up in the latter half of the 1980's, the Northern Region has recently taken the largest regional share of foreign direct

investment into the U.K. and has been a favoured location within the U.K. for Japanese and other Far Eastern manufacturing investments. There is also growing evidence of more widespread organisational and linkage changes being undertaken by existing manufacturers in the region. It is to an examination of the contribution of in-situ reorganisation and new inward investment to the changing character of the Northern Region manufacturing industry that this chapter now turns.

### 3.4 THE LOCALLY EMBEDDED BRANCH PLANT? RECENT LINKAGE CHANGE IN NORTHERN REGION MANUFACTURING INDUSTRY

It is important to remember that the Northern Region has a diverse economy. Few of the traditional or new industries in the region have been organised on something approximating to a 'Fordist' division of labour. The steel and chemicals industries have a long history in the region. They are both mass production industries although the nature of the production process necessitate a relatively high degree of vertical integration of operations. Shipbuilding and heavy engineering also have a long history in the region. Production in these industries as well as in the offshore fabrication industry (which has to some extent grown up in place of the shipbuilding industry) is organised upon a batch or project basis and has historically tended to have quite high local multiplier effects as a result of the degree of subcontracting of activities. In these industries, as Hudson (1989) reminds us, the changes in the organisation of production, including some outsourcing or subcontracting of work, have been based primarily upon an attempt to intensify production and cut costs in industries dominated by craft work.

On the other hand, there are series of industries which have grown up in post-war period (e.g. clothing and footwear, electronics and light engineering) which could, to stretch a point, be construed as having been

organised on something approximating to a 'Fordist' division of labour. The evidence regarding the extent and nature of processes of externalisation and linkage change in these industries does not accord with the 'flexible production' theses.

There is considerable optimism apparent in a recent study of purchasing practices of manufacturing industry in the Northern Region (Hindle, 1989; Segal, Quince, Wicksteed, 1988). This study concentrated upon purchasing practices and intentions rather than upon actual patterns of purchasing. The study apparently found that many companies

felt that changes in technologies, markets and internal management structures were clearly pointing to the increased use of local suppliers. (Segal, Quince, Wicksteed, 1988: introduction).

The survey provides evidence of the quite widespread adoption of just-in-time supplier relations among Northern Region manufacturers (31% of those companies surveyed). However, just-in-time appeared as merely one of a number of purchasing practices adopted by companies in the region and was, for instance, less widespread than the continued multiple sourcing of key components (46% of those companies surveyed).

The survey also considered the various reasons as to why companies were unable to purchase inputs locally. In the majority of cases no suppliers of the required inputs existed in the regional economy whilst large proportions of those companies surveyed also indicated that potential sources within the region were inadequate in terms of cost or quality. Only 12% of companies surveyed considered that corporate policy precluded the adoption of local sources for inputs.

The study is generally optimistic regarding the potential for processes of organisational and linkage change to be translated into increased local sourcing. However, it identifies the problems of a non-existent or inadequate supplier base which must, for the time being, prevent processes of externalisation from leading directly to increased local sourcing.

The shipbuilding industry, which has traditionally subcontracted elements of a production process which can be readily subdivided, has been all but eliminated in the region. Increased subcontracting by the industry during the 1980's was primarily an attempt to cut costs and intensify work practices in a craft dominated industry (e.g. see Pickard, 1986) in the face of intense international competition. From these initial motivations to externalisation, subcontracting has remained a feature at the two remaining shipyards in the region. The same motivations to the externalisation of activities are in evidence at British Steel's operations in the region. Much of the activities at BSC's Redcar integrated iron and Steel rolling mill has been contracted out as at other BSC sites in the U.K. (Fevre, 1982). The essentially short-term attempts to cut costs and intensify the production process have persisted to become a permanent feature of the organisation of production in the region's steel and shipbuilding industries.

Other industries of long-standing in the region have also undergone limited externalisation of production. Peck (1988,1989) provides accounts of the reorganisation of linkages in the regions heavy engineering industries organised upon a batch and project basis (e.g. electrical and power process engineering). He finds evidence of quite widespread linkage change and the adoption of 'just-in-time' supplier relations. However, these linkage changes appear to have little appreciable effect upon the degree of local sourcing. Furthermore, whilst the region's suppliers have been able to adapt to the increasing requirements in terms of quality of inputs 'the "quality factor" means that not even existing levels of local linkage can be taken for granted.' (Peck, 1988: 51).

Another industry with a considerable presence and long-standing in the region is the chemicals industry. The case study of organisational change at I.C.I.'s Teesside operations provided by Gibbs and Jenkins (1989) is generally unsupportive of the 'flexible production' theses. They document the selective

specialisation upon certain high volume chemical products where 'large scale dedicated plant [for] producing bulk commodity chemicals remains essential' (Gibbs and Jenkins, 1989: 16). Nevertheless, I.C.I. and other chemical firms have also specialised selectively in custom chemical products where plant sizes tend to be much smaller. However, these smaller plants tend, themselves, to have integrated internal organisations and not to subcontract activities.

Among the newer industries in the region, the offshore fabrication industry stands apart. It has grown to absorb a portion of the work forces previously engaged in shipbuilding. The industry is certainly the best, although perhaps the only, example of vertical disintegration. Indeed, studies of the industry have described it in such terms (Cumbers, 1987).

The textiles and clothing and footwear industries became established in the region as a result of accumulated post-war inward investment. Several large textiles factories were set up in the immediate post-war period and the large vertically integrated clothing and footwear factories established in the 1960's 1970's in order to serve mass markets have been replaced to an extent by smaller factories. The large factories up until the 1960's and 1970's can be considered as prime examples of the branch plant syndrome; taking advantage of relatively low labour costs of the region and hence not engaging in subcontracting of activities instead taking significant proportions of inputs from other company sources (see Allen et al, 1957) and serving mass markets. However, the fact that factory sizes in these regional industries has declined does not sufficient cause to infer that the organisation of production, including the types of markets served, and linkages have changed significantly.

Other evidence, though more general, of the restructuring of mass production industries in the region comes from Peck's (1989) case studies of mass producers in the region. Once again, whilst linkage change and particularly the adoption of just-in-time supplier relations are in evidence,

these 'changes in linkages.... were far removed from the expectations under the flexible accumulation thesis'. (Peck, 1989: 17).

Very few of the above mentioned studies provide hard evidence regarding the extent of externalisation of activities by long-established companies in the region. All concentrate upon linkage change more generally. In this way, they indicate that externalisation is only one aspect of processes of linkage change which are occurring for a variety of reasons though generally not because of market fragmentation or the introduction of 'flexible' technologies. What is also clear from these studies is that such processes of linkage change do not necessarily have positive implications for levels of local sourcing. Indeed, the absence of an adequate supplier base and the heightened requirements for quality of inputs appear to be restricting the prospects for localisation of backward linkages of many of the larger companies operating in the region.

That new inward investment may be contributing directly to a change in the nature of the 'branch plant economy' was noted in chapter 3 and explored in chapter 5. There is general support from a number of other studies for the conclusions reached in chapter 5 regarding the minimal impact of new greenfield investment upon patterns of linkages in the regional economy.

Three recent studies of inward investment to the region have been made. There are the studies of foreign direct investment in the Northern Region during the 1980's (Smith and Stone, 1989; Smith and Stone, 1991) and within County Cleveland (Stone, 1990). However, most useful to an appreciation of the organisational characteristics of new inward investment to the region is a recent study of the labour market impact of new inward investment to the Northern Region (Peck and Stone, 1990; 1991). Peck and Stone examine the differences between new inward investment and longer established manufacturing establishments in the region in terms of their respective manufacturing systems. The differences between old and new investment in the region is

generally small. For instance, 44% of new inward investors compared to 38% of existing firms had adopted just-in-time manufacturing systems. Overall, the authors conclude that 'inward investors have, as a group, been only marginally more innovative in their manufacturing systems than the longer established firms.' (Peck and Stone, 1991: 18).

Other evidence regarding the characteristics of new inward investments is rather anecdotal. Whilst several studies of the Nissan investment in the North East suggest that the investment cannot be considered as a typical branch plant or to have typical industrial relations and work practices in particular (Tomaney, 1991), the weight of evidence also suggests that, as yet, Nissan's operations are only weakly integrated into the local economy (Peck, 1988, 1990; Tomaney, 1991) and the wider national economy as a result of the poorer quality of U.K. suppliers relative to other Japanese and European based suppliers. There is a relatively small number (18 out of 177 U.K. suppliers) of suppliers to Nissan that are based in the region and of these it is the invited Japanese suppliers which provide the higher value parts. Komatsu, which produces excavators etc., perhaps because of the fact that its input requirements are more in keeping with the heavy engineering skills in the region, has more localised linkages with indigenous companies being quite well represented among its list of suppliers (Peck, 1988).

That the region's industrial structure often provides only an inadequate source of supply for many components and parts required by new inward investments, primarily in the electronics and light engineering sectors, is highlighted by the fact that a survey of 275 U.K. based Japanese companies by The Economic Development Briefing found that the North 'topped the list where more suppliers were needed.' (Northern Echo, 13-3-90).

The limited evidence provided by the studies of new inward investment to the region suggest that such investments are, in terms of the organisation of production and probably in terms of linkage patterns, not greatly different



from long-established investments in the region. Part of this lack of difference between old and new investment is undoubtedly due to the degree of in-situ change that is occurring among older established investments which have adopted 'just-in-time' supplier relations etc. However, such in-situ changes are not particularly significant and hence the degree of similarity between old and new investments in terms of linkages appears to suggest that new branch plants are unlikely to be any more locally embedded than branch plants of previous decades.

### 3.5 CONCLUSION

The Northern region has evolved into a prime example of a 'branch plant economy' gaining its reputation as a result of the extremely rapid rise of external control during the 1960's and 1970's. The large vertically integrated branches of firms in the electronics, food and drink and clothing and footwear industries were symbolic of the region's experience of the branch plant syndrome during this period. During the 1960's and 1970's there was, therefore, the partial incorporation of near 'Fordist' elements of production within the regional economy. Such 'Fordist' elements were of greater symbolic than quantitative importance within the industrial make-up of the regional economy as Hudson (1989) and Peck (1989) have since reminded us. Furthermore, the 1980's witnessed the rationalisation of much of this 'Fordist' element within the regional economy. The region has, however, never fully conformed to the 'branch plant economy' stereotype; its traditional industries maintaining a considerable presence until very recently whilst 'newer' industries have been representative of a diverse range of production techniques and corporate contexts.

With the long-term decline of traditional industries there has been the gradual loss of strong local multiplier effects. The growth of new industries

in the region, primarily as a result of inward investment, has engendered only weak local multiplier effects. There is little in the way of existing evidence to suggest that, as a result of either recent in-situ restructuring or new inward investment, including a significant influx of Japanese and Far Eastern investments to the region, manufacturing industry is displaying a greater degree of local embeddedness. On the other hand, there is considerable evidence to suggest that Northern Region manufacturing industry has become increasingly integrated into national and international corporate divisions of labour. Levels of external control of the region's manufacturing industry have not increased greatly upon the very high levels of the 1970's but the importance of foreign owned manufacturing industry in the region has steadily increased into the 1980's.

This chapter has provided an important benchmark against which the fresh empirical findings presented in chapters 5 and 6 can be measured. The description of the Northern Region's evolution into a prime example of 'branch plant economy' has served to underline problems with stereotypical conceptions of branch plant led economic development noted in chapter 2.

The chapter has also provided some initial understanding of the likely extent and origin of aggregate linkage change in the region. This review of existing studies of contemporary organisational and linkage change in the region is broadly confirmed by the fresh empirical findings presented in chapters 5 and 6.

## CHAPTER 4

### RESEARCH METHODOLOGY

#### 4.1 INTRODUCTION

Chapter 2 provided a review of theoretical treatments of the branch plant syndrome. Several criticisms of stereotypical notions of branch plant led economic development and of the flexible production interpretations of contemporary forms of organisational and linkage change were raised. The previous chapter, being a brief review of the evolution of the Northern Region into a prime example of a branch plant economy, lent life to the abstract concepts and theoretical propositions of chapter 2. This chapter is concerned with describing the research methodology employed to investigate the theoretical propositions regarding linkage change in the branch plant economy detailed in chapter 2.

In chapter 2 this research was divided into two main questions. One concerned the extent of the forms of current restructuring, in this case, of externalisation and vertical disintegration and changing geographical patterns of backward and forward linkages. Two components of linkage change were identified for the purposes of examining the extent of processes of externalisation and vertical disintegration in a peripheral region. Change resulting from in-situ restructuring and from differences between 'old' inward investments and 'new' inward investments are the two components considered in the empirical analysis contained in the next chapter.

A second question, regarding the causes and nature of processes of externalisation and changing spatial patterns of linkages in peripheral region

economies was also raised. It was suggested that the causes and nature of processes of externalisation and other forms of linkage change in peripheral regions are likely to be quite different from those evident in agglomerations of industry.

This chapter discusses the purpose, design, conduct and methods of analysis of the empirical research used to address the above two general questions regarding contemporary processes of linkage change in peripheral region economies.

## 4.2 RESEARCH DESIGN

For the purposes of this thesis, questions regarding the extent and causes and nature of linkage change in peripheral region economies have been distinguished and are examined with the use of extensive and intensive forms of empirical investigation respectively. Questions of the extent of linkage change are addressed with aggregate primary data provided by a postal questionnaire survey of the larger manufacturing establishments in the Northern Region. The causes and nature of linkage change in the Northern Region are examined through the use of in-depth case studies of particular manufacturing establishments.

A similar, quite rigid, distinction between the role of extensive and intensive forms of research in explanation is drawn by Sayer (1984) and Sayer and Morgan (1986). They suggest that

the two types of design ask different sorts of questions, use different techniques and method and define their objects and boundaries differently. (Sayer and Morgan, 1986: 150).

Sayer and Morgan (1986) also ascribe very different functions to the two forms of empirical investigation. Extensive research is concerned with description of regularities, of patterns or with the generation of 'non-real' classifications whereas intensive research is involved with discovering

necessary and contingent relations in a causal explanation.

However, the distinction between intensive and extensive forms of research is rarely as clear as either the present author initially envisaged or as Sayer and Morgan have argued. The distinction between extensive and intensive research designs in terms of their explanatory power is one of degree. That is, intensive forms of research are more likely to uncover the actual causes of phenomena than extensive forms of research. There is, however, no inherent reason why necessary and contingent relations can or will be uncovered to provide a causal explanation in intensive forms of research. As with extensive forms of research, the most decisive stage of research design is that of the initial selection of theories and concepts which then dictate the capture of relevant information. Without such a narrowing of the field of interest and implicit or explicit structuring of interviews etc. it is unlikely that anything meaningful would come out of intensive research. It is this choice of theories and concepts which ensures lively academic debate and differing findings as regards the likely causes of phenomena.

Nevertheless, the importance of such a distinction between the role of extensive and intensive forms of research in explanation can be emphasised by examining the empirical foundations to the 'flexible specialisation' and 'flexible accumulation' accounts of contemporary restructuring. For instance, it is suggested that

With relatively few exceptions, the case for flexible niching has been made at either a highly abstract, macroanalytic level, or at a very micro, case-study level in which stories and anecdotes substitute for trend lines and significance tests. (Luria, 1990: 139).

Leaving aside one important objection,<sup>1</sup> this statement captures the essential weakness of the empirical foundations to such accounts of contemporary

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<sup>1</sup>The implication is that case study research is somehow less valid than statistical analysis of aggregate data. However, there has been considerable effort devoted to establishing the purpose and validity of case study research (e.g. Yin, 1985).

restructuring.

It was noted, in the previous chapter, how few attempts to assess the significance of contemporary examples of the agglomeration of production in terms of world manufacturing employment and output have been made. Whether a large number of agglomerations can be taken as evidence of the widespread emergence of 'flexible accumulation' or 'flexible specialisation' depends, crucially, upon whether one can identify a common logic to agglomeration.

However, case studies of particular agglomerations of production make use of extensive forms of research to draw conclusions regarding the causes and nature of agglomeration. Scott's studies of the women's dress industry and the printed circuit board industry in California (Scott, 1983b, 1984), for example, make use of aggregate primary survey data. These case studies are seen to support the author's generalised explanation of agglomeration in terms of an abstract system of transactional relations between firms (Scott, 1983a). Similarly, Storper and Christopherson (1987) make use of aggregate secondary data on firm and establishment sizes in their case study of the motion picture industry in California. They argue that increasing numbers of smaller firms and establishments in the industry can be interpreted as representing a reorganisation of the industry into a system of 'flexible specialisation'. In both of these examples the aggregate data on particular industries could be used to support several different explanations of the causes of agglomeration.

Sayer and Morgan (1986) acknowledge that extensive and intensive forms of research ought, in principle, to be complementary and it is hoped that in dividing the issue at hand in this thesis into two more or less discrete questions that this can be the case. Indeed, in several practical ways the extensive and intensive components in the research design have proved complementary. For example, the ability to make reasonable generalisations based upon quantitative analysis depends, significantly, upon the quality of the data included. In this respect, the case study work informed the author's

estimations of the quality of certain data to be included in the quantitative analysis. Furthermore, whilst the postal questionnaire survey was primarily aimed at providing data to answer questions about the extent of linkage change it also addressed itself to the possible reasons for (or causes of) linkage change. In several practical ways, then, the survey material and case studies are interrelated.

#### 4.3 EXTENSIVE RESEARCH DESIGN

There are several precise forms that the extensive component of the empirical research could conceivably have taken. Aggregate secondary or primary data, in the form of a postal or interview survey, or a combination of these forms, for example, could have provided information regarding the extent of processes of externalisation within Northern Region manufacturing industry. Sources of aggregate secondary data proved inadequate whilst a postal questionnaire survey was preferred to an interview survey.

Government statistics can provide direct (input-output tables) and indirect indications of the degree of vertical integration of manufacturing industries. However, the statistics are not sufficiently disaggregated to enable an analysis of regional manufacturing industries. Furthermore, time series of the relevant data are either rather inadequate (due to the re-classification of industries in 1979) or non existent (the last U.K. input-output table was published in 1979).

Alternatively, an interview survey of a carefully selected (stratified) sample of Northern Region manufacturing establishments could have elicited aggregate data on linkage change. Interview surveys are most appropriate where a survey is likely to otherwise suffer from a poor response rate or the information sought is of a relatively sensitive nature (Kalton and Moser, 1980). However, to be able to infer meaningful conclusions regarding the

extent of processes of externalisation and linkage change more generally a reasonably large absolute number of establishments would have to be interviewed. For example, even if 100 interview questionnaires were administered it is likely that several forms of statistical analysis would be precluded. Given the limited human and financial resources available for the completion of this research, this particular research strategy was considered to be both too time consuming and expensive.

In chapter 2 a distinction was made between questions regarding the extent and causes and nature of linkage change in the 'branch plant economy'. A further distinction has been drawn between the general means of addressing each of these questions within empirical research. The postal questionnaire proved to be the form of extensive research most consistent with these distinctions in the issues for, and means of, empirical investigation. Three characteristics of the information required from the survey were also suggestive of the suitability of a postal as opposed to an interview survey. Firstly, since case studies would be used to explore the causes and nature of linkage change, the information provided from the survey need only pertain, in the main, to relatively simple factual data. Secondly, the information required from the survey was thought to be relatively non-sensitive. Thirdly, it was likely that the questionnaire would have to be completed by more than one respondent. Other things being equal, postal surveys have a distinct advantage over interview surveys given these three characteristics of the type of information required for the extensive research. In addition, the postal survey offered the prospect of being able to maximise the absolute numbers of respondents to the survey.

#### 4.3.1 Survey sample

It was decided to confine the postal questionnaire sample to the larger



manufacturing establishments in the region. It is these larger establishments which constitute the bulk of manufacturing employment in the region and which have contributed to the region's reputation as a branch plant economy. In using such a sample frame it was assumed that biases in the sample of respondents to the survey would be minimal.

A list of all Northern Region manufacturing establishments with 100 or more employees was produced from various local business directories. Some problems were encountered in identifying appropriate individual manufacturing establishments to include in the survey sample. This problem was, however, confined to the chemicals and steel industries in the region in which I.C.I. and British Steel have large production complexes. Approximately 530 such establishments were initially identified. However, many of these proved to have been wrongly classified as manufacturing establishments, or to have closed. A definitive list of 465 manufacturing establishments with 100 or more employees was drawn up and questionnaires were eventually sent to 428 of these establishments.

#### 4.3.2 Questionnaire Design

Questionnaires used in previous linkage studies of manufacturing industry in the Northern Region (e.g. Hodgson et al, 1981; Marshall, 1979; Morley, 1976; N.R.S.T., 1974; Smith, 1981) were examined prior to undertaking the design of the questionnaire used in this survey. There were several iterations to the questionnaire design. No formal pilot survey was undertaken although copies of the questionnaire were examined by members of the business community. The questionnaire was designed to be applicable to all types of establishments in all manufacturing industries. Consequently the questionnaire design, especially in terms of the order of questions, was quite complex. Some specific problems with, or features of, particular questions are dealt with

in greater detail in chapter 5. The final draft of the questionnaire can be seen together with the initial and reminder letters in Appendix iii.

The problem of obtaining accurate data on linkage change was of particular concern. Indications of linkage change are provided by retrospective assessments made by respondents. In this respect Taylor's (1978) observation of the likely accuracy of such retrospective assessments found in the studies of linkage change made by Le Heron and Schmidt (1975) by Moseley and Townroe (1973) and by Steed (1970) is worth noting. These studies of linkage change use data collected at one point in time,

introducing the very distinct possibility that the historical data may well have been colored with the wisdom of hindsight, and colored in a manner likely to justify the position that a firm finds itself in at present. (Taylor, 1978: 318).

This observation is particularly relevant to debates concerning contemporary corporate restructuring. Many industrialists are aware of the positive connotations, and are inclined to overstate the extent, of organisational innovations such as outsourcing, just-in-time supplier relations etc.<sup>2</sup>.

#### 4.3.3 Analysis of Data

The information collected in the postal questionnaire survey was encoded and entered into three separate data files and then analysed using SAS Institutes statistical package. All the categorical data on linkage change was contained in a single file and from this frequencies, percentages and cross tabulations (with chi-squared statistics) were produced. Differences between groups of establishments in terms of geographical patterns of sales and purchases were examined using analysis of variance, whilst changes in patterns of purchases within groups of establishments are examined using a matched

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<sup>2</sup>The problem is compounded by the fact that the term 'flexibility' appears to be both an academic concept and a piece of management rhetoric (Gertler, 1988).

pairs t-test. Further details of each of these statistical techniques are given in chapter 5.

#### 4.4 INTENSIVE RESEARCH DESIGN

Aggregate changes in the degree of vertical integration and geographical patterns of sourcing of Northern Region manufacturing establishments could conceal several distinct processes of linkage change. The case studies of particular manufacturing establishments can provide a more detailed and disaggregated examination of processes of linkage change within a peripheral region setting. Since the concern is with linkage change, it was intended that the case studies be, as far as was possible, historical.

##### 4.4.1 Purpose of the case studies

Case study research, according to Yin (1985), involves the investigation of

a contemporary phenomena within its real-life context; when the boundaries between phenomena and context are not clearly evident; and in which multiple sources of evidence are used. (Yin, 1985: 23).

In contrast to the postal survey, which concentrated upon only a limited set of linkage changes (internalisation and externalisation) in only a partial context, the case studies examine all processes of linkage change within their wider market and corporate contexts.

Changes in market demand and technologies are held to be determinant of processes of industrial restructuring in accounts of a transition to an era of 'flexible specialisation' or 'flexible accumulation'. However, chapter 2 revealed that these accounts of transition have neglected the role of corporate structures and strategies in affecting the course of industrial

restructuring. It was also argued that an analysis of corporate structures and strategies was central to an understanding of both the extent and the causes and nature of linkage change within a peripheral region context. The case studies are therefore designed to explore the role of market circumstances, technologies and corporate structures and strategies in engendering changes in the organisation of production and backward linkage structures at particular manufacturing establishments.

The rationale to case studies of the corporate organisation of production has been undermined by recent criticisms of a body of work identified as corporate geography (Walker, 1990). Many of Walker's detailed criticisms of corporate geography highlight the weaknesses of empirical studies of the corporate organisation of production. His criticisms stem from a desire to assert a more abstract and generalised account of the organisation of production and, in particular, from the recognition that the dualism of firm and market provides an inadequate basis for understanding the organisation of production. Two particular criticisms of corporate geography are at the heart of Walker's critique. Neither, however, present insurmountable problems to either theoretical or empirical accounts of the corporate organisation of production.

Firstly, much of the work within corporate geography defines the firm on the basis of ownership of the means of production. This leads to a rather incomplete understanding of how

capital has increased its power to integrate and organise increasingly far-flung and complex labor systems in the global economy. (Walker, 1990: 62).

A definition of the firm as one of an entity in control of the means of production could usefully form the basis for a revised corporate geography in which an analysis of corporate strategies would be central to an understanding of how such control of assets not under direct ownership is exercised. Thus, chapter 2 suggested that processes of externalisation and linkage change more

generally could only be understood within the context of imperfect competition.

Secondly, corporate geography has failed to situate the corporation in its wider market context. However, this is not a failing of all work on the corporate organisation of production. Massey (1984), for instance, situates her taxonomy of capitalist enterprise within an understanding of 'place in economic structure' and the 'organisational structure of capital'. In a practical sense also, it is quite possible to include such considerations within empirical studies by having regard for the (upstream and downstream) market conditions faced by particular companies. Thus, the case study material presented in chapters 6 and 7 does attempt to take account of this latter criticism by situating the case study establishments within their respective market contexts and by briefly exploring the effect of upstream and downstream market structures upon processes of linkage change.

#### 4.4.2 Selection of case study establishments

It proved difficult to select case study establishments from one or more well defined industries present in the Northern Region. Had this been possible it would have enabled a more accurate assessment of the effect of corporate organisation upon processes of linkage change. The region's economy, however, is diversified and contains few concentrations of establishments within relatively well defined industries. Those subsectors which did offer the prospect of several case study establishments were, for one reason or another, unsuitable. For example, the offshore fabrication industry is perhaps the best example of an industry in the region which is characteristically vertically disintegrated. However, the industry was already subject to study (Cumbers, 1987). Similarly, the chemicals and clothing and footwear industries are both major industries within the region. However, the chemicals industry, because

of the nature of the production process, and the clothing industry, which is composed of large rationalised branches catering for mass markets, seemed unlikely to offer the prospect of suitable case studies.

Instead, those branches and subsidiaries known to be engaged in significant organisational change were considered along with those establishments newly arrived in the region. Thus, the case study establishments do not conform to any branch plant stereotype nor are they particularly representative of the large majority of actual branches and subsidiaries present within the region. For instance, several of the case study establishments are less 'truncated' than the majority of branches and subsidiaries in the region whilst some display considerable degrees of managerial autonomy as well as being accompanied by non-manufacturing functions such as R&D. Instead, the sample of case study establishments is composed of some of the region's most proactive establishments in terms of organisational innovation.

Furthermore, although it was not intended, each of the case study establishments are each part of foreign multinationals. This introduces a degree of specificity into the intensive research component which does not exist in the extensive research component. Whilst it is possible to justify this selection on theoretical grounds, it does increase the problems of reconciling the two components of the overall research design.

#### 4.4.3 Conduct of case study research

The case study research was carried out over the period October 1989 to June 1990. In each case an attempt was made to prepare for interviews with staff of the chosen case study establishments by assembling a large amount of secondary data. Such secondary data did provide a useful background to critically evaluate responses to a structured interview schedule (see Appendix

iv), and informed more detailed questions relevant to the particular establishment under study.

The secondary information relating to each case study establishment and company was assembled from national newspaper articles (mainly those produced on card and microfiche by McCarthy Ltd.) and local newspaper articles (from the library of the Northern England Newspapers in Darlington). Other articles were traced through directories such as Research Index and Business Periodicals Index. Moody's industrial manual proved useful on general company background and details of factory locations etc. for case study establishments which were part of U.S. headquartered companies. Particular studies, such as Government reports and Masters theses (from Durham Business School) and reports to trade unionists, where these had been produced, also proved useful. Financial data and annual reports were obtained from Companies House in London and from the London Business School's library.

Initial contact was made with the purchasing managers of each of the case study establishments who were asked for their cooperation with a structured interview lasting approximately one hour. The scope of the interviews was then broadened to staff from sales and, in some cases, from data processing and design departments. In two cases, staff from more strategic levels were also interviewed.

In all cases staff were asked to provide particular pieces of information (primarily pertaining to geographical breakdowns of numbers of suppliers and the value of total material purchases and sales) relevant to the case study establishment. In most cases some or even all of the information requested was obtained. The quality and quantity of relevant information relating to each case study was, however, rather variable. This is largely a reflection of the quality and quantity of secondary data. For instance, the publication of two Government reports upon Black & Decker (Price Commission, 1979; Monopolies and Mergers Commission, 1989) greatly enhanced both the

quality and quantity of information included in that case study. On the other hand, the recent arrival of Sanyo and Samsung's investments in the North East meant that both the quantity and quality of information available was much less than was the case for the four case studies presented in chapter 6.

#### 4.5 CONCLUSION

The distinction between the issues for empirical research and the further distinction between the general form of empirical research used to address these separate questions means that questions of the extent and causes and nature of peripheral region linkage change could be explored quite fully. However, there are, as a result, problems in reconciling the two components to the empirical work. The degree of specificity in the intensive component to this research means that the findings regarding the causes and nature of linkage change may be of limited relevance to the wider population of Northern Region manufacturing establishments. On the other hand, the case studies do provide some scope for generalising about the causes and nature of the two aggregate components of linkage change identified for the purposes of the extensive research.

Chapter 8 attempts to reconcile the findings of the two components of the empirical research. Processes of linkage simplification provide some understanding of why there is a lack of externalisation and localisation of backward linkages occurring in the Northern Region. The intensive research component does provide some basis for understanding changes in the extent of externalisation and aggregate geographical patterns of sourcing in the 'branch plant economy'.



## CHAPTER 5

### ASPECTS OF AGGREGATE LINKAGE CHANGE: SURVEY EVIDENCE

#### 5.1 INTRODUCTION

In chapter 2 several general hypotheses regarding the extent, or quantitative importance of processes of externalisation and vertical disintegration and associated changes in the geography of backward linkages were outlined. In this chapter, information collected from a postal questionnaire survey of Northern Region manufacturing establishments is used to critically examine these general hypotheses regarding linkage change in the branch plant economy.

