PLANNING FOR KNOWLEDGE DRIVEN INDUSTRY IN THE SOUTH EAST

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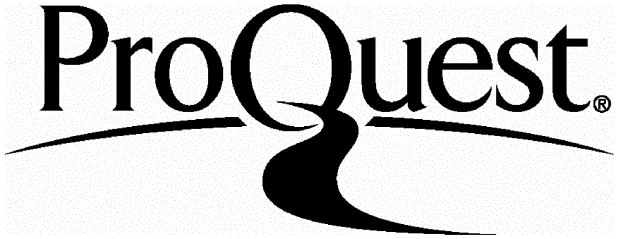

ABSTRACT

This study examines planning for knowledge driven industries in the South East in the context of cluster policy.

The literature review establishes that knowledge driven industries cluster together to reduce uncertainty, and enable innovation to take place. By clustering, competitiveness can be sustained. However, clustering has land use implications requiring a continuous supply of high quality and often greenfield sites. These implications potentially conflict with the sustainability objectives of the planning system. Despite this the DTI endorse clustering, and recommend that the planning system be reformed to facilitate it. This research examines the land use implications of clustering and investigates whether or not the existing planning system does need reforming for local practitioners.

There are two strands to the research. Firstly, the geography of high technology clustering in the South East is identified at local authority level using location quotient and differential analysis. This is compared with a base case, comprising previous research results and a summary of the sub-regional economy. Secondly, the top thirty high technology local authorities are canvassed on the current operation of the planning system and how far it fosters clustering. The high technology sector is a proxy for knowledge driven industries.

The geography of high technology clustering reveals a more complex picture than earlier research studies. High technology is not clustered solely in the west of the region, there are also examples to the East. Authorities in the Western Arc to the immediate north and west of London perhaps surprisingly do not have high representation, whereas authorities on the rim of the region, including the South coast are well represented.

The survey of the top thirty high technology authorities identifies that there is no conscious planning for clustering, although the planning system has been able to foster them. Problems arise when there is a shortage of land, as occurs in many parts of the South East. On these occasions authorities compromise established planning policies- sustainability imperatives - to foster high technology clusters. In the absence of defined clusters planning policy, authorities tend to resist this option.

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The land use requirements of clusters are relatively simple. What is less simple is how they can be met in Great Britain, particularly in the South East of England where land supply is particularly constrained.

The British land use planning system is defined by an ever-changing policy context. Since the early 1990s, the philosophy underpinning the system has shifted, from one of economic efficiency to one of sustainability (Adams, 1994, Cullingworth, 1997, Rydin, 1997). Today, sustainability imperatives are at the core of planning policy. A sustainable planning system must, "*meet the needs of a growing and competitive economy, in providing for new development such as housing, and in protecting the natural and built environment*" (DETR, 1997). Therefore, while economic growth is important it is not economic growth at all costs. Instead, planning policy must regulate land uses in a way that best provide for future and existing generations. Recent Planning Policy Guidance notes (PPGs) have advised planners on how to apply this new agenda to housing, transport and retail uses, in addition PPG 1 (DETR, 1997) and PPG 12 (DETR, 2000) provide advice on general principles and development plans. Conspicuously, there is no updated guidance on how to plan sustainably for commercial uses. Seemingly, how to use the planning system to attain sustainable economic growth is not a government priority.

In this context, where employment planning is demoted, and sustainability is to the fore, it is understandable why planners perceive clusters as conflicting with the existing land use system. As Nick Davies of the RTPI stated following the publication of the Competitiveness White Paper;

> "*There does seem to be a conflict between the Government's sustainability agenda for the protection of the countryside, and his (Peter Mandelson's) latest enthusiasm for high tech clusters*" (RTPI, 1998)

1.4 High Technology in the South East

This thesis tests the compatability of the planning system with the land use implications of high technology clustering policy in the South East.

Previous research has identified concentrations of high technology clustering at county level in the South East (Hart, 1993, Simmie and Sennett, 1999); it is popular because of its proximity to

London, the strategic infrastructure (airports, roads) and the good quality of life in the South East. Clusters already exist in this region, despite the planning system.

Crucially, commentators have identified that high technology clustering has not taken place uniformly throughout the region, but instead has concentrated in particular counties to the north and west of London. There are therefore parts of the South East that, despite it being part of the most prosperous region in Great Britain (ONS, 1999), do not have clusters of high technology. At the same time, the South East has a diverse sub-regional economy, characterised by pockets of prosperity and deprivation. Historically, high technology clusters are assumed to have grown in these most prosperous regions, to the north and west of London.

The first research stage of this thesis is to identify the existing geography of high technology clustering in the South East at local authority level. This analysis identifies the extent of high technology clustering in the South East, and also its location. A comparison with the sub-regional economic geography identifies if clustering necessarily occurs in prosperous parts of the region, or whether it occur elsewhere, in areas of '*abundant land supply*' (Dover). This geographical analysis identifies where cluster policy should focus in the South East, the economic context indicates at a sub-regional scale which target areas are constrained and therefore unlikely to be able to foster additional clustering.

As well as identifying the spatial logic of current high technology clusters, the process of identifying the geography of high technology clusters enables the identification of the top thirty high technology authorities in the region. These authorities are the subject of the second stage of the research, which is a survey investigating the compatability of the land use implications of clustering with existing planning policy at local level. Insights into sub-regional market conditions provided in the analysis of the geography of high technology are fed into the analysis.

The final product is therefore an updated geography of high technology clustering for the South East region, and an investigation of how clustering policy fits into the current planning system, whether there is a need for reform, and if so what form it takes.

1.5 Outline of Thesis

The study is written in five further chapters:

Chapter 2 outlines innovation and cluster theory, examining the land use implications of the different theorisations. It also includes a review of the South East economy, including existing cluster studies, and establishes the national and regional competitiveness and planning policy context for this study.

Chapter 3 outlines the research design and methods used in this study. Two strands of research emerge; an update of the geography of high technology clustering in the South East, and a survey of the top thirty high technology authorities to examine the potential incompatability of planning and cluster policy at local authority level.

Chapter 4 identifies the emerging geographies of high technology, arising from location quotient and shift share analysis. The results are presented using GIS technology, and compared against a base case comprising existing cluster research to date, and a summary of the sub-regional economic geography of the South East region. The results indicate that clusters of high technology do occur to the east of the region and that the geography of high technology clustering is more complex than previous research suggests.

Chapter 5 details the results and analysis of a survey of the top thirty high technology authorities in the South East, investigating the extent to which the current planning system needs reforming to foster cluster development. Planning policies are identified as both a help and hindrance to cluster formation. Practitioners require additional guidance to link clusters in with land use planning objectives.

Chapter 6 discusses conclusions drawn from the whole study and outlines areas for further research.

Chapter 2: Literature Review

2.1 Introduction

This thesis is investigating the planning and geography of *high technology* industries in the South East of England, excluding Greater London. High technology industries, including the information technology, pharmaceuticals, telecommunications sector and other technology based sectors, contribute high added value to the economy. They therefore belong to a wider group of knowledge driven industries that the Labour government, in their Competitiveness White Paper, view as key to the future prosperity of the Great Britain economy.

The rationale behind fostering these added value industries is embedded in the spatial and aspatial theorisations of innovation, as originated by Schumpeter, and latterly developed by neo-Schumpeterians- Storper (1995), Hall (1994), Camagni (1991), Simmie and Sennett, (1999), Gordon and McCann (1998). Together, these theorisations provide a clear justification for economic development and competitiveness policies prioritising the fostering of high technology and knowledge driven industries. They also endorse the concentration of knowledge driven industries in groups, or **'clusters'**. This chapter will develop these linkages.

The purpose of this research is to investigate how these spatial and aspatial theorisations can be usefully converted into local planning policy in the South East of England. This is done in two ways, by:

- Examining the extent to which high technology industries do cluster

- Reviewing planning policy to assess the extent to which local authorities can and do use the planning system to encourage high technology industry in their areas.

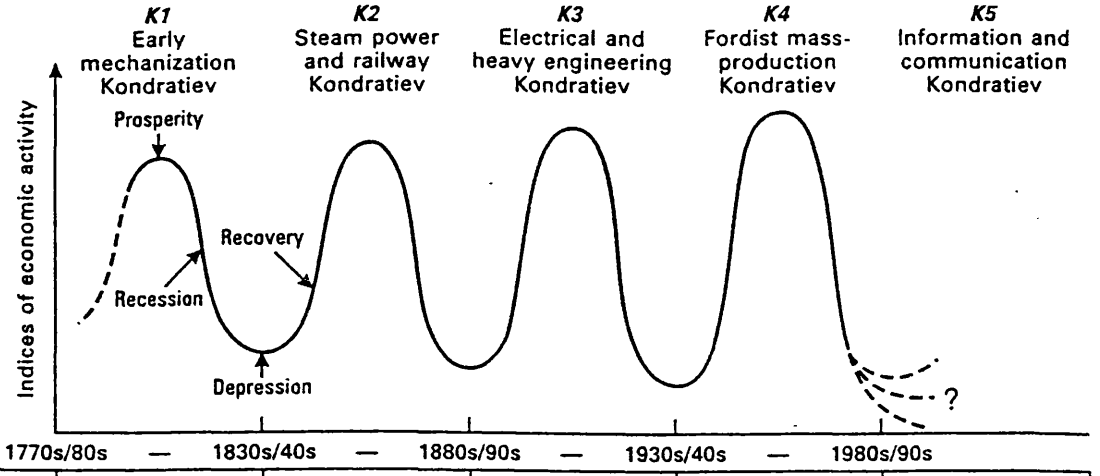
This chapter sets the context and rationale for this research. It does this by:

- Outlining an innovative or knowledge-driven conceptualisation of economic development.

- Detailing how innovation manifests itself over space, and reviewing cluster theory.

economic growth. Demographic, social, industrial and financial demand conditions have 'also to be right' (Schumpeter, 1943, quoted in Dicken, 1998, pg 147).

Figure 2.1: Kondratieff Waves
Source: Dicken (1998), pg 148



Main 'carrier' branches	Textiles Textile chemicals Textile machinery Iron working/castings Water power Potteries	Steam engines Steamships Machine tools Iron and steel Railway equipment	Electrical engineering Electrical machinery Cable and wire Heavy engineering / armaments Steel ships Heavy chemicals Synthetic dyestuffs	Automobiles Trucks Tractors Tanks Aircraft Consumer durables Process plant Synthetic materials Petrochemicals	Computers Electronic capital goods Software Telecommunications Optical fibres Robotics Ceramics Data banks Information services
Infrastructure	Trunk canals Turnpike roads	Railways Shipping	Electricity supply and distribution	Highways Airports/airlines	Digital networks Satellites
Limitations of previous techno-economic paradigms. Solutions offered by new paradigms	Limitations of scale, process control and mechanization in domestic 'putting out' system; of hand-operated tools and processes. Solutions offering prospects of greater productivity and profitability through mechanization and factory organization in leading industries	Limitations of water power *re*: inflexibility of location, scale of production, reliability and range of applications restricting development of mechanization and factory production to the economy as a whole. Largely overcome by steam engine and new transport system	Limitations of iron as an engineering material (strength, durability, precision, etc.) partly overcome by universal availability of cheap steel and alloys. Limitations of inflexible belts, pulleys, etc., driven by one large steam engine overcome by unit and group drive for electrical machinery, overhead cranes, power tools permitting vastly improved layout and capital saving. Standardization facilitating worldwide operations	Limitations of scale of batch production overcome by flow processes and assembly-line production techniques, full standardization of components and materials and abundant cheap energy. New patterns of industrial location and urban development through speed and flexibility of automobile and air transport. Further cheapening of mass-consumption products	Diseconomies of scale and inflexibility of dedicated assembly-line and process plant partly overcome by flexible manufacturing systems, 'networking' and 'economies of scope'. Limitations of energy and materials intensity partly overcome by electronic control systems and components. Limitations of hierarchical departmentalization overcome by 'systemation', 'networking' and integration of design, production and marketing
Organization of firms and forms of co-operation and competition	Individual entrepreneurs and small firms (<100 employees) competition. Partnership structure facilitates co-operation of technical innovators and financial managers. Local capital and individual wealth	High-noon of small-firm competition, but larger firms now employing thousands rather than hundreds. As firms and markets grow, limited liability and joint-stock company permit new pattern of investment, risk-taking and ownership	Emergence of giant firms, cartels, trusts, mergers. Monopoly and oligopoly become typical. Regulation or state ownership of 'natural' monopolies and public utilities. Concentration of banking and 'finance-capital'. Emergence of specialized 'middle management' in large firms.	Oligopolistic competition. Transnational corporations based on direct foreign investment and multiplant locations. Competitive subcontracting on 'arm's length' basis or vertical integration. Increasing concentration, divisionalization and hierarchical control. 'Techno-structure' in large corporations	'Networks' of large and small firms based increasingly on computer networks and close co-operation in technology, quality control, training, investment planning and production planning ('just-in-time'), etc. 'Keiretsu' and similar structures offering internal capital markets
Geographical focus	Britain, France, Belgium	Britain, France, Belgium, Germany, USA	Germany, USA, Britain, France, Belgium, The Netherlands, Switzerland	USA, Germany, other EEC, Japan, Switzerland, Sweden, other EFTA, Canada, Australia	Japan, USA, Germany, other EEC and EFTA, Sweden, Taiwan, Korea, Canada, Australia

2.3.2 Neo-Schumpeterians

Schumpeter's work has more recently been questioned and elaborated on by Neo-Schumpeterians. Neo-Schumperians are evolutionary economists, following Schumpeter's example with Kondratieff's long waves. Their temporal view of economic development exposed debates about technological pathways and choice in economic evolution (Dosi, Soete 1988, Nelson and Winter 1982, Piore and Sabel 1984, Storper, 1995). It was claimed that technologies develop along pathways or trajectories that describe choice sets that are totally different from those of orthodox economists (Storper, 1995). Choices are not substitutable and reversible, as in the standard neoclassical model, but are infect irreversible and crucially impossible to predict. Uniquely, therefore, technology is viewed as path-dependent and historically contrived (Piore and Sabel, 1984), as the products of interdependent choices based on a variety of user-producer and user-user interactions (Storper, 1995). Any choices of technological pathway not only informs current technological innovation, but spills over to inform future research and production, but in ways that are not predictable (Romer, 1990 quoted in Storper,1995).

In recent years, there has been a tendency for innovation to be theorised as a less specific, more all encompassing phenomenon. Neo-Schumpeterian theorists have recognised different types and relationships required for innovation to take place. As a consequence, definitions of innovation have evolved resulting in the 1997 European Commission definition (see section 2.3). At a practical level, MacKintosh (1995) recognised an innovation as comprising both an idea and commercial viability. Morgan (1995) understands innovation to include *"product, process and organisational innovation in the firm as well as social and institutional innovation at the level of the industry, region and nation"*. There has been a shift from the conception of innovation as a technology- driven process, that is linear in character, to a more complex non-linear concept where demand factors, in addition to other inputs, influence and therefore define it (Simmie and Kirby, 1995, Morgan, 1995, EC, 1995, EC 1997, Dicken 1998, Freeman, 1994).

Schumpeter and Neo-Schumpeterian theorists believe that innovation is the basis for economic prosperity. Innovation occurs unpredictably, often by accident. It is not something that follows a precise formula, but instead evolves as a consequence of individual choices, societal demand, technological invention and chance. Simply, while it is something to encourage, its very

The work of Marshall and his conceptualization of an industrial district, or an economic space characterized by agglomerated industries, is the starting point for an innovation theory, which considers the "intangibles" of innovative spaces. Although this dates from the 1890s, it recognises some key synergies and intangibles in a regional space (Castells and Hall, 1994, Simmie and Kirby, 1995, Camagni, 1991, Simmie and Sennett, 1999).

When describing an industrial district, Marshall stated that;

> "When an industry has chosen a locality for itself, it is likely to stay there long; so great are the advantages which people following the same skilled trade get from near neighbourhood to one another. The mysteries of the trade become no mysteries, but are as it *were in the air* and children learn many of them unconsciously....if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas. And presently, subsidiary trades grow up in the neighbourhood, supplying it with implements and materials, organizing its traffic, and in many ways conducing to the economy of its material"*(pg 225 Castells and Hall, 1994 from Marshall,A (1920) Principles of Economics, London: Macmillan, pg 225)*

Spatial proximity is important due to the relationships between agents in terms of easy information exchange, a similarity of cultural and psychological attitudes, a frequency of contacts, cooperation, mobility within a small area (Camagni, 1991). He began to forge the conceptual link between aspatial innovation theory where innovation and invention trigger economic growth, and the reasons why a particular spatial configuration- in clusters- was required. Subsequent theorisations expose that the internal social, political and institutional characteristics of clusters can be all important (Simmie and Kirby, 1995)

2.8.1 Knowledge

Subsequent theorizations by Storper 1995, Malmsberg and Maskell 1997, Camagni, 1991, Morgan 1995, Lundvall 1992, Simmie and Kirby 1995, Dicken 1998, Simmie 1997a, sought to investigate exactly what it was that was 'in the air' in industrial districts. They sought to identify how and why the need for companies to innovate led to cluster formation. In other words, why do firms decide to cluster, rather than set up away from similar companies?

The role of the cluster within the post-Fordist capitalist economy is clarified with an appreciation of what has been termed the 'learning economy' (Morgan, 1995, Lundvall, 1992), "flexibility per

se" and 'untraded interdependencies' (Storper, 1995, Morgan, 1995, Dicken 1998, Finegold, 1999). Neo-Schumpeterian theory provides the conceptual background to the three interrelated theorisations, in particular the uncertainty and unpredictability associated with the choice of technological pathways open to the innovative firm. The new economics of technological change recognises that there are knowledge or "common practice spillovers" such that technological excellence comes in packages or ensembles (Lundvall, 1990b, Lundvall and Johnson, 1992, Belije, 1991 as quoted in Storper, 1995). This excellence relies on acquiring knowledge or practices that are not fully codifiable.

Here, the "learning economy" theory of Morgan, (1995) comes into play, where he considers this problem of knowledge transfer as of fundamental importance in the current economy, because "*knowledge is the most strategic resource and learning the most important process* " (Lundvall, 1994 quoted in Morgan, 1995). Morgan argues that the learning economy is a product of the evolution of the global economy, where a new set of economic priorities, focusing on technological learning and not mass production are determining competitiveness in the current post-Fordist stage. This, in turn, is linked with the notion of "*flexibility*" which has been proposed as a description of the particular characteristics of production in the 1990s (Harvey, 1990, Storper, 1995, Simmie 1997, Dicken 1998). Although largely discredited (Storper, 1995, Simmie and Kirby, 1995), the flexible specialisation thesis does have some fundamental theoretical merits. Most importantly, it is true that flexibility does characterise current production processes, and significantly, it necessitates a learning ethos . Flexibility per se, the ability to rapidly adjust to market and demand conditions to maintain market niche, is of no use without an ability to identify which directions and forms this flexibility should take. It is only if the agents are able to learn, with access to all necessary resources, that firms can be flexible and therefore successful.

This explanation of a learning economy as a necessary complement to flexibility does not explain why clusters should emerge. It is only when considering the nature of the learning, and its diffusion over space that an explanation emerges. Here, many of the observations of Marshall and Hall and Castells become relevant. Storper (1995) and Dicken (1998) believe that the necessary role of the region is as the locus of what economists call the "*untraded interdependencies*" between actors, which generate region-specific material and non-material assets in production. Exactly what these "*untraded interdependencies*" consist of is usefully explained by Lundvall (1994) in his analysis of know-how:

> *"parts of the know-how can be sold as patents and other parts as turn-key plants, but important parts remain tacit and cannot be removed from its human and social context. Therefore, the labour market it the most important market for know-how and important elements of tacit knowledge are collective rather than individual"* (quoted from Morgan, 1995).

Untraded interdependencies are those very characteristics that make up clusters, and are *"in the air"* in Marshall's descriptions of industrial districts. They are the entrepreneurism and the work ethic of Silicon Valley as recognised by Hall and Castells (1994) and Porter (1998).