The literature review in chapter 2 gave reason to believe that the extent of processes of externalisation and localisation of backward linkages would not be as great in the case of peripheral regions as in the case of regions currently taken to exemplify flexible production systems. That is not to say that new manufacturing techniques, including changes in buyer-supplier relations, have been absent in Northern Region manufacturing industry as chapter 4 illustrated. However, this chapter demonstrates that despite this undoubted reorganisation of production and linkages throughout parts of Northern Region manufacturing industry, the low levels of local sourcing by the region's manufacturing industry detailed in the previous chapter remain little changed.

## 5.2 DISCUSSION OF THE SURVEY SAMPLE

During the period November 1989 to January 1990 a postal questionnaire survey of all Northern Region manufacturing establishments with 100 or more employees was administered. The questionnaire was concerned with the changing purchasing and sales patterns within the region's manufacturing industry. The results from this survey form the basis of the following analysis of aggregate patterns of linkage change of Northern Region manufacturing industry. Greater detail upon the sample frame and sample of respondents can be found in appendix ii. It is assumed that the sample of respondents is broadly representative of the larger manufacturing establishments in the region in terms of industrial sector, age of investment, mode of entry and ownership characteristics of establishments. However, one or two observations with regard to each of these characteristics of the sample of respondents need to be made.

The survey was designed to reflect the sectoral and organisational composition of Northern Region manufacturing industry. As such, the sample frame and sample of respondents include a sizeable number of independent manufacturing firms as well as the greater number of branches and subsidiaries. Although branch plants are likely to be under-represented in the sample of respondents (see appendix ii) the absolute number of branches is considerably less than the number of subsidiaries and, indeed, the number of independent establishments. This fact highlights the many problems with the 'branch plant economy' stereotype.

The following analysis is concerned with aggregate linkage change among independent, branch and subsidiary manufacturing establishments in the region. In analysing linkage change within the 'branch plant economy' it is important to retain an appreciation of the role played by independent firms as well as 'branch plants'. The analysis is not directly concerned with examining the

relation between the extent of linkage change and the organisation of production as this varies between individual manufacturing establishments. This is explored in the following chapter. However, comparisons of the linkage changes evident among branches and subsidiaries and independent firms can provide a more disaggregated view of contemporary linkage change among Northern Region manufacturing establishments.

The industry in which Northern Region manufacturing establishments operate (at the level of S.I.C. classes) had little bearing upon the patterns of purchasing and sales of establishments with two exceptions. Establishments within the electrical and electronic engineering industries (S.I.C. 34) appeared more likely to outsource component requirements than establishments in other industries. Similarly, the chemical industry (S.I.C. 25) appears to be the only industry to have consistently increased the degree to which material inputs are sourced from overseas.

Clearly, the sample of respondents is representative of only the larger manufacturing establishments within the Northern Region as a consequence of the design of the sample frame. As such, however, the sample of respondents will be representative of those establishments forming the vast bulk of manufacturing employment and output of the region's industry. The majority of establishments in the sample of respondents have under 250 employees (Table 5.1). Independent firms tend to be smaller than branches and subsidiaries. The small number of branches includes a high proportion of establishments of the smallest (1-99) and largest (over 1000) sizes in terms of total employment. The vast majority of establishments in the survey sample are subsidiaries.

Table 5.2 shows the composition of the sample of respondents in terms of mode of entry and period of establishment of manufacturing establishments. Assuming that the sample is not significantly biased in terms of the distribution of greenfield or acquisition investments, Table 5.2 indicates that these two modes of entry have been of variable importance through the

TABLE 5.1

TYPE AND SIZE OF SURVEY SAMPLE ESTABLISHMENTS.

	1-99	100-249	250-499	500-999	Over 1000
Independent	4 (8.9)	29 (64.4)	7 (15.6)	3 (6.7)	2 (4.4)
Branches	4 (13.3)	13 (43.3)	5 (16.7)	2 (6.7)	4 (13.3)
Subsidiaries	7 (5.3)	61 (46.6)	40 (30.5)	14 (10.7)	7 (5.3)
Total	15 (7.3)	103 (50.0)	52 (25.2)	19 (9.2)	13 (6.3)

Source: author's survey.

TABLE 5.2

DATE OF ESTABLISHMENT AND MODE OF ENTRY OF SURVEY SAMPLE ESTABLISHMENTS.

	Pre 1945	1945-1959	1960-1969	1970-1979	1980-	Total
G.F.	6 (5.7)	24 (22.9)	35 (33.3)	23 (21.9)	17 (16.2)	105 (67.3)
Acq.	3 (5.8)	4 (7.8)	19 (37.3)	10 (19.6)	15 (29.4)	51 (32.7)
Total	9 (5.8)	28 (18.1)	54 (34.8)	33 (21.3)	31 (20.0)	156 (100.0)

Source: author's survey.

TABLE 5.3

TYPE AND NATIONALITY OF OWNERSHIP OF SURVEY SAMPLE ESTABLISHMENTS.

	U.K.	U.S.	E.C.	Oth. E.	Far East	Other	Total
Bran.	24 (80.0)	4 (13.3)	1 (3.3)	1 (3.3)	0 (0.0)	0 (0.0)	30
Subs.	92 (70.2)	16 (12.2)	11 (8.4)	6 (4.6)	5 (3.8)	1 (0.8)	131
Total	116 (72.0)	20 (12.4)	12 (7.4)	7 (4.3)	5 (3.1)	1 (0.6)	161

Source: author's survey.

years. Greenfield investments are more important than acquisition investments in each of the five time periods included in table 5.2. However, acquisitions have been relatively more important in the 1980's than greenfield investments. This confirms the finding that acquisition is usually, and has been in the Northern Region, the preferred mode of entry during times of recession (Smith, 1980). On the other hand, greenfield investments have been relatively more important during the immediate post war period.

The time periods to which establishments are allocated in Table 5.2 were originally devised to distinguish between qualitatively different rounds of inward investment to the region (see also chapter 4). Inward investment prior to World War2 was small scale and contributed in only a minor way to structural change in the region's economy. The investments of the 1940's and 1950's, although marking the rise of the branch plant syndrome in the region, were limited to a few sectors and do not conform fully to the branch plant stereotype. The 1960's and 1970's was, however, a period when the region gained its reputation as a branch plant economy. Inward greenfield investments of the 1960's constituted relatively self contained, vertically integrated, 'cloning' branch plants whilst those of the 1970's - by virtue of the dominance of electronics investments - constituted relatively 'truncated' part-process branch plants. Since about 1983 greenfield inward investment has again accelerated involving considerable Japanese and other Far east foreign direct investment as well as the arrival of investments associated with the European-wide, rather than merely regional or U.K. market.

The vast majority (70.2%) of establishments included in the sample of respondents are U.K. owned. Since the U.S. has been the dominant source of world flows of foreign direct investment of which the U.K. has taken a large share over the years, U.S. owned establishments form the second largest contingent within the sample of respondent establishments. There is only a small number and proportion of E.C. and Far East owned establishments

reflecting the highly fragmented nature of the E.C. market and the very recent growth of Far East foreign direct investment in the U.K. and the Northern Region (Table 5.3). This suggests that any organisational restructuring and hence linkage change evident in the Northern Region would primarily be a reflection of the restructuring of U.K. companies. The investments of Far East owned companies, regardless of whether or not they are significantly different from the investments of Western manufacturers, will exert a relatively small effect in terms of the extent of organisational restructuring and linkage change in the region.

The survey results presented in the following sections should therefore be reasonably representative of Northern Region manufacturing industry as a whole and of the non-independent sector in the region.

### 5.3 IN-SITU LINKAGE CHANGE

Few studies have examined the extent to which there has been linkage change in peripheral region economies. Those which have, tend to concentrate upon the differences between recent and previous rounds of inward investment to a particular regional economy (see next section). Most studies do suggest that branch plants become progressively more locally integrated, in terms of linkages, over time. However, such a process of in-situ linkage change is argued to be a cause of the differences between the degree of localised linkages exhibited by new and existing investments (see section 5.4). The detailed evidence regarding the significance of in-situ linkage change among existing inward investments in peripheral region economies is, however, contradictory. Stewart (1976), for example, found that foreign industry in Ireland tended to increase the degree to which it sourced from the domestic economy. However, such increased integration of foreign industry into the Irish economy was found to be primarily a reflection of the differences

between recent and previous foreign direct investments than of marked in-situ changes in patterns of sourcing by existing foreign industry.

#### 5.3.1 Externalisation

In chapter 2 it was noted how multi-locational and multinational firms tend to retain value-added within the company, either as a whole (among different plants) or at individual establishments. In the former case (which encompasses those firms organised on a 'part-process' basis) intra-corporate trade presents a significant constraint on the potential for the development of localised linkages.

The significance of intra-corporate trade to the operations of multinational corporations and hence within international trade has long been recognised (e.g. Adam, 1976; Hamilton, 1981; Helleiner, 1972; Helleiner and Lavergne, 1979; Sharpston, 1972) and is now widely accepted. The relationship between such intra-corporate trade and the attenuation of localised linkages in host economies has consequently been identified (McAleese and McDonald, 1978; O'hUllachain, 1985; Stewart, 1976). However, intra-corporate trade is also of significance to the operations of multilocal firms more generally (e.g. Dicken, 1976; Hamilton, 1978) and hence within intra-national patterns of trade. The significance of intra-corporate trade to the operations of peripheral region branch plants has been recognised since the early evaluations of the effect of regional policy (e.g. Allen et al, 1957), and has been repeatedly observed in studies of industrial movement (Townroe, 1979; D.T.I., 1973). Studies of the effect of external control upon regional manufacturing industry have been particularly successful in identifying the role of intra-corporate trade in constraining the development of localised linkages (e.g. McDermott, 1976; Marshall, 1979). Marshall (1979), for instance, in his study of linkages of Northern Region manufacturing industry,

found that,

the contrast in linkage patterns is only between independent plants with localised material inputs and externally owned establishments with a large proportion of material inputs from their organisation, little autonomy and non-regional linkage. (Marshall, 1979: 543).

The results of this study confirm this relationship between intra-corporate trade and the attenuation of localised linkages. Table 5.4 compares the average proportion of inputs sourced from the Northern Region according to whether establishments took none, less than 50% and more than 50% of inputs from other company sites. A similar (though not statistically significant) inverse relationship as that found by Marshall (1979) is evident.

In order to understand the potential for vertical disintegration and possible increased local sourcing we must examine the extent to which intra-corporate trade has changed among companies in which it is, or has been of significance.

Table 5.5 shows the changes in the degree of intra-corporate trading in which Northern Region branches and subsidiaries are involved. Only those establishments for which such intra-corporate trade has or is of some importance have been included since for the majority of establishments intra-corporate trade is and has never been of any importance. The statistical significance of in-situ changes in patterns of sourcing is examined with a difference of means test for matched pairs of observations. In this case, the proportion of intra-corporate trade in 1979 is subtracted from the proportion of intra-corporate trade in 1989 to produce a sample distribution of data pertaining to changes in intra-corporate trade. A students t-test is then used to assess whether the mean of this sample distribution differs significantly from a parent normal distribution with mean zero.

The degree to which Northern Region branches and subsidiaries source material inputs from other company plants has declined slightly. Such a decrease is equally evident for the proportions of material inputs coming from



TABLE 5.4

RELATIONSHIP BETWEEN DEGREE OF INTRA-CORPORATE PURCHASING AND DEGREE  
OF LOCAL SOURCING BY NORTHERN REGION MANUFACTURING ESTABLISHMENTS.

	No intra-corporate purchases	1-50%	51-100%
Marshall (1979)	44.6%	32.6%	18.2%
Phelps (1992)	22.3%	17.5%	11.0%

Sources: Marshall (1979), author's survey.

TABLE 5.5

CHANGE IN THE DEGREE OF INTRA-CORPORATE TRADING BY  
ESTABLISHMENTS EXISTING PRIOR TO 1980.

	N	1979 Mean	1989 Mean
Sourcing from U.K.	26	35.85	31.54
Sourcing from overseas	21	34.19	31.86
.....			
Total Sourcing	37	39.38	36.84
.....			
Transfers to U.K.	33	41.15	35.67 *
Transfers to overseas	17	33.94	41.88 *
.....			
Total Transfers	40	48.88	48.10

\* p<0.05

\*\* p<0.01

Source: author's survey.

other company factories in the U.K. and overseas. Changes in the degree to which Northern Region branches and subsidiaries transfer their output to other company plants are more variable. Overall, there is a decline in such transfers. However, a matched pairs t-test indicated that there is a statistically significant difference in the degree to which Northern Region branches and subsidiaries transferred their output to U.K. and overseas plants between 1979 and 1989. The degree of intra-corporate transfers within the U.K. has declined whilst the proportions of such transfers to overseas factories has increased.

Northern Region branches and subsidiaries appear to have become slightly more vertically disintegrated within the context of inter-plant inter-dependencies in the form of purchases of material inputs and transfers of finished products. However such a trend is weak. Furthermore, the Region's branches and subsidiaries appear to have become increasingly integrated, in terms of both backward and forward linkages, into an international division of labour. It is likely that this would be a reflection of both the continued internationalisation of U.K. multiplant and multinational companies as well as the simplification of corporate structures of foreign multinationals after rationalisation of their U.K. capacity. The data in Table 5.6 suggest that there is only a very limited increase in the scope for vertical disintegration of manufacturing activities at Northern Region branches and subsidiaries as a result of changing degrees of intra-corporate trade.

Intra-corporate trade is one way in which value-added is retained within the company in the case of multilocal firms. However, for the majority of branches and subsidiaries and for independent firms value-added is retained through on-site, in-house manufacture. We, therefore, need to consider the extent to which value added is being retained at individual manufacturing establishments and firms.

Table 5.6 indicates proportionate changes in the degree of outsourcing

TABLE 5.6

FREQUENCIES AND PERCENTAGES OF ESTABLISHMENTS EXPERIENCING  
PROPORTIONATE CHANGES IN MANUFACTURING ACTIVITIES  
SUBCONTRACTED AND COMPONENTS BOUGHT-OUT.

	Components			Subcontract		
	Inc.	Same	Dec.	Inc.	Same	Dec.
Independents	15(55.6)	6(22.2)	6(22.2)	12(60.0)	3(15.0)	5(25.0)
Branches	7(36.8)	10(52.6)	2(10.5)	6(46.2)	2(15.4)	5(38.5)
Subsidiaries	39(46.4)	37(44.0)	8 (9.5)	37(46.8)	22(27.8)	20(25.3)
Total	46(44.2)	47(45.2)	10 (9.6)	43(46.7)	24(26.1)	25(27.2)

Source: author's survey.

of components and use of subcontractors by Northern Region manufacturing establishments. Overall, processes of increased outsourcing of component requirements and use of subcontractors appear to outweigh any counter-processes of internalisation of such manufacturing activities. This is particularly the case with component requirements. The use of subcontractors appears more volatile (a large proportion of establishments also decreasing their use of subcontractors). It is not clear, therefore, whether, in the case of subcontracted manufacturing activities, such a trend toward outsourcing is systematic. Much subcontract work is ephemeral and it may therefore be that the increased use of subcontractors by Northern Region establishments may represent a short-term, temporary trend.

Tables 5.7 and 5.8 may be able to shed some light on the strength and permanence of processes of externalisation and internalisation. There are some differences in the method of obtaining reasons for the externalisation and internalisation of component requirements and subcontracted work. Open ended questions were used to elicit the two main reasons for internalisation or externalisation of component requirements. On the other hand, indications of the motives for the increased or decreased use of subcontractors were obtained through structured questions. These structured questions were comprised of a set of pre-given categories pertaining to a range of possible motives for internalisation or externalisation which, in turn, were derived from a review of the theoretical literature. Responses to the open ended questions regarding the changed outsourcing of component requirements were not as fully completed. They also generated reasons which were difficult to interpret or categorise or were tautological (i.e. 'it is cheaper to use outside suppliers'). However, the open-ended questions also highlighted the dangers of conceiving of the motivations to vertical (dis)integration solely in accepted theoretical terms. For example, variations in product range and mix, which had not been stressed in the academic literature on vertical (dis)integration, were found to be

TABLE 5.7

REASONS FOR INTERNALISATION OF COMPONENT REQUIREMENTS AND MANUFACTURING  
ACTIVITIES PREVIOUSLY SUBCONTRACTED.

COMPONENTS		
	Indep.	Non-Indep.
.....	.....	.....
Process innovation.	0 (0.0)	3 (30.0)
Changes in demand.	1 (20.0)	2 (20.0)
Increased in-house manufacturing capacity.	1 (20.0)	3 (30.0)
Lower cost of manufacturing in-house.	2 (40.0)	2 (20.0)
Flexible use of labour.	0 (0.0)	1 (10.0)
Other reasons.	1 (20.0)	0 (0.0)
.....	.....	.....
Total responses	5	10
.....	.....	.....
SUBCONTRACT		
	Indep.	Non-indep.
.....	.....	.....
To assure the quality of inputs.	2 (40.0)	11 (44.0)
To protect this company's specific knowledge or technology.	0 (0.0)	3 (12.0)
To economise upon the costs of contracting with suppliers.	2 (40.0)	16 (64.0)
To avoid disruption to the supply of inputs.	2 (40.0)	2 (8.0)
To achieve economies of scale.	3 (60.0)	11 (44.0)
Other reasons.	1 (20.0)	3 (12.0)
.....	.....	.....
Total responses	5	25
.....	.....	.....

N.B. Respondents were asked for the two main reasons as to why  
internalisation had occurred therefore percentages do not sum to 100.

Source: author's survey.

TABLE 5.8

REASONS FOR EXTERNALISATION OF COMPONENT REQUIREMENTS AND MANUFACTURING  
ACTIVITIES PREVIOUSLY CARRIED OUT IN-HOUSE.

COMPONENTS		
	Indep.	Non-indep.
.....	.....	.....
Increase in business.	6 (40.0)	14 (32.6)
Increase in the product range.	3 (20.0)	8 (18.6)
Change in the output mix.	3 (20.0)	4 (9.3)
Product innovation or sophistication.	3 (20.0)	3 (6.9)
Cheaper to buy-out from suppliers.	1 (6.7)	8 (18.6)
Other reasons.	2 (13.3)	14 (32.6)
-----		
Total responses	15	43
-----		

SUBCONTRACT		
	Indep.	Non-indep.
.....	.....	.....
To provide capacity for variation in demand for your products.	5 (41.7)	26 (61.9)
To take advantage of a supplier's specialised knowledge or technology.	4 (33.3)	24 (57.1)
To take advantage of lower labour costs open to suppliers.	7 (58.3)	9 (21.4)
To avoid industrial disputes over parts of the production process.	0 (0.0)	0 (0.0)
To take advantage of economies of scale open to suppliers.	0 (0.0)	8 (19.0)
Other reasons.	3 (25.0)	8 (19.0)
-----		
Total responses	12	42
-----		

NB. Respondent were asked for the two main reasons as to why internalisation had occurred therefore percentages do not sum to 100.

Source: author's survey

important.

Tables 5.7 and 5.8 reveal that trends toward increased outsourcing among non-independent establishments are, essentially, part systematic and associated with vertical disintegration (57.1% of respondents suggesting that they have increased their use of subcontractors in order to take advantage of suppliers' technology or knowledge) through the use of speciality subcontractors, and part temporary (61.9% of respondents increasing their use of subcontractors because of variations in demand) as a result of horizontal disintegration through the use of capacity subcontracting. The temporary nature of increased outsourcing of components is also apparent in the fact that 32.6% of respondents suggested that such a change was a reflection of an increase in business.

Outsourcing of components and increased subcontracting of manufacturing activities by the smaller number of independent firms appears, however, to be rather less systematic. Independent firms appear to be subcontracting in order to provide for variations in demand or to take advantage of the lower labour costs of suppliers.

Partly as a reflection of the degree of autonomy exhibited by various establishments and partly as a reflection of the likely role within corporate divisions of labour we would expect indigenous firms to be exhibiting greater potential for outsourcing than subsidiaries and branches respectively. The data in Table 5.6 can be consolidated into 2 by 2 contingency tables (Tables 5.9i-iv) in order to examine the differences in the proportions of different types of establishments increasing or not increasing the extent to which they outsource components and use subcontractors. Clearly, independent firms appear more likely to make increasing use of outsourcing than non-independent establishments and subsidiaries also appear more likely to make increasing use of outsourcing than branches, however, such differences are not particularly (and certainly not statistically) significant.



TABLES 5.9 i-iv

TWO BY TWO CONTINGENCY TABLES COMPARING PROPORTIONATE CHANGES IN  
MANUFACTURING ACTIVITIES SUBCONTRACTED AND COMPONENTS BOUGHT-OUT  
AMONG DIFFERENT TYPES OF ESTABLISHMENT.

(i)

(ii)

	Components		Subcontract	
	Inc.	No inc.	Inc.	No inc.
Independents	15 (55.6)	12 (44.4)	12 (60.0)	8 (40.0)
Non-independents	46 (44.2)	57 (55.8)	43 (46.7)	49 (53.3)

$$\chi^2=1.423$$

$$\chi^2=1.191$$

(iii)

(iv)

	Components		Subcontract	
	Inc.	No inc.	Inc.	No inc.
Branches	7 (36.8)	12 (63.2)	6 (46.2)	7 (53.8)
Subsidiaries	39 (46.4)	45 (53.6)	37 (46.8)	42 (53.2)

$$\chi^2=1.744$$

$$\chi^2=0.393$$

Source: author's survey.

### 5.3.2 Geographical patterns of linkages

If the actual processes of outsourcing among Northern Region manufacturing establishments cannot easily be interpreted as vertical disintegration, the spatial implications of linkage change are just as complex and variegated. Table 5.10 compares the extent processes of externalisation and internalisation are associated with changes in the absolute and proportionate (i.e. proportion of total spend on materials and components) usage of local suppliers.

Increased outsourcing of componentry is significantly unassociated with a proportionate increase in the use of local suppliers in the case of the externalisation of component requirements and the subcontracting of manufacturing activities. It would appear to be the case that increased outsourcing of components is not associated with either absolute or proportionate increases in business being placed with local suppliers. The geographical implications of the increasing use of subcontractors are more varied. Increased use of subcontractors would appear to be associated with absolute increases in business for local suppliers but not necessarily an increase in the proportion of value of material inputs sourced locally.

Some differences between independent firms and non-independent establishments, in terms of the extent to which outsourcing is translated into increased local sourcing, are apparent (Table 5.11i-v). In the case of independent firms, the absolute increase in business going to local subcontractors is also likely to be translated into a proportionate increase in the degree of local sourcing. In the case of non-independent establishments, however, an increase in the use of subcontractors whilst engendering an absolute increase in business with local firms is likely to be outweighed by the amount of business going to non-local firms. Thus there do appear to be some differences between non-independent establishments, for whom

TABLE 5.10

EXTENT TO WHICH EXTERNALISATION IS ASSOCIATED WITH ABSOLUTE  
AND PROPORTIONATE INCREASES IN THE USE OF LOCAL SUPPLIERS.

	COMPONENTS		SUBCONTRACT	
	Inc.	No inc.	Inc.	No inc.
Absolute	25 (40.3)	37 (59.7)	36 (66.7)	18 (33.3)
Proportionate	15 (24.2)	47 (75.8)	16 (29.0)	39 (71.0)

$\chi^2=18.84$   
 $p<0.001$

$\chi^2=10.80$   
 $p<0.005$

Source: author's survey.

TABLES 5.11 i-iv

TWO BY TWO CONTINGENCY TABLES COMPARING DIFFERENCES IN THE EXTENT TO WHICH EXTERNALISATION BY DIFFERENT TYPES OF ESTABLISHMENT IS ASSOCIATED WITH ABSOLUTE AND PROPORTIONATE INCREASES IN THE USE OF LOCAL SUPPLIERS.

COMPONENTS

	(i)		(ii)	
	Absolute		Proportionate	
	Inc.	No inc.	Inc.	No inc.
Ind.	6 (37.5)	10 (62.5)	4 (25.0)	12 (75.0)
Non-indep.	19 (41.3)	27 (58.7)	11 (23.9)	35 (76.1)
	$\chi^2=2.391$		$\chi^2=14.522$ $p<0.001$	

SUBCONTRACT

	(iii)		(iv)	
	Absolute		Proportionate	
	Inc.	No inc.	Inc.	No inc.
Ind.	7 (58.3)	5 (41.7)	7 (58.3)	5 (41.7)
Non-indep.	29 (69.0)	13 (31.0)	9 (20.9)	34 (79.1)
	$\chi^2=9.589$ $p<0.005$		$\chi^2=7.600$ $p<0.01$	

Source: author's survey.

increased outsourcing tends to benefit non-local suppliers more than local suppliers, and independent firms who are inclined to place proportionately more business with local suppliers when increasing the extent to which they outsource.

Table 5.12 shows the overall geographical patterns of purchases of material inputs and sales of establishments. Independent firms tend, surprisingly, to source less from the Northern Region than do branches and subsidiaries. However, over the period 1979 to 1989 independent firms have increased their use of Northern Region suppliers slightly compared to branches and subsidiaries which have experienced a (statistically significant) decrease in the the value of purchases made from Northern Region suppliers. Furthermore, branches and subsidiaries, over this period, have also decreased the value of their purchases from suppliers in the U.K. as a whole meaning that there has been an increase in imports at the regional and national scale.

There are several possible reasons as to why the processes of outsourcing in evidence in the Northern Region do not necessarily engender the localisation of backward linkage structures. For example, much will depend upon the types of manufacturing activities being externalised and the degree to which these requirements coincide with the existing industrial structure of the region. Externalisation may also be only one of a number of changes to backward linkages being effected by manufacturing establishments in the region. It may, therefore be that these processes of linkage change are leading, in the main, to a decrease in local sourcing. The aggregate data on linkage change provided by the survey conceal such detailed processes of linkage change, however, these two points are explored in more detail in chapter 6. However, the information provided by the survey does provide an indication of the likely role of corporate strategy in restricting the degree of localisation of backward linkages. 50% of non-independent manufacturing establishments in the survey indicated that their parent corporation had some

TABLE 5.12

GEOGRAPHICAL DISTRIBUTION OF PURCHASES OF MATERIAL INPUTS AND SALES  
OF ESTABLISHMENTS EXISTING PRIOR TO 1980.

		Non-independents		Independents			
		1979	1989		1979	1989	
PURCHASES	N	Mean	Mean	N	Mean	Mean	
Northern Region	72	27.40	25.47 *	32	20.88	21.66	
U.K.	92	72.00	69.60 *	32	82.34	77.44	
Overseas	96	30.88	32.29	32	14.53	19.44	
SALES							
Northern Region	94	15.40	12.09 ***	2	22.00	13.50	
U.K.	96	81.02	74.52 ***	2	90.00	81.50	
Overseas	96	18.98	25.23 ***	2	10.00	18.50	

\* p&lt;0.05

\*\* p&lt;0.01

\*\*\* p&lt;0.001

Source: author's survey.

form of corporate sourcing policy. 41.2% also indicated that the sourcing of certain material inputs was bound up with agreements between the parent company and other legally separate companies. In this way corporate strategy exerts an indirect influence upon geographical patterns of sourcing with certain material inputs being subject to corporate decisions regarding the precise sources from which they are to be obtained.

Some very clear changes in the geographical patterns of sales of non-independent manufacturing establishments are evident in Table 5.12. These establishments now sell much less of their output to the regional and national markets and much more to overseas markets. A matched pairs t-test indicates that such changes are statistically significant. Thus, whilst there is some evidence to suggest that Northern Region manufacturing industries purchases of material inputs are increasingly coming from further afield, there is very strong evidence to suggest that the region's manufacturing industries sales are also becoming more widely spread. Such increasingly internationalised sales patterns are likely to reflect the increasing importance of overseas markets relative to the domestic U.K. market and, in particular, the increasing importance of the European market.

### 5.3.3 Summary

In chapter 2 it was hypothesised that 'There is significant in-situ externalisation of manufacturing activities by independent firms, branches and subsidiaries in peripheral region economies'. The evidence from the Northern Region, detailed above, would suggest that, in the case of some branches and subsidiaries (for which intra-corporate trade is of some significance), intra-corporate trade, continues to represent a significant constraint upon the potential for vertical disintegration in the Northern Region. Whilst processes of outsourcing appear to be occurring among Northern Region manufacturing

establishments these are not necessarily to be associated with a long-term systematic process of vertical disintegration. Rather, horizontal disintegration (capacity subcontracting) and even processes of internalisation appear to be equally as important.

It was also hypothesised that 'There is significant localisation of backward linkages attending the in-situ externalisation of production within peripheral region economies'. There is rather less evidence, in the case of the Northern Region, in support of this hypothesis than that regarding in-situ vertical disintegration. Externalisation is in the majority of cases associated with absolute increases in the amount of business being given to local (Regional) suppliers rather than proportionate increases in the use of such suppliers. The effect upon levels of local sourcing of any increases in externalisation appear, therefore, to be minimal.

#### 5.4 NEW INWARD INVESTMENT: LINKAGE CHARACTERISTICS

In chapter 2 the rise of the importance of inward investment, and foreign direct investment in particular, to the Northern Region was identified. In particular, the rise of Far Eastern investments since 1979 in the North was evident. This section now examines whether branches and subsidiaries as recent greenfield inward investments (acquisitions are excluded) to the region are qualitatively different from the branches and subsidiaries of previous decades.

Table 5.13 compares the size of 'greenfield' branches and subsidiaries in employment terms as this varies according to period of establishment (be that the opening of a new factory or the transfer of an existing factory). Table 5.13 suggests that the greenfield branches and subsidiaries of the past decade are considerably smaller in size than those established during previous decades. The average size of greenfield branches and subsidiaries in the



TABLE 5.13

SIZE OF GREENFIELD INVESTMENTS BY PERIOD OF ESTABLISHMENT.

	0-99		100-249		250-499		500-999		1000-		Mean
-1945	0	(0.0)	4	(66.6)	1	(16.7)	0	(0.0)	1	(16.6)	681.8
1945-59	0	(0.0)	10	(41.7)	6	(25.0)	4	(16.7)	4	(16.7)	550.3
1960-69	4	(11.4)	9	(25.7)	16	(45.7)	5	(14.3)	1	(2.9)	336.1
1970-79	0	(0.0)	12	(54.5)	7	(31.8)	2	(9.0)	1	(4.5)	324.0
1980-	1	(6.3)	10	(62.5)	5	(31.3)	0	(0.0)	0	(0.0)	196.8

Source: author's survey.

TABLE 5.14

INDUSTRY SECTOR OF GREENFIELD INVESTMENTS BY PERIOD OF ESTABLISHMENT.