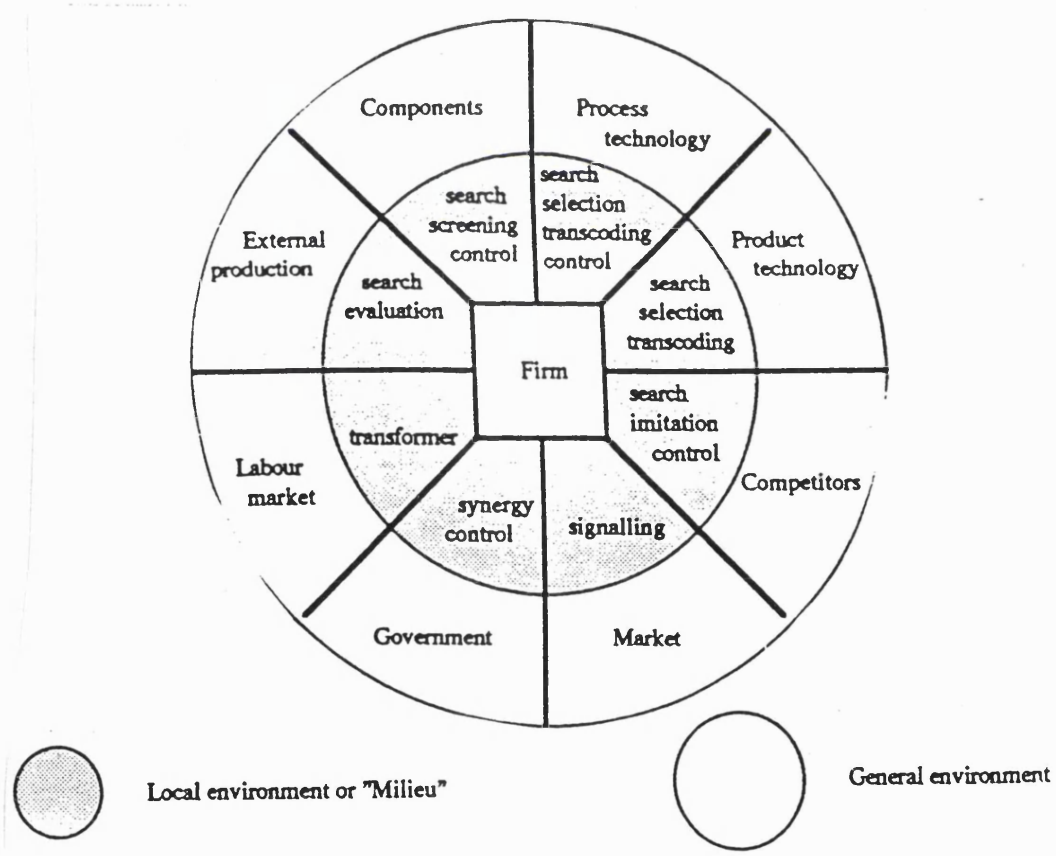
It is these intangibles that both Morgan (1995) and Storper (1995) argue provide the economic rationale for the emergence of the innovative region in post-Fordist capitalism. The inevitably collective nature of these untraded interdependencies mean that agglomeration ensues, spatial proximity is vital, the region provides the *"supply architecture"* for learning and innovation (Storper, 1995). The region facilitates and protects the pursuance of a particular technological pathway, with the construction of a set of conventions or untraded interdependencies, concentration in space is a way of maintaining the economic lead as long as possible (Storper, 1995). Uncertainty is resolved by a set of conventions.

Maskell and Malmberg (1999) usefully compare traditional agglomeration theory as proposed by Weber (1909), with an alternative agglomeration theory driven by the continual need for knowledge creation. They describe stages in the progression to the knowledge driven economy, by discussing the extent to which Weberian agglomeration factors have evolved or been replaced by others.

In traditional location theory, Weber distinguished between two types of production input. Firstly, there are factors of economic importance for the operation of the firm, for which the costs differ significantly between locations. These are known as 'localized materials'. Secondly, there are materials which are available everywhere at the same cost, irrespective of location. These are 'ubiquities'. This distinction was used by Weber to determine the degree of market-pull on the location of industries, *"the larger the element of ubiquities in the final product, the more strongly would the potential saving in transportation cost pull the industry away from the sources of raw material towards a location near the customers"* (Maskell and Malmberg, 1999).

locational efficiency, which can be expressed in two processes. Firstly, there is the reduction in transaction costs possible through geographical, sociological and cultural proximity, limiting uncertainty. Camagni (1991) recognises many ways in which the milieu reduces uncertainty, by partially filling up certain gaps in knowledge. These include information collection functions limiting a gap in information, transcoding functions which reduce a competence gap between firms (the ability to process and codify information for use in many different firms) (Camagni, 1991). Secondly, spatial proximity is seen to actively reduce external economies, in particular the cost disadvantages of small firms. It is proposed that agglomeration will allow a general reduction in average production costs for small firms in labour education and training, information collection, by sharing infrastructure and collective services (Camagni, 1991). For many of the

Fig. 2.3 The Main Uncertainty Functions Performed by the "Milieu"
from Camagni, R ed(1991) Innovation Networks, pg 133



milieux theorists the "network" is used as their principal organizational metaphor (e.g. Camagni, 1991). The milieu has been conceptualised as a network of actors in a region, for others, the network concerns the input-output system and the milieu provides members of the network with what they need for coordination, adjustment and successful innovation (Storper, 1995).

Demand based theorizations argue that companies cluster next to each other not because they benefit from each others activity and work together in any way, but benefit from the urban region in which they are located.

These are external economies available to all firms irrespective of sector. This is a system that "*simply functions as an ecology of activities benefiting from proximity*" (Gordon and McCann, 1998 as quoted in Simmie and Sennett, 1999); describing an urban reality in which firms are able to change their products, markets and suppliers in response to current advantage. As Dicken (1998) describes it, large- scale agglomerations make it possible to supply other facilities which would not be possible under geographically dispersed circumstances, i.e. in locations further away from large urban areas.

2.8.4 Product Life Cycle Theory

"*In order to enhance the competitiveness of firms, the specific localized capabilities of the areas of location must represent a combination of assets of significant value and rareness....As the locational demand of firms changes over time, the localized capabilities must adapt and transform in order to remain valuable*" Maskell, P, Malmberg, P (1999, pg 10).

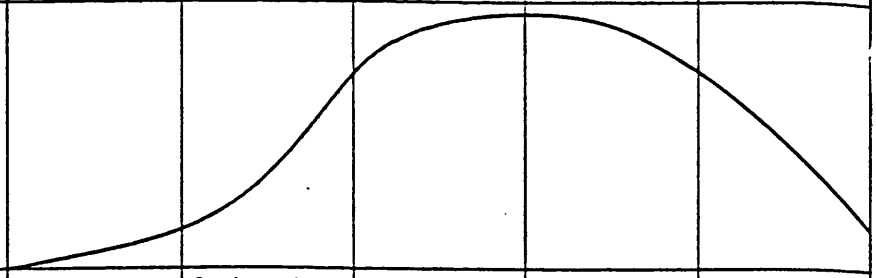
The work on the Product Life Cycle Theory, as originally put forward by Vernon (1966), provides a useful conceptualization of the differing relationship between clusters and space over time. This concept is increasingly being used by commentators in their analysis of resulting geographies of clusters (Simmie, Sennett, 1999, Simmie 1997, Dicken 1998), and provides insights into why companies cluster for different reasons- whether it be to be close to urban markets, to work closely together, or to benefit from region-specific attractions- universities, labour force, location of executive housing.

Product Life Cycle Theory is based on the premise that a product cannot be competitive infinitely, because of the constraints of a global capitalist system. This is usefully summarized by Casson, in Dicken 1998,

"Long-run growth requires either a steady geographical expansion of the market area, or the continuous innovation of new products. In the long run only product innovation can avoid the constraint imposed by the size of the world market for a given product" (Casson, 1983, pg 24 quoted in Dicken 1998, pg 161).

The essence of the product life cycle is that the growth of sales of a product follows a systematic path from initial innovation through a series of stages; early development, growth, maturity and obsolescence (fig 2.7 below). Sales of a new product are initially low because of poor customer knowledge and the producer's lack of track record, and therefore known reliability and product quality. Once a product gets a foothold in the market it then enters a phase of rapid growth as demand increases. A ceiling is reached when the demand saturation is nearly reached; eventually demand for the product slackens once it becomes obsolescent.

Figure 2.5: The Theorisation of the Product Life Cycle
Source: Based in part on Hirsch (1967), taken from Dicken (1998), pg 162

	Initial development	Growth	Maturity	Decline	Obsolescence
Sales volume					
Demand conditions	Very few buyers	Growing number of buyers	Peak demand	Declining demand	Steep fall-off in demand
Technology	Short production runs Rapidly changing techniques	Introduction of mass-production methods Some variation in techniques but less rapid change	Long production runs and stable technology Few innovations of importance		
Capital intensity	Low	High because of high rate of obsolescence		High because of large quantity of specialized equipment	
Industry structure	Entry is 'know-how' determined Numerous firms supply specialist services Few competitors	Growing number of competing firms Increasing vertical integration	Financial resources critical for entry Number of firms starts to decline	General stability at first, followed by exit of some firms	
Critical production factors	Scientific and engineering skills External economies (access to specialist firms)	Management, capital	Semi-skilled and unskilled labour, capital		

The product life cycle theory has important implications for the growth of firms, and the location of them. Dicken (1998) identifies that three factors can have a positive effect on the ability of a firm to prolong the growth stage of the product life cycle. These are techniques of production, the

scale of production, and finally location. Different scales of production, and different techniques all have implications for the kinds of spaces that companies will want to locate in, and imply that these spatial requirements will change throughout the life cycle of the particular product. An obvious example of this is for maturer companies to shift production to cheaper labour sources in developing countries to maintain market share.

The theorization of the cluster overlaps with the product life cycle theory in three main ways. Firstly, clusters are formed as a consequence of geographical uncertainty, and the increasing need for firms to innovate and produce more and different products. Arguably, in the competitive world of Porter et al, the average life cycle of the product is speeding up. This has implications for the location of firms- if they are not reliant on one product at a time, presumably it makes more sense to have a permanent head quarter 'homebase' in a cluster close to other companies and a wider metropolitan area to stimulate the likelihood of innovation.