SIC	pre-1945		1945-59		1960-69		1970-79		1980-	
22	0	(0.0)	0	(0.0)	1	(2.8)	0	(0.0)	0	(0.0)
24	0	(0.0)	0	(0.0)	1	(2.8)	0	(0.0)	0	(0.0)
25	1	(16.7)	7	(29.2)	6	(17.1)	3	(13.0)	4	(23.4)
31	1	(16.7)	0	(0.0)	2	(5.7)	1	(4.4)	2	(11.8)
32	0	(0.0)	3	(12.5)	2	(5.7)	2	(8.7)	1	(5.9)
34	0	(0.0)	3	(12.5)	4	(11.4)	3	(13.0)	5	(29.4)
35	0	(0.0)	0	(0.0)	1	(2.8)	0	(0.0)	0	(0.0)
36	0	(0.0)	0	(0.0)	1	(2.8)	0	(0.0)	0	(0.0)
37	0	(0.0)	0	(0.0)	0	(0.0)	1	(4.4)	0	(0.0)
41	2	(33.3)	1	(4.2)	3	(8.6)	1	(4.4)	1	(5.9)
42	1	(16.7)	1	(4.2)	0	(0.0)	0	(0.0)	0	(0.0)
43	0	(0.0)	2	(8.3)	1	(2.8)	0	(0.0)	0	(0.0)
44	0	(0.0)	0	(0.0)	0	(0.0)	1	(4.4)	0	(0.0)
45	1	(16.7)	1	(4.2)	4	(11.4)	2	(8.7)	2	(11.8)
46	0	(0.0)	0	(0.0)	1	(2.8)	0	(0.0)	0	(0.0)
47	0	(0.0)	4	(16.7)	4	(11.4)	4	(17.4)	0	(0.0)
48	0	(0.0)	2	(8.3)	4	(11.4)	5	(21.7)	1	(5.9)
49	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	1	(5.9)

Source: author's survey.

sample of respondents has decreased from 681.8 for those established prior to 1945 to 196.8 for those established during the 1980's. Whereas the majority of greenfield branches and subsidiaries established up until the 1970's had over 250 employees the majority of branches and subsidiaries established in the 1970's and 1980's had less than 250 employees.

This of itself is suggestive of differences between the nature of greenfield investments of different periods of establishment. Despite the prospect that those longer established branches and subsidiaries have undergone considerable in-situ contractions in employment it is these older established branches and subsidiaries which remain the largest.

There are some differences between the profile of inward investments to the Northern Region according to period of entry. A greater proportion of contemporary inward investment than previous rounds of inward investment is likely to be composed of foreign direct investment as opposed to new investments by U.K. companies. Furthermore, a greater proportion of contemporary foreign direct investment than previous rounds of foreign direct investment is likely to be composed of investments by Far East manufacturers (see also chapter 4). However, as was noted earlier, this Far East investment has had a minimal impact upon the industrial structure. Far East direct investment has occurred in the same industries in the region as have witnessed disinvestment by U.S. manufacturers (Smith and Stone, 1989).

Undoubtedly some of the difference in size, and presumably in terms of the organisation of production, between older and more recent greenfield inward investments is due to temporal variations in the distribution of industries within which these investments have occurred. The design of the survey sample does not make allowance, however, for the effect of such temporal variations in the industry composition of inward investment to be factored out as for example with a matched pairs sample design (see, for example, Peck and Stone, 1990 and 1991). Some differences between the industry

composition of different rounds of inward greenfield investments have occurred are evident in Table 5.14. It is difficult to say categorically what effect differences between the industry composition of different rounds of investment are likely to have upon the results presented below. However, we can observe that the bulk of recent greenfield investments included in the analysis are within the chemicals and electrical and electronic engineering sectors.

It is also likely that new greenfield establishments are simply more capital intensive than their earlier counter-parts. There is some evidence to suggest that the size of establishments within particular industries has decreased over time. This is not sufficient to infer that the organisation of production at establishments of different vintages is decidedly different. For example, the average size of branches within the clothing and footwear industry within the region has tended to decrease over time. However, it is doubtful that, as a result of this, newer establishments are, for example, more vertically disintegrated or display radically different geographical patterns of backward linkages than older establishments.

Several studies have examined the differences in linkage patterns of inward investments according to their age or period of establishment. Whilst there may be good a priori reasons to expect differences between vintages of inward investments in terms of their organisation of production and hence in terms of their degree of integration into the local economy, there remains very little evidence in support of such a conviction.

Stewart's (1976) finding, that the increasing integration of foreign owned industry into the Irish economy was primarily a reflection of newer inward investments as opposed to in-situ linkage change among existing inward investments, contrasts with the majority of studies including an analysis of linkage change in peripheral regions. Most studies find a positive relationship between age of investment and degree of local linkage (McAleese and McDonald, 1978; Morley, 1976). These studies tend to stress that the

TABLE 5.15

COMPARISON OF PATTERNS OF PURCHASES AND SALES OF GREENFIELD INVESTMENTS ACCORDING TO PERIOD OF ESTABLISHMENT.

PURCHASES										SALES											
		U.K.				Overseas				Tot. corporate		U.K.				Overseas				Tot. corporate	
	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean			
-1945	6	8.17	6	56.67	6	43.33	6	24.50	5	69.80	5	30.20	5	13.20	5	13.20					
1945-59	15	25.00	15	66.93	15	33.07	15	13.20	17	68.47	17	30.06	17	19.65	17	19.65					
1960-69	23	16.52	29	70.15	29	28.83	29	17.34	26	81.92	26	18.38	26	29.69	26	29.69					
1970-79	19	15.74	20	55.20	22	47.82	20	12.30	20	65.10	20	34.00	20	25.95	20	25.95					
1980-	11	18.80	11	58.79	14	41.21	14	43.07	13	71.46	13	28.18	13	35.77	13	35.77					
F		0.80		1.12		1.62		2.32		0.87		0.75		0.55		0.55					

Source: author's survey.

differences between new and existing inward investments are primarily a reflection of a process of in-situ linkage change. It is suggested that new inward investments are frequently not as locally embedded, in terms of local linkages, as existing inward investments due to the fact that several processes of linkage adjustment have yet to take effect. For instance, fully localised manufacture may only be achieved after the assembly of kits and the substitution of local sources for company sources of inputs etc.. Such considerations highlight the problems of identifying any real differences that may exist, in terms of the organisation of production, between new and existing greenfield investments with the use of aggregate data.

#### 5.4.1 Externalisation

Table 5.15 shows the results of an analysis of variance test upon the patterns of backward and forward linkages of groupings of greenfield manufacturing investments according to period of establishment. An analysis of variance test compares the degree of variation (the sum of squared differences from the group mean) within groups of observations with the degree of variation (the sum of squared differences from an overall or 'grand' mean) between groups of observations. (Blalock, 1976) The larger the variation between groups of observations relative to the degree of variation within groups of observations the greater the likelihood that the groups of observations represent distinct populations with separate means; in this case, the greater the likelihood that different 'vintages' of greenfield investments have distinctly different linkage patterns. The results, in terms of statistical significance are naturally sensitive to the precise way in which groupings of observations are arrived at; in this case the categories pertaining to period of establishment. However, as was explained in section 5.1 of this chapter, the particular categorisation of period of inward

investment was intended, as far as was possible, to distinguish between rounds of inward investment.

Recent greenfield investments along with pre-1945 greenfield investments do appear to source high proportions of their total material input requirements from other corporate sites. Rather surprisingly, the greenfield investments of the 1960's and 1970's appear to be engaged in relatively moderate degrees of intra-corporate trading compared to both the pre-1945 and post-1980 greenfield investments.

A simpler comparison between different vintages of greenfield investments can be made by consolidating groups of investments into those pre-1980 (OII) and those post-1980 (NII) (Table 5.16). Table 5.16 does demonstrate that new (NII) greenfield investments source more of their total material input requirements from corporate sources than old (OII) greenfield investments. Indeed, such a difference between old and new greenfield investments in the degree of intra-corporate sourcing is highly statistically significant.

That differences between vintages of greenfield investments are likely to be a reflection of the fact that insufficient time has elapsed for new inward investments to have established fully localised manufacture was noted above. However, such are the differences between old and new inward investments in terms of the degree of intra-corporate sourcing that it would be difficult to support the contention that the differences apparent in table 5.16 are due entirely to such a process of transition to localised manufacture. Whilst it is expected that the degree of intra-corporate sourcing of new greenfield inward investments will decrease over the coming years, such linkage adjustment is unlikely to eliminate the large differences that exist between old and new inward greenfield investments in terms of intra-corporate sourcing. Similarly the expected increases in the degree of local sourcing are unlikely to be sufficient to mean that new greenfield investments have

TABLE 5.16  
COMPARISON OF PATTERNS OF PURCHASES AND SALES OF NEW (NII) AND EXISTING (OII) GREENFIELD INVESTMENTS.

	PURCHASES						SALES					
	N.R.		U.K.		Overseas		Tot. corporate		U.K.		Overseas	
	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
NII	14	18.86	14	58.79	14	41.21	14	43.07	13	71.46	13	28.16
OII	69	17.12	70	64.16	70	36.72	70	15.63	68	72.85	68	26.94
F	0.06	0.42	0.28	8.68	0.02	0.94	p<0.005					

Source: author's survey.

significantly more localised backward linkages than old greenfield investments.

The fact that there do not appear to be any significant differences between various vintages of greenfield investments in terms of geographical patterns of backward and forward linkages will be returned to later in this section. The differences between old and new greenfield investments in terms of intra-corporate sourcing, however, suggest that the latter are likely to be more vertically integrated than the former. Consequently the contribution of new greenfield investments to aggregate processes of vertical disintegration in the Northern Region is likely to be less than that of older greenfield investments. We can investigate this further by examining differences between old and new greenfield investments in terms of the extent of subcontracting and outsourcing of manufacturing activities.

Two points of comparison between the extent to which new and old greenfield investments are currently outsourcing component requirements and subcontracting manufacturing activities can be observed in table 5.17. Firstly, none of the new greenfield investments experienced a decrease in the proportion of manufacturing activity subcontracted or component requirements outsourced. Secondly, the differences in the extent to which new and old greenfield investments are currently outsourcing component requirements is minimal (Table 5.18i). On the other hand, the differences in the extent to which old and new greenfield investments are currently subcontracting manufacturing activities is considerable (although not statistically significant) (Table 5.18ii).

It may be that the nature of externalisation of production by new and old greenfield investments differs. Tables 5.19 and 5.20 can provide a limited indication of the likelihood of such differences in motivations to externalisation. Although the motives for increased subcontracting of manufacturing activities are broadly similar in the case of new and old



TABLE 5.17

FREQUENCIES AND PERCENTAGES OF EXISTING (OII) AND NEW GREENFIELD INVESTMENTS (NII) EXPERIENCING PROPORTIONATE CHANGES IN MANUFACTURING ACTIVITIES SUBCONTRACTED AND COMPONENTS BOUGHT-OUT.

-----						
Subcontract			Components			
.....						
	Inc.	Same	Dec.	Inc.	Same	Dec.
-----						
NII	7 (70.0)	3 (30.0)	0 (0.0)	5 (45.5)	6 (54.5)	0 (0.0)
OII	19 (42.2)	16 (35.6)	10 (22.2)	23 (43.4)	26 (49.1)	4 (7.5)
-----						

Source: Author's survey.

TABLE 5.18 i-ii

TWO BY TWO CONTINGENCY TABLES COMPARING PROPORTIONATE CHANGES IN MANUFACTURING ACTIVITIES SUBCONTRACTED AND COMPONENTS BOUGHT-OUT AMONG EXISTING AND NEW GREENFIELD INVESTMENTS.

-----				
Subcontract			Components	
.....				
	Inc.	No inc.	Inc.	No inc.
-----				
NII	7 (70.0)	3 (30.0)	5 (45.5)	6 (54.5)
OII	19 (42.2)	26 (57.8)	23 (43.4)	30 (56.6)
-----				

$$\chi^2=2.689$$

$$\chi^2=1.834$$

Source: author's survey.

TABLE 5.19

REASONS FOR INTERNALISATION OF COMPONENT REQUIREMENTS AND  
MANUFACTURING ACTIVITIES PREVIOUSLY SUBCONTRACTED AMONG  
EXISTING INVESTMENTS.

----- COMPONENTS .....	
	OII
-----	-----
Process innovation.	1 (14.3)
Changes in demand.	1 (14.3)
Increased in-house manufacturing capacity.	2 (28.6)
Lower cost of manufacturing in-house.	2 (28.6)
Flexible use of labour.	1 (14.3)
Other reasons.	0 (0.0)
-----	-----
Total responses	4
-----	-----
----- SUBCONTRACT .....	
	OII
-----	-----
To assure the quality of inputs.	6 (60.0)
To protect this company's specific knowledge or technology.	0 (0.0)
To economise upon the costs of contracting with suppliers.	4 (40.0)
To avoid disruption to the supply of inputs.	1 (10.0)
To achieve economies of scale.	7 (70.0)
Other reasons.	0 (0.0)
-----	-----
Total responses	10
-----	-----

N.B. Respondents were asked for the two main reasons as to why internalisation had occurred therefore percentages do not sum to 100.

Source: author's survey.

TABLE 5.20

REASONS FOR INCREASED OUTSOURCING OF COMPONENT REQUIREMENTS AND  
SUBCONTRACTING OF MANUFACTURING ACTIVITIES AMONG EXISTING AND  
NEW INVESTMENTS

COMPONENTS		
	NII	OII
Increase in business.	2 (40.0)	8 (57.1)
Increase in the product range.	1 (20.0)	3 (21.4)
Change in the output mix.	1 (20.0)	5 (35.7)
Product innovation or sophistication.	1 (20.0)	2 (14.3)
Lower costs of suppliers.	0 (0.0)	2 (14.3)
Other reasons.	1 (20.0)	7 (50.0)
Total responses	5	14

SUBCONTRACT		
	NII	OII
To provide capacity for variation in demand for your products.	3 (42.9)	13 (68.4)
To take advantage of a supplier's specialised knowledge or technology.	5 (71.4)	12 (63.2)
To take advantage of lower labour costs open to suppliers.	1 (14.3)	4 (21.0)
To avoid industrial disputes over parts of the production process.	0 (0.0)	0 (0.0)
To take advantage of economies of scale open to suppliers.	1 (14.3)	4 (21.0)
Other reasons.	1 (14.3)	4 (21.0)
Total responses	7	19

NB. Respondent were asked for the two main reasons as to why internalisation had occurred therefore percentages do not sum to 100.

Source: author's survey.

greenfield investments, the former would appear to be involved in forms of subcontracting which are likely to be less ephemeral than the latter. Fewer new (42.9%) than old (68.4%) greenfield investments appear to have engaged in capacity subcontracting. Correspondingly, more new (71.4%) than old (63.2%) greenfield investments appear to have engaged in speciality subcontracting.

#### 5.4.2 Geographical patterns of linkages

That new greenfield investments are expected to externalise more production and increase their local sourcing as a process of linkage adjustment takes place was noted. The section above confirmed that the externalisation of production was indeed more prevalent among new than old greenfield investments. We can now consider to what extent such processes of externalisation are translated into increased local sourcing.

Tables 5.21i-iv compare the extent to which the increased outsourcing of component requirements and subcontracting of manufacturing activities by old and new greenfield investments is translated into absolute and proportionate increases in local sourcing. Tables 5.21 (i) and (ii) show that following the externalisation of component requirements the majority of both new and old greenfield investments increased their use of local suppliers in absolute terms (i.e. increased the total amount spent upon inputs purchased locally). However, such an increase in externalisation of component requirements is, for the majority of respondents, unassociated with a proportionate increase in the use of local suppliers. Hence whilst the trends toward outsourcing of component requirements are reasonably strong (Table 5.17) they are significantly unassociated with a localisation of backward linkage structures.

One important difference between new and old greenfield investments emerges with respect to the extent to which increases in subcontracting are

TABLE 5.21

TWO BY TWO CONTINGENCY TABLES COMPARING DIFFERENCES IN THE EXTENT TO WHICH EXTERNALISATION BY EXISTING AND NEW GREENFIELD INVESTMENTS IS ASSOCIATED WITH ABSOLUTE AND PROPORTIONATE INCREASES IN THE USE OF LOCAL SUPPLIERS.

COMPONENTS					
(i)			(ii)		
Absolute			Proportionate		
.....			.....		
Inc.	No inc.		Inc.	No inc.	
OII	12 (66.7)	6 (33.3)	5 (21.7)	18 (78.3)	
NII	4 (66.7)	2 (33.3)	1 (20.0)	4 (80.0)	
$\chi^2=2.667$			$\chi^2=5.474$ $p<0.05$		

SUBCONTRACT					
(iii)			(iv)		
Absolute			Proportionate		
.....			.....		
Inc.	No inc.		Inc.	No inc.	
OII	12 (66.7)	6 (33.3)	4 (21.1)	15 (78.9)	
NII	4 (57.1)	3 (42.9)	4 (60.0)	3 (40.0)	
$\chi^2=2.143$			$\chi^2=5.755$ $p<0.05$		

Source: author's survey.

associated with absolute and proportional increases in purchases within the Northern Region. Whereas both old and new greenfield investments tend to purchase more locally in absolute terms -as a result of increased subcontracting (table 5.21 iii), Table 5.21 iv shows that a greater proportion of new greenfield investments tend to increase their use of local suppliers in proportionate terms, as a result of increased subcontracting, than old greenfield investments.

Returning to tables 5.15 and 5.16 to explore differences in the overall geographical patterns of backward and forward linkages, no statistically significant differences between vintages of greenfield investments are apparent. Surprisingly, pre-1945 greenfield investments appear to be the least integrated into the Northern Region economy; taking only a small proportion of inputs from within the region and a high proportion of inputs from corporate sources. Whilst the greenfield investments of the 1960's and 1970's are only weakly integrated into the Northern Region this does not, contrary to expectations, appear to bear any relation to the degree of intra-corporate sourcing. Recent (i.e. post 1979) greenfield investments do not appear to have different geographical patterns of linkages from greenfield investments of earlier years. The presumption that such recent greenfield investments might be more oriented toward the emerging single European market and hence send a higher proportion of sales overseas is not borne out by the data in tables 5.15. and 5.16. The fact that there are few differences in the export orientation of different vintages of investments is likely to be due, in no short measure, to the dramatic in-situ increases in export orientation among longer established manufacturing establishments (see section 5.3.2). New investment is undoubtedly more oriented to the European market than previous rounds of investment, however, the contribution of new investment to the overall export orientation of the region's manufacturing industry is obscured by a process of in-situ reorganisation of forward linkages.

The difficulties in ascertaining whether there are any real differences between vintages of greenfield investments in terms of the organisation of production and hence linkages were noted earlier. It could be that one reason as to why new greenfield investments do not appear to have markedly different linkage patterns from older greenfield investments is due to the process of in-situ change among the latter. However, in section 5.3.2, pre-1980 manufacturing establishments were found to have sourced less from the regional economy during the last decade. Thus, not only is there a lack of differences in patterns of local sourcing between old and new investment but this similarity is also within the context of static or declining levels of local sourcing by the region's existing manufacturing industry. Given this, it is difficult to sustain the argument that the new branch plants are a breed apart from the old.

#### 5.4.3 Summary

In chapter 3, the general hypothesis that 'New greenfield investments to peripheral region economies externalise more of their manufacturing activities than older greenfield investments.' was formulated. The discussion in this section has highlighted that no such significant differences exist. Furthermore, it seems likely that any differences in the future propensity of new and old inward investments to become more vertically disintegrated are small.

Whilst new inward investments appear more likely to use local suppliers when increasingly outsourcing components or increasing their use of subcontractors this does not appear to contribute to differences in overall geographical patterns of purchases of material inputs. Thus there would appear to be little support for the hypothesis that 'New greenfield investments to peripheral region economies have significantly more localised backward

linkages than older greenfield investments.'.

## 5.5 CONCLUSION

The preceding sections of this chapter have demonstrated that processes of externalisation of production by Northern Region manufacturing establishments are in evidence. However, such trends are relatively weak. Intra-corporate trade in the form of inputs from corporate sources represents, as expected, a significant constraint upon the extent of vertical disintegration in the Northern Region. Reasonable proportions of manufacturing establishments are externalising manufacturing activities previously performed in-house, on-site. Some of this externalisation appears to be of a relatively ephemeral, non-systematic nature.

The processes of externalisation evident in the Northern Region are not, on the whole, leading to an increase in local sourcing from the localisation of backward linkage structures. Whilst local suppliers are highly likely to benefit in terms of increases in business it appears that, for the majority of establishments, proportionately more business is being placed with non-regional suppliers following the externalisation of production. Consequently, there appears to be no marked changes in the degree of local sourcing exhibited by Northern Region manufacturing establishments and certainly no significant increase in the degree of local sourcing.

The northern Region continues to be integrated into an intra-, and increasingly, an inter-national division of labour. Many existing manufacturing establishments have become more export oriented. There is also the suggestion that processes of rationalisation and reorganisation by many multinational companies with operations in the region is leading to a more internationalised system of intra-corporate trading into which Northern Region manufacturing establishments fit.



There appears to be a reasonable degree of in-situ externalisation of production in evidence among Northern Region manufacturing establishments, However, such processes are significantly unassociated with any increased localisation of backward linkage structures. Indeed, the evidence suggests that in-situ change among establishments has led to a decrease in local sourcing. There is considerable evidence of in-situ increases in export orientation of Northern Region manufacturing establishments.

In chapter 2, it was suggested that new greenfield investments may be directly transforming the regional economy by virtue of the fact that the organisation of production at such establishments differs significantly from previous greenfield investments. The issue is clouded by the inherent difficulties of comparing vintages of investments. It was found, perhaps as a result of the in-situ change among existing establishments described above, that differences between old and new greenfield investments in terms of the degree of vertical integration and extent of externalisation were not particularly significant. Indeed new greenfield investments, although tending to externalise more production activities than existing establishments were also seen to be involved in high degrees of intra-corporate sourcing of inputs. As a consequence, the differences between old and new greenfield investments in terms of geographical patterns of sourcing were insignificant. Furthermore, new greenfield investments did not appear to be more export oriented than older greenfield investments.

This chapter has provided some evidence of the extent of processes of externalisation and changes in the geographical patterns of input and output linkages of manufacturing establishments in a peripheral region. The information presented above can, however, provide little indication of the causes or nature of these aggregate changes in linkage patterns. The following chapter attempts to understand the causes and nature of linkage change by examining it within its full and proper corporate, market and technological

context. With the results of this chapter in mind, it would appear that there are likely to be a number of reasons as to why processes of externalisation, although in evidence, are not, on the whole, leading to more localised linkages.

## CHAPTER 6

### THE CAUSES AND NATURE OF LINKAGE CHANGE: CASE STUDY EVIDENCE

#### 6.1 INTRODUCTION

In chapter 2 it was argued that both the likely extent and causes and nature of processes of externalisation linkage change in peripheral regions would be rather different than is the case for contemporary examples of the agglomeration of industries. This, in turn, was seen to be a reflection of the unique way in which changes in technology and in market demand and changes in corporate structures and strategies impinge upon the organisation of production at peripheral region manufacturing establishments. It is precisely this unique combination of factors and their impact upon linkage structures of Northern region manufacturing industry that this chapter examines.

The previous chapter found that the extent of externalisation and of localisation of backward linkages by Northern Region manufacturing industry was limited. In briefly pursuing the possible reasons for these findings the previous chapter raised two important points regarding the likely nature of linkage change in the region. It was suggested that the precise geographical implications of peripheral region linkage change would reflect, a) the types of activities being externalised relative to the industrial structure of the region in question and, b) the operation of forms of linkage change other than externalisation. The latter of these two observations is explored in greater depth in this chapter, where, in conclusion, processes of externalisation are found to be rather limited in comparison to other forms of contemporary linkage change evident at the case study establishments.

FIGURE 6.1

SUMMARY TABLE OF CASE STUDY ESTABLISHMENT DETAILS.

CASE STUDY COMPANY			CASE STUDY ESTABLISHMENT			
Nat.	Range of products	Tot. emp. 1989	Location	Date of estabmt.	Range of products	Tot. emp. 1989
Black & Decker	U.S. Electric power tools & other D.I.Y. equip- ment. Small domestic electric appliances. Various hardware & materials.	38,600	Spennymoor	1965 G	Electric power tools & other D.I.Y. equipment	1250
Electrolux	Swe. Complete range of domestic appliances. Gardening equipment	147,200	Spennymoor	1987 A	Electric cookers	800
Eaton Corp.	U.S. Electrical & electronic controls. Vehicle components.	37,932	Newton Aycliffe	1963 A	Truck axles	250
Cummins Engines	U.S. Diesel engines.	26,100	Darlington	1965 J	Diesel engines	850

Source: company annual reports.

Whereas the previous chapter necessarily examined a limited set of linkage changes in a partial setting, this chapter attempts to explore the relationship of linkage change at each of the case study establishments within its wider corporate, market and technological context. By way of introduction to the case studies the following section briefly summarises the main ways in which changes in technologies, market circumstances and corporate structures and strategies impinge upon the organisation of production and linkage structures at the case study establishments. The next section explores the causes and nature of changes in intra-corporate linkages. The latter set the context for understanding the causes and nature of changes in inter-corporate linkages reviewed in the subsequent section.

## 6.2 INTRODUCTION TO THE CASE STUDIES: THE IMPACT OF CORPORATE STRUCTURES AND STRATEGIES AND CHANGES IN TECHNOLOGY AND MARKET DEMAND UPON LINKAGES

The review contained in chapter 2 indicated that changes in technologies, market circumstances and corporate structures and strategies each had an effect upon organisational and linkage change at individual manufacturing establishments. This section provides an introduction to each of the case studies - brief details of which can be seen in Figure 6.1 - by way of a preliminary examination of the main ways in which each of these factors impinged upon the organisation of production at the individual case study establishments. The following two sections then explore in greater detail the role of changes in technology, market demand and corporate structures and strategies in effecting particular forms of intra- and inter-corporate linkage change.

### 6.2.1 Corporate structure and strategy

In contrast to accounts of recent restructuring positing the emergence of systems of 'flexible specialisation' or 'flexible accumulation', a major argument of this thesis is that existing corporate structures and strategies are likely to constrain the prospects for vertical disintegration and hence local sourcing in peripheral regions. In particular, organisational interdependencies, reflecting existing managerial and technical divisions of labour, are likely to significantly restrict processes of vertical disintegration and hence the prospects for increased local sourcing. The case studies provide confirmation of this theoretical argument. The maintenance or refinement of corporate managerial and technical divisions of labour has naturally supported existing intra-corporate linkages but has also been an important factor behind processes of linkage consolidation.

Three out of the four case study establishments are part of companies with diversified business interests. Electrolux's Spennymoor electric cooker factory, Eaton's Aycliffe axle factory and Black & Decker's Spennymoor power tool and D.I.Y. product factory are each part of large diversified multinational companies. The former is part of a large site producing electric cookers and refrigerators within the Electrolux group which was acquired as part of Thorn EMI's domestic appliance division in 1987. The case study focuses upon the electric cooker operations at Spennymoor. These electric cooker manufacturing facilities are the lead site in the Electrolux group for experimenting with concepts such as 'just-in-time', 'World Class Manufacturing' as well as the introduction of EDI with suppliers. Eaton's Newton Aycliffe axle factory, previously part of ENV Engineering - a joint venture between Rubery Owen and Co. Ltd. and Eaton established in 1947 - was finally acquired in 1962 along with other factories at Manchester, Warrington and Darlaston. Newton Aycliffe, the largest of these sites, was the

headquarters of the European truck components division of a much larger and diversified company<sup>1</sup> until 1982. Black & Decker's Spennymoor factory is the company's largest in terms of turnover. The factory was established in 1965 as greenfield operation during the period of the company's most rapid expansion<sup>2</sup>. Cummins Diesel Engines Ltd. at Darlington is, on the other hand, part of a medium sized single product U.S. multinational concerned exclusively with the manufacture and reconditioning of heavy duty diesel engines<sup>3</sup>.

None of the case study establishments appeared to have benefited from the devolvment of decision-making responsibilities within their respective corporate contexts. Indeed, far from there being any re-synthesis of the managerial division of labour within the case study corporations, three of the four case study establishments appeared to have lost a greater or lesser degree of decision-making autonomy as a result of an increasingly hierarchical corporate managerial division of labour. Eaton's axle factory at Aycliffe, for instance, was transformed from a divisional headquarters to a rationalised

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<sup>1</sup>In 1911 the Torbenson Gear and Axle Co., the forerunner of Eaton Corporation, was incorporated in Bloomfield, New Jersey. In the first year of production just seven axles were built. The company expanded during the 1920's and 1930's through acquisition and in 1937 the company established its first factory outside the U.S.; in Windsor, Ontario. Not until 1959 did the company become a multinational with the establishment of manufacturing operations for transmissions in Brazil. During the 1960's, the company's truck component interests expanded rapidly in geographical and sales terms with acquisitions of factories in England and elsewhere in Europe. The company also made significant moves to become more diversified (Eaton Corporation, 1985b).

<sup>2</sup>The Black and Decker manufacturing Company (later to be renamed the Black and Decker Corporation) was founded in Baltimore, Maryland in 1910. Twelve years later the company began manufacturing in Canada and by 1928 became a small multinational with the addition of manufacturing facilities at Slough in England. Based upon the dominant position in consumer and professional power tool markets built up in a relatively short period during the late 1950's to 1960's, the company began to expand rapidly in terms of geographical spread of manufacturing operations during the 1960's and 1970's (Black and Decker Corporation, 1986b).

<sup>3</sup>In 1919 Cummins Engine Company was founded in Columbus Indiana. Not until 1955, however, did it become a multiplant enterprise with the addition of a second factory in Columbus. Cummins did not become a transnational company until 1956 with the opening of a factory at Shotts, Lanarkshire. Shortly after, in 1960, the company became a multinational with the opening of a factory in Australia (Cummins Engine Co., 1985b).

branch plant during restructuring in the 1980's. Losses of decision-making autonomy at Black & Decker and Electrolux's factories in the North East have been less dramatic. Black & Decker's Spennymoor operations continue to be one of just two research and development sites within the company, however, decisions regarding the location of manufacture of products are now made at corporate head office in the U.S.. Prior to acquisition by Electrolux, Thorn EMI's Spennymoor electric cooker and refrigerator factories used to be managed as a self contained operation. However, both the cooker and refrigerator operations are now integrated into a much larger grouping of similar manufacturing operations.