Secondly, several commentators have more explicitly linked theorizations of the cluster and product life cycle theory by using the latter as an explanation of a particular configuration of clusters around urban centres (Simmie,1997, Simmie, Sennett, 1999). In their description of urbanized economies, Simmie and Sennett (1999) cite the work of Vernon (1966) on the product life cycle, and the theory that inventors and young innovative firms are most likely to be found in large metropolitan agglomerations. This is because, unlike in traditional agglomeration theory where the "distance-transaction costs paradigm" is based on the movements of shipments between fixed points in space, the application of innovation theory ensures that the creation of new innovative products is more dependent on good communications, as found in urban centres.

This notion of the cluster is one of re-invention and constant stimulation, where new companies and new ideas are free flowing and prolonging the economic lifetime of the cluster. However, as is implicit in Product Cycle Theory, products do have a finite lifetime and clusters can become out of date and superceded (Simmie and Sennett 1999, Porter, 1998). They cite old port transshipment practices or hot lead printing as examples of failed clusters in London. This analysis raises the point that clusters must be flexible enough, and changeable enough to maintain the flow of knowledge within it and external to it, so as to ensure competitive advantage is maintained.

This point is reiterated through the analysis of Scott (1995), in which he usefully conceptualized the growth of clusters in terms of the degree to which it becomes path-dependent. After a while a cluster becomes locked in to a pattern, which is strongly influenced by its organizational history. This can be a weakness, given that shifts in markets, technologies, skills and so on are ongoing, and locational benefits of an area can be finite in those circumstances. "*The very existence of lock-in effects means that regions, as they develop and grow, will eventually find it difficult to adapt to certain kinds of external shocks*" (quoted in Dicken, 1998, pg 12). A challenge for clusters, and for policy makers behind them, is to devise policies that foster particular sectors and technologies without enforcing dependency.

2.8.5 Theory of Pure Agglomeration

A final theorisation of the cluster is provided in the Theory of Pure Agglomeration, as forwarded by Gordon and McCann (1998). This concept more explicitly associates cluster formation with agglomeration, and as the Product Life Cycle theory conceptualises the cluster over time, the Theory of Pure Agglomeration theorises at different spatial scales. In so doing, it provides a theory of cluster formation similar to that provided by Porter (1990,1998) for the individual firm.

The Pure Theory of Agglomeration is based on a classification proposed by Hoover (1937, 1948), where sources of agglomeration are grouped into three categories. These are internal returns to scale, localization economies and urbanization economies. As in the theorizations of Malmberg and Maskell (1999), the notion of globalisation economies are also introduced to up date the theory to reflect the scale of current economic activity.

While each individual component has aspects in common with other cited cluster theory; in providing a total theory of agglomeration it provides an effective point at which to end the theorisation of clusters for the purposes of this research. Below each of the four spatial stages of agglomeration are described.

- Internal economies of scale.

These may arise due to production cost efficiencies realized by serving a large market. Simmie and Sennett (1999) recognize that in a global economy, where markets of a firm may be national and international in scale, internal economies of scale are found through the presence and

intangible nature of 'untraded interdependencies' themselves. Perhaps the closest policy approach would be the creation of communal spaces to facilitate informal interaction between separate firms in a cluster.

Table 2.2: Summary of Key Reasoning Behind Cluster Formation

Theoretical Observation ***Clustering occurs because of the:***	**Source**
• University spin off process • High quality of life • Good infrastructure • Intervention of the state to trigger innovation	Descriptive School
• Need to innovate and communicate with other agents in close proximity to do so • Reliance on 'untraded interdependencies', and therefore face to face contact to transfer 'uncodified' or 'tacit' knowledge	Networking, and Milieux
• Requirement to exchange experiences between firms working in similar yet distinct production processes	Pure Agglomeration Theory and Flexible Specialisation Thesis
• Proximity of the firm to major urban activities and therefore ever-changing markets and suppliers	Demand Based Theorisations
• Need to provide new product innovations and to not get trapped in a particular technological paradigm • Requirement of firms to locate on the periphery of urban cores early in the life cycle process	Product Life Cycle
• Provision of skilled labour market • Requirement for face to face contact to transfer 'tacit knowledge' • Common need for good infrastructure and proximity to airports	Pure Agglomeration Theory and Knowledge Theory

In contrast, it is the more descriptive theorisations of clusters, as described by Hall and Castells (1994) among others, that more obviously lend themselves to policy solutions. It is conceivable to have a policy that encourages SME's for example, or seeks to maintain the quality of life via a series of strict environmental regulations, and limited and design driven high quality housing and commercial construction programmes. It is a shame therefore that this theorisation is the weakest one.

The work of the EU (1995) usefully highlighted the difficulties of converting cluster theory into practice. In their conceptualisation of a "*regional system of innovation*", or a cluster, an attempt was made to graphically depict the many different variables at play within an innovative region, and therefore perhaps illustrate the areas that policy can be directed at (Fig. 2.7).

Table 2.3: Markusen's cluster typology
(reproduced and adapted from Simmie and Sennett, 1999, amended by the author).

Type of District	Description	Possible Policy Response
Marshallian Industrial	Dominated by small, locally owned firms. Substantial intra-district trade among buyers and sellers, long term contracts between local buyers and suppliers, low degrees of cooperation or linkage with firms external to the district	• Encouraging SMEs (finance, premises) • Education and skill development in the area to provide suitably skilled labour force • Encourage continuation of strong supply chains. Suggest new local linkages to be made
Hub and Spoke	Dominated by one or several vertically integrated firms surrounded by suppliers. Core firms work with suppliers outside the district, although there is intra-district trade among dominant organisations and suppliers. High degrees of cooperation among large competitor firms to share risk, stabilise the market and share ideas. A high degree of public involvement in the creation of infrastructure.	• Encourage joint working between major companies, including R & D collaboration • Encourage joint sponsorship of higher education facilities • Facilitate and co-fund infrastructure projects
Satellite Industrial Platforms	Minimal intra-district trade among buyers and suppliers, absence of long-term commitment to local suppliers, absence of long-term commitment to local suppliers, high degrees of cooperation and linkages with external firms, especially the parent company, and low cooperation with competitor firms to share risk, stabilize market share and share innovation.	• This scenario indicates little joint working at district level, but linkages with those outside the region. To perpetuate this pattern of clustering, the facilitation and maintenance of infrastructure projects is desired.
State Anchored Industrial Districts	Dominated by one or several government institutions e.g. military bases, state or national capitals, large public universities. Surrounded by suppliers and customers, substantial inter-institution trade within districts but not between other organisations, high degrees of cooperation in public sector, low cooperation in private sector to share risk, stabilise the market share and share innovation. Reliant on high public involvement in infrastructure provision.	• Encourage public sector joint working, include R&D collaboration and sponsorship of education facilities • Facilitate and co-fund infrastructure projects
Multi-Clustering in Cities	Associated with cities at the top of national hierarchies, also international trading nodes. Characterised by multiple clusters of innovative sectors, low levels of linkage with local suppliers and customers, the importance of national and international markets, critical infrastructure e.g. hub airports, high concentrations of competitive innovations.	• Facilitate and co-fund new and improved infrastructure projects, hub airports. • Encourage continued innovation through support of innovation award schemes etc • Provide suitable premises, and executive housing and infrastructure, to allow new companies to locate and existing ones to expand

The creation of very different policies, targeting different aspects of cluster formation, can achieve the same final product- a cluster. Cluster policy is therefore best conceptualized as a

combination of complementary policies which individually provide policy solutions in a distinct institutional environment, but together all aim to foster and maintain clusters. The emphasis of each set of policies on a type of policy- whether it be economic development, SME policy, education and training, competitiveness policy or land use policy (planning)- will vary based on the particular requirements of the chosen cluster area as well as the distinctions between policy arenas in the area concerned. Crucially, and less obviously, the choice of cluster policy is also informed by the theoretical sympathies of influential policy makers.

This section provides an initial insight into the potential complexities of policy making for clusters, albeit at a largely theoretical level. What is less clear is the role of planning policy as a part of cluster policy. A consideration of the policy implications of the bodies of theory, reveal that land use policy should form only a part of any cluster policy. Other policy types- including training and education, and economic development- contribute an equally valuable role in setting up conditions for clustering.

However, possible policy responses to Markusen's cluster typology indicate that land-use policy has a major role to play. In addition to generally providing land of sufficient quality for many firms to locate and expand in, land-use policy largely determines the nature and extent of infrastructure, airports, housing, and other support facilities. While these spatial components appear more important in Markusen's 'state anchored industrial districts', and when there is 'multi-clustering in cities', they are basic land use requirements of **any** cluster.

2.10 Applying Innovation and Cluster Theory to the South East of England.

The review of innovation and cluster theory reveals three factors. Firstly, that the cluster is the main spatial manifestation of knowledge-driven or innovative growth and this has been demonstrated worldwide often in high technology sectors. Secondly, that the cluster is complex and the logic for its existence is often based on intangible components- such as untraded interdependencies. Thirdly, that resulting cluster policy spans several different policy areas including planning.

West Sussex	Banking and Finance, pharmaceuticals, multi-media	Electrical/Electronic Engineering, Pharmaceuticals, Air transport, Creative Industries	High technology concentration	Chemicals and chemical products, Machinery and Equipment, Electrical Machinery/Apparatus, Radio/TV Communications, Medical Precision Instruments, Other transport equipment, Financial Intermediation, Insurance and Pensions, Financial Intermediation Aux., Computer and related activities
Cambs				Food products and beverages, rubber and plastic products, Machinery and Equipment, Office machinery and computers, Radio TV Comms, Medical Instruments, Motor Vehicles, Telecoms, Insurance and pensions, Financial Intermediation, R&D, Computers
Greater London				Water transport, Post and telecommunications Financial Intermediation, Insurance and Pensions Financial Intermediation Auxiliary, Computer and related activity

Table 2.6 shows there are clusters in the South East, clearly distinguishable at County level. It also shows how there are sub-regional variations in the distribution of clustering in the South East. Some counties have more clusters than others, Simmie and Sennett (1999) identify that Buckinghamshire was over-represented, and therefore experienced clustering in 13 distinct sectors; Kent with only 5 sectors clustering. Sub-regional variation also occurred by type of cluster. Crucially, clustering is not restricted to high technology sectors (see chapter 3 for definition used in this thesis); but instead applied to more conventional 'low technology sectors' including water transport, and food transport and beverages. Each of these sectors has its own economic geography, most clearly indicated by Hall et al's (1987) observation that the high technology sector is located only to the North and West of the London connurbation and not in the South East region as a whole.

Therefore, despite the general proclamations of SEEDA (1999) and GOSE (1999) that the South East region fosters clusters; the results of studies completed to date indicate that the geography of that clustering varies considerably across the region. This thesis examines the extent to which there is variation across the region, by looking at high technology industry at a finer geographical grain, local government level.

2.13 The South East: A Diverse Economic Geography

As analyses have identified a varying geography of clustering in the South East, reviews of the region and areas within it expose that it is very much characterised by a varied and distinct economic geography. Simply, while the South East as a whole is the most competitive region in

traditional county boundaries, and distinguishes between areas due to their economic characteristics.

It is not the purpose of this thesis to examine in detail the economic geography of the South East. This has been undertaken by both GOSE (1999) and SEEDA (1999). What this thesis is testing however, is the extent to which the sub-regional economic geography matches the geography of high technology clustering in the South East. Table 2.5 revealed that, at a regional level, observations about the South East economy seemed to fit the requirements of cluster theory. The South East had a highly skilled labour force (particularly of scientists), a good quality environment, good infrastructure, proximity to a large city, R & D institutes and universities, and a high number of small companies. At a more local level, however, as table 2.8 indicates, parts of the South East do not fit these requirements.

Table 2.8: Economic Constraints of Areas in the South East.
(Source: SEEDA , 1999)

Area	Economic Constraints
East Sussex and Brighton and Hove	Pockets of deprivation- Brighton and Hove (60th most deprived area), Hastings (81st most deprived area). Population concentrated on coastal strip. Parts of the area are inaccessible, poor road infrastructure, road congestion. Narrow economic base. Much of East Sussex is rural.
Hampshire	Pockets of deprivation- Portsmouth (75th most deprived area), Southampton (78th most deprived area). 70% of Hampshire is rural. Pressure on the infrastructure in some areas, experiencing labour and land shortages
Kent	No major airports or adequate road links. Part of area is very deprived and forms part of the Thames Gateway regeneration area (see fig x). Poor inner urban environments in parts of North Kent. Shortage of high quality business premises. Relative isolation in East Kent. South and East coastal towns suffered from decline in tourism and port activity.
Buckinghamshire	Deteriorating transport links, shortages of premises and labour, Heathrow is reaching capacity
Oxfordshire	Area of Economic Pressure. Limited environmental capacity to accommodate growth. Poor public transport limited.
Surrey	High house prices. Lack of small office space. High commuting. Green belt designations restrict availability of sites for inward investment.
West Sussex	Concerns about congestion. Limited range of business accommodation, especially along the coast.

In an area of such wide economic diversity, it would be surprising if clustering located uniformly across the region. Table 2.6, illustrating the range and variety of identified clusters, begins to indicate variations across the region, but only at county council level. Hall et al (1987) also

"The government is reviewing how the planning system can help promote the needs of clusters of businesses in growth industries; and the implications for their expansion for other land uses such as housing and transport infrastructure" and;

"The government is overhauling the planning system to fit better the needs of enterprise while still meeting wider environmental objectives" (paragraph 29).

The planning system, as currently structured, cannot effectively foster high technology clusters due to conflicts between the competitiveness and land use policy, until the 'reform of the planning system'. Exactly what these conflicts might be are explored in section 2.20 which describes land use planning policy in greater detail.

To date the government has failed to overhaul the planning system. Consultants have been instructed to *"review how the planning system can best help to promote the needs of clusters"*, and while completed, their reports are not publically available. Equally, there is no clear timetable for the reform of the planning system.

2.18 Biotechnology Clusters: Lord Sainsbury's report

As a part of the drive to introduce national cluster policy, a Biotechnology Taskforce was set up headed by Lord Sainsbury which investigated clustering conditions in the biotechnology sector, based on interviews with biotechnology companies in the UK and overseas.

The context for the document is largely taken from cluster theory. Clustering is defined as a series of linkages between agents in accordance with Porters (1998) definition, and, as with Hall, Storper and several other commentators, it identifies that *'there is not a single formula or sequence for building successful clusters'* (pg 3). The report identifies ten critical factors for cluster development. For each of these, it describes the current situation for the biotechnology sector, and then makes policy suggestions (table 2.10).

Table 2.10 reiterates that sets of policies together form a cluster policy, and relatively few of them are obviously planning policies. Significantly however, as with the Competitiveness White Paper, Lord Sainsbury does recognise the need for the planning system to devise policies to encourage clusters with the RDA as agency responsible for instigating it.

The clusters report specifies the land use problems of individual biotechnology firms, and indicating why the planning system needs reforming. '*Planning restrictions can be a significant barrier to cluster growth'*. This is because of a '*conflict between environmentally sensitive areas and growth*'. This conflict, and how it expresses itself in national, regional and local environments is a major part of this thesis.

The Report states that "innovative solutions" are required to resolve the conflict between economic growth and the environment. The report proposes the fashioning of Urban Networks, and a method of designating zones where innovative clusters may develop. The M11 in Cambridgeshire, M40 and A34 in Oxfordshire provide possible locations for these clusters.

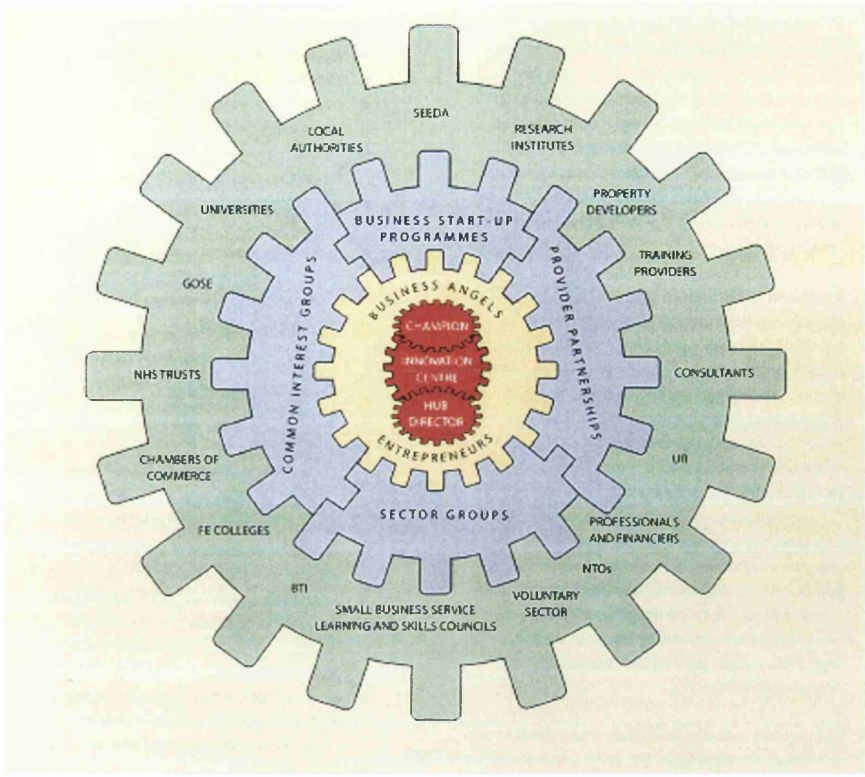
> *"These Urban Networks for Innovative Cluster Areas (UNICAs) consist of a research and incubator-intensive 'mother-city', well-linked by digital and land transport communications to modest and easily accessible growth points for specialised production, analysis, testing and services"(pg 41, para 5.16).*

In addition, the report identifies other land-use conditions which are necessary for cluster formation. In the context of a shortage of premises; the reasons for a constrained land supply is often the attractiveness of the environment the cluster is intending to base itself in.

> *"The effect of clusters is to concentrate the growth of companies in particular areas which are usually attractive places to live. The consequence is that there is a tension between the need to provide for growth (not only of the companies themselves but of associated housing and transport development) and the need to protect the environment"(pg 27, para 3.34)*

It is firmly within the remit of the planning system therefore to ensure not only that adequate and suitable employment provision is in place, but that housing and infrastructure and a good quality environment can be provided. All this in a densely populated country with high pressures on land supply as a consequence. The Sainsbury report produces a planning solution that promises to be controversial. It states,

Figure 2.8: Enterprise Hubs
(Source: SEEDA, 1998).



SEEDA acknowledge the importance of planning and land-use factors as a contributing factor to the achievement of a competitive Southeast, without detailing what this means for competitive businesses. Reliable and sustainable regional transport infrastructure, and a high quality environment are necessary. There is no guidance about how businesses and local authorities can meet all planning and competitiveness requirements in an area of restraint such as the South East.

This is possibly because 'planning' is beyond its remit. At the outset, the RES compares its role with the RPG, stating that cluster policy must be consistent with planning policy;

"Where physical growth is necessary, this should be done in such a way as to minimise travelling needs, create sustainable communities and address concerns such as the need for affordable housing and social inclusion"

2.19.2 EEDA

The EEDA Economic Strategy (April 1999) includes three counties within the study area for this research, Bedfordshire, Hertfordshire and Essex. The overall vision of EEDA is to:

"make the East of England a world-class economy, renowned for its knowledge base, the creativity and enterprise of its people and the quality of life of all who live and work there"

As a part of EEDA's aim to foster world-class business, policies intend to increase the rate of growth in key sectors and foster business clusters with high growth potential. This is to be achieved by:

- Establishing nine business-led sector groups that will bring together large and small companies
- Identifying clusters of regional significance and drawing up a regional strategy to foster cluster development
- Providing strategic support for network and supply chain initiatives.

Nowhere in the description of clusters is there any reference to the land-use implications of cluster development. There is however a section of the report dedicated to the production of a 'competitive infrastructure', which includes investment in sustainable transport and communications infrastructure and the need to analyse intra-regional patterns of development, to identify constraints on business expansion, including the availability of business sites and housing. All this information, as yet incomplete, will feed into any strategies to foster cluster development in the region.