Similarly the case studies provide no evidence of any re-synthesis of the technical division of labour within corporations. Material interdependencies between case study establishments and other company establishments have remained important at those case study establishments where they have historically been of importance (i.e. Cummins). Otherwise, case study establishments become, for one reason or another, increasingly integrated into patterns of intra-corporate trade (i.e. Black & Decker, Eaton, Electrolux). Black & Decker's and Electrolux's factories in the North East have both been subject to corporate strategies which accord particular product and component roles to individual company operations. Eaton's program of rationalisation, on the other hand, has increased significantly the dependence of its Northern Region factory upon work re-distributed from other company operations.

#### 6.2.2 Technology

Chapter 2 identified the role of product, process and communications technologies in engendering contemporary organisational and linkage change. Changes in all three technologies and their impact upon the organisation of



production and linkages were examined at each of the case study establishments. Changes in product and process technology at the case study establishments proved to be closely related. At those establishments at which significant changes in product and process technology were evident (i.e. Black & Decker and Cummins) it was some combination of the two that was observed to engender corresponding changes in the organisation of production and linkage structures. Significant linkage changes have also occurred at case study establishments which have experienced little in the way of either product innovation or investment in new process technology (i.e. Eaton and Electrolux).

We can distinguish between those changes in product technology which are, relatively infrequent discrete developments accompanied by costly reorganisation of, and/or investment in, process technology, those which represent relatively frequent incremental changes which may or may not be accompanied by similar changes in process technology, and those which are minimal or non-existent, which may or may not be associated with changes in process technology. A similar distinction is made by Mason et al (1991). Clearly the timing and the scale of investment in the cases of discrete and incremental changes in product technology are radically different.

There is a close connection between the form of changes in product technology and the form of changes process technology at particular establishments. With regard to changes in process technology, we can distinguish between 'technological change' and the 'intensification' of production (after Massey and Meegan, 1982). The former involves major investment in equipment, the latter can involve small piecemeal investment in equipment.

Major changes in product technology, whether discrete or incremental are usually accompanied by major changes in process technology. Examples of changes in product technology unrelated to changes in process technology at

case study establishments were therefore rather limited; reflecting changes in corporate wide divisions of labour and hence reallocations of product responsibilities among company sites. Increases in product ranges at case study establishments were found to reflect the allocation of additional product responsibilities as a result of rationalisation (Black & Decker and Eaton) and as a result of acquisition and utilisation of different brands (Electrolux). Thus, in the wake of a far-reaching program of rationalisation, Black & Decker's Spennymoor factory produces approximately 20% of the company's sales and is jointly the largest manufacturing site in the company (with Tarboro, U.S.A.). It is one of just two remaining design centres in the company. 80% of the U.K. market for Black & Decker's products are supplied from the Spennymoor factory which exports 70% of total output (30-40% of which goes to mainland Europe)<sup>4</sup>. The factory produces 22 basic product groups tailored to a range of electrical specifications and regional preferences. On the other hand, although Electrolux has broadened the range of electric cookers (primarily through the manufacture of other brands controlled by the company) produced at the Spennymoor factory it acquired from Thorn EMI there has been little change in export orientation of this factory<sup>5</sup>. At present the site is geared toward producing a range of electric cookers (free standing, fitted cookers, etc.) with different chassis on a batch basis. The basic metalworking (steel cutting, presswork, welding) for the different chassis is organised on a batch basis as is the subsequent assembly work.

Cummins' diesel engine factory at Darlington provides an example of discrete changes in product technology. The factory was set up in 1963 as a joint venture with Chrysler to manufacture small 'Vee' diesel engines intended primarily for the U.K. market. Due to technical problems the Vee engine failed

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<sup>4</sup>Exports from the Spennymoor factory had risen from 35% of sales in 1966 to 50% of sales in 1970 (Evening despatch, 24-2-71).

<sup>5</sup>Exports from cooker facilities at Spennymoor were around 10% prior to acquisition by Electrolux (Northern Echo, 13-1-87).

to gain a sizeable share of the U.K. market and so Cummins quickly reached agreement with D.I.N.A., the Mexican state owned truck manufacturer which was to be the major customer for Darlington Vee engines throughout the life of that engine. During the early 1980's the Darlington engine plant was bidding against other U.K. and U.S. plants to produce the company's new B series engine. The Vee engine was to be superseded by the new B series engine and its demise was hastened by the collapse of the Mexican economy during the world recession of the late 1970's and early 1980's. In a deal signed with B.L. - the major customer for the engine in the U.K. - the Darlington factory was to produce the new engine. B.L. pulled out of the deal and was subsequently divested to D.A.F. - a vertically integrated OEM with its own engine manufacturing facilities - Despite concern over the long term market for the engine, Cummins went ahead with manufacturing the B series at Darlington. Currently D.A.F. continues to account for a large share of Cummins' U.K. sales of the B series, although the pattern of sales of the B series is more diverse than that for the Vee engine<sup>6</sup>.

Black & Decker's power tool operations at Spennymoor, on the other hand, are an example of incremental or evolutionary changes in product technology. Design modifications to products have been ongoing, whilst there have been several advances in process technology associated with assembly of electric motors which fit into many of the company's products.

Thus, whilst the cases exemplifying major technical change are different in respect of the frequency and scale of such innovations they present a remarkably similar account of the relationship between technical change and wider organisational changes. These two cases of major changes in product and process technology exemplify the attempt to simplify the production process

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<sup>6</sup>Exports of the Vee engine grew from 61% in 1966 to 80% in 1968 to 86% in 1971 to 97% in 1978 (Northern Despatch, 21-7-66; 10-1-68; 27-7-71; 29-6-78). Around one-third of these exports went to one single customer, D.I.N.A.. Currently, exports of the B series engine are around 30% of total sales (author's interviews).

and external linkage structures; the latter being achieved primarily through reduced numbers of discrete inputs and the opportunities for consolidation of purchases and externalisation of activities.

Eaton's axle producing factory at Newton Aycliffe represents a case where product technology has remained virtually unchanged. In the absence of either major product or process innovation at Newton Aycliffe axle factory a changes in the organisation of production have been centred on intensification through the reorganisation of work practices. Similarly, the electric cookers produced at Electrolux's Spennymoor plant have remained largely unchanged. Intensification, until recently, has taken the form of investment in various pieces of equipment rather than radical reorganisation of work practices<sup>7</sup>.

Only one company was, as yet, using communications technology to schedule materials to any significant extent. All the case study companies were committed to pilot schemes but for various reasons such schemes had yet to take shape. The use of communications technology to schedule materials and finished products appears to be in its infancy. It is no accident that the greatest use of such technology was at a case study establishment (Cummins) which fits into a transnational production system composed of regular and important flows of component parts. The volume of intra-corporate trade, and hence existing corporate structures and intra-organisational interdependencies, has prompted the use of communications technology which has then been extended to suppliers and downstream companies. The main impact of communications technologies seems therefore to have been in reinforcing

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<sup>7</sup>In the early 1980's, after many of the former 1300 employees had been made redundant, it was described how 'multiple machine minding is essential to our survival and competitiveness' (Evening Despatch, 17-3-81). Such multiple machine minding has since been enshrined in further agreements with the A.E.U. alongside the introduction of the 'Eaton philosophy' to Aycliffe. The significance of this change in the social organisation of production should not be underestimated. Between 1980 and 1986, sales per employee increased four times, the number of standard minutes required to make an axle fell by 36% but between 1980 and 1984 there had been no investment in new machinery (Brittan, 1986: 56).

existing corporate managerial and technical divisions of labour and hence existing patterns of intra-corporate trade and subsequently in the realm of consolidation of purchases of inputs at a division or corporate-wide level.

### 6.2.3 Market conditions

Market structures have been argued to be becoming less concentrated as a consequence of the undermining of the need for scale economies deriving, in turn, from fragmentation of markets and the emergence of customised or differentiated products. This section summarises the main impact of changing market circumstances upon the organisation of production and linkages at the case study establishments.

Only one of the case study establishments could be said to be operating in a market that could be construed to be fragmenting. Black & Decker is a medium sized U.S. multinational company which has enjoyed world leadership in markets for electrically powered tools. During the 1980's the company diversified as its power tool business experienced losses in market share with competitors taking up particular niches in the power tool market. However, it is arguable whether such fragmentation of the market as suggested by the company's loss of market share has been accompanied by the undermining of scale economies. Economies of scale in power tool manufacture remain important and are consistent with increased product variety. Black & Decker's loss of market share reflects the difficulties of disassociating itself from its very success as a mass manufacturer and marketer.

Three out of the four case study establishments manufactured products which were becoming more standardised and the markets for which were becoming more concentrated. For different reasons, the axles produced by Eaton at its Aycliffe factory, the cookers produced by Electrolux at its Spennymoor factory and the diesel engines produced by Cummins at its Darlington factory are

becoming more standardised. Both Cummins and Eaton face similar circumstances in terms of intensified competition coupled with developments in product technology in the direction of standardisation. However, their reactions have been rather different. Cummins - a small single product multinational company - had little option but to invest in new products and processes in order to compete whereas Eaton's major diversification into 'high-tech' activities at an economically unpropitious time diverted funds away from investment in its truck components division. Electrolux, on the other hand, is attempting to champion moves toward standardisation of domestic appliances and integration of the various national European markets. The company is unique in terms of its presence in several of the major national markets within Europe and correspondingly has perceived the unique opportunity to standardise its products.

Each of the case study establishments faced pressures from customers in relatively concentrated downstream markets to reduce inventories. The institution of 'just-in-time' supplier relations and reductions in inventories by the powerful OEMs provided an important stimulus to Eaton's and Cummins' subsequent attempts to adopt similar practices. Similarly, Electrolux and Black & Decker have had little choice but to react to the inventory reductions made by larger retailers.

The precise form and implications of linkage change at each of the establishments has partly reflected the variability of upstream market structures. The general motivation to gain pecuniary external economies through linkage simplification holds whether suppliers are within a relatively competitive market situation or oligopolistic or monopolistic situation. It is likely that inputs for which markets are relatively competitive will be subject to some localisation of sourcing both as a result of the elimination of multiple sourcing and the switch to existing local suppliers or else the relocation of suppliers. However, the success of 'just-in-time' systems of

delivery the localisation of sourcing may be impaired in those instances where suppliers operate in oligopolistic or monopolistic market situations.

### 6.3 INTRA-CORPORATE LINKAGE CHANGE

In order to understand the scope and setting for processes of inter-corporate linkage change at the case study establishments it is first necessary to consider the changing scale and nature of intra-corporate linkages. The case studies provided examples only of increasing or stable - as opposed to decreasing - interdependence in terms of intra-corporate material linkages.

#### 6.3.1 Increasing interdependence

Black & Decker has become significantly more diversified in recent years. The company had only moved very selectively into related product areas during the 1970's when it was enjoying monopoly shares in its power tool markets. As competition from Japanese and W. German manufacturers has significantly eroded these market shares during the 1980's the company has made more concerted efforts to diversify. In 1984 the company purchased General Electric's small domestic electric appliance division (adding a further seven manufacturing facilities) and a year later Rank Electric Housewares Pty and Rank Electric Appliances Ltd. (with a manufacturing operation in New Zealand) in what was widely interpreted as a piece of defensive diversification. There was further diversification in 1988 with the acquisition of Emhardt Corporation.

In 1979 with 23 manufacturing sites in 12 different countries on four continents, Black & Decker perceived its operations as being truly global in nature.

In order to be effective in the market place, Black and Decker follows a decentralised organisational approach. All business functions (marketing, engineering, manufacturing, etc.) are kept as close as possible to the market to be served.... the company's strategy is a global one, and Black and Decker operates in virtually all parts of the world. This reduces the effect of a slowdown in the economy of any one nation. (Black & Decker, 1979: 31).

This organisation of power tool manufacturing operations was greatly modified over the subsequent decade through divestment, rationalisation of power tool manufacturing operations and the acquisition of manufacturing capacity.

The acknowledged erosion of profits as Black & Decker attempted to match competition in its professional power tool markets prompted, in 1983, the sale of the McCulloch gasoline chain saw business and the first of two rounds of factory closures and contractions. Despite the reports of a return to profitability in the wake of the first round of factory closures the need for further rationalisation was apparent. Factories newly acquired from General Electric figured prominently in the closures that occurred throughout 1985 and 1986. The company consolidated its power tool operations into a smaller number of larger, more specialised, factories. The number of research and development sites in the company decreased from eight to just two during the 1980's. Factory autonomy has correspondingly decreased with the centralised allocation of new products to various company factories. As a result, various factories have gained additional product and market responsibilities. During the 1980's, therefore, a new global manufacturing strategy had emerged.

Globalisation remains a strategic objective. In 1985, sound progress was made in designing and marketing products for a worldwide market rather than just regional ones. Focused design centres will ensure a greater number of global products for the future. The basic communications systems for linking all design centres are now in place. Global purchasing programs have been established, and cost benefits are being realised. (Black & Decker, 1985: 4).

Despite the company having been considered an exemplar of mass production techniques twenty years ago, there was clearly much scope for standardisation in production and a more integrated approach to worldwide mass production. The allocation of manufacturing responsibilities for new products emanating from



these two design centres among company factories is made according to expectations regarding least cost/profit maximisation which can provide a worldwide product mandate.

The corporate division of labour has also been refined to permit particular company sites to specialise in particular products and particular electric motors. Thus,

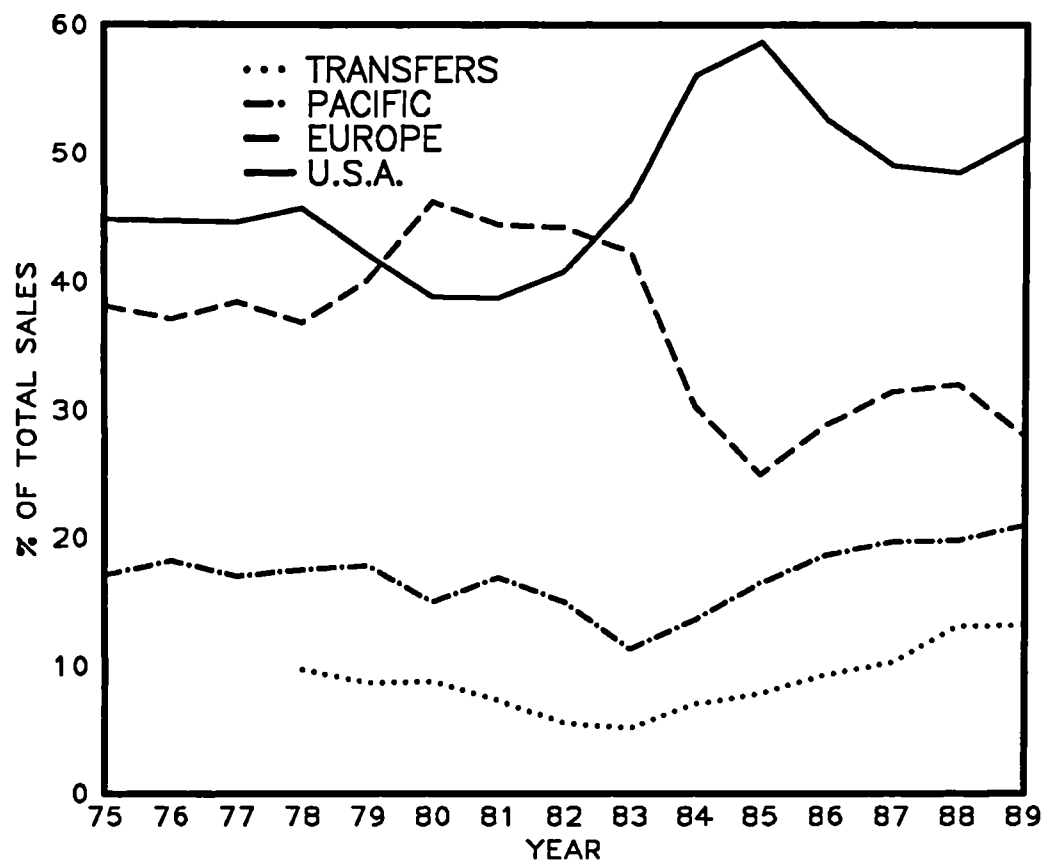
What we have done around the world is standardise our motor modules.... there has been a very clear motor strategy which says that individual plants are the specialists in a particular size of motor. (author's interviews).

The prospects for such standardisation and further economies of scale are apparent with the current development of a 'global' motor pack capable of being assembled and used in products made at any one of the company's manufacturing locations.

The severe recession coinciding with increased competition from European and Japanese manufacturers has engendered a definite change in structure and strategy of a company that remains a transnational monopolist. The company has moved away from a situation whereby its manufacturing plants had a relatively wide product range, a fuller range of business functions (esp. R&D) and manufactured a range of different motors for assembly into their own products to a situation whereby plants specialise on the basis of a particular motor and a narrower product range associated with that particular motor size. As a consequence, we should expect that the company has increasingly served particular geographical markets indirectly (exports) and the volume of intra-corporate trading of semi-finished products (i.e. motors) to have increased. Figure 6.2 provides some basis for confirming these deductions. Up until 1982/83 the company had been expanding in geographical terms. At this time it was at its most extensive geographically and operated a decentralised manufacturing strategy. However, as rationalisation during the 1980s took place and a new strategy began to emerge the importance of intergeographical

FIGURE 6.2

INTER-GEOGRAPHIC TRANSFERS AND GEOGRAPHICAL DISTRIBUTION OF SALES  
OF BLACK & DECKER.



Source: Black & Decker annual reports, various years.

transfers (measured as the proportion of value of total sales accounted for by such transfers) which had been gradually falling until 1982/83 has begun to gradually increase.

Unfortunately it is not possible to decompose the figures for inter-geographic transfers which include exports of finished products as well as transfers of semi-finished products (i.e. motors). All that can be suggested is that both have contributed to the increase in importance of transfers during the 1980s as a result of the restructuring and the emergent strategy of specialisation by individual plants.

Electrolux has a vast collection of manufacturing sites as a result of a large number of acquisitions throughout the 1970's and 1980's. With the acquisition of Thorn EMI's domestic appliance division in 1987 it obtained manufacturing facilities and a sizeable share of the U.K. domestic appliance market in which it had had only limited penetration. Thorn EMI's market position had been rather erratic and during the 1980's had failed to generate significant profits from a dominant share. Finance for desperately needed investment had been used for the company's diversification strategy through the merger with EMI in 1979 and the acquisition of Inmos.

With production sites for the manufacture of domestic appliances in each major country in Western Europe, Electrolux's strategy has been one of creating interdependencies between plants by assigning particular roles to individual plants through a program of regional specialisation. However, since the acquisition of Thorn EMI's domestic appliance division some duplication has once again emerged. In the longer term the six electric cooker manufacturing sites now being operated by the company would appear excessive in relation to Electrolux's ambitions to integrate individual national markets. The strategy in electric cooker production, which is also one in domestic appliances generally, is

One of global harmonisation and standardisation of products. That is to use standard products and components where we can; thus giving... [us]

the benefits of economies of scale and also flexibility, reduced lead times etc. (author's interviews).

In this way

National sales companies around the world draw supplies from these central production units, which have been transformed from long-run factories often devoted to domestic markets into flexible, multi-model facilities supplying several countries. (Financial Times, 29-3-88).

The declared aims of the company are four-fold: to increase economies of scale in product development, manufacturing and distribution; the standardisation of products and components; the efficient use of strategically located joint production resources and; concentration on international brand names (Electrolux, 1987).

There are several ways, at a Company-wide level, that this specialisation and standardisation is facilitated through increased interdependencies between manufacturing sites. In the wake of the acquisition of Zanussi and White Consolidated the Company announced its intentions to standardise certain components and supply these from Zanussi's and White Consolidated's factories. There are also Company-wide attempts to simplify the manufacturing process through common directives. One such directive of relevance, is one to reduce inventory-to-sales ratios through a mixture of fewer suppliers, fewer components and greater factory flexibility. (Financial Times, 28-3-88).

The loss of market share and hence of volumes in axle manufacture is critical to understanding the organisation of production at Aycliffe and in particular the increased importance of material linkages with other parts of the company's truck component operations. During the 1960's and 1970's the company had enjoyed a virtual monopoly position within the U.K. for axles, being the major supplier to Ford and General Motors' factories in the U.K.. Changes in transmission technology and competition from vertically integrated OEMs has led to increased standardisation and mass production of single speed axles. In contrast to Cummins - a single product company - which invested in

order to standardise products and achieve greater economies of scale in response to similar changes in competition and product technology, Eaton - a company with more diverse interests - failed to invest in capacity for producing standardised single speed axles.

Eaton established dominant shares in truck component markets in the U.S. over a long period of time from the 1920's. Market shares in the U.K. and Europe in general have been much smaller. For transmissions, Eaton had around 90% of the available market in the U.S. but only around 45% in Europe. To a large degree this pattern of market share reflects the differences in organisation of production between OEMs and suppliers in North America and Europe. Thus, in 1976, the Financial Times reported how

What Eaton is gambling on is that the continental heavy duty truck market will go more in the direction that the U.S. (and the U.K.) markets have taken in recent years, towards a more horizontal industrial structure. This would be a radical departure in most of Europe. The U.K. apart, truck manufacturers tend to be vertically organised operating an extremely tight system of in-house component production. (Financial Times, 8-7-76).

The relatively fragmented nature of the European heavy vehicle market, divided among various national producers, has since this time become more concentrated following acquisition and merger.

Eaton's market shares in heavy vehicle components have, particularly in Europe, been eroded through a number of factors. Firstly, the more vertically disintegrated organisation of production between OEMs and their suppliers in the North American heavy vehicle market has not proved to be economically superior to that of the vertically integrated OEMs<sup>8</sup>. Indeed, a major competitive pressure upon Eaton, in terms of axles, has been the continued manufacture of axle requirements in-house, by major European OEMs. For example, between 50-60% of the U.K. market for axles is taken by vertically

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<sup>8</sup>The company noted how 'It had become obvious by 1983 that the American automobile industry had forfeited permanently at least 25% of the U.S. automobile market to foreign competitors, and that foreign truck manufacturers were establishing by acquisition a firm presence in the U.S. markets.' (Eaton Corporation, 1985a).

integrated OEMs having fitted their own axles onto imported vehicles (e.g. Volvo, Mercedes, Scania and D.A.F.). Eaton claims to have a fairly stable share, along with Rockwell International, of the remaining 40-50% of the potential market. Where these vertically integrated OEMs have discontinued in-house production of axles this has been because of a move toward single speed axles.

Secondly, the market for two-speed axles (a product in which Eaton has made its name and gained large market shares), is dwindling. Because of developments in transmission technology (the development of 9,12,13,15 and 18 speed transmissions) the need for two-speed axles has decreased while, correspondingly, the market for single speed axles has increased. Thus, there is only a small continuing and replacement market for these types of axles. Eaton's success in single speed axles has been limited. Rockwell International having established a joint venture to supply Iveco with axles has also, with the merger between Ford and Iveco, secured Ford's requirements for single speed axles.

As a result of these competitive pressures and developments in transmission and axle technology, the volume of axle production at Aycliffe has decreased significantly on that of the 1960's and 1970's<sup>9</sup>. The organisation of production at Aycliffe as well as backward and forward linkages reflect this decline in output. In 1981, loss making activities in axle production were transferred to the axle plant at Pamplona in Spain. With a dearth of orders for axles in the early 1980's the Aycliffe factory acted as a subcontract facility for the Manchester transmissions operation. The company's Aycliffe factory has continued to act in a subcontract capacity for

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<sup>9</sup>Comparing the volume of axles produced from the North American and European truck components operations, one member of staff commented, 'In terms of volume its massive compared to ours. Ours is really very very low volume. Its almost got to the point where we specialise. Whereas in the States they tend to be recognised as a key axle manufacturer.' (author's interviews).

various company plants<sup>10</sup>.

### 6.3.2 Stable interdependence

Since Cummins has remained a single product company apart from the brief attempt at diversification in the early 1970's<sup>11</sup> the company has established a fairly coordinated and systematic approach to international production. The company is organised into North American and European divisions (the manufacturing for European markets being an exclusively U.K.- based affair). Previously, the company had been organised on a fairly decentralised basis. The major development has been the grouping of plants according to engine series as the equivalent of product divisions in a more diversified company. These pseudo divisions then act as a focus for a common approach to engineering and purchasing etc<sup>12</sup>.

U.K. operations, in particular, have benefited from diversions of trade from U.S. manufacturing plants for North American markets in times of recession<sup>13</sup>. Similarly, there is a long history of intra-corporate trading in the form of company plants undertaking subcontract work for other company

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<sup>10</sup>The most recent examples being the machining of parts for hypoid axles made at U.S. plants and various parts for medium-duty transmissions made at Basingstoke.

<sup>11</sup>There was the acquisition of Management Information Systems in 1970, K2 Ski Co. in 1970 among others. All concerns acquired during the early 1970's had been divested by 1976 (Moody's Industrial Manual, 1985).

<sup>12</sup>The possibilities for consolidating purchases with particular suppliers are discussed at meetings of the company's Worldwide Sourcing Councils.

<sup>13</sup>In 1971, when sales of U.K. operations dropped by 25%, trade was diverted to U.K. operations: 'Our parent concern diverted the Canadian business to us.... Our worst spell was about the middle of 1971 and it didn't start improving until the latter part of 1972. We would definitely have had to lay people off.... were it not for Canada, whom we were supplying with about 300 engines a week at one stage.' (Scotsman, 5-9-73).

factories<sup>14</sup>. Given this, the reorganisation of the company in the 1980's marks a continuation and refinement of these principles.

A major development has been the doubling up of manufacturing capacity for particular engine series under a 'lead plant' concept. Nowadays engine families are made in more than one location. There has been this doubling up of locations which has strong implications for where we source our materials. .... We basically have a single sourcing policy but in many cases we also theoretically have a dual sourcing policy. We have second source security in many cases. (author's interviews).

The essential feature of the 'lead plant' concept is that the lead plants produce certain of the engine components at volume. Thus, regarding the new B series engine produced at Darlington,

A large part of the cost savings stems from the highly automated machining selected for the production plant at Rocky Mount, N.C.. However, many aspects of the engine design were established to directly avoid costs and, in addition, provide the most suitable characteristics for low-cost high volume production. (Jones et al, 1983)

These scale components are then utilised by the other plant producing that engine series. Thus, the Darlington plant continues to fit into a transnational production system. The lead plant for manufacture of the B series engine is at Rocky Mount, N.C., U.S. and from here Darlington receives machined engine blocks, heads and connecting rods, certain other machining having been transferred to the company's Mexican plant (Financial Times, 4-10-84)<sup>15</sup>. The Darlington operation is now essentially an assembly as opposed to a manufacturing operation. This lead plant concept has not greatly increased

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<sup>14</sup>In 1972, Cummins acquired a factory at Daventry which began machining parts for engines as well as producing prototype engines and old engines about to be phased out. 'These plans are quite consistent with the company's integrated manufacturing strategy based upon the most efficient use of the combined manufacturing capability of all plants rather than the limited production of goods for one product or market. Currently, the existing Cummins U.K. plants both produce for and take parts from other factories in the group.' (Financial Times, 17-10-72). Furthermore, 'The purchase avoided a capacity problem which was beginning to appear, although its most immediate effect will be to postpone some new investment at the company's American plants which have been undertaking subcontract machining for the British operation.' (Economist, 21-10-72).

<sup>15</sup>Darlington itself produces fuel systems which are used in engines manufactured at Daventry and Shotts whilst Shotts produces cam shafts for Darlington and connecting rods for Daventry.



the amount of intra-corporate trade of components since components critical to the performance of the engine have always been produced in-house (either at the manufacturing site at which they are needed or, as noted above, subcontracted to other company plants) but has systematised and crystallised these patterns of trade.

#### 6.4 INTER-CORPORATE LINKAGE CHANGE

A number of processes of change in backward linkage structures are evident at one or more of the case study establishments. Each of these processes is isolated and represented diagrammatically in Figure 6.3i-vi. The implications, in terms of spatial patterns of linkages, and relationship of each of these forms of inter-corporate linkage change to changes in product and process technology, market circumstances and corporate structures and strategies are explored in this section.

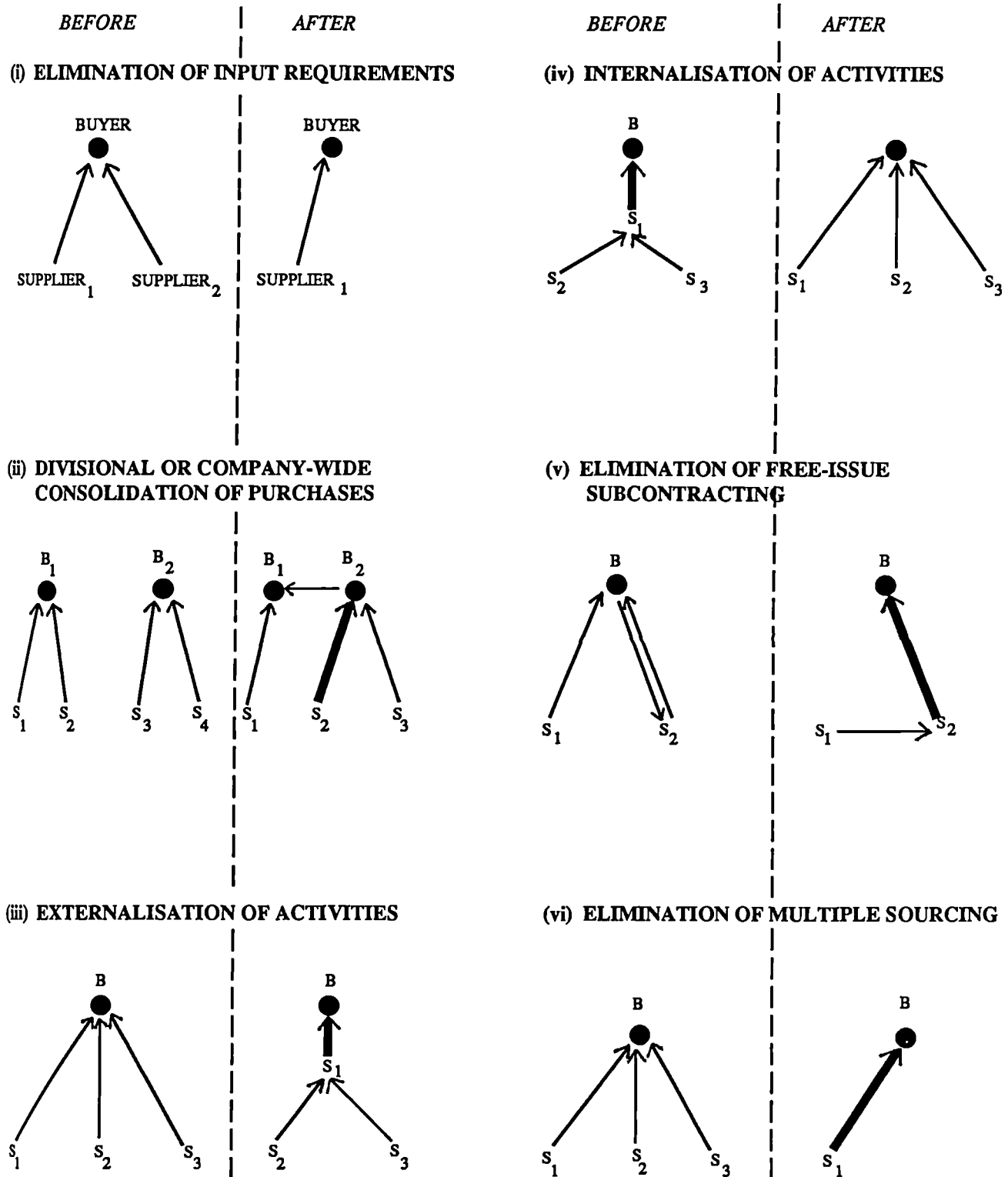
##### 6.4.1 Elimination of input requirements

The standardisation of products through reductions in numbers of discrete components and the variations of particular components leads essentially to a simplification of linkage structures by way of the elimination of input requirements. Such product standardisation and elimination of input requirements was apparent, to a greater or lesser degree, at each of the case study establishments.