2.20 Land Use Planning

Innovation and cluster theory indicate possible land-use implications of any policy for high technology industry in the South East. This thesis is particularly concerned about the ways in which the planning system is able to foster clusters, in other words the planning of commercial and economic spaces, as well as other forms of land-use that are immediately related to its development. Cluster theorisations, and to a certain extent cluster policy, identify 5 main land-use components for an effective cluster (table 2.11).

Table 2.11: Land-Use Implications of Cluster Theory

Land-Use Requirement for Clusters	Source
Commercial space for existing companies to expand or locate in close to each other	Sainsbury (1999), SEEDA (1999), indirectly through cluster theorisations advocating agglomerations (Storper, Simmie and Sennett, Maskell and Malmberg, Camagni etc).
Provision for large and small companies	Sainsbury (1999), SEEDA (1999), cluster theorisations, particularly Vernon (1966) in support of smaller companies early on in product lifecycle process
Provision of essential road and airport infrastructure	Sainsbury (1999), SEEDA (1999) DTI (1998), Simmie and Sennett (1999), Porter (1998, 1990) as part of agglomeration theory.
Requirement for high quality working environment	SEEDA (1999), Sainsbury (1999), DTI (1998), work of descriptive school (Hall and Castells, 1994).
Requirement for robust housing provision, and other facilities (schools, community facilities, retail) to support cluster formation	Sainsbury (1999), not commonly mentioned in cluster theory, or in policy documents.

Planners have a vital role in providing the basic land-use components upon which a cluster can grow. Nevertheless, key commentators have raised concerns about the ability of the planning system, as currently operating, to perform these functions (Sainsbury, 1999, DTI, 1998). In this section, through a brief review of theory and national and regional planning policy, we summarise the extent to which planning policy is consistent with land use requirements of cluster policy.

2.21 The Town Planning System of Great Britain

'Land use planning is a process concerned with the determination of land uses, the general objectives of which are set out in legislation' (Cullingworth, 1997)

The British town planning system is based on the 1947 Town and Country Planning Act. Its basic structure and functioning remains largely unaltered. The broad objective of the UK system is to, " *regulate the development and use of land in the public interest*" (DETR, 1999). An alternative definition, sees planning as a process through which the government resolves disputes about land uses (Cullingworth, 1997).

The town planning system is plan-led in accordance with Section 54 (A) of the Town and Country Planning Act (1990), which bases decisions about land-use on the content of Development Plans, drawn up at County and/or Local Authority levels throughout Great Britain. The plan must be up to date, constantly under review, and reflect the thrust of national and regional planning policy guidance, as summarised in Planning Policy Guidance notes (PPGs) and RPGs. Other policy documents, including local, regional and national economic strategy documents, are involved, but carry less weight.

Since its conception in 1947, British planning legislation has defined procedure but not policy content, enabling politicians, officials and pressure groups to fill the system with whatever content is considered most important at the time (Healey, 1992). This enables the function of the planning system to change, as policy content is adapted in accordance with emerging government views (Adams, 1994). Planning policy is, as with Competitiveness Policy, a product of its time.

Below summaries of recent theorizations, and national and regional policies are provided, to assess the extent planning for clusters is foremost on the planning policy agenda, as well as identifying which other current policy trends.

2.22 From Economic Efficiency to Sustainability

The planning system has been conceptualised in various different ways (Rydin, 1994, Cullen, 1997, Adams, 1994), but all commentators note a shift in the thrust of planning policy following the removal of Mrs. Thatcher from government in the early 1990s.

Until 1979, postwar urban planning had sought to promote economic efficiency, protect the environment and fulfill community needs, but under Thatcherism "*the first of these has become paramount, the second important only in specified geographical areas and the third is no longer seen as the remit of planning*" (Adams, 1994). In the quest for economic efficiency urban

planners were encouraged not to intervene in the market as controllers and providers, but to adopt a market-led planning style, in which they were enablers and regulators. To a certain extent this role continues to the current day.

The work of Sorenson (1982), Hayek (1960), Friedmann (1962) as quoted in Adams (1994), and other libertarian writers advocated a market led planning system, as markets,

> "*stimulate innovation and facilitate its application and are the only effective way to harness the dispersed knowledge of the community to maximise the quantity, range and quality of services produced at the lowest possible prices*"(Adams, 1994).

The review of cluster and innovation theory reiterates the importance of the market, in advocating a system of economic growth within a capitalist system entirely predicated on 'innovation'. Indeed, cluster theory, in its failure to expose policy implications, appears to be devised in a free-market situation. In this situation, policy is regarded as a constraint- a philosophy that perhaps sheds light on the observations of the DTI (1998) and Lord Sainsbury (1999).

Margaret Thatcher sought to limit the effectiveness of planning policy. Adams (1994) noted that, in a political climate which prioritised economic efficiency, the role of the planning system was to be downsized. Cullingworth (1997) conceptualised planning under the Conservatives as 'releasing enterprise', removing unnecessary tiers of metropolitan government in London (the Greater London Council) and introducing other regulation-free areas, including the Enterprise Zones and Urban Development Corporations, with beneficial tax provisions. These were intended to foster the growth of business, by removing or reducing constraints provided by the planning system.

While Margaret Thatcher was in power, the merits of the cluster, as supported by the work of innovation and cluster theorists were relatively unknown, and cluster policy was undeveloped. Arguably, in this political climate, where the planning system is viewed as a obstruction to free market activity, and therefore to economic growth, the land-use requirements of cluster policy could be realised, by the planning system 'turning a blind eye'.

However, the rationale of the planning system in the new Millennium has shifted sharply from one aiming for economic efficiency, to one advocating sustainability, for now and for the future.

Opposition to the New Right approach to planning first emerged in the early 1990s, following the recognition of four fundamental flaws in this conception of planning (table 2.12). These are based on the flawed nature of Smith's Law of Competition, which underpins any laissez-faire approach to economic growth as advocated by Thatcher.

Table 2.12: Four criticisms of the New Right Approach to Planning

Source: Adams, 1994

- It generates inequalities in land use, where particular types of land use, because they are more lucrative than others, continue at the expense of other uses, particularly community and environmental uses
- It allows for extensive monopolies in land and property ownership, excluding individuals from the planning process and therefore making decisions on the use of land. The ability of monopolies to be secretive about transactions enhances their power over land and property
- It ignores the possibility of measuring value in ways other than monetary. For example, people associate socio-cultural values with the countryside, coastline and mountains (Low, 1991, quoted in Adams, 1994). These broader values are generally unrespected by the market.
- It does not consider sustainability, and in particular the key principles of intra and inter-generational equity. This is the principle of making decisions that are in the best interest of all of this generation, wherever they are, as well as future generations.

The Far Right failed because of an 'emergence of externalities', beyond the market led system, and not in the public interest. It was unable to meet renewed concern in the early 1990s about environmental quality and sustainability and about social and community welfare (Healey, 1992).

Today, the planning system is underpinned by a sustainability rationale. Crucially, economic growth can be sustainable and is only endorsed via the planning system if it is.

The current planning system therefore has a different relationship with the market. It is more interventionist, but at the same time does not operate devoid of the market. Instead, '*the new agenda provides urban planning with a critical test of its opportunity to influence market processes rather than merely respond to them*' (Adams, 1994).

In this new conception of planning, active and dynamic intervention in market processes is theoretically at least more important than the routine administration of excessively rigid and conservative development regulations. Low (1991) quoted in Adams (1994) envisaged that planners could be better planners by grasping the value of the market as a working tool, without

abandoning their activities or completely subordinating them to the market. As Healey (1992) phrased it, the challenge for urban planning in the next decade is to develop understandings and methods, "*which neither blindly follow the market or naively seek to "structure" it*". It is a kind of middle ground that appreciates the market, yet seeks to limit externalities arising from it.

2.23 Planning Policy: National and Regional

The next section summarises national and regional planning policy influencing the South East of England, in order to further identify what the new planning agenda means in real policy terms. In particular, the policy review will consider the extent to which clustering is fostered, or excluded from this modernised conceptualisation of planning.

2.24 National Planning Policies

At national level, planning policies are in the form of PPGs. These officially provide guidance to authorities when setting out local plan policies, and are not statutory. They are however material considerations influencing the determination of planning applications.

Planning policy under the Labour government has undergone a significant review; with the emergence of new planning policy guidance on several themes- including sustainability, housing, regional development agencies. Forthcoming guidance includes the Urban Regeneration White Paper, spurred on by the Urban Renaissance initiative launched by Richard Roger's Task Force in July 1999. Planning Policy Guidance for commercial developments however, has not been forthcoming. Instead county and local planning authorities (or both if at UDP level) still rely on government guidance from 1992. This raises some interesting questions about the future planning of economic spaces.

While each of these PPGs have a bearing on planning in England, and therefore potentially influence the decision of any local authority as to the location of any high technology firms; for the purposes of this thesis only 4 PPG's are reviewed. This is on the basis that they provide direct policy guidance to local authorities when planning for employment spaces in their local plans, and determining planning applications for commercial uses. It is beyond the remit of this thesis to consider the planning for ancillary uses, including housing and retailing. A review of PPG 1,PPG 4, PPG 7, and PPG 13 follows below.

uses well served by public transport, encourage home working, and distribute land uses to enable people to work closer to their homes.

PPG 13 (1994) therefore provides recommendations for local authorities about the locations of employment uses generally, without specifying any requirements for knowledge-driven or high technology industry. It firmly links employment land allocations and infrastructure provision (both current and forecast) in development plans and development control decisions and crucially, by referring to balance between jobs and houses, encourages planners to recommend small catchment areas for workers. This potentially is contrary to cluster development, especially if cluster margins extend beyond the local authority boundary.

In October 1999 the public consultation draft of an updated PPG 13 became available (DETR,1999). This sets the context of transport policy within the general framework of an integrated transport strategy. It places greater emphasis on the requirement to locate transport-generating uses in locations well served by the existing public and private transport network. As a consultation draft, the updated version of PPG 13 carries less weight than the adopted PPG 13.

2.24.6 Regional Planning Policy for the South East (RPG 9) (1994)

RPG 9 (1994) provides a regional planning framework for the South East, including London and the rest of the South East (GOSE, 1994). The document advocates economic growth but not at the expense of environmental quality with opportunity for economic development throughout the Region particularly the Eastern half.

A key objective of the document is " *to provide a framework for economic growth to maintain and develop the South East's competitive position in Europe and given employment to its people*", (paragraph 1.7). Significantly, "*planning policy should not seek to constrain economic activity at a regional level"(*paragraph 1.10).

Regional planning in the South East should achieve several broad objectives, which should be pursued together and a balance achieved between them. Objectives include enhanced economic performance, sustainable development and environmental improvement, opportunity and choice. Table 2.13 below summarises major regional (economic) trends, and ways in which policy aims to have an effect.

Table 2.13: Regional and intended policy trends in the South East

Source: RPG 9 (1994)

- Economic growth in the South East should continue to be encouraged, to maintain the region's international competitiveness. It is a leading region within the UK.
- Growth should not be unrestrained. Key to the economic success of the region is the high quality environment. For this reason, "growth and development needs to be thoughtfully planned in the interests of an efficient economy"(paragraph 3.3).
- There is a much higher level of development in the West of the region than in the East. Although this context is ever-changing, policy initiatives encourage greater development in the East of the region, including north and east Kent and Essex.
- The South East economy has suffered from structural change in recent years with the decline of the military bases and defence related industry. All parts of the region must "*cope with economic and technological change*" (paragraph 37)
- Efforts must be made to match local jobs to the local workforce. This can be facilitated by a combination of planning and transport policies "*to make work places more accessible to the untapped labour force of London and the region*"(paragraph 3.9).
- In order to foster economic competitiveness in the South East, other sectors must be encouraged to locate there. In this vein, "*Planning policies need to ensure that new activities can be accommodated*" (paragraph 3.10).

The planning system therefore must be proactive in supporting changing economic trends. The policy is forward thinking, yet constrained by the strict environmental agenda detailed throughout the document.

Section 7 of RPG 9 (1994) divides the South East sub-region into geographical sectors, enabling a review of the varying conditions and circumstances across the Region. While London is the focus of the Region, both physically and economically, there are many distinctions between parts of the Rest of the South East; the focus of this thesis (ROSE). The main distinction is the east:west division, with the western areas suffering from over-crowding and over-development, in contrast with the comparatively underpopulated east of the region. In addition, further northern, eastern, western and southern sub-regions are identified.

2.25 Land Use Planning: High Technology vs. the Environment, or High Tech and the Environment.

" *Sustainable development is described as development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" World Commission on Environment and Development, 1987, quoted from PPG 1 (DETR , 1999).

The review of town planning theory and national and regional policy for the South East regions roots land use decisions within a sustainability agenda without providing clear-cut policy and theoretical guidance for planning for clusters, or indeed high technology generally.

Under the conservatives, town planning was underpinned by a logic of economic efficiency, and the planning process was generally under attack and perceived as a constraint to economic growth. The introduction of the Enterprise Zone and Urban Development Corporation, together with the relaxation of the use classes order (Rydin, 1994), provided an indication of this, as planning constraints were eased to reduce the ability for the planning system to interfere with the market.

The shift in planning philosophy from one dominated by economic efficiency to another underpinned by sustainability principles, provides a new context for the planning of economic spaces. Seemingly, it becomes more complicated. The land use planning system is in place to protect **all** the development needs of future generations; it therefore has to fulfill economic planning requirements but also others. The sustainability agenda widens the scope of the planning system; concerned with traditional 'externalities', including the environment and community uses, and less primarily with the fostering of economic growth. As a part of this policy shift, it is less than clear what this means for the planning of clusters of high technology.

The review of selected national and regional planning policy for the South East, shows that while there are policies in place for employment spaces, these are not specifically designed to complement cluster policies. Indeed, planning policy does not obviously link in with the competitiveness agenda, there is no mention of high technology, knowledge-driven industries or clusters in any of the documents. Crucially, this does not mean that the planning system is currently unequipped to foster cluster formation. It may be that economic planning policy as

crafted still permits clustering to take place. Table 2.14 below illustrates this, by showing the extent to which the isolated land use requirements of cluster development can be met by PPG and RPGs.

Table 2.14 : The Compatibility of Cluster and Economic Planning Policy

Cluster Land Use Requirement (taken from table 2.11)	**Extent to which national and regional planning policy guidance links with it.**
Commercial space for existing companies to expand or locate in close to each other	One of seven locational considerations for planning authorities to consider for commercial and industrial uses is the requirement for businesses to link with other businesses (PPG 1 and PPG 4). This does not occur in greenbelt or countryside locations (PPG 2, PPG 7), or in locations, which might compromise the high quality environment (RPG 9). There is no mention of particular sectors or groups of sectors.
Provision for large and small companies	Planning authorities should provide employment land for large and small businesses. PPG 4 makes special provision for small businesses. PPG 1, PPG 4 and RPG 9 require the planning system to provide sufficient employment land for companies of all sizes. This should not be provided in greenbelt or open countryside (PPG 2, PPG 7).
Provision of essential road and airport infrastructure	PPG 1 and PPG 4 view the necessity for adequate infrastructure as a key consideration when identifying the location of employment land. RPG 9 refers to the importance of wider transport links for the South East. PPG 2 and PPG 7 place the onus against development in the greenbelt and countryside.
Requirement for high quality working environment	PPG 4 notes the need for a 'high quality environment' as well as economic growth. RPG 9 does not permit commercial development in locations where the high quality environment might be compromised. There is therefore the onus against enabling commercial development in locations close to a high quality environment.
Requirement for robust housing provision, and other facilities (schools, community facilities, retail) to support cluster formation	Both PPG 4 and PPG 13 place emphasis on close proximity of land uses, particularly PPG 13, which refers to balancing of housing and employment, uses. This is concerned with reducing commuting levels rather than building a coherent cluster.

National planning and regional policy for employment spaces could potentially fulfill some of the land-use requirements of clusters. The planning system provides space for large and small firms, and aims to provide for similar groups of firms to locate close to each other. PPG 13 advocates growth of housing close to commercial uses, and PPGs 2, 7 and RPG 9 seek to maintain high environmental quality, albeit without a clear indication of how new firms can be located near to take advantage of it. Perhaps there is no need for a 'reform' of the planning system, despite the suggestions of Sainsbury (1999) and DTI (1998), as infect implicitly the existing system fosters clusters already. The work of Simmie, Hart et al,has identified many clusters already in the South

Chapter 3: Methodology

3.1 Introduction

The purpose of this research is to investigate if and how cluster theory and policy can be converted into local planning policy in the South East of England. As a part of this, there are two stages to this research:

1. Examining the extent high technology industries do cluster

2. Reviewing local planning policy to assess the extent local authorities can and do use the planning system to encourage high technology in their areas.

Chapter 2 provided a comprehensive review of cluster theory literature, together with a review of existing cluster policy at national and regional levels. It emerged that this was predominantly aspatial, and that the planning policy implications of cluster theory and competitiveness policy was underdeveloped. Despite the absence of land-use guidance for clusters, a review of studies exploring clustering in the South East exposes that clustering does occur, and that it is largely concentrated in the north and west of the South East region, outside London (Hall et al 1987), although there is evidence of it at county level in all counties in the ROSE (Simmie and Sennett, 1999).

The conclusion of chapter 2 outlined research questions that underpin the two stages of this research. These are reproduced below.

Stage 1

1. Do high technology sectors mainly cluster in the North and West of the region as per Hall's (1993) analysis?

2. How far does the geography of high technology at local authority level reflect differences in the South East economy?

3. What are the policy implications of this geography of high technology clustering?

Stage 2

1. How does the existing planning system foster high technology employment and clusters?

2. Is there a need for the reform of the planning system to effectively plan for clusters?

3. What form should this reform take?

This chapter describes how each research question is tested. It is divided into three sections; General Methodological Considerations, Objective 1: Methodology, and Objective 2: Methodology.

3.2 General Methodological Considerations

This section summarises aspects of the research that equally apply to both stages. It describes the following:

- Definitions of high technology, and differences and similarities between it and knowledge-driven industries

- The Standard Industrial Classification (SIC) and how high technology is measured as a part of it.

- The choice of local authority as the basic spatial unit for the research.

- The study area.

3.3 High Technology vs. Knowledge Driven Industries

"*The term high tech has created the misconception that only a handful of businesses compete in sophisticated ways*" (Porter, 1998)

with those identified previously and also to compare the results with the geography of economic diversity of the South East.

There are 99 local authorities in the South East region as defined for this research (see section 3.6). These are mapped below, and will be referred to throughout.

Figure 3.1: Adminstrative Area of the South East
Source: RPG 9 (2000), GOSE.

A possible limitation of this research is its failure to consider the planning policy implications of clustering at the County Council level. In the review of planning documents, and interviews with planning and/or economic development personnel, the research concentrated on those working at local authority level and not at the more strategic level. It was considered that any major policy influences at county council level would be apparent at local level, given the requirement of local planning policies to accord with county level planning policies in PPG 12 (January 2000).

East as a whole. This thesis explores the sub-regional geography of high technology clustering to see if it has links with the varied economic geography of the South East, and also compares with the findings of Hall et al (1987) and Simmie and Sennett (1999), GOSE (1999) and SEEDA (1999). It also provides policy implications of the findings.

There are 5 key stages to the research:

1. Defining the base case. This has two components:
    - an expected geography of high technology
    - a review of sub-regional economic differences

2. Defining the geography of high technology at local authority level using SIC data and location quotient (LQ) analysis.

3. Defining the geography of high technology at local authority level using SIC data and Shift Share (differential) analysis.

4. Providing a comparison of the base case with each high technology geography.

5. Summarising findings and suggesting policy implications.

Each of these is described in turn below.

3.8 Objective 1: Defining the base case

This has two components. Firstly, it provides an expected geography of high technology, based on a review of existing research on high technology clustering in the South East. Secondly, it establishes sub-regional economic trends within the South East.

The information comprising the base case is based on a desktop research using secondary sources, and is incorporated within Chapter 2. It is summarised and represented in the opening section of Chapter 4 for ease of comparison. The expected geography of high technology is also mapped using GIS Technology.