Black & Decker has, in terms of market share, been adversely affected by fragmentation of demand for power tools. The emergence of important niches for higher quality consumer tools, professional tools and cordless tools has however not been incompatible with some continued standardisation of products or the retention of internal economies of scale in production.

**FIGURE 6.3**

**SCHEMATIC REPRESENTATION OF SOME FORMS OF INTER-CORPORATE  
LINKAGE CHANGE.**



The extremely rapid rise in Black & Decker's market share (an increase from 30% of the U.K. consumer tools market in 1961 to 91% in 1967, see Table 6.1) during the 1960's had been based upon the company's mass manufacture and marketing of standard drills with numerous attachments<sup>16</sup>. However,

In response to the increasing saturation of the drill market by about 1970, Black and Decker shifted its emphasis from attachments to integrals and as a result of the economies of scale in production of electric motors was able to narrow the price differential between attachments and integrals. This combined with increased disposable incomes encouraged consumers to enjoy the greater convenience of self powered single purpose tools. (Price Commission, 1979: 3).

An increase in product variation had a firm basis in economies of scale in the manufacturing process.

Black & Decker's virtual monopoly of the U.K. market for electrically powered consumer tools (which compares with rather smaller shares of other regional markets<sup>17</sup>) began to be eroded in the late 1970's. Table 6.1 shows the changing shares of the U.K. market for power tools of four main producers. Bosch serves the U.K. market by exporting from its factories in Germany and Switzerland. Hitachi and Makita have served the U.K. market with exports from Japan<sup>18</sup>. Rockwell International's declared strategy, of producing customised tools<sup>19</sup>, to enter and gain market share in the U.K., appears rather belated in the light of Black & Decker's own moves in this direction (noted above). Rockwell sold off its power tool interests during the early 1980's.

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<sup>16</sup>'The outstanding example of the company's entrepreneurial talents is the way it caught onto the concept of the mass market approach before its competitors. It went all out to, capture the householder with its mass advertising campaigns, and to hold him by progressive price reductions as production costs were cut.' (Times, 20-10-71).

<sup>17</sup>Black and Decker's shares in consumer power tool markets are as follows: U.S. 39%, France 43%, Germany 21%, Benelux 44% (Monopolies and Mergers Commission, 1989: 7).

<sup>18</sup>Makita also has factories in the U.S., Canada and Brazil and has recently announced its intentions to open a factory at Telford, England (Financial Times, 5-9-89).

<sup>19</sup>'We believe - and sales are bearing us out - that demand is changing. People want self powered tools with specific functions, rather than basic drills with attachments.' (Financial Times, 27-12-78).

TABLE 6.1

U.K. CONSUMER MARKET SHARES OF MAJOR ELECTRIC POWER TOOL MANUFACTURERS.

	a	a	b	c	c
	1961	1967	1978	1984	1988
Black & Decker	30%	91%	91%	79%	66%
Bosch	--	--	--	10%	23%
Hitachi	--	--	--	1%	3%
Makita	--	--	--	2%	3%

Sources: a) Farrant (1967)  
b) Price Commission (1979)  
c) Monopolies and Mergers Commission (1988)

However, Bosch and, to a much lesser extent, Makita have gained market share in the professional power tool market as well as in the higher price end of the consumer power tool market. Hitachi's success, on the other hand, stems primarily from its concentration on cordless power tool markets (Monopolies and Mergers Commission, 1989).

The loss of market share to Bosch, although large, has been less a reflection of any inadequacies as a manufacturer than a result of Black & Decker's own success in marketing for mass markets and the attendant brand associations. The company's problems with being associated with the cheaper end of the market led it to restrict supplies to those retailers using Black & Decker products as loss leaders, leading, in turn, to the Monopolies and Mergers Commission's (1989) investigation of this restriction of supply by Black & Decker. In contrast, it was the manufacturing and marketing strategy of Japanese competitors that was perceived to be more of a long term threat to the company's dominant shares in consumer tool markets<sup>20</sup>.

Standardisation of product technology has reduced the number of discrete input requirements for the company's products. During the 1970's, the company eliminated a large number of products from the range of its U.K. operations<sup>21</sup>. There has been a reduction in the numbers of different component parts to different electric motors. Thus,

One result of careful value engineering has been a high degree of commonality of parts, resulting in bulk-buying economies. For instance, one motor chassis is used for all the products, power differences being achieved by variations in windings. (Price Commission, 1979: 21).

There has also been a reduction in the number of different motors used in the company's products. There have been as many as 100 different electric motors

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<sup>20</sup> 'The Japanese undermined the company's strategy of making customised products for specialised markets. Instead, the Japanese sold standardised products world-wide.' (Business Week, 1985).

<sup>21</sup> 'The U.K. product range was cut from 130 to 50 tools; 'the 80 we took out had relatively small volumes, were expensive to make, and many suffered from quality problems because they were too small to bother with.... we took out many millions of cost in an 18 month period.' (Lester, 1979).

used in the company's products but this has fallen to twelve in the 1980's and to five or so that are currently used (Financial Times, 31-3-89).

Electrolux is attempting to standardise the electric cookers that it produces at various locations within Europe. The company's rapid expansion through acquisition has left it with large shares in individual national markets. The company is attempting to exploit its presence in many of these individual national markets by standardising its products whilst continuing to market products under the many brand names it now controls.

During the 1950's and 1960's the European domestic electric appliance industry was one of a collection of national producers. Only the Italian manufacturers, in the 1970's, began to design and manufacture appliances for the wider European market. Italian producers, however, concentrated upon the bottom of the range of appliances and this early attempt to integrate national markets failed<sup>22</sup>. Furthermore, there has been little cross penetration of North American and European producers into each others markets. Indeed the North American producers' share of the European market has declined during the 1970's and 1980's despite the higher degrees of concentration in the North American market.

Little change in the degree of market concentration in the UK market for electric cookers has occurred during the latter half of the 1970's and into the 1980's although the dominant three manufacturers have consolidated their positions (see Table 6.2). Thorn EMI (now owned by Electrolux), T.I. (now owned by G.E.C.) and Belling take around 90% of the U.K. market. The high degree of concentration in individual national markets is not mirrored in the

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<sup>22</sup>, .... while overall demand in terms of units has remained static, the composition of total demand has shifted away from an emphasis on standard low or mid-price range goods. Greater product variety combined with some trading-up to more expensive goods has presented producers with a new challenge. Initially, Italian producers, reliant upon mass output from inflexible plants, were not well placed to meet this new challenge and as a result they have suffered prolonged periods of low profitability or losses.' (Stopford and Baden-Fuller, 1989: 74).

TABLE 6.2

U.K. MARKET SHARES OF MAJOR ELECTRIC COOKER MANUFACTURERS.

	a	a	b
	1968	1975	1985
Thorn EMI (now Electrolux)	21	33	35
T.I. (now G.E.C.)	18	30	35
Belling	9	19	20
G.E.C.	13	8	--
Others	39	10	10

Sources: a M.L.H. Consultants (1977)  
b Euromonitor (1987)

European market taken as a whole. In the late 1980's, however, there are signs of increasing concentration in the European market and consequent integration of different national markets. In 1984 Electrolux acquired Zanussi, in 1985 it acquired White Consolidated of the U.S., and in 1987 it acquired the domestic appliance division of Thorn EMI to become the largest manufacturer of domestic electrical appliances in the world. Concentration has continued with the 'mega-merger' of Phillips and Whirlpool's domestic appliance businesses in 1988. T.I.'s interests in domestic electric appliances were also divested to G.E.C. in 1987.

Despite the maturity of the products involved, market concentration at a supranational scale has been limited until very recently. With the emergence of two multinationals with very large shares of the European and North American markets the prospects for integration of national markets and increasing cross penetration of producers in both continental markets seems likely. Electrolux has shown itself to be highly proactive in such processes.

Electrolux has introduced a degree of product differentiation at its Spennymoor electric cooker factory, however, such an increased *product range* is a reflection of the company's acquisition of a wide range of different national brands rather than any designed increase in the range of cookers offered. Despite the Company's intentions toward having an integrated European manufacturing system, moving away from individual plants producing for particular national markets, little progress has, thus far, been made in this respect. Currently, the Spennymoor factory produces a wide range of models and brands of cooker which are based on several different metal frames or chassis. Much of the product differentiation is based upon different liveries associated with the many brand names now controlled by Electrolux which can be introduced into various national markets<sup>23</sup>. However, even the benefits of

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<sup>23</sup> 'Greater product and brand differentiation will be achieved by deploying brand names in response to market needs and orienting specific brands to international or local markets.' (Electrolux, 1987).



such 'trivial' product differentiation may be outweighed by the diseconomies of multi-model production under the current range of cookers. Before the domestic appliance business was divested to Electrolux, Thorn EMI held only 30% of the U.K. electric cooker market under eight different brands. Electrolux, inherited this situation such that currently around 50% of sales are accounted for by just three models with the remaining 50% of sales spread over 110 models. Furthermore, the several different chassis upon which these different models of cooker are based mean that the move toward smaller batches of production involves some considerable sacrifice in internal economies of scale even with the vastly reduced set up times for metal pressing equipment that have recently been achieved.

In the near future, the Company's 'New Cooker Concept' will radically alter this state of affairs. The Company's new cookers will share a single common chassis thus permitting full automation of the metalworking stages and the elimination of the welding stage<sup>24</sup>. Product differentiation will be concentrated more than ever at the assembly stage where different liveries and features can be easily assembled onto the basic cooker. The number of components included at the assembly stage will also be much reduced. A trivial, though striking, example of the degree of component proliferation that can occur, is that of the number of different screws which will decline from 132 in current production to 9 under the new cooker concept<sup>25</sup>.

In the post-war period Cummins built up its dominant share of the U.S. truck and heavy duty diesel engine market. The company's engines are found in a variety of applications (e.g. trucks, off-highway vehicles, trains, marine

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<sup>24</sup> Sheet metal is pressed into shape and bent to form a cavity which is then welded together to form the basic frame upon which doors, switches etc. are assembled.

<sup>25</sup> In this respect, Electrolux's new cooker concept is mirrored by the attempts of other cooker manufacturers to simplify products and hence the manufacturing process. For example, one new model being introduced by Belling has 180 components compared to the 320 components required for the model it replaces (Financial Times 10-5-90).

applications) associated with particular requirements and specifications. Recently, Cummins has faced pressures to cut costs and achieve greater volumes in the manufacture of its diesel engines. A major part of such cost cutting has stemmed from the standardisation of engines.

Cummins' strong position in the U.S. market is based on the greater size and the greater division of labour between original equipment manufacturers (OEMs) and suppliers. Furthermore, the company clearly believed that the relatively vertically disintegrated form of the U.S. OEMs would prevail in the case of the European market<sup>26</sup>. However, during the crisis of the late 1970's the company relied upon its dominant shares in the U.S. markets as European OEMs remained relatively vertically integrated.

Growth of Cummins' sales and its market shares have been affected by three main factors. Many applications are making use of smaller diesel engines forcing Cummins into extending its range into smaller, lower horsepower engines in order to retain market share. Such a move has brought the company into direct competition with other producers where volumes are, and have traditionally been, much greater (e.g. Perkins). Secondly, during the recession of the early 1980's competition from the vertically integrated OEMs in Europe and also the U.S. intensified as these producers sought to maintain turnover and value added by retaining and exploiting markets external to their own requirements for engines. Thirdly, Japanese OEMs were poised to enter Cummins' most important market (the U.S.) and this proved to be decisive in prompting a reorganisation of the company during the 1980's.

The various market pressures, to cut costs to compete with Japanese OEMs

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<sup>26</sup>'We continue to believe that the component-supplier and assembler-manufacturer system operating in the U.S. truck industry is inherently superior to the vertically integrated system. We believe that engine volumes for many manufacturers enable Cummins to offer efficiencies in product cost, quality and advanced technology that no single manufacturer can obtain by producing engines purely for its own equipment.... However, the historical arm's length relationship between component-supplier and the end-product manufacturer has resulted in layers of excess cost....' (Cummins Engine Co., 1983).

(Cummins cut its prices on many engines by up to 40% overnight to protect its market share), and to compete with higher volume producers and other vertically integrated OEMs appear to have engendered a greater standardisation and the search for increased internal economies of scale and pecuniary external economies.

Thus, 'Design changes to reduce the number of engine components and improve and simplify the manufacturing process are an integral part of the company's program to lower production costs....' (Cummins Diesel Engine Co., 1986). Engineers involved with the development of the new B series engines manufactured at Darlington described how

.... the integration of component functions and the consequent reduced number of parts to be manufactured showed cost benefits not anticipated at the beginning of the project. This aspect was further enhanced by the high degree of parts commonality among engines in the B series. (Jones et al, 1983).

The increased commonality of parts for different engines within the B series reduces parts proliferation following from the different engine specifications and leads directly to a reduction in input requirements. In this respect it is estimated that the B series in-line 6 cylinder engine has around 20-25% fewer parts than similar engines of its competitors and that, although it is difficult to compare the two types of engine, the B series 6 cylinder has around 40% fewer component parts than the 6 cylinder Vee engine previously manufactured at Darlington. The major way in which this has been achieved has been through advances in casting technology. Much small fabrication work (e.g. pipes, tubes etc.) and machined bores have been made integral to the castings themselves. Such high quality castings, however, come largely from W. Germany, U.S. and Brazil and not from the U.K.

#### 6.4.2 Company or division-wide consolidation

Most case-study companies had been, or were involved in, trying to

consolidate purchases of materials and components either at a corporate-wide or division-wide level. Such consolidation is exclusively associated with the search for pecuniary external economies. The scope and success of attempts to consolidate purchases has varied according to organisational structure and the nature of the product.

Black & Decker has a Group Purchasing Organisation which attempts to coordinate the requirements of individual factories and consolidate particular of these requirements. Chief among such items for which requirements are consolidated are copper wire (used in the company's own A.C. electric motors) and D.C. electric motors used in the company's cordless products. The latter is, however, an example of the difficulties of gaining pecuniary external economies through consolidation. A small D.C. electric motor is fitted into the company's cordless products and company-wide requirements for this motor are consolidated and placed with a company based in the Far East; one of only a handful of efficient manufacturers of the motor in the world. However, automotive manufacturers also purchase similar D.C. motors and hence, even when there is consolidation, Black & Decker's demand for the motors is dwarfed by that of the automotive manufacturers.

Electrolux's growth by acquisition has left it with a collection of diverse nationally based manufacturing operations with backward and forward linkage structures which reflect such particular national orientations. Some attempts are, therefore, being made to consolidate requirements for particular components among various factories in order to gain pecuniary external economies. For example, there is an attempt to consolidate purchases of thermostats with a W. German supplier, however, at present U.K. operations at Spennymoor source from a U.K. supplier because of differences in technology.

Cummins has also made significant reductions in the numbers of suppliers to its factories. The company claims to have reduced the numbers of suppliers to the company as a whole from 1000 in 1982 to 550 in 1986 (Cummins Diesel

Engine Co., 1986). The company has developed a 'lead plant' concept whereby there is duplication of manufacturing capacity for particular engine series with particular factories also specialising in the volume production of certain key components. There is, therefore, some scope for consolidation of purchases between 'lead' factories and their sister factories. Over and above this the company holds meetings of its World Wide Sourcing Councils in order to try and consolidate purchases at a company wide level. Because of the importance of key components for diesel engines which are manufactured in volume and then distributed to various company plants the company has made considerable moves to schedule materials between plants as well as between major suppliers and its factories using Electronic Data Interchange (EDI). The significance of intra-corporate trade in components has meant that effective coordination and scheduling of parts within the company has been particularly important to the company's competitiveness. EDI is primarily an intra-corporate affair within the U.K./European context (with only B.L., Darlington's major customer, being linked directly to central sales and purchasing for the European operations at Darlington)<sup>27</sup>. The private network linking U.K. plants as well as marketing offices and other subsidiaries is mirrored in the U.S.. Orders to U.K. and European suppliers are sent to Columbus, Indiana and then material requests are made from there to these suppliers via a VAD network operated by a third party<sup>28</sup>.

The scope for consolidation of input requirements under the lead plant concept has obvious repercussions regarding the sourcing patterns of the company's Darlington factory. Table 6.3 provides a geographical breakdown of

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<sup>27</sup> The application of EDI to schedule components from suppliers is likely to be limited. A pilot scheme with Lucas has yet to start with the prospect of perhaps only another nine suppliers being linked direct to Darlington.

<sup>28</sup> At present there are different standards prevailing in the U.S. compared to the U.K. and so the company routes orders for components via the U.S.. One hundred out of approximately 300 suppliers to all U.K. operations have schedules sent in this way.

TABLE 6.3

GEOGRAPHICAL BREAKDOWN OF SOURCES OF MATERIAL INPUTS TO  
CUMMINS, DARLINGTON.

	No. Suppliers	% of total spend
North	27	4.4
Scotland	8	0.3
Yorks. & Humber.	15	10.1
N. Ireland	0	0.0
North West	18	0.8
E. Midlands	24	3.6
W. Midlands	62	11.6
E. Anglia	5	1.2
S. West	7	2.6
Wales	6	1.0
South East	31	11.6
U.K.	203	46.2
U.S.A.		31.8
Europe		19.8
Japan		1.3
Other		0.8
Overseas		53.8

Source: author's interviews

numbers of suppliers and value of spend on materials and components for Cummins' Darlington factory. The reasonably high proportion, by value, of material inputs coming from non-affiliated suppliers in the U.S. is a reflection of the consolidation of purchases with established U.S. suppliers to the company's sister factory in the U.S..

The most striking example of how the organisation of production and attendant spatial patterns of backward linkages of a case study establishment has been affected by processes of consolidation is that of Eaton's Newton Aycliffe axle factory. Whilst the declared intention of Eaton corporation has been to have single worldwide specifications for its truck components (i.e. axles, transmissions etc.) mirroring the strategy of its major competitor, Rockwell International<sup>29</sup>, the contribution of such product standardisation to a process of consolidation is far less important than changes in corporate structure. The process of consolidation of purchases - into which the company's Newton Aycliffe factory is integrated - reflects a conscious effort to centralise decision-making activities within the company's European and North American truck components divisions.

Eaton had expanded its range of interests in truck and vehicle components during the 1940's and 1950's. The cyclicity of business was a major motivation for seeking to diversify into other industries and thus, in 1963, Eaton acquired Yale and Towne Inc., manufacturers of locks, hardware equipment and materials handling equipment. In 1968, the international business division had become too large to be operated separately and was therefore reorganised and consolidated into the five main product areas as part of the overall corporate organisation.

During the 1970's it had become increasingly apparent that the Yale and Towne business had not succeeded in ironing out the cyclical nature of

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<sup>29</sup> Rockwell's world axle family has a high degree of commonality of parts and a modular design (Rockwell International, 1986).

earnings and so the company decided, on the eve of the world recession of the late 1970's early 1980's, to diversify into high technology activities. In 1978, three major acquisitions took Eaton into the field of electrical and electronic control systems as well as defence electronics. At this time the company had also been forced to rethink the organisation of its truck and automotive component activities. Thus,

the aim has been to cut out unnecessary duplication of overheads in what previously were semi-autonomous plants. In the States there is now a centrally managed, centrally scheduled manufacturing system linked through Eaton Corporations major computer installation at Cleveland, Ohio. Purchasing and planning have been centralised.... (Financial Times, 19-10-77).

The recession, beginning in earnest in 1979, forced a large scale rationalisation of Eaton's truck component operations under 'operation shrink'. The European truck components business did not, however, experience any closures. Whilst truck components remained the company's main business in terms of sales, this diversification just prior to recession meant that the company was poorly placed to invest in modernising its truck components operations. Eaton took the decision, certainly within the European context, to invest in transmissions production as opposed to axle production and, given the greater investment in axle operations by its major competitor, Rockwell International, has lost market share.

With the rebuilding of the fire destroyed Manchester transmission factory in 1982, European truck components operations became subject to the declared reorganisation and centralisation. Correspondingly, Aycliffe was stripped of most of the non-manufacturing business functions and the headquarters of European truck components operations were established at the newly rebuilt Manchester transmissions factory. From being the centre of Eaton's European operations, the Aycliffe axle complex (of six factories) reverted to a rationalised 'branch plant'. In just two years, from 1980 to 1982, 1000 of the 1300 previously employed were made redundant and operations



TABLE 6.4

## GEOGRAPHICAL BREAKDOWN OF EXPENDITURES ON MATERIAL INPUTS TO EATON, NEWTON AYCLIFFE.

U.K.		France	Spain	Turkey	U.S.	W. Germ	Japan	% Tot. Spend
<u>BEARINGS</u>								8.4
Taper	30						70	
Ball & Roller	10						90	
<u>COMPONENTRY</u>								19.5
Bracketry	100							
Brakes	100							
Fasteners	60				10	30		
Gaskets	100							
Pressings	100							
Seals	5				35	60		
Subcontract	100							
Valves	100							
<u>FORGINGS</u>								33.6
Crownwheels	85				15			
Pinions	95				5			
Half shafts	40	10		50				
<u>CASTINGS</u>								32.4
Carriers	15		15	55			15	
Diff. cases	15		40	25				
Gear supp. cases	50		50		20			
Hubs	50		50					
Drums	50		50					
<u>STEEL</u>								6.1

Source: author's interviews.

reduced to a single factory. The dependent relationship between the Aycliffe factory and the other factories in the European truck components division is an important factor in terms of the organisation of production and attendant spatial patterns of linkages at the company's Newton Aycliffe axle factory. The Aycliffe factory has been undertaking subcontract work on transmission parts for the company's Basingstoke transmissions factory. The degree of dependency is likely to change in the near future when the Newton Aycliffe factory assumes production of medium duty transmissions when the Basingstoke factory is closed<sup>30</sup>.

The strategy of centralising control of European and North American truck components operations and the progress made in standardising products and consolidating purchases means that

Geographical diversification provides additional strength. Eaton manufactures in 21 countries on six continents. Particularly, in our vehicle components business, manufacturing capacity has become interchangeable, giving Eaton the ability to shift production from country to country when fluctuating exchange rates, or peak country demand for products requires it. (Eaton Corporation 1985a).

Indeed there is a good degree of interchangeability of production capacity between the European and North American truck components operations<sup>31</sup>.

The spatial patterns of material linkages of the Aycliffe axle factory shown in table 6.4 reflect the concerted efforts of the Manchester based purchasing organisation to consolidate the various material and component requirements of the three transmissions and two axle factories within the European division. Thus, for instance, castings for axle parts completed at Aycliffe have come from as far afield as Japan as a result of 'piggy-backing' on demand for castings coming from U.S. factories. However, such transatlantic

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<sup>30</sup>The company's Basingstoke transmissions factory is to close in the near future with production of transmissions being removed to the Newton Aycliffe axle factory (Newcastle Journal, 19-5-90)

<sup>31</sup>At the time of interview, the company's Manchester transmissions factory was exporting virtually all its output to the U.S..

consolidation of purchases is rare. Consolidation is far more routine on a European division-wide basis. This process of consolidation has generally increased the amount of materials and components imported into the U.K.<sup>32</sup>. In part this represents the poor competitive position of many U.K. suppliers, although centralised purchasing and the consolidation of requirements means that, division-wide, the company can take advantage of fluctuations in exchange rates<sup>33</sup>. The consolidation of purchases of castings and forgings etc. is, however, also bound up with a deliberate strategy to find lower cost sources in lesser developed countries<sup>34</sup>. This is particularly the case as regards various castings which account for about 32.4% of total spend on material inputs at Newton Aycliffe and for forgings for half shafts (see Table 6.4).

The specific examples of consolidation within the case study companies described here clearly highlight the likely negative implications for the regional and U.K. economy. Generally speaking, consolidation of purchases is likely to lead to a total demand beyond the capacity of many, especially small, suppliers. Selection of suppliers with which to place consolidated orders may also be made on the basis of conditions such as minimum size (turnover) and whether or not there is a second source of supply. Such

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<sup>32</sup>This is particularly the case for transmissions (and since Aycliffe produces parts for transmissions, applies, in part, to the Aycliffe operations): 'six years ago 90 per cent. of castings for Eaton's transmissions operations were U.K. produced. Now it is just 10 per cent.. Forgings were all supplied from the U.K. but now that is down to 40 per cent..'. Similarly, 'Quality hardly varies between bearing manufacturers yet supply from the U.K. to Eaton has collapsed from 100 per cent. to 20 per cent., replaced largely by Japanese manufacturers.' (Financial Times, 12-3-84).

<sup>33</sup>'it is partly poor quality or uncompetitive prices which has driven many British companies off its [Eaton's] vendor list in favour of foreign manufacturers. Eaton's buying patterns, though, partly reflect price factors such as currency movements, over which British component suppliers have no control.' (Financial Times, 12-3-84).

<sup>34</sup>As described in Caddick and Dale (1987). This is a study of an unnamed company which, from a knowledge of Eaton's European operations and sourcing patterns, was deduced to refer to Eaton's European truck components division.

consolidation is, therefore likely to lead to an increased mutual trading between multi-locational, even multinational companies at the expense of smaller, local or even national suppliers.

#### 6.4.3 Externalisation

There are three main forms that externalisation of manufacturing activities took among the case study establishments. Capacity subcontracting (horizontal disintegration) was of rather limited and diminishing importance for the case study establishments. Outsourcing of particular components or processes for which there were either variable or low volume requirements has been of some importance. The systematic outsourcing of sub-assemblies or particular components or materials has been of increasing importance. Both capacity subcontracting and the outsourcing of low volume components has been ephemeral whereas the outsourcing of larger volume components and sub-assemblies appears to be more systematic.

Axle manufacture at Eaton's Newton Aycliffe factory is quite vertically integrated; the production process being one of manufacture rather than assembly. Thus,

We manufacture in-house all gears and shafts. We machine 90 per cent of all castings. Where there are a lot of simple operations we tend to buy them out. We tend to concentrate on those areas where the process is not readily available outside. In other words, we control the heat treatment, we control the synchronisers, we control the gear technology. (author's interviews).

There have been some conscious decisions to outsource certain parts. Half shafts for axles are the prime example. However,

We are looking more and more now to taking product in at a later stage. We are looking to take a forging with the base operations already completed on it. Turning, drilling, milling.... we are less and less interested in doing and so now more of this is being bought-out. Similarly with castings, its advantageous to buy castings with the proof machining done and location points put in. (author's interviews).

Other than this only 4 per cent or so of the total spend on materials and components at the Newton Aycliffe factory are on subcontracted work. Such outsourcing appears to be motivated mainly by considerations of simplifying the internal manufacture and assembly process.

Electrolux, at its Spennymoor complex, has and continues to subcontract a small amount of presswork for its electric cookers from time to time. However, such capacity subcontracting has been provided by other company factories. Furthermore, with the introduction of the company's 'New Cooker Concept' such capacity subcontracting is likely to be eliminated altogether. Under the company's New Cooker Concept the single chassis forming the basis of all models of cookers will permit complete automation of the metalworking and welding stages. Otherwise externalisation of small, labour intensive, sub-assemblies such as switches etc. have taken place with the job of assembly being given to one of the suppliers of materials. Although it must be stressed that there are also examples of internalisation of such sub-assemblies (see later).

Cummins engines at Darlington provides the best example of the variable nature of outsourcing of low volume parts. The different specifications for the company's diesel engines, according to the particular application, means that there is a proliferation of varieties of certain components. For example, high volume requirements for flywheels for the engines had traditionally been manufactured in-house at Cummins' Darlington factory using manual and N.C. machine tools, with the remainder, of low volume requirements, being subcontracted locally. A decision was made to purchase a C.N.C. machining centre to cope with both high and low volume requirements for flywheels and so internalise the low volume flywheel requirements. However, the C.N.C. solution to proliferation of lower volume flywheels had to be abandoned. Currently, therefore, high volume flywheels are machined in-house with the rest being subcontracted locally. The problem of proliferation of flywheel

requirements is something which has beset the company as a whole (Venkatesan, 1990).

The main changes in the degree to which operations at Darlington are vertically integrated revolve around considerations of retention of value-added and key technology within the company where internal economies of scale can be obtained and around trying to gain pecuniary external economies and economise upon transaction costs through simplifying backward linkage structures. In this respect, the reasons for increased outsourcing at the Darlington site, which is some distance away from the main concentration of automotive assemblers and suppliers in the U.K., may differ from those for the Company's plants in the U.S. industrial heartland<sup>35</sup>.

The clearest example of externalisation among the case study establishments is that of Black & Decker's power tool operations at Spennymoor. There are several processes of externalisation that have led to such a vertical disintegration of activities at the Spennymoor factory and these in turn are related to changes in corporate structure and product and process technology.

Firstly, corporate restructuring, including several factory closures within Europe, has resulted in some minor increases in outsourcing at the company's Spennymoor factory. During the 1970's Black & Decker reorganised the production between its two other factories in England (at Maidenhead and Harmondsworth) and as a result the metal pressings and laminations for electric motors which had been produced in-house at these factories were outsourced (Lester, 1979). The company also used to manufacture its own chucks for its drills at a factory in France and these were then distributed to other company factories throughout the world. However, with the closure of the French factory a decision was taken to outsource the chucks.

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<sup>35</sup> In the words of the Diesel Workers Union secretary-treasurer: 'We think that the company will outsource and build elsewhere, and get this [Indiana] workforce down even further.' (Business Week, Oct. 17, 1988).

Secondly, advances in product and process technology have also engendered some outsourcing of manufacturing activities. The economies of scale associated with motor assembly are at the heart of the organisation of manufacturing in Black & Decker's plant at Spennymoor. There are several stages of metal working for basic parts for the electric motors assembled at Spennymoor which form the basis of most products produced at Spennymoor. In 1974 up to 10 per cent of machine shop activities at Spennymoor were subject to capacity subcontracting (Dowdle, 1974). Today such capacity subcontracting has been eliminated entirely. The machining, turning and heat treatment of shafts (upon which the motor is assembled) are retained in house. However, the drilling of various castings and machining of gear blanks are now undertaken by outside suppliers.

The gradual process of externalisation during the last two decades has been based initially upon process innovation and latterly upon a combination of product and process innovation. In 1979, the Price Commission (1979) reported upon the organisation of production at Spennymoor and the introduction of a new line for automatic assembly of *electric motors*. A further advancement in automated assembly was recently introduced and gained the Queens Award For Technology in 1986. The most recent figures of productivity growth of 16% p.a. (Northern Executive, 1988) are thus primarily a reflection of the massive gains in output of motors as a result of improvements in automation (see Table 6.5).

The economies of scale in manufacture of products at Spennymoor are, however, not simply a reflection of process innovation at the stage of motor assembly. Rather, it is the combination of product and process innovation which has enhanced both internal economies of scale as well as pecuniary external economies associated with the simplification of backward linkage structures.

Thus the principle of modular assembly has since been taken further:

TABLE 6.5

NUMBER OF EMPLOYEES AND VOLUME OF ELECTRIC MOTORS PRODUCED  
AT BLACK & DECKER SPENNYMOOR.

	Electric motors	Employees
1977	50,000	1823
1983	100,000	1380
1987	200,000	1200
1988	250,000	1200

Sources: author's interviews; Northern Region F.O.S. database, Ian Smith and Ian Stone.



an electric drill, an electric garden product and a domestic electric appliance might all share the same motor unit (though they would have different transmissions and gear mechanisms). This required a redesigning of B&D power tools.... the traditional batch production method was for each model to be separately assembled on its own line, with the motor being built within and supported by the outer casing. By contrast in most current B&D tools the modular motor rested separately within the outer casing, the motor pack, including its windings and armatures, having been assembled as a separate unit. This method of production involved higher capital costs in setting up the automated motor production line, but made possible a manufacturing volume that enabled the motor's cost to spread over many models, not just the production run of any one tool. (Monopolies and Mergers Commission, 1989: 7).

Final assembly, where the remainder of bought-out parts are assembled with the motor has also undergone some changes. Although there has been little change in terms of the proportion of components bought-out at this stage (e.g. screws, switches, plastic mouldings, electrical flex, packaging etc.) the organisation of the assembly process has changed - primarily as a result of the move toward modular manufacture.

Black & Decker conducts formal 'make or buy' reviews to appraise whether particular activities should be externalised or the production of certain bought-out components be internalised. On balance 'make or buy' reviews held by the company have worked in favour of increased outsourcing and this reflects the declared intent of the company as described by a senior member of staff at Spennymoor.

Our objective is to simplify the manufacturing process. Our business, by definition, has a lot of cost in it associated with complexity, and standard accounting systems don't actually show you this. And we've recognised that if you simplify the business you save money. Although you don't see it in accounting terms, you can in real terms save money. One of the things we're trying to do is to outsource as many sub-assemblies as possible. (author's interviews).

Thus, the value of the finished product constituted by bought-out components has increased significantly from the 60% in 1979 (Lester, 1979)<sup>36</sup>.

The outsourcing of sub-assemblies frequently labour intensive operations, simplifies the internal assembly process and economises upon

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<sup>36</sup>The author was requested not to reveal the corresponding figure for 1989.

transaction costs (one supplier where formerly there may have been several suppliers for the separate constituent parts of the sub-assembly) and, potentially, labour costs when suppliers are relatively small firms and where the sub-assembly involves a relatively labour intensive, unskilled set of operations. The proportion, by value, of material inputs coming from the U.K. as a whole has increased from 71% in 1986 to 84% in 1990 (Interviews). Such increased outsourcing of sub-assemblies has tended to occur locally although the contribution of processes of externalisation to this localisation of linkages is likely to be small in comparison to processes of 'linkage adjustment' following the assumption of additional product responsibilities transferred from the French factory rationalised during the 1980's (see section 6.5.5).

Processes of externalisation appear to be evident at each of the case study companies which have been long established. In two of the cases however, there are also processes of internalisation. Furthermore, not all of the processes of externalisation detailed above appear to be systematic. Outsourcing of sub-assemblies appears to be successful to the extent that it simplifies the internal production process or simplifies the problems of coordinating and monitoring exchanges with outside suppliers.

#### 6.4.4 Internalisation

Processes of internalisation appeared to be of some importance in two out of the four case study establishments.

At Cummins' Darlington factory there have been two quite significant examples of internalisation. The example of externalisation following an attempt to machine all flywheels in-house was mentioned earlier. There is a similar problem of volume and mix of requirements apparent with flywheel housings with which outside subcontractors have been unable to cope. These

flywheel housings are now manufactured in-house at Darlington. A second example of internalisation reflects developments in technology. Heat treatment of cam shafts for the diesel engines assembled at Darlington, is a complicated business - the shaft but not the cams having to be hardened - which used, until the company developed its own technology, to be subcontracted locally.

At Electrolux's electric cooker operations at Spennymoor there has been little aggregate change in the proportion of the product being bought-out (remaining constant at around 60 per cent). However, processes of externalisation (see above) and internalisation have both been in evidence. One example of internalisation, described by a member of staff at Spennymoor, highlights the transaction costs associated with outsourcing.

For our appliances... [ceramic glass is]... glued into aluminium trim. The aluminium trim is made up of an aluminium extrusion and a metal pressing. So basically, you have a line of three suppliers. One of the glass, one of the aluminium and one of the metal work. Then you have a supplier who takes these components and glues them together.... that is one area we thought we could control greater, in terms of delivery, price and flexibility, in-house. (author's interviews).

#### 6.4.5 Elimination of free-issue subcontracting

A process of elimination of free-issue subcontracting was evident at one of the case study establishments and is likely to be of particular rather than general significance. The elimination of such free-issue subcontracting economises upon the transaction costs associated with monitoring both the quality of materials and subcontract work done. However, the elimination of such subcontract work has been dictated by developments in product technology aimed at reducing certain input requirements rather than considerations of comparative transaction costs.

Cummins has discontinued the practice of buying castings which are then issued to subcontractors to be machined. Such a practice can involve considerable costs involved with monitoring the quality of castings (which may only be revealed at the machining stage) and the quality of the subcontractors

work. This system has been replaced by one whereby the subcontractors purchase castings direct from Cummins approved suppliers. Cummins is thereby relieved of having to be responsible for the quality of the castings, whilst a number of exchanges between materials supplier and subcontractor are replaced by a single transaction (Figure 6.3).

#### 6.4.6 Elimination of multiple sourcing

All of the case study establishments have, in one way or another, attempted to eliminate multiple sourcing of particular materials and components with the aim of moving toward single sourcing. Such objectives are frequently limited to attempts to introduce just-in-time supplier relations (see below), although neither is necessarily dependent upon the other.

Eaton's Newton Aycliffe axle factory, primarily as a result of centralised purchasing and consolidation of material and component requirements at a division-wide level (see above), is 90 per cent single sourced for such inputs. The scope for further reductions in the number of suppliers by way of elimination of multiple sourcing is therefore rather limited.

Cummins' attempts to eliminate multiple sourcing are also bound up with considerations of reducing part proliferation attending the many different applications of its diesel engines. In this respect Cummins is trying to replace customer specified options for its engines with a range of standard options offered by Cummins. This is essentially a marketing problem which, as yet, has had limited success.

Black & Decker has, at various times, faced pressure to reduce inventories as a result of retailers' own moves in this direction. During the mid 1980's the company's U.K. operations were severely affected by inventory

reduction by the larger retailers<sup>37</sup>. Such action by retailers is likely to have been at least partly responsible for the company's move toward 'just-in-time' supplier relations and its attempts to eliminate multiple sourcing. In most cases the company has been able to institute 'just-in-time' systems of delivery given its monopoly position vis a vis its suppliers<sup>38</sup>. Similarly, the pioneering of EDI links with Black & Decker and other suppliers by one major retailer has been largely responsible for Black & Decker's subsequent experimentation with the use of EDI with its own suppliers (Goldman, 1991).

However, despite such pressures, the company has been less successful in reducing the number of its suppliers to its Spennymoor factory. Spatial patterns of backward linkages at Black & Decker's Spennymoor factory, in part, reflect the allocation of additional product responsibilities following closure of other company factories. Spennymoor assumed responsibility for manufacturing the Workmate workbench after the closure of the company's factory in Kildare, Eire and cordless products after the closure of a factory at Dardilly, France. Spatial patterns of backward linkages at Spennymoor still reflect a process of adjustment from a largely French and continental European supplier base for the cordless products previously produced at Dardilly and for which Spennymoor now has responsibility. The failure of Black & Decker to eliminate multiple sourcing and reduce the number of suppliers to its Spennymoor factory are, therefore, primarily a reflection of the problems of linkage adjustment in the wake of assuming additional product

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<sup>37</sup> 'Although sales of our products to end users remained at respectable levels throughout the year, the higher channel inventories, coupled with extraordinary inventory reduction programs initiated by our larger customers, created a slowdown in factory orders.' (Black and Decker, 1985).

<sup>38</sup> Black and Decker used to operate a policy of not taking more than 25-30% of a supplier's business. However, with the elimination of multiple sourcing and the introduction of 'just-in-time' systems of delivery such limits no longer apply. The asymmetry of buyer-supplier relations in this case is such that, for example, should a faulty component stop the company's expensive automatic motor assembly lines, the offending supplier is fined a 'nominal' sum relating to the down-time of the lines.

responsibilities. By the same token the localisation of sourcing which has occurred recently is primarily a reflection of this process of linkage adjustment. Only two suppliers have relocated into the region - presumably as a result of the elimination of multiple sourcing and the introduction of 'just-in-time' supplier relations and as such the process of physical attraction of suppliers has had a marginal impact upon levels of local sourcing. The number of suppliers to Black & Decker's Spennymoor factory has increased from 199 in 1986 to 280 in 1989 but is expected to fall to 230 by the end of 1990.

At Electrolux's electric cooker factory at Spennymoor the major process of linkage change has been the elimination of multiple sourcing. Activities have not, on the whole, become noticeably more vertically disintegrated, but there has been a large reduction in the number of suppliers.

This is largely a reflection of the company's attempts to move toward single sourcing and just-in-time supplier relations. Table 6.6 shows the changes in the numbers of suppliers to Electrolux's Spennymoor factory over the period 1987 (the year in which Electrolux acquired the factory along with other domestic appliance manufacturing factories owned by Thorn EMI) to 1989. In just two years the number of suppliers of components and materials has halved. However the number of local (Northern Region based) suppliers has actually increased. Thus far, the process of elimination of multiple sourcing has tended to work to the advantage of local suppliers. Furthermore, although Electrolux has made efforts to encourage suppliers to locate on its spacious site at Spennymoor, there has been only one example of such relocation of a supplier into the Region.

Table 6.7 shows the changes in the numbers of suppliers according to commodity group. Clearly there has been much scope for reductions in the numbers of suppliers of rather less costly components and materials (e.g. fasteners, insulation, packaging, mouldings and miscellaneous materials). 80

TABLE 6.6  
CHANGES IN THE GEOGRAPHICAL BREAKDOWN OF NUMBERS OF SUPPLIERS TO  
ELECTROLUX, COOKERS DIVISION, SPENNYMOOR.

	N.R.	U.K.	Overseas	Total
1987	18 (8.4)	201 (93.5)	14 (6.5)	215
1988	21 (11.0)	176 (92.6)	14 (7.4)	190
1989	21 (18.3)	101 (87.8)	14 (12.2)	115
1990 (est.)				95

Source: author's interviews

TABLE 6.7.

CHANGES IN NUMBERS OF SUPPLIERS OF MATERIAL INPUTS TO ELECTROLUX,  
COOKERS DIVISION, SPENNYMOOR.

Commodity	Year	No. of Suppliers	% of total spend	Commodity	Year	No. of Suppliers	% of total spend
STEEL	1987	8	18.7	FASTENERS	1987	57	2.9
	1988	10	15.3		1988	41	2.8
	1989	7	16.0		1989	17	2.2
ENERGY CONTROLS	1987	12	12.7	ENAMEL & PAINT	1987	5	3.9
	1988	17	14.4		1988	5	3.6
	1989	13	15.0		1989	5	3.75
ELEMENTS	1987	4	10.9	PACKAGING	1987	12	2.7
	1988	4	8.8		1988	11	2.2
	1989	2	9.0		1989	6	2.16
TIMERS	1987	3	7.8	MOULDINGS	1987	18	2.5
	1988	3	8.6		1988	16	5.8
	1989	3	8.2		1989	6	3.0
LAMPS	1987	8	5.4	MISC.	1987	39	1.7
	1988	8	5.8		1988	28	1.6
	1989	4	4.4		1989	24	1.33
GLASS	1987	4	4.4	MOTORS	1987	3	1.4
	1988	4	2.6		1988	2	1.9
	1989	2	2.7		1989	2	1.8
EXTRUSIONS	1987	5	4.2	ELECTRICAL	1987	7	1.21
	1988	4	5.8		1988	9	1.6
	1989	2	4.7		1989	6	1.56
INSULATION	1987	23	4.2	HINGES	1987	1	0.7
	1988	22	3.9		1988	1	0.5
	1989	13	4.0		1989	1	0.52
CABLES	1987	6	3.7				
	1988	5	3.0				
	1989	2	3.0				



per cent of the decline in numbers of suppliers to Electrolux's cooker operations at Spennymoor is due to elimination of multiple sourcing of these five commodities. In 1987, fasteners, insulation, packaging, mouldings and miscellaneous materials accounted for 12.7 per cent of the total spend on materials and components but 70.2 per cent of the total number of suppliers, by 1989 these figures were 14.0 per cent and 50.7 per cent respectively.

Such a reduction in the number of suppliers has been achieved largely as a result of working with the existing supplier base rather than substituting existing suppliers with new suppliers. Since the greatest consolidation of purchases with single or a reduced number of suppliers has been with regard to these low value material inputs and since there has been an increase in the number of local suppliers we can surmise that the Northern Region has gained business with regard to these lower value items. This is not to say that the Northern Region does not supply some of the higher value material inputs but that there has been markedly less consolidation here and indeed if there was it is likely that such a process would act to the detriment of levels of U.K. sourcing.

At present production of electric cookers at Spennymoor is on a batch basis corresponding to the need for reasonably long production runs to gain the economies of scale associated with setting-up metal pressing and bending equipment. The company has been attempting to reduce set-up times and so reduce batch sizes. However, as one member of staff at Spennymoor commented,

.... We need economies of scale. What we are trying to do is to have smaller batch sizes on a regular basis and that costs money. So you've got to try and save money somewhere else and one of the ways is economies of scale - so your supplier gets better utilisation out of his equipment and his labour force. (author's interviews).

By eliminating multiple sourcing and, by the same token, consolidating purchases with a single or reduced number of suppliers there is the potential for gaining pecuniary external economies to offset any losses in internal economies of scale as a consequence of reducing batch sizes. Consolidation

with a single supplier may, where these suppliers have an oligopolistic position<sup>39</sup>, be the only way in which costs can be restrained.

## 6.6 CONCLUSION

The case studies provide barely any examples of changes in technology, market demand and corporate structures and strategies impacting upon linkage change in the manner posited by the various 'flexible production' theses. This in turn can be seen to reflect the unique way in which these market and technological circumstances and corporate structures and strategies impinge upon the organisation of production in the peripheral region setting.

The precise forms of linkage change at the individual case study establishments stem from a diverse and unique combination of technological, market and corporate influences. It would, therefore, be unacceptable to make gross generalisations regarding the influence of changing market demand and technology upon corporate structures and hence linkage structures at individual establishments. If, however, a generalisation can be made, it is that none of the individual case study establishments appear to conform to any stereotype of a 'flexible' manufacturer which may exist within the academic literature. This in turn is a reflection of the unique way in which changes in technology, market demand and corporate structures and strategies impact upon the organisation of production at peripheral region establishments.

Major process innovations in evidence, or soon to be in evidence, at case study establishments were associated with increases in the volume of production. Black & Decker's motor-pack assembly-line, Electrolux's metalworking equipment associated with its New Cooker Concept and Cummins' machining technology at Rocky Mount are all evidence of strategies based upon

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<sup>39</sup>An example here would be suppliers of ceramic glass which is fitted into cooker doors.

volume production. More importantly, the combination of product innovation, in the form of modular designs and reductions in the range and total numbers of component parts, and process technology make increased product ranges compatible with volume production; the elimination of input requirements leading to a simplification of the manufacturing process. Such a combination of product and process innovation was seen, in the cases of Black & Decker, Cummins and Electrolux, to offer improved scope for pecuniary external economies as a result of a simplification of material input requirements. In this sense, product developments appeared, in the main, to be heading in the direction of standardisation as opposed to the customising of products.

None of the market contexts within which individual case study establishments were situated could reasonably be interpreted as genuine market fragmentation. The only case study company to be situated in a market experiencing deconcentration was Black & Decker. In the case of Black & Decker market shares were being eroded due to the arrival of recent competition from the Far East and due to problems of brand association as opposed to fragmenting demand leading to the undermining of internal economies of scale. Reorganisation of upstream market structures have created important pressures toward the reorganisation of the case study establishments linkages. In particular, case study companies have been prompted to 'pass on' 'just-in-time' supplier relations and inventory reduction to their suppliers by similar programs initiated by their powerful customers.

The case studies provide little support for the argument that there is a re-synthesis of the technical or managerial division of labour within corporations leading, in turn, to a lessening of intra-corporate divisions of labour. The four multinationals concerned have all either maintained managerial divisions of labour or increasingly centralised decision-making (e.g Eaton). Technical divisions of labour within each of the case study corporations has tended to increase primarily as a result of rationalisation

and the allocating of more specialised roles - be that in terms of finished products or components - to particular establishments. Consequently, the case studies indicate that technical and managerial divisions of labour within corporations continue to present an important constraint upon the prospects for vertical disintegration in peripheral regions.

There is a range of different forms of linkage change of which externalisation is only one. Furthermore, processes of externalisation and linkage proliferation appear to be outweighed, in the peripheral region setting, by other forms of linkage change more closely related to a simplification of backward linkage structures. The case studies demonstrate that the elimination of multiple sourcing, corporate and division-wide consolidation of purchases and the elimination of input requirements are each important forms of linkage change at peripheral region manufacturing establishments. It can be suggested that the notion of linkage simplification as the general form of contemporary peripheral region linkage change provides a basis for understanding the continued lack of local embeddedness of Northern Region manufacturing industry despite the presence of processes of externalisation and the adoption of 'just-in-time' supplier relations, as noted here and in chapter 4.

The following chapter provides a synthesis of the findings contained in this and previous chapters of the thesis as a basis for understanding the implications of contemporary linkage change for the development of peripheral regions in general.

## CHAPTER 7

### LINKAGE CHARACTERISTICS OF NEW GREENFIELD INWARD INVESTMENTS

#### 7.1 INTRODUCTION

A conceptual distinction between the role of in-situ restructuring and the arrival of new greenfield investment in generating aggregate changes in linkage patterns was made in chapter 2. The previous chapter made use of company case studies to explore various forms of linkage change resulting from in-situ reorganisation of manufacturing operations. This chapter makes use of similar, though less detailed, case studies to examine the likely contribution of the most recent vintage of branch plants to patterns of linkages in the Northern Region. The chapter seeks to understand whether the recent and older vintages of 'branch plants' in the Northern Region are breeds apart from one another.

An examination of the linkage characteristics of new inward investments by way of case studies poses many conceptual problems. The 'newness' of investments itself presents a problem as in chapter 5. Most importantly, and unlike the aggregate analysis in chapter 5, there is no hard and fast benchmark, except in the sense of some stereotypical notion of a 'branch plant' or of greenfield operations established in previous 'rounds' of investment, against which to compare these company case studies.

This chapter examines the current backward material linkage patterns of two microwave oven assembly operations recently established in the Northern Region by the Japanese company, Sanyo and the South Korean firm, Samsung. The chapter briefly considers the influence of the corporate organisation of production and the technology of, and market for, microwave ovens in the next

section. It then details the backward linkage patterns of the two case study establishments. The analysis suggests that these new inward investments display many of the same deficiencies associated with branch plant investments - relatively routine assembly work, lack of non-manufacturing functions (e.g. R&D) and high degrees of intra-corporate trading. Significant future 'upgrading' of these new operations in respect of these deficiencies seems unlikely. As a result of the high degrees of intra-corporate trading both new investments have low levels of local sourcing in terms of value of material inputs. However, those linkages with non-affiliated suppliers that do exist tend to be highly spatially concentrated - much more so than might be expected. This pattern, it can be suggested, appears to be partly bound up with the institutional environment facing Japanese and Far Eastern inward investment into the E.C. which has partly precipitated such investment in the first place (e.g. see Young et al, 1990) but has also dictated levels of local content for an increasing range of products and consequently provided the stimulus to secondary inward investment.

## 7.2 THE IMPACT OF CORPORATE STRUCTURES AND STRATEGIES AND CHANGES IN TECHNOLOGY AND MARKET DEMAND UPON LINKAGES

### 7.2.1 Corporate structure and strategy

For Samsung the microwave oven manufacturing site in the North East is among its earliest overseas manufacturing operations. Samsung established its first overseas manufacturing subsidiary in Portugal in 1982 and had just six overseas plant in 1989 (three in Europe and two in North America) with plans for a further four or five by 1990 (Samsung Group, 1989). The company has three microwave oven manufacturing sites, one in Korea, one in North America and one in the U.K.. The total worldwide company output is around 3,000,000

ovens with the U.K. capacity amounting to less than one-tenth of this. Much of the company's consumer electronics activities are concentrated in one large integrated complex at Huwon in South Korea, and many of the overseas plants take components direct from this complex. The intra-corporate divisions of labour are less developed in Korean electronics companies than in their Japanese counterparts upon which they are dependent for many key components. However, this is not to say that intra-corporate transfers of components and materials are insignificant. Indeed, Samsung threatened to cancel its proposed investment in the North East when faced with the prospect of tougher E.C. legislation against Japanese and Korean 'screw-driver' plants seen to be being set up in the wake of anti-dumping actions with respect to other electronics goods (Rapaport, 1987). With 70-80% of components being imported in the early stages of production of microwave ovens at Billingham, the possible extension of anti-dumping legislation to cover components as well as finished products was considered a threat to the financial viability of the operations (Dodsworth, 1987).

Sanyo, on the other hand, has a much larger number and longer history of overseas manufacturing operations. Sanyo currently has seven factories manufacturing ovens worldwide, of which the factory at Newton Aycliffe is both the most recent and the exception in that the others produce other consumer electronics. Consequently, Sanyo exhibits a more elaborate corporate division of labour which is clearly illustrated in the case of microwave oven production.

To maximise profitability, we are implementing a unique system that will allow us to take advantage of varying conditions worldwide by conducting each stage of the production process - R&D and product design, materials and parts procurement, component assembly, and final assembly - in a separate country.

.... Our plan for producing microwave ovens for the U.S. is a good example. The magnetron will be manufactured in Japan and shipped to our subsidiary in Malaysia. Certain materials abundant in Singapore will be supplied by our subsidiary in that country to the subsidiary in Malaysia, where components will be assembled. The components will then be transported to our U.S. subsidiary for final assembly and marketing. This system makes our products competitive and contributes to the

prosperity of local economies. (Sanyo Electric Company, 1986: 13, emphasis added).

However, in one important respect, the North East's position within such an international division of labour is exceptional. Sanyo assembles the magnetron, the major component for microwave ovens, in the North East. And indeed, the company has more recently spoken of a greater decentralisation of its international operations.

One important international business goal is to strengthen our overseas businesses and make them more independent and representative of the regions where they operate. In each region - Europe, North America, Asia, etc. - a corporation will be established to create and administer region-wide integrated sales and production systems manufacturing complete products - including all components - in thoroughly integrated local systems which will improve our business efficiency and help create a more truly international profile. (Sanyo Electric Company, 1988: 3, emphasis added).

The E.E.C. based microwave oven assembly operations of Japanese and South Korean manufacturers are not subject to European Commission legislation regarding 'local' content. The conclusion of the 1987 investigation into the dumping of ovens by Far East manufacturers prompted one European Commission official to claim that 'We can see the injury [to E.E.C. industry] but can't find the dumping margins....' (Wolf, 1988). No anti-dumping levies could, therefore, be imposed. However, it may be, given the tendency for Japanese and Far East manufacturers to assemble different electronics products at individual sites, that anti-dumping actions taken by both the European Commission and U.S. Federal Government with respect to other consumer electronics products (e.g. television sets, video recorders) have distorted any erstwhile ideal structure to these companies' international operations as the case of Sanyo appears to suggest.

#### 7.2.2 Technology

The microwave oven is a product of recent origin. As such it is not currently subject to rapid change in design. Its recent origin ensures that,



for instance, the number of discrete parts is already low. The main aspects of product innovation are with respect to the overall size of the ovens - with successive designs becoming smaller - and the incorporation of traditional oven features along with the microwave oven. Neither of these main aspects of product innovation appear to have particularly important implications for input sourcing patterns.

Similarly, the production process for microwave ovens is relatively simple. It involves the assembly of several sub-assemblies and components into a pressed metal cavity. The magnetron, the capacitor and the transformer are the main components and the door and the control panel are the main sub-assemblies. Again there is little suggestion of likely process innovation, perhaps in terms of automated assembly, that is likely to have important implications for sourcing patterns.

Finally, whilst both companies did have computer networks these were only being used in a very rudimentary way to send periodic reports and production and financial data rather than to coordinate the scheduling of material inputs or shipments of ovens.

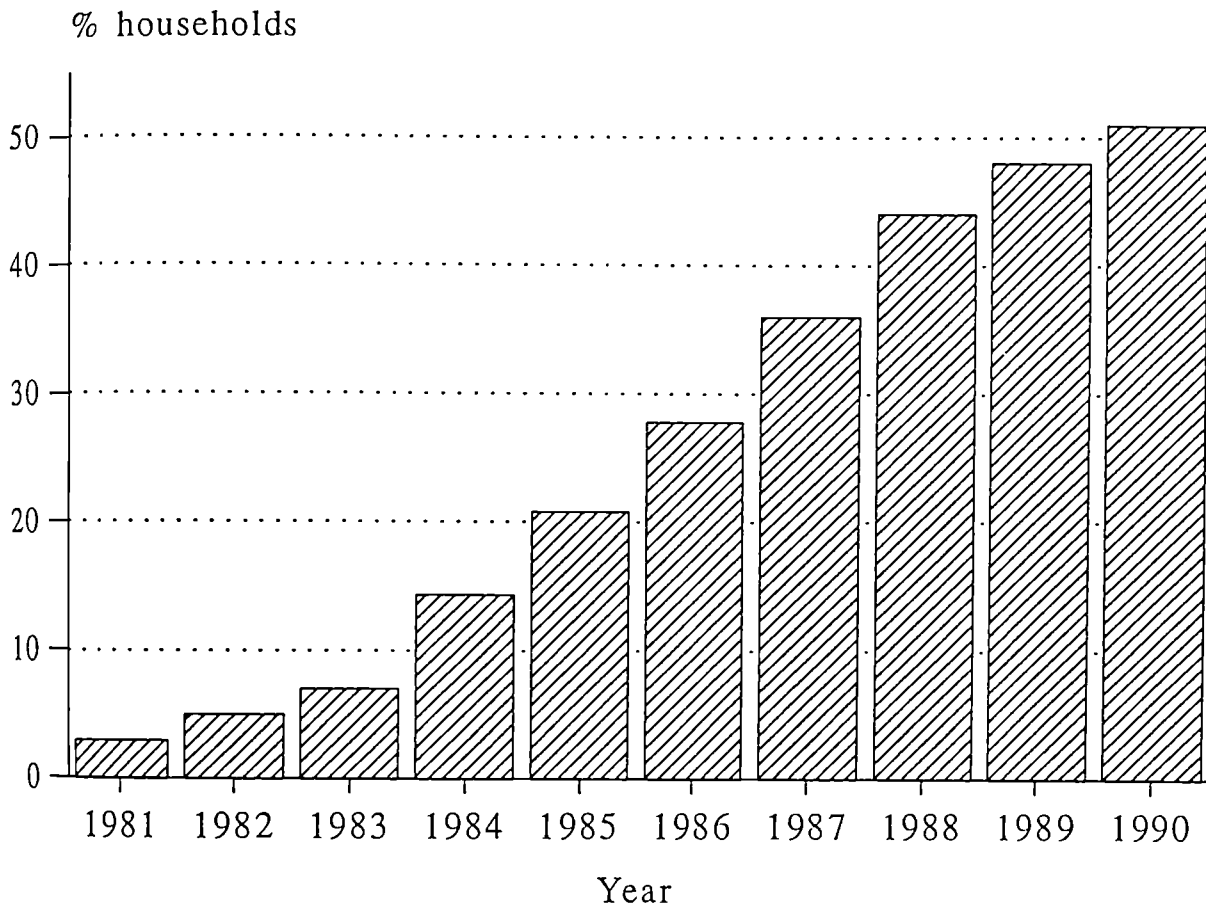
Thus, there is unlikely to be much in the way of product and process sophistication at either of these two microwave oven manufacturing operations in the North East. Little in the way of upgrading of microwave oven manufacturing operations is likely unless these are manufactured alongside a range of more sophisticated consumer electronics products.

### 7.2.3 Market conditions

The degree of household penetration of microwave ovens in the U.K. has, from a small base in the late 1980's, grown rapidly to approach that in Canada and Japan. Figure 7.1 shows that the growth in the U.K. market for microwave ovens has slowed in the last two years. Approximately half of all U.K.

FIGURE 7.1

HOUSEHOLD PENETRATION OF MICROWAVE OVENS IN THE U.K.



Sources: 1981-1986; Bond (1987)  
1987-1990; G. & A. Marketing

households now have microwave ovens. The largest and most rapid period of growth in the U.K. market would appear to have taken place during the 1980's. On the other hand, there is considerable scope for growth in sales of microwave ovens in mainland Europe. During the mid 1980's household penetration of microwave ovens in the mainland European market was negligible with only around 7% of households having microwave ovens (Bond, 1987).

The degree of concentration in the U.K. market for microwave ovens has remained reasonably constant (Table 7.1) though the large shares held by the four or five major producers conceal the fact that the U.K. market is served by upward of thirty manufacturers. The European market as a whole, as within the U.K. market, is competitive with the dominant Japanese and South Korean microwave oven manufacturers - most of whose recently established oven manufacturing operations are located in the U.K. - pitted against the European domestic appliance manufacturers with monopolistic market shares of their respective domestic markets. The U.K. market is dominated by the Japanese manufacturers, the formerly U.K. owned domestic appliance concern of Thorn EMI (owned since 1987 by Electrolux), and Philips. In the mainland European market, however, the emerging pattern of market shares may well be different, with South Korean manufacturers said to be likely to account for around one-third of that market (Rapaport and Dixon, 1986). The South Korean manufacturers have yet to gain such a share of the French and Italian markets, although they accounted for around 22 per cent. of the W. German market in 1988 (E.I.U., 1987a, 1988, 1989a,b).

Although several of the major foreign suppliers of microwave ovens to the U.K. market have operated factories in the U.K. for some time, direct investment in oven production has been a relatively recent phenomenon (Table 7.2). Toshiba, Hitachi and Matsushita, for instance, had established consumer electronics factories by the end of the 1970's. Production of microwave ovens at these sites, however, did not begin until well into the 1980's. Brother had

TABLE 7.1

U.K. MARKET SHARE OF LEADING MICROWAVE OVEN MANUFACTURERS.

	a) 1978	b) 1982	c) 1985	c) 1986
CR4	.68	.64	.66	.68
Sharp	20	17	23	24
Toshiba	21	17	22	22
Thorn EMI	14	13	11	12
Philips	13	17	9	9
Sanyo	8	9	10	10
Nat. Panasonic	5	6.5	7	7
Others	19	20.5	18	16

Sources:   a) Market Assessment (cited in Harris, 1984)  
          b) Centre for Business Research (1984)  
          c) Leatherhead Food Research Association (cited in Bond, 1987)

TABLE 7.2

PLANNED CAPACITY DATE OF ESTABLISHMENT AND LOCATION OF U.K. MICROWAVE OVEN  
FACTORIES OF JAPANESE AND S. KOREAN PRODUCERS.

	Output	Date est.	Location
Matsushita	75,000	1987	Cardiff
Toshiba	200,000	1985	Plymouth
Hitachi	180,000	1987	Blyth Bridge
Brother	200,000	1987	Wrexham
Sharp	150,000	1985	Wrexham
Sanyo	200,000	1988	N. Aycliffe
Samsung	150,000	1987	Billingham
Goldstar	300,000	1988	Washington

Sources: press releases, Milne (1990)

established its electronic typewriter factory in South Wales in 1985 and announced the setting up of a microwave oven plant at the same site two years later. Sharp did not establish its consumer electronics factory, and begin manufacturing ovens until the mid 1980's. Sanyo and Goldstar's investments in the North East are the most recent.

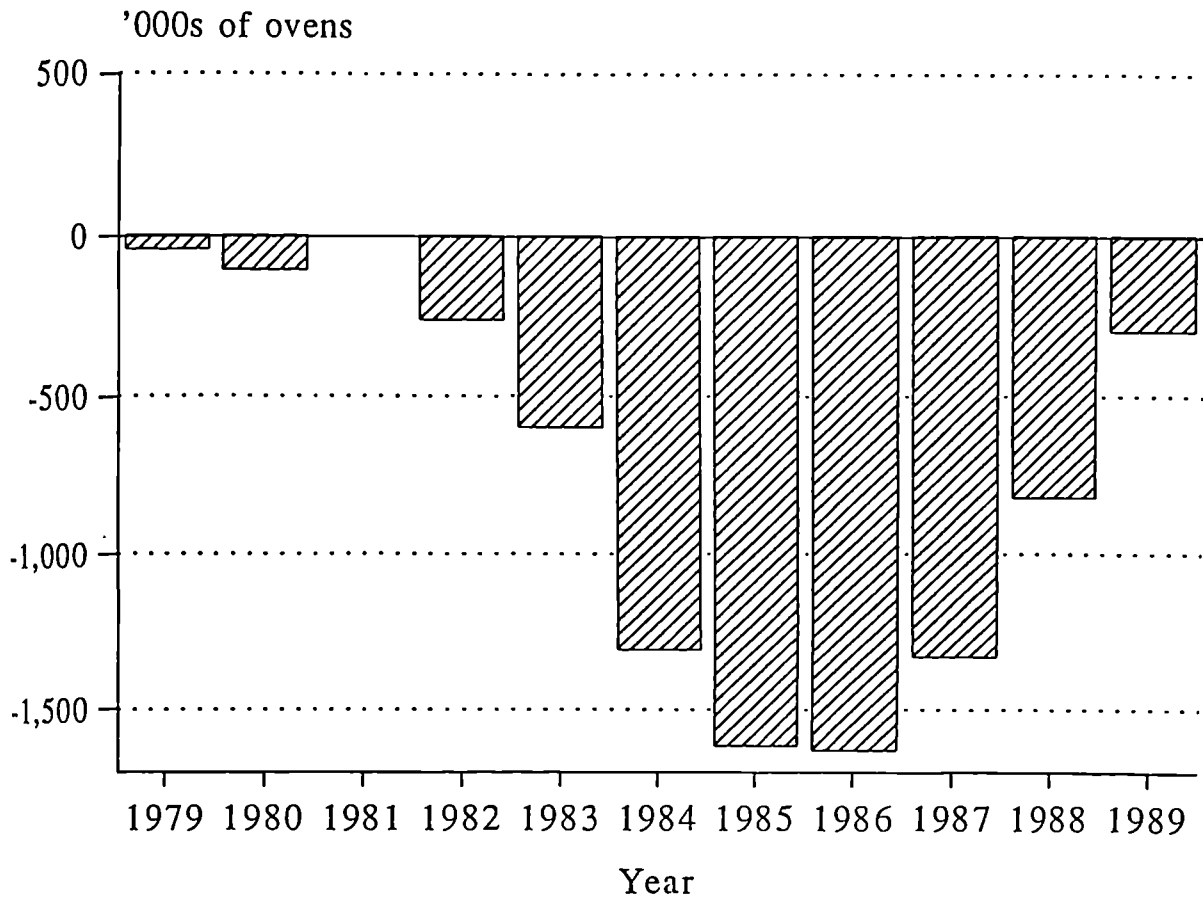
The U.K. market during its period of rapid growth in the 1980's was served primarily through imports by the important Japanese and Korean manufacturers. In 1985, the height of the balance of trade deficit, fully 70% of imports of microwave ovens came from Japanese manufacturers, rising to 86 % for Far Eastern manufacturers as a whole (E.I.U., 1987b). During the early 1980's a large trade deficit in microwave ovens developed as a result (Figure 7.2). The foreign direct investment by Japanese and South Korean oven manufacturers began before the 1987 European Commission investigation of dumping by these producers. That investigation failed to produce evidence of dumping 'margins'. As the eight Japanese and South Korean manufacturers have established operations in the U.K., domestic production has risen and the large trade deficit has reduced accordingly.

### 7.3 LINKAGE PATTERNS

Sanyo's factory in the Northern Region is effectively a manufacturing operation by virtue of the fact that it assembles the magnetron (composed predominantly of parts imported from Japan), does virtually all the metal presswork for the ovens and assembles the door and control panel sub-assemblies at its two plants in the North East. Samsung, on the other hand, is purely an assembly operation. Sub-assemblies, such as the door and control panel as well as the press work have been subcontracted locally and assembled at its Billingham plant. Table 7.3 shows the regional breakdown of numbers and proportions of non-affiliated suppliers to Sanyo and Samsung's factories in

FIGURE 7.2

U.K. BALANCE OF TRADE IN MICROWAVE OVENS (000's of ovens).



Source: Business Monitor Production Series PA3460, P360

TABLE 7.3

GEOGRAPHICAL DISTRIBUTION OF NON AFFILIATED SUPPLIERS TO SANYO< NEWTON  
AYCLIFFE AND SAMSUNG, BILLINGHAM.

	Sanyo		Samsung(a)	
	Number	%	Number	%
Northern	26	45.6	18	90.0
Scotland	1	1.8	0	0.0
North West	6	10.5	0	0.0
Yorks & Humb.	2	3.5	0	0.0
W. Midlands	4	7.0	1	5.0
E. Midlands	2	3.5	0	0.0
Wales	0	0.0	1	5.0
E. Anglia	1	1.8	0	0.0
S. West	0	0.0	0	0.0
S. East	7	12.3	0	0.0
U.K.	49	86.0	20	100.0
Overseas	8	14.0	0	0.0

- (a) The figures are estimates relating to the use of suppliers as of 1989, prior to the company reverting to assembling imported kits.

Source: Author's interviews



the North East. Both companies have been single sourced for all their input requirements. Similarly, both take transformers from the North East based Japanese company, Tabuchi (Peppin, 1990), and other inputs from Japanese consumer electronics manufacturing operations elsewhere in the U.K.. There have been a greater proportion of local (Northern Region) suppliers to Samsung's Billingham plant (approximately 90%) and, given the proportion of the value of the product that has been bought-out, the size of the business placed with these local suppliers is likely to have been greater than is the case for Sanyo's operations. The magnetron, transformer, capacitor and printed circuit board for the control panel are the four components which constitute the bulk of the value of a microwave oven. Sanyo makes the magnetron itself and purchases the transformers from Tabuchi at Billingham. The ability to reduce the Far East content of the ovens depends upon exchange rates. Thus far, of the components being supplied from the Far East, the only one to have been re-sourced from elsewhere is the capacitor which now comes from the U.S..

In a sense, Sanyo's operations conform to the 'branch plant' stereotype, there being limited local linkages in terms of value although not in terms of proportions of local suppliers. There is a retention of value-added in-house at the company's sites in the North East as well as the trading of component parts produced elsewhere in the company. Samsung, on the other hand, can be considered to be more vertically disintegrated. Although there is still a considerable degree of intra-corporate trading, Samsung subcontracts several major sub-assemblies for its microwave ovens locally.

The weight of academic thought on this issue (including current literature suggestive of the growth potential of vertically disintegrated complexes) would indicate that the prospects for economic development are that much greater in the case of Samsung than in the case of Sanyo. However, in the wake of health scares regarding microwave ovens in the U.K. Samsung, given its minimal investment in in-house manufacturing capacity, has reverted,

since late 1989, to importing and assembling KD kits. Sanyo claims to have been less severely affected by this slump in demand since it is far less reliant on the U.K. market. Samsung exports only 40% of its output from its Billingham plant whereas Sanyo exports 70% of output from its Newton Aycliffe factory. However, the lack of investment in in-house manufacturing capacity and the relative ease with which relations with suppliers can be terminated is surely a factor in the Samsung's ability to revert to assembly of imported kits. Thus, while Samsung's operations can be considered to have been reasonably vertically disintegrated and to have exhibited highly localised linkages before reverting to assembling kits, it does not follow that they are well integrated into the regional economy.

Whether any qualitative differences exist between these recent Japanese and S. Korean investments and previous greenfield investments by U.S. and U.K. and other European companies is not easy to assess. The S. Korean and Japanese microwave oven plants are more heavily oriented toward the mainland European market than the investments of domestic manufacturers, however, this is likely to reflect the fact that the European domestic appliance industry has, until recently, been highly fragmented (Stopford and Baden-Fuller, 1988). Certainly, in geographical terms, the case study establishments have very localised backward linkages. On the other hand,

the microwave oven industry in the U.K. is highly developed. The establishment of indigenous and Japanese manufacturers has led to the development of an efficient components manufacturing industry. (Parkes, 1987).

The degree of localised linkages of recent Japanese and S. Korean investments are, therefore, unlikely to exceed those of other manufacturers. For example, Electrolux, it is reported, purchases 70% of the components for its Luton produced microwave ovens from the U.K. (Parkes, 1987).

#### 7.4 CONCLUSION: NEW BRANCHES FOR OLD?

The two examples of recent inward manufacturing investment, discussed here, illustrate the dangers implicit in generalising about the character of 'branch plants'. The two plants share several of the deficiencies associated with branch plant led economic development although are more locally integrated than might be expected of new greenfield investments; Sanyo, as a result of a combination of in-house investment and limited local linkages, Samsung as a result of limited in-house investment but greater local linkage. This finding helps to reinforce the idea that the various deficiencies of branch plants are interrelated and a reflection of intra- and inter-corporate divisions of labour. Firms enjoy a considerable degree of choice regarding the internal and external configuration of their activities and this in turn has implications for particular regions (Hagstrom, 1990).

Nevertheless, the case study material presented here indicates the difficulty in sustaining the argument that the U.K. operations of the Japanese and S. Korean microwave oven manufacturers represent a breed apart from the stereotypical 'branch plant'. Whilst both display highly localised linkages in terms of numbers of non-affiliated suppliers, this needs to be interpreted in the context of other local and international aspects of the organisation of production of these companies. In both cases, highly localised linkages exist alongside routine assembly work, considerable intra-corporate trading of components and more or less elaborate international corporate managerial and technical divisions of labour.

There is a need to ascertain not only the value of localised backward linkages but also the quality of such localised linkages if one is to be able to understand the contribution of localised linkages to local embeddedness of regional manufacturing industry. As the case of Samsung illustrated, localised vertical disintegration cannot necessarily be associated with positive

implications for regional development. Just as the costs of selection of location and initial investments can be socialised, as the cases of G.M.'s Saturn plant in the U.S. (Meyer, 1986) and Nissan's plant in the North East of England (Crowther and Garrahan, 1988) illustrate, so the costs of possible failure of manufacturing investments can be further socialised through minimal investment in in-house manufacturing capacity. The development of the social division of labour in any regional economy can, in the long run, be a factor in regional growth, however it can also, as the case of Samsung illustrates, be one means by which many of the private costs of possible failure of investments could, to an extent, be socialised.

The unique contribution of Japanese inward investment - as new investment - to linkage development lies in the extent to which the domestic system of dense vertical sub-contracting relations can be transplanted abroad. Thus,

the issue is not so much how successful the overseas investment activity of single individual firms can be but how effectively the multinationalization of an entire industry can be accomplished. (Ozawa, 1990: 136, emphasis added).

In this respect,

The E.C. .... is an economic entity more suitable for transplanting Japan's multi-layered system of manufacturing than the U.S. market, since wages and other labour-market conditions are regionally still so diverse and structurally heterogenous that a vertical division of labour through sub-contracting can be more appropriately arranged and implemented. (Ozawa, 1990: 150-151).

All this, in turn, has implications for spatial patterns of linkages. Whether such wholly or partially transplanted systems of production are more locally embedded is debateable. For example, McDermott (1976) notes how high levels of local linkage exhibited by the externally owned sector of the Scottish electronics industry cannot be taken as evidence of the degree of integration of that sector into the regional economy as such localised trade may be chiefly within the externally owned sector (see also Hayter, 1982). This is

a very important point, given the degree of inter-trading among Japanese manufacturing operations in the U.K. and E.C., as was noted earlier (section 2.4) and confirmed, to an extent, in this chapter.

Together, this chapter and chapters 3, 5 and 6 have explored the contribution of older and newer vintages of 'branch plants' to linkage change and development in the Northern Region. The next and final chapter attempts to draw together the main findings contained in these empirical chapters and relate them to more general concerns regarding the changing character of the branch plant economy.

## CHAPTER 8

### CONCLUSIONS

#### 8.1 INTRODUCTION

The aim of this thesis has been to examine the changes in the organisation of production in the 'branch plant economy'. Recent literature positing the rise of a new paradigm industrial organisation - flexible production - raise questions regarding the changing character of the branch plant economy. The material presented here has been a study of the extent to which flexible production is evident within periphery of the U.K. economy. In particular, the thesis has concentrated upon the role of industrial linkages in peripheral region development. The thesis has provided a case study of contemporary material linkage change within manufacturing industry in one peripheral U.K. region; the Northern Region.

The focus of the thesis arose out of a concern with the role of contemporary processes of industrial restructuring in effecting, among other changes in the organisation of production, a greater local embeddedness of peripheral region manufacturing industry. In particular, the thesis has examined the extent of processes of externalisation and localisation of backward linkages and the causes and nature of linkage change in one peripheral region. A study of linkage change through-out Northern Region manufacturing industry has been provided by way of the secondary and original empirical material presented in chapters 4 and 5 and 6 respectively.

The next section of this chapter situates this study within a broader corpus of existing and potential work contributing to an understanding of the local embeddedness of regional manufacturing industry. The third section then

summarises the findings regarding contemporary linkage change in the Northern Region. These findings are then used to provide some insight into the likely extent and causes and nature of linkage change in peripheral regions more generally. Finally, the findings of this thesis - which are at variance with influential interpretations of the increased local embeddedness of regional manufacturing industry - are suggestive of the need for policies to help secure and enhance levels of local sourcing in peripheral regions.

## 8.2 THE CHANGING FACE OF THE 'BRANCH PLANT ECONOMY'

This thesis has examined one aspect of contemporary changes in the degree of local embeddedness of peripheral region manufacturing industry. As such, it is a partial examination of the several interrelated ways in which organisational change impacts upon the degree of local integration of manufacturing industry. In some senses processes of linkage change represent the end product of broader changes in the corporate division of labour. By concentrating, in the main, upon processes of linkage change this thesis has left unexplored other, perhaps more immediate, manifestations of the degree of local embeddedness of manufacturing industry. In particular, this work has only been able to examine in passing changes in the extent of technology transfer, changes in the degree of managerial autonomy, altered roles played by affiliates within their respective corporate contexts, the accretion or loss of additional manufacturing or non-manufacturing functions and the changing occupational profile at case study establishments. As yet little evidence exists about these other facets of the local embeddedness of peripheral region manufacturing industry. Empirical work within the spatial divisions of labour tradition could usefully explore these other important manifestations of the re-synthesis of corporate divisions of labour.

Furthermore, this thesis has concentrated upon the corporate

organisation of production as the main determinant of linkage change within regional economies. This is largely a product of the theoretical approach adopted. The spatial division of labour approach attempts to analyse together two largely separate approaches to the study of industrial location; firstly, a body of work which draws out the the spatial aspect of ostensibly aspatial organisational processes and, secondly, an approach which stresses the unique input to processes and patterns of industrial location provided by the character of particular places. Despite these noble intentions it is however inevitable, given the scale of such a task, that the former approach to the study of industrial location tends to dominate within the spatial divisions of labour approach. As a result, this thesis has been largely concerned with an analysis of the corporate organisation of production. Only in chapter 3, the historical review of the industrial development of the Northern Region, has this thesis considered the role of place specific factors in contemporary industrial restructuring in the region's manufacturing industry. The thesis has left unexplored the connections to be made between an emergent literature on the role of place specific institutions and political processes in the reproduction of labour in, and economic development of, particular localities or regions (e.g. Cox and Mair, 1988, 1991; Warde, 1988) and the existing literature on the economic processes involved in industrial organisation.

The institutional environment can be decisive to the ability of regions to effect processes of restructuring to their own ends (e.g. Brusco, 1981). The results of this thesis may, therefore, not accurately reflect the progress toward, or prospects for, greater local embeddedness of manufacturing industry in other peripheral regions where a greater institutional infrastructure exists (cf. Cooke et al, 1989; Cooke and Morgan, 1991). However, it is not merely the local institutional environment which helps shape the degree of local embeddedness of manufacturing industry as chapter 7 indicated. Supranational policies, such as E.C. anti-dumping legislation, may exert a



profound influence upon spatial patterns of linkages and these are not so readily analysed by way of a conceptual and empirical attention to place.

Nevertheless, as a partial study of the phenomenon of local embeddedness of regional manufacturing industry, this study is at variance with contemporary accounts of flexible production.

Traditionally, branch plant led regional development has been held to be deficient in several respects. 'Branch plants' have been considered to be only weakly integrated into their host economies in terms of localised backward linkages. This in turn has been seen to be a reflection of the development of intra-corporate technical divisions of labour which have correspondingly curtailed the development of localised inter-firm linkages. Some of the the literature reviewed in chapter 2 gave reason to believe that assumptions regarding this particular aspect of the branch plant syndrome are increasingly unwarranted. Contemporary forms of restructuring involving a re-synthesis of the technical division of labour and subsequent vertical disintegration of manufacturing operations and localisation of material linkages are seen to undermine the accepted wisdom regarding the branch plant syndrome and to presage the transformation of branch plant economies back into thriving regional economies.

However, this thesis has provided empirical evidence and a theoretical interpretation which contrasts with such an account of contemporary industrial restructuring in peripheral regions. Such a transformation of branch plant economies back into regional economies is premised on an assumption regarding the predominance of processes of externalisation and localisation of linkages within peripheral regions as in examples of 'flexible production systems'. The evidence presented here suggests that, despite the presence of processes of externalisation, such an assumption is unjustified. Rather, processes of externalisation and linkage proliferation are overshadowed by other forms of linkage change within the peripheral region setting which, on balance, are

leading to a simplification of backward linkage structures. Such a process of linkage simplification is one expression of the continued integration of peripheral region manufacturing industry into intra- and inter-corporate divisions of labour which are increasingly international in scope.

The radical re-interpretation of contemporary branch plant led regional development implied in recent literature cannot therefore be endorsed. Rather, the spatial division of labour approach to understanding geographically uneven industrial development remains the most appropriate framework for analysing contemporary industrial restructuring in the U.K. (Amin and Robins, 1990; Mason et al, 1991). Accordingly, an understanding of the corporate organisation of production continues to provide a valuable insight into the prospects for economic development in peripheral regions. The main contribution of the debate concerning the prevalence and form of flexible production systems to an understanding of the branch plant syndrome has been to rightly expose simplistic assumptions regarding branch plant led economic development and problems of external control of regional manufacturing industry more generally.

### 8.3 THE NORTHERN REGION: FROM BRANCH PLANT ECONOMY TO REGIONAL ECONOMY?

It would be difficult to sustain, on the basis of the evidence presented in chapters 3, 5, 6 and 7 the argument that the Northern Region has, over the last two decades or so, has been transformed from a 'branch plant economy' into a regional economy as a result of processes of industrial and corporate restructuring. Levels of foreign and external control of the region's manufacturing industry have continued to increase into the 1980's and 1990's. Whilst the region has not as yet conformed fully to the stereotypical notion of a 'branch plant economy' it is possible to argue that such a label is

increasingly apt. The traditional, 'pre-Fordist' industries have been significantly eroded within the region leaving many newer mass production (possibly 'Fordist') industries to dominate the industrial landscape.

Externalisation of production appears, for a variety of reasons, to be in evidence to a degree in many of the region's manufacturing industries. The current industrial structure of the Northern Region economy is such that it appears to provide a rather inadequate source for many of the manufacturing activities and component requirements which are currently being externalised. Furthermore, externalisation is only one of a number of processes of linkage change in evidence in the region's manufacturing industries. Processes of linkage change in the region appear complex both in terms of their coexistence at individual manufacturing establishments and in terms of their precise impact upon levels of local sourcing. However, it is apparent that Northern Region manufacturing industry has not, on the whole, become more locally embedded as a result of such linkage change.

Similarly, intra-corporate trade continues to play an important part in the operations of a sizeable proportion of the regions manufacturing industry. That such intra-corporate trade constrains processes of externalisation and the localisation of backward linkages was discussed in chapter 2 and indicated in chapters 5 and 6. As such, the development of the technical division of labour, as reflected in the evolution of corporate divisions of labour, continues to attenuate the development of the social division of labour within the regional economy.

That is not to say that nothing has changed in terms of the organisation of production and linkage patterns of the region's manufacturing industry but rather that the continued low levels of local sourcing reflect the continued integration of the region's industry into an evolving spatial-functional division of labour.

In-situ organisational and linkage change appears to be of greater

importance than the arrival of new inward investment in terms of transforming the nature of the region's manufacturing industry. Many of the region's manufacturing companies have adopted new manufacturing practices which are deemed (within the academic literature) to have a broadly positive impact upon levels of local sourcing. However, such organisational innovation has occurred alongside changes in corporate-wide divisions of labour following rationalisation and reorganisation by many multilocal firms with manufacturing operations in the region. As a result corporate organisation of production continues to play an important role both directly, in terms of determining the precise forms of linkage change and in particular the extent of processes of externalisation within the region, and indirectly, in terms of influencing the extent to which these processes of linkage change affect levels of local sourcing.

On the other hand, new inward investment to the region does not appear to be composed of branch plants which could be considered to be a breed apart from the branch plants of previous rounds of inward investment. New inward investments appear to display many of the commonly identified deficiencies of branch plants and, in particular, appear to be situated within quite complex corporate-wide divisions of labour. There is, however, a contrast between the aggregate findings and case study material presented in chapters 6 and 7. The two case studies of chapter 7 suggested that while the present value of material inputs purchased from non-affiliated suppliers may be low those linkages which do exist may be highly localised which in turn does offer cause for optimism regarding future integration of new inward investments.

#### 8.4 BRANCH PLANTS AND THE EVOLVING SPATIAL DIVISION OF LABOUR

The material contained in the preceding section and at greater length

in chapters 3, 5, 6 and 7 provides an understanding of the extent and causes and nature of linkage change in one peripheral region; the Northern Region. To the extent that the Northern Region can be regarded as a peripheral region, this material forms the basis of a more general understanding of the likely extent and causes and nature of linkage change within peripheral regions.

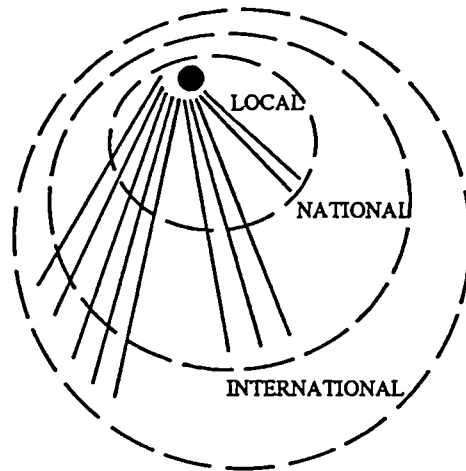
The evidence suggests that processes of externalisation are in evidence to a degree and that this is primarily a reflection of in-situ organisational and linkage change among manufacturing operations constituting previous rounds of inward investment to peripheral regions. Although new greenfield investments to peripheral regions do not conform fully to the branch plant stereotype neither do they conform to the 'flexible manufacturer' archetype. As such, new greenfield investments do not appear to be providing a particularly significant contribution to changes in the organisational make-up of peripheral region manufacturing industry. There is little evidence to suggest that there is a proliferation of localised linkages following the externalisation of activities by peripheral region manufacturing establishments. This, in turn, is a reflection of the fact that externalised activities are not always farmed-out to local suppliers because of the lack of, or inadequacies of, peripheral region industries as sources for many input requirements or else that externalisation is merely one of a number of other linkage changes evident in the peripheral region setting, not all of which have, on the whole, positive implications for levels of local sourcing. Linkage change within a peripheral region setting is more adequately captured in the notion of linkage simplification than that of linkage proliferation.

The lack of profusion of localised backward linkages accounts for the fact that branch plants do not appear to have become more locally embedded. That branch plants have remained relatively unintegrated into peripheral region economies however conceals a range of linkage changes which amount to linkage simplification. Figure 8.1 captures this schematically. Figure 8.1i

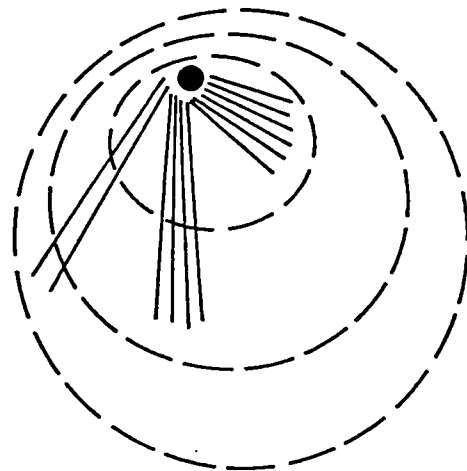
FIGURE 8.1

SCHEMATIC REPRESENTATION OF BACKWARD LINKAGE STRUCTURES.

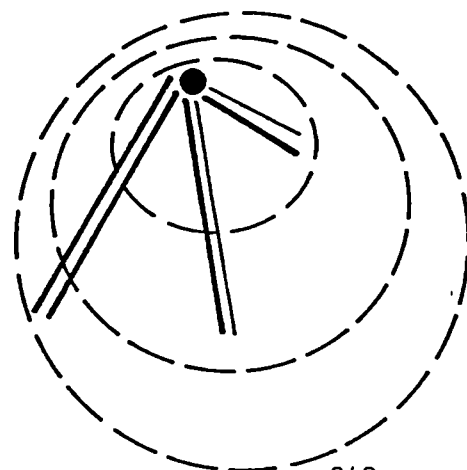
(i) STEREOTYPICAL BRANCH PLANT



(ii) LINKAGE PROLIFERATION



(iii) LINKAGE SIMPLIFICATION



displays the backward linkage pattern of the stereotypical branch plant; a large number of suppliers, very few of which are local or single sources for inputs. Rather than the proliferation of many localised linkages (Figure 8.1ii) as suggested under the flexible production theses, there is a process of linkage simplification (Figure 8.1iii). Some aspects of linkage change appear to lead to an increase and others to a decrease in the level of local sourcing.

As far as linkage change can be taken as one manifestation of broader changes in the division of labour, we can conceive of an evolution of the spatial-functional division of labour described by Massey (1979, 1983, 1984). There are organisational, linkage and labour market changes evident in peripheral regions as a result of in-situ restructuring and the arrival of new inward investment. However,

this does not constitute the emergence of a new flexible regime of accumulation in the OIRs [old industrial regions], but rather a partial reworking of old production strategies, that is designed to replace, through a selective transformation, the complex of existing and new modes of accumulation in such areas. (Hudson, 1989: 24).

There is no evidence to suggest that there has been a re-synthesis of the technical division of labour, at least not as it has affected the organisation of peripheral region manufacturing industry, and hence no re-emergence of an old spatial division of labour based upon regional specialism.

Processes of corporate rationalisation and reorganisation have maintained or refined corporate-wide divisions of labour. Companies organised upon a decentralised, geographical basis have rationalised to the extent that many individual production sites are specialists in products for supra-national if not world markets. There is very little evidence to suggest that companies organised on something approximating to a 'part-process' basis have recomposed the production process at particular sites. Intra-corporate trade remains a powerful constraint upon processes of vertical disintegration in peripheral regions. Indeed, there is evidence to suggest that in some respects

(especially in terms of international flows of inputs and transfers of semi-finished products) intra-corporate trade has become a more vital element in the operations of multilocal firms.

The evolution of corporate divisions of labour appears to have been complemented if not engendered by the deployment of product and process technologies to enhance both internal and external economies of scale. That such product and process innovations can be quite compatible with mass production of a range of superficially different but essentially standardised products is apparent. The actual deployment of new product and process technology to enhance, rather than to undermine scale economies in manufacturing in the peripheral region setting, underlines the lack of any re-synthesis of the division of labour and proliferation of localised, idiosyncratic, backward linkages among peripheral region manufacturing establishments.

On the contrary, it would appear that peripheral region branches and subsidiaries are becoming integrated into corporate divisions of labour (and hence a spatial division of labour) which are (is) becoming increasingly international. Such a conclusion is in accord with other accounts of contemporary processes of restructuring during the 1980's (Amin, 1991; Amin and Robins, 1990; Amin and Smith, 1986; Massey, 1989) and of the poor competitive position of U.K. manufacturing industry (Nolan and O'Donnell, 1991). As Massey puts it,

In some ways the nature of the branch plants has changed: the spatial structures of which they are a part are different. A higher proportion of them are responsible to ultimate headquarters outside the U.K.. In part this is because of the decline of British owned manufacturing industry within the U.K.; in part it is because of new inward investment by foreign companies.... (Massey, 1986: 258).

There are several processes likely to be contributing to such integration of peripheral regions into a more internationalised spatial division of labour. There is the large scale rationalisation programs of domestic and foreign companies with multiple operations in the U.K. (e.g. Peck and Townsend, 1986;



Fothergill and Guy, 1990). There is the relative disinvestment in the U.K. economy by U.K. companies, whose balance of production in offshore locations has correspondingly increased (Dunning, 1979, 1988; Thrift, 1986). There is also the reorganisation of operations of domestic and foreign multinationals reflecting the increasing importance of the emergent trading blocs in the world economy and the emergent European market in particular (e.g. Dicken, 1992; Howells, 1992). Finally, there is the increasing importance of foreign direct investment within the stock of total inward investment to peripheral regions in the U.K..

To argue that contemporary processes of organisational and linkage change within peripheral region manufacturing industry amounts to the re-emergence of an old spatial division of labour is to obscure an understanding of the continued problems of economic development in such regions. It can be accepted that stereotypical notions of 'branch plant economies' and of the position of peripheral regions within a spatial-functional or 'Fordist' division of labour has provided at best a partial account of the problems of peripheral region manufacturing in the post-war period. However, as the case of the Northern Region demonstrates, the notion of a spatial-functional division of labour is one which is of increasing relevance to an understanding of the organisation of production in peripheral regions. Many peripheral regions in the U.K. have become shorn of the last vestiges of their traditional industries to the extent that new, broadly mass production, industries dominate the industrial landscape. These mass production industries show no signs of becoming significantly more locally embedded. Rather, processes of corporate rationalisation and reorganisation have led to peripheral region manufacturing operations becoming part of increasingly international intra- and inter- corporate divisions of labour. Certainly the notion of a spatial-functional division of labour remains a partial account of the problems of peripheral region development but one which offers a

valuable insight.

#### 8.5 BRANCH PLANTS AND POLICIES FOR LOCAL EMBEDDEDNESS

In contrast to several influential accounts of contemporary industrial restructuring (Scott, 1988; Sabel, 1989), this thesis has demonstrated that such processes of restructuring are not sufficient, of themselves, to improve the prospects for peripheral region development. Processes of externalisation and other linkage changes which have potentially positive implications for local sourcing and hence peripheral region development are, in the absence of some form of intervention, not associated with more localised linkages. The wider significance of this can be seen in the existing attempts to secure increased local sourcing in the Northern Region (Batchelor, 1990; N.D.C., 1990) and in Scotland (Stokes, 1991) as well as at the national level in the case of some industries (Intermatrix Ltd., 1991).

Regard for policies to increase levels of local sourcing by manufacturing industry is likely to re-kindle debate concerning the appropriateness and efficacy of economic development strategies based upon indirect mechanisms of growth (e.g. Hirschman, 1958; Perroux, 1950; Livesey, 1972). However, the findings of this thesis also suggest that such development strategies are likely to be of particular rather than general relevance. The processes of externalisation and localisation of linkages upon which such strategies are based are likely to be limited within the peripheral region setting.

Without attempting to modify the industrial structure of a particular region, agencies concerned with attempting to secure increased levels of local sourcing can nevertheless help ensure that activities being outsourced by companies are done so locally. One example here would be the Northern Development Company's 'Purchasing Initiative' (N.D.C., 1990). The Northern

Development Company essentially facilitates contacts between potential buyers and supplier firms by acting as a broker of information held in the form of an industrial capacity register or else by arranging exhibitions or meetings. The impact upon levels of local sourcing is likely to be extremely limited due to the fact that most of the important buyer firms are likely to be already aware of potential suppliers within the region. Alternatively, and looking toward the role of inward investment in transforming peripheral region economies, agencies may do better to concentrate their efforts on attracting inward investments which are likely to generate significant indirect employment (see also the discussion relating to the Irish economy in O'Farrell and O'Loughlin, 1981). This sort of strategy could be pursued by actively directing financial assistance toward investments which are complementary to existing regional industrial structures or else toward those likely to generate considerable indirect employment per se.

Policies based upon existing regional industrial structures are both limited and limiting. Those based upon attempts to fill 'gaps' identified in regional industrial structures are likely, in some senses, to be more realistic and more successful. There are two main ways in which agencies can attempt to fill identified 'gaps' in regional industrial structures; through the development of indigenous industry or through further inward investment. The S.D.A.'s initiatives with respect to the Scottish electronics industry provide a sobering lesson regarding the likely success of policies geared toward the development of indigenous suppliers to major buyer firms. The S.D.A. has held equity stakes and provided loans to several electronics firms including several suppliers and subcontractors to the major original equipment manufacturers. More importantly, the S.D.A. actively supported the setting up of at least one company in response to a 'gap' identified in the electronics support industry structure. However, most of these firms that the S.D.A. supported have experienced difficulties and in several cases have since been

acquired.

Perhaps greater possibilities exist of increasing local multiplier effects by way of inward investment. This at least seems to be happening, in some instances, without the active involvement of agencies responsible for regional development. Again, the Scottish electronics industry provides a clear example of this phenomenon of secondary inward investment. Similarly, both Japanese electronics and automotive manufacturers have brought, in their wake, a round of secondary Japanese inward investment by supplier firms. The Northern Region itself has benefitted from such a phenomenon; the majority of local suppliers to Nissan's car manufacturing operations at Washington are the affiliates of Nissan's suppliers in Japan. Such a strategy, of course, poses questions as to whether such complexes of externally-controlled industry (based upon initial and secondary inward investment) are, as a whole, locally embedded.

## APPENDIX I

### CONCEPTUALISING INDUSTRIAL CHANGE IN PARTICULAR REGIONAL ECONOMIES: AN ELEMENTARY CRITIQUE OF REGULATION THEORY.

The variants of regulation theory adopted by some geographers (e.g. Scott, 1988; Moulert and Swyngedouw, 1989; Schoenberger, 1988 Storper, 1989; Storper and Christopherson, 1987) within accounts of contemporary industrial restructuring focus attention upon rather misleading and crude oppositions between one earlier period of history (Fordism) and one contemporary period ('flexible accumulation' or 'flexible specialisation'). As such, change in general and continuities, in particular, are forced into the theoretical partitions of history. Attention is focused upon identifying and delineating such regularities rather than on the process of change itself. More precisely, the role of transition or of crisis in the decline and rise of such regimes of accumulation is understudied. This has some very important implications.

Firstly, it means that empirical work on restructuring can only be interpreted in relation to an old ('Fordist') regime of accumulation or be taken as evidence of an emerging new regime of accumulation. There is, thus a slippage between description and prediction which amounts to a teleological explanation of change (Amin and Robins, 1990). It was noted in chapter 2 that much of the perceived change in industrial organisation may be inherent in the overly reductive oppositions which are the basis of a regulationist account of capitalist development. It is specifically argued, here, that this is the case. We have the highly curious situation that within accounts of a new regime of 'flexible accumulation' the NIDL thesis, for example, is both explicitly rejected as having any explanatory purchase upon contemporary

industrial organisation and restructuring and implicitly accepted as a reasonable account of the Fordist spatial division of labour. Theories of a 'New International Division of Labour' or simply stereotypical conceptions of 'branch plant economies' are unrealistic (false) caricatures of regional economies which compose the 'Fordist' half of an opposition between the old and the new. So, for example, Hudson (1989) argues that Fordist production has 'only ever been of marginal importance' within older industrial regions. This is confirmed in the case of the Northern Region of England (see chapter 4).

Secondly, the, for want of a better expression, 'components of change' under a period of transition are understudied. Gertler (1989) makes essentially this point when he distinguishes between the elements of 'rediscovery', 'transformation' and 'coexistence' in regulationist interpretations of contemporary industrial restructuring. As he sensibly notes, there is an element of each of these in contemporary processes of restructuring but the relative importance of each is left unevaluated in such interpretations.

It is particularly important to distinguish between, for example, simple rationalisation (of say, Fordist production capacity), in-situ change (investment) and the role of new (possibly 'flexible') investment in accounting for change in regional economies. Such 'components of change' do not lend themselves to quantification in the same way as in the case of employment but nonetheless must be considered if a realistic assessment of the process of change in regional economies is to be arrived at. For, example, it could be argued that a considerable element in the perceived emergence of flexible accumulation in regional economies derives from the 'cosmetic' of wholesale rationalisation (closure) of 'Fordist' branch plants.

This is something which is intuitively sensible, since it is precisely these plants that were opened under conditions of stable oligopoly with restricted product responsibilities, representing, perhaps, marginal

investments that are likely to be closed first within any rounds of rationalisation, leaving the more flexible and locally embedded branch plants to survive. Indeed, Hood and Young (1988) argue that it was the 'rationalised manufacturing' U.K. subsidiaries (as opposed to subsidiaries with greater strategic importance, e.g. 'miniature replicas' etc.) of foreign multinationals that underwent the most severe rationalisation during the 1980's. Similarly, Forthergill and Guy (1990) find outright closure of 'branch plants' by multilocal firms to be more prevalent in peripheral regions (including the Northern Region) during the 1980's. Finally, chapter 4, above, identifies the significant proportion of the Northern Region's archetypal 'part-process' branch plants of the late 1960's and early 1970's closed in the early 1980's. Clearly, it is difficult, to quantify this component of change within a particular regional economy but we can observe that it is likely to be not insignificant, especially in the case of branch plant economies.

Thirdly, the lack of concentration upon the process of change leads to an indeterminacy concerning the causes of change associated with a new era of capitalist accumulation. Both market demand and technological change are held to be determinant in regulation theory interpretations of the demise of Fordism. However, the origins of changes in market demand and technological change within such accounts are left unspecified. For example,

It is not clear why the environment has shifted in this way.... But prominent on the list are consumer tastes and the new flexibility of technology itself, factors which are viewed by the business community as unlikely to go away, hence compelling a permanent institutional adjustment. (Piore, 1986:).

In this way, market demand and technological change are exogenous to the theory itself, just as in neo-classical economic theory. The very aspect of capitalism, its dynamic, which these theories set out to address cannot be analysed directly. Regulation theory represents a form of comparative static analysis which suffers from 'technological determinism'.

Without further reasoning as to why and how technological change and

changed market demand come about the potential relationships between altered market demand and the adoption of new technology and organisational change appear little more than speculative assertions. Market demand and technological change are taken out of the very context in which they develop. Abstract and idealised properties of markets and technologies are then re-imposed exogenously into a regulation theory from which organisational changes (and spatial outcomes) are 'read off'.



## APPENDIX II

### POSTAL SURVEY SAMPLE DETAILS.

A list of all manufacturing establishments in the Northern Region with 100 or more employees was produced from lists produced by Tyne and Wear Research & Intelligence Unit, Cleveland County Council, and various local business directories including those produced by: Darlington Borough Council, Durham County Council, Cumbria County Council, Northumberland County Council, Peterlee Development Corporation.

Approximately 530 such establishments were initially identified for contact by telephone in order to elicit the appropriate recipient to which a copy of the questionnaire could be sent. In most cases, questionnaires were sent to staff from purchasing, sales or personnel departments. In the act of obtaining telephone numbers many of these establishments could not be traced. A further tranche were found to be closed or to be closing when contacted by telephone. This left a list of 465 establishments which were known to be in existence. Eight establishments were purposefully omitted from the survey sample as they were thought to offer considerable potential as case studies.

When contacted by telephone 29 establishments felt, for one reason or another, that they would be unable to complete the questionnaire or refused outright to take part in the survey. In this respect, the survey sample underrepresents the population of rationalised branch plants within the region. Within the food, footwear and clothing and furniture industries, for example, major firms have several factories in the Region only one of which was likely to be able to answer the questionnaire. Rather than burden staff at the other, purely manufacturing, branches with questionnaires or else to burden the immediate head office with individualised requests for information on individual establishments, questionnaires were sent to one establishment

only.

In November 1989 postal questionnaires were sent to each of 428 Northern Region manufacturing establishments with 100 or more employees. 109 questionnaires were received before a second copy of the questionnaire with a reminder letter was sent to those which had neither returned the first copy or expressed their wish not to participate. In all, 206 fully or partially completed questionnaires were included in the analysis.

Information on dates of establishment, mode of entry, and current nationality of ownership of externally controlled branches and subsidiaries provided by the questionnaire returns was far from complete. These pieces of information which were either absent from, or inaccurately given on, the questionnaire returns were derived with the help of Dr. Ian Smith and from data sources in the Centre for Urban and Regional Development Studies.

Table A.1 shows the details of the survey sample. The table indicates the point made above, concerning the fact that, in certain industries, branch plants might be underrepresented in the sample population (see figures for B/A). The response rate (C/B) was quite variable although there seems to be little relationship between response rate and likely perceived relevance of the questionnaire. For instance, given that a large part of the questionnaire was devoted to questions on subcontracting and purchasing of components we might have expected higher response rates for those industries to which the survey was most relevant (i.e. SIC 31, 32, 33, 34, 35, 45, 46). On the other hand, we might have expected lower response rates for those industries to which the questionnaire was likely to be perceived as less relevant (i.e. SIC 22, 23, 24, 25, 41, 42, 47, 48). However, no such relationship between the response rate and likely relevance of the questionnaire to particular industries appears to be apparent in table A.1. The overall response rate (those received/those sent to) of 48.1% is, thus, satisfactory given the problems of making the questionnaire relevant to all types of establishments

TABLE A.1

## POSTAL QUESTIONNAIRE SURVEY DETAILS.

S.T.C.	(A)		(B)		(C)		(E)				
	No. identfd.	Per cent. identfd.	Sent	A/C	Ind. Br.	Sub.	(D) Tot.	Per cent. tot.	D/A	D/C	F/P-100
22 Metal manufacturing	12	2.60	11	91.7	0	1	2	3	1.45	25.0	27.3
23 Extraction of minerals n.e.s.	2	0.43	2	100.0	1	0	0	1	0.48	50.0	50.0
24 Manufacture of non-met. min.	17	3.65	16	94.1	1	6	1	8	3.88	47.1	50.0
25 Chemicals	47	10.10	39	83.0	0	3	22	25	23.60	53.2	64.1
26 Man-made fibres	1	0.22	1	100.0	0	0	1	1	0.48	100.0	100.0
31 Metal goods	25	5.40	25	100.0	1	0	12	13	6.31	52.0	52.0
32 Mechanical engineering	65	14.00	54	83.1	8	2	16	26	12.62	40.0	48.1
33 Office & data proc. equipment	1	0.22	1	100.0	0	0	0	0	0.00	0.0	0.0
34 Electrical & electronic eng.	51	11.00	45	88.2	5	0	19	24	11.65	47.1	53.7
35 Motor vehicles & parts	11	2.40	9	81.8	0	2	1	3	1.45	27.3	33.3
36 Other transport equipment	7	1.50	6	85.7	2	1	0	3	1.45	42.9	50.0
37 Instrument eng.	4	0.86	4	100.0	1	0	1	2	0.97	50.0	50.0
41 1	36	7.74	36	100.0	5	4	6	15	7.28	41.6	41.6
42 1 Food, drink & Tobacco	19	4.10	15	78.9	3	0	3	6	2.91	31.6	40.0
43 Textiles	15	3.22	15	100.0	1	2	4	7	3.40	46.6	46.6
44 Leather & leather goods	2	0.43	2	100.0	0	0	1	1	0.48	50.0	50.0
45 Footwear & clothing	53	11.40	47	88.7	3	3	11	17	8.25	32.1	36.2
46 Timber & wooden furniture	22	4.73	17	77.3	3	0	2	5	2.43	22.7	29.4
47 Paper, paper prods.	43	9.25	42	97.7	6	4	11	21	10.19	48.8	50.0
48 Rubber & plastics	32	6.90	32	100.0	5	1	14	20	9.71	62.5	62.5
49 Other	10	2.15	9	90.0	1	1	4	6	2.91	60.0	66.6
Total	465	100.00	428	92.0	46	30	130	206	100.00	44.3	48.1

in all industries.

That is not to say that some industries do not appear to be over or underrepresented in the sample of respondents to the questionnaire. The final column of figures (D/E) in table A.1 gives an indication of the degree of under or overrepresentation of particular industries. The chemicals, metal working and plastics industries (SIC 25, 31, 48) appear to be overrepresented whereas the, mechanical engineering, automobile, food and drink, footwear and clothing and furniture industries (SIC 22, 32, 35, 42, 45, 46) are underrepresented in the sample of respondents (i.e. compared to the actual numbers of establishments identified in each of these industries).

APPENDIX III

COPY OF THE POSTAL QUESTIONNAIRE.



# University of Newcastle upon Tyne

CENTRE FOR URBAN  
AND REGIONAL DEVELOPMENT STUDIES

Director: Professor J.B. Goddard  
Deputy Director: Mr A.T. Thwaites

THE UNIVERSITY  
NEWCASTLE UPON TYNE  
NE1 7RU  
UNITED KINGDOM

Facsimile: (091) 232 9259  
Telephone: (091) 222 6000  
Ext: 6439

Claremont Bridge, 4th Floor

Our Ref: NPP/CLB

13 November 1989

Dear

As part of my research for my PhD thesis (I enclose a brief summary of my research interests) I am conducting a postal questionnaire survey of manufacturing firms in the North. The survey is aimed at understanding the changing geographical pattern of purchasing and sales of companies in the North. The quality of my thesis depends on the success of this survey, the results of which, should provide a very useful contribution to policy debates concerning economic development in the North.

I would be very grateful if you would arrange for the completion and return of the enclosed copy of the questionnaire. I realise that I am making demands upon your time and for this I can only thank you in advance. I assure you that the information collected in the survey will be treated in the strictest confidence and only used in aggregate form for academic purposes.

Please do not hesitate to contact me if you have any queries regarding the questionnaire.

Thank you for your cooperation.

Yours sincerely

Nick Phelps  
Postgraduate Student

Enc

CHANGING PATTERNS OF PURCHASING AND SALES AND REGIONAL ECONOMIC  
DEVELOPMENT IN THE NORTH OF ENGLAND

Important new changes are occurring in British industry. One particular change of interest, to academics and policy makers alike, is the changing purchasing requirements and sales patterns of manufacturing companies. New manufacturing practices, such as the move toward buying-in more materials and components as well as changing patterns of sales as companies adapt to the possibilities presented with 1992, will have profound implications for economic development in the regions of Britain.

This research examines the implications of changing purchasing practices and sales patterns of companies in the North for local economic development. To what extent will local suppliers benefit from the increased outsourcing of materials and components? To what extent are the markets served by companies in the North becoming more international? And how do these changes vary from industry to industry in the North? These are some of the general questions the research will address.

The enclosed questionnaire is designed to provide some of the basic information upon which such a study of regional economic development in the North can be based.



# University of Newcastle upon Tyne

CENTRE FOR URBAN  
AND REGIONAL DEVELOPMENT STUDIES

Director: Professor J.B. Goddard  
Deputy Director: Mr A.T. Thwaites

Claremont Bridge, 4th Floor

Our Ref: NP/CLB

1st December 1989

THE UNIVERSITY  
NEWCASTLE UPON TYNE  
NE1 7RU  
UNITED KINGDOM

Facsimile: (091) 232 9259  
Telephone: (091) 222 6000  
Ext: 6439

Dear

Two weeks ago I sent a copy of a questionnaire to you as part of a survey into changing patterns of purchasing and sales of manufacturing companies in the North. The results of the survey will form an important part of my research for my Ph.D. thesis but will also, I anticipate, provide a useful contribution to policy debates concerned with economic development in the North' (I enclose a summary of my research interests).

It is important that completed questionnaires are received from as many companies in all industries in the North as possible in order for the results of the survey to be representative of industry in the North.

I would be very grateful if you would arrange for the completion of the questionnaire. For your convenience, I enclose a second copy of the questionnaire and a pre-paid envelope for its return. I assure you that the information collected in the survey will be treated in the strictest confidence and only used in aggregate form for academic purposes.

Please do not hesitate to contact me if you have any queries regarding the questionnaire.

Thank you for your cooperation.

Yours sincerely

Nick Phelps  
Postgraduate Student.





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## **SURVEY OF CHANGES IN PURCHASING AND SALES OF MANUFACTURING COMPANIES IN THE NORTH**

**STRICTLY CONFIDENTIAL**

### **GENERAL INSTRUCTIONS**

*Please tick or write in appropriate boxes or spaces giving answers for the most recent financial year available.*

*NB Some questions ask for estimates for the year 1979. If this establishment was not in existence at this time please give estimates for the year in which the company was established.*

Position(s) of respondent(s): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## A:GENERAL INFORMATION

1. Name of this establishment: \_\_\_\_\_

2. Is this establishment:

- a) an independent company.(if so, go to question 4). ☐  
 b) a subsidiary establishment. ☐  
 c) a branch establishment. ☐

NB if b) or c), please give name of parent company: \_\_\_\_\_

3. Year in which this establishment became a branch or subsidiary of the parent company named above. \_\_\_\_\_

4. Does this establishment undertake:

- a) the production of finished products ☐  
 b) the production of semi-finished products or components ☐  
 c) final assembly ☐  
 d) other (please specify) \_\_\_\_\_ ☐

5. Is this establishment a head office for other firms, branches or subsidiaries?

Yes ☐ No ☐

6. How might the production process at this establishment best be described?

- a) Small batch ☐ e) Prototype production ☐  
 b) Large batch ☐ f) Assembly line/ mass production ☐  
 c) Fabrication in stages ☐ g) Other (please specify) ☐  
 d) Continuous process ☐

7. Please indicate where the major decisions, regarding the following business activities, are made (tick only one box per business activity). If (B) or (C), please state the location of the establishment at which decisions are taken.

	(A)	(B)	(C)	
Not Applic.	Here	Other Parent Co. Establishment	Split	Location
<input type="checkbox"/> a) Sales promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> b) Product design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> c) Market coverage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> d) Pricing policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> e) Raising short period bank loans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> f) Capital investment appraisal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> g) Final decisions on budgeting targets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> h) Purchase of materials/ components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> i) Stock levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> j) Selection of subcontractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> k) Reorganisation of work flows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> l) Planned contraction or expansion of workforce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> m) Detailed wage bargaining	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> n) Wage and salary policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/> o) Executive recruitment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

8. How many employees are there currently at this establishment?

- a) total \_\_\_\_\_  
b) management, technical and office staff \_\_\_\_\_  
c) production workers \_\_\_\_\_

9. How has the scope for making decisions at this establishment changed since 1979 (or since established)?

Increased ☐ Decreased ☐ Remained the same ☐

## B: PURCHASING

10. Please estimate the percentage of total value of material inputs purchased from:

		1979 (or when established)	Now
OTHER PARENT CO. ESTABLISHMENTS	within the region*	_____	_____
	outside the region but within the UK	_____	_____
	outside the UK	_____	_____
NON- PARENT CO. ESTABLISHMENTS	within the region	_____	_____
	outside the region but within the UK	_____	_____
	outside the UK	_____	_____
TOTAL		100%	100%

\* NB In this question, and in question 27 below, "the region" is defined as Tyne and Wear, County Durham, Cleveland, Northumberland and Cumbria.

Please ignore the next question if this is an independent company.

11. Does your parent company have a corporate sourcing policy for material inputs?

Yes ☐ No ☐

12. Do you currently contract out (to legally separate companies) for the following services used at your establishment. For each service, please indicate how the proportionate use of outside contractors has changed since 1979 (or since this company was established).

Not Applic.	Currently contract out		Change since 1979 (or since established)		
	Yes	No	Increased	Decreased	No Change
<input type="checkbox"/> a) Product development research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> b) Market research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> c) Personnel services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> d) Legal and financial Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> e) Computer/ data services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> f) Advertising	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> g) Purchasing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> h) Marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> i) Distribution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> j) Warehousing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> k) Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> l) Cleaning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> m) Catering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**B(i):PURCHASING OF COMPONENTS**

13. Do you or have you in the past, bought-in manufactured components for your product(s)?

Yes ☐

No (go to question 21) ☐

14. Do you now buy-in proportionately more components than you did a decade ago (or since established)?

More ☐

Less (go to question 17) ☐

About the same (go to question 19) ☐

15. Please briefly describe the main reasons for this change.

---



---

16. Has this proportionate increase in the amount of components bought-in mean that you have made more or less use of suppliers in the Northern Region?

More ☐

Less ☐

About the same ☐

Now go to question 19

17. Please briefly describe the main reasons for this change.

---



---

18. Has the proportionate decrease in components bought-in meant that these components are now manufactured at this site, or another parent company site?

At this site ☐

Other parent company site ☐

19. How has the range of similar components in your product(s) changed over the last decade (or since you were established)?

Increased ☐

Decreased ☐

Remained the same ☐

Please ignore the next question if this is an independent company.

20. Does your parent company have agreements with other, legally separate companies to supply particular components in the parent company's plants over specified areas (eg. Europe/ world-wide)?

Yes ☐

No ☐

**B(ii)MANUFACTURING WORK SUBCONTRACTED**

21. Do you, or did you in the past, subcontract manufacturing work to other companies?

Yes ☐

No (go to question 26) ☐

22. How has the proportionate amount of manufacturing work subcontracted from this establishment changed over the last decade (or since this company was established)?

Increased ☐

Decreased (go to question 25) ☐

Remained the same (go to question 26) ☐

23. Please identify the two most important reasons, from the following, which have accounted for the increase in manufacturing work subcontracted.

- a) To provide capacity for variation in demand for you products.
- b) To take advantage of a supplier's specialised knowledge or technology.
- c) To take advantage of lower labour costs open to suppliers.
- d) To avoid industrial disputes over parts of the production process.
- e) To take advantage of economies of scale open to suppliers.
- f) Others (please specify) \_\_\_\_\_

☐  
☐  
☐  
☐  
☐  
☐

24. Has this proportionate increase in the amount of work subcontracted meant that you have made more or less use of subcontractors in the Northern Region?

More ☐ Less ☐ About the same ☐

Now go to question 26.

25. Please identify the two most important reasons that have accounted for the increase in manufacturing work done in-house.

- a) To assure the quality of inputs.
- b) To protect this company's specific knowledge or technology.
- c) To economise upon the costs of contracting with suppliers.
- d) To avoid disruptions to the supply of inputs.
- e) To achieve economies of scale.
- f) Others (please specify) \_\_\_\_\_

☐  
☐  
☐  
☐  
☐  
☐

## C:PRODUCTS AND SALES

26. Please indicate the two main products of this establishment and estimate the percentage contribution of each, by value, to total sales.

	1979 (or when established)	Now
Product (i) _____	_____ %	_____ %
Product (ii) _____	_____ %	_____ %

27. Please estimate the percentage of total value of sales made to:

		1979 (or when established)	Now
OTHER PARENT CO. ESTABLISHMENTS	within the region	_____	_____
	outside the region but within the UK	_____	_____
	outside the UK	_____	_____
NON- PARENT CO. ESTABLISHMENTS	within the region	_____	_____
	outside the region but within the UK	_____	_____
	Outside the UK	_____	_____
TOTAL		100%	100%

**APPENDIX IV**

**COPY OF THE INTERVIEW SCHEDULE.**

## INTERVIEW SCHEDULE: PURCHASING

### General

1. Could you describe the product range and responsibilities that this site has? (eg. sales R&D).  
  
-how changed?  
-how does it compare with other manufacturing sites in Co.?  
-how does this affect purchasing requirements?
2. How is the Company as a whole organised? (eg. geographical or product divs. or matrix).  
  
-how does this affect purchasing requirements and geography?  
-Is there a Corporate sourcing policy for certain components? (egs, (why?, how priced?)  
-How has this changed?
3. Does the Company have a computer network linking different sites in the Company.  
  
-what is its purpose?  
-affect on purchasing?

### Markets, Competition and Strategy

1. How has the nature of demand for your products changed over the last 10- 20 years?  
  
-why?  
-what effect upon the way you manufacture and on purchasing?
2. -What competition has the Company faced over the years?  
  
-in what areas?  
what has been the strategy of competitors?  
-has it affected the way you manufacture?
3. Does the Company use a computer network to coordinate sales to its customers (and or schedule supplies from its factories?).  
  
since when?

### Current and past purchasing policy

1. Are there examples of components/materials that used to be manufactured in-house but are now bought-in?
  - which?
  - why?
  - when?
  - where are suppliers? (any reasons why Northern Region suppliers have not done well?).
2. Are there examples of components/materials that used to be bought-in but are now manufactured in-house?
  - which?
  - why-
  - when?
  - where were suppliers?
3. How do you decide whether to make or buy-in components/materials?
4. What is the current policy relating to suppliers? (eg. JIT, single sourcing, multi sourcing?).
  - why?
  - when adopted? (old policy)
  - how has this affected geography of suppliers?
  - is it the same for all suppliers/components?
  - have any suppliers changed their location?
5. How would you characterise the relationship you have with your suppliers?
  - quality/cost?
  - what does it entail? (eg visits/evaluation of suppliers?).
  - same for all suppliers/components?
  - are there any suppliers upon which the Company is dependent (why?).
6. Does the Company use a computer network to link with its suppliers?
  - since when?
  - has it affected the way you operate?



### Purchasing and technology

1. How would you describe the production process here? (eg. level of automation etc.).  
  
-how does this affect purchasing requirements?
2. Are there specific examples of where automation and investment in new manufacturing technologies have necessitated or facilitated changes in purchasing requirements?  
  
-egs?  
-what changes?  
why?
3. Have there been any developments in designing and assembling products which have changed purchasing requirements? (eg modular assembly?).
4. How are workers organised and materials scheduled in the factory as compared to between you and your suppliers?

Nick Phelps

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