The main limitation to this aspect of the research is that it is based on a desktop study of selected region-wide sources, and is not based on raw research material. It provides a contextual base line for the later statistical analyses. The regional studies cover the span of the South East and not individual pockets of the region; a more rigorous information trawl, at local authority level for example, would have undoubtedly resulted in a more detailed appraisal of both known geography of clusters as well as economic diversity across the region.

As this thesis is time constrained, and also has a second research objective to attain, it was considered sufficient within time constraints to provide a "base case" of both existing high technology clustering and economic diversity based on fewer key sources. A further study could more fully focus on the provision of a finer grained geography of high technology in the South East.

3.9 Stage 1: Defining the Geography of High Technology using SICS statistics and Statistical Methods.

This exercise is undertaken at local authority level, using figures for high technology and total employment derived from the annual employment surveys for 1991 and 1997. Section 3.4 provides detail on the SIC and the definition of high technology used in this study.

High technology figures are manipulated to identify rates of change in the high technology sector between 1991 and 1997 in each local authority area. High technology figures are also used to estimate the strength of representation (compared to the national average) of the high technology sectors. This is done by calculating the location quotient for each local authority in ROSE. The method used to calculate rates of change and location quotient are detailed below.

Finally, the resulting geographies are represented on a GIS map. The GIS system and methods used, and the limitations of it, are outlined below.

3.9.1 Location Quotient

Location Quotient or LQ measures how far a sector is over or under represented in London by comparison with the national economy. An LQ of one indicates that the sector accounts for the

same share of total employment in the district as it does in Great Britain. If the LQ is more than one, the activity is over-represented in the district; it accounts for a greater share of jobs than it does nationally. In other words, there is a cluster of that particular sector. Conversely, an LQ smaller than one indicates that the activity is under-represented in the chosen district. Importantly, the location quotient does not indicate whether or not the representation of the sector is higher or lower than it has been in recent years; nevertheless is provides a simple method of assessing the importance of a particular sector to the local economy at a fixed point in time.

This methodology is commonly used in sectoral analysis. Examples include Western Sunrise, where Hall et al 1987 et al (1993) identified a geography of high technology along the M4 corridor using location quotients. Sennett and Simmie (1999) used LQs to identify high technology clustering throughout the wider South East region, including London. Two other examples are research studies undertaken for the London Planning Advisory Committee on Industrial Demand in London (1999), and Business Parks in London: Demand and Capacity (1999). These both used the LQ methodology to identify representation of particular sectors in the London economy, in the former study this extended to a range of sectors, the latter sector focused on particular aspects of the office sector.

To calculate the LQ for high technology industry in each authority in the South East, the following 4 processes were followed and repeated for each district.

- Raw data was collected. For this calculation, high technology employment statistics (according with the OECD definition) were collected for the district concerned, and also Great Britain as a whole. Total employment figures for the district and Great Britain were also collected. For the purposes of this study, these were taken from the Annual Employment Survey 1997, and downloaded using the NOMIS.

- National high technology representation was calculated. This is done by dividing total high technology employment for Great Britain by total employment figures for Great Britain, in order to calculate high technology employment as a proportion of total employment.

- Local high technology representation was calculated. This is done by dividing total high technology employment for the district by total employment figures for the district, in order to calculate high technology employment as a proportion of total employment.

- Calculation of LQ. To calculate the LQ, the local high technology representation is divided by the national high technology representation. The resulting figure is the LQ.

This process was reproduced for the 99 districts in the South East. All calculations are reproduced in Appendix 4.1. The results are produced and analysed in Chapter 4, Section 4.4.

3.9.2 Rates of High Technology Employment: The Local Differential

Literature on the South East economy, and on knowledge-driven industries in general, indicate a high representation of high technology industry in the South East, and imply that the sectors are growing (SEEDA, 1999, EEDA 1999, Simmie and Sennett, 1999, Hall et al, 1987, Sainsbury, 1999).

In order to identify not only the current representation of high technology industries in South East, but to also ascertain whether that representation is part of a growing or a slowing trend, an analysis of rates of change in high technology employment is undertaken for each district. This is achieved by calculating the number of jobs that have been lost or gained in the sector between two periods.

Calculating gross change in total high technology jobs in one district over two points in time is a crude form of analysis. This is because it does not isolate the cause of growth, and the extent to which it is attributed to national structural change in the same sector. For example, if the high technology sector were identified to grow by ten percent between 1991 and 1997 in Havant, creating 1,000 jobs, it would not be possible to conclude that this was because Havant was particularly attractive to high technology industries. A contrary, but equally valid explanation could be that national growth in the high technology sector converted into more high tech jobs in Havant. In other words, Havant would only have a growing and healthy high technology sector if it were proved to generate jobs **above and beyond** those that would have been created by structural changes in the national economy.

This analysis seeks to isolate the extent to which local economic factors explain the growth or decline in the high technology sector in the South East. This figure is known as the **differential**. In order to isolate the differential, the analysis of rates of change in high technology employment

while small firms fuel the cluster, firms of different sizes also require enough space in close proximity to other firms.

- If and how the planning system ensures that companies can locate in 'good working environments'. Here, there is emphasis on the quality of the provision and whether it meets the requirements of a high technology, or knowledge-driven firm. It is not sufficient to provide enough space, but to provide the right kind of space. It is at this juncture, in assessing what is the 'right kind of space' that considerations relating to infrastructure and the proximity of other facilities (the remaining two identified land use components of clusters) come into play.

These three aspects of the planning system are the basis for the survey design for this stage of the research. They provide an answer to the first research question, and in so doing provide insights into whether or not the planning system needs reforming (research question 2).

The conversion of these three questions into a survey format is discussed in section 3.14.

3.13 Stage 2: Isolating a sample of innovative high technology districts

The study area contains 99 local authorities. This is the total population. The work of Simmie and Sennett (1999) establish that all have high technology companies operating within them; the statistical analysis in Chapter 4 confirms this. There is therefore value in interviewing each of these local authorities and seeking to understand how they plan for high technology, and whether or not there is a requirement for a specific cluster policy.

It is not manageable to interview all 99 local authorities. This is mainly because of time constraints, as each interview is scheduled to last for between 45 minutes and 1 hour and all responses require coding and subsequent analysis.

A second, and equally important reason for not interviewing all 99 local authorities is indicated by the mapping exercise. It is clear that there is considerable variation in the levels and intensity of high technology clustering by district, and that almost half of the districts in the South East do not have clusters of high technology, and are under-represented in comparison with the national average. Although it is impossible to be definitive given the limitations in high technology

definitions, it is highly likely that those local authorities without high technology clusters will not experience any conflict between cluster and land use planning policy. On this basis, it is not appropriate to interview any of these authorities.

To investigate whether any clustering and land use planning policies complement or conflict, it is necessary to interview districts that are performing well in high technology sectors and have experience of clustering. Analysis so far has exposed two distinct statistical methods of assessing the intensity of high technology clustering in the district. These are based on firstly the representation of the sector compared to the national average (LQ), where clustering is the extent of over-representation of the sector (i.e. a value exceeding one). The second method of evaluating high technology is based on the differential increases and decreases in high technology employment in the districts. In this case, the success of the high technology sector is the amount of differential high technology employment increase between 1991 and 1997. The higher the increase, the more successful the district has become as a high technology employer between 1991 and 1997.

These measures of success are used to identify the top thirty performing high technology districts. These high technology districts have two factors in common:

- A positive LQ. The authority must be over-represented in high technology sector.

- A positive differential. The authority must demonstrate a positive differential, as this is indicative of the continuing growth of the sector over time because of local factors, that is those above and beyond national structural explanations.

Figure 3.13 illustrates the selection process graphically, where the authorities that fit the above criteria fill the right hand corner of the graph, above and right of the x and y axes. The graph illustrates why several authorities with high location quotients- for example Medina, Crawley and Dartford- are excluded from the sample. They have negative differentials; they have experienced a decrease in high technology job totals between 1991 and 1997.

Chapter 4: High Technology in the South East

4.1 Introduction

Stage 1 of this thesis examines the extent to which high technology industries cluster in the South East. It seeks answers to the following three research questions:

- Do high technology sectors mainly cluster in the North and West of the region as per Hall et al (1987) analysis?

- How far does the geography of high technology at local authority level reflect differences in the South East economy?

Answers to these questions are presented in this chapter. It provides the results of the statistical and mapping exercise described in Chapter 3, which reveals two high technology geographies both at local authority level. Firstly, there is the geography of high technology clustering, as statistically displayed using location quotient calculations. This calculates the level of over-representation of the high technology sector within the district, compared to the national average. Secondly, there is the geography of high technology growth, as shown using the differentials calculation. This calculates how much the high technology sector has grown and how much of that growth is attributed to local rather than national economic factors. Together these geographies therefore provide a detailed picture of both the clustering and growth rates of the high technology sector in the South East.

These emerging geographies are compared with the baseline case. This has two components. Firstly, it is the existing geography of high technology clustering, as identified at county level by previous commentators (Simmie and Sennett, 1999, Hall, 1987, SEEDA, 1999, EEDA, 1999,GOSE, 1999). Secondly, it is the sub-regional economic geography of the South East, as described by SEEDA (1999), EEDA (1999), RPG 9 (2000), Regional Trends (1999), English Partnerships (1998). This chapter also explores the extent to which the emerging geographies of high technology at local level match the baseline, that is mirror the previously discovered high technology geographies and match particular sub-regional economic characteristics.

The results of these investigations are described below. Firstly, the methodology used to calculate and analyse the geography of high technology in the South East is briefly described. This is followed by a brief summary of the base case, including the existing geographies of high technology, and a summary of the economic geography of the South East. Finally, the results of the statistical and mapping exercise are presented; referring first to the geography of LQ and secondly to the differentials geography. Throughout comparisons are made with the base case. The conclusion considers the policy implications of the findings of this research.

4.2 Methodology

This exercise is undertaken at local authority level, using figures for high technology and total employment derived from the annual employment surveys for 1991 and 1997. A classification of high technology according to SIC category, and the limitations of the definition, are explained in Chapter 3.

High technology figures are manipulated to identify rates of change in total high technology job numbers, the differential, in the high technology sector between 1991 and 1997 in each local authority area. This is a measure of the local economic strength in high technology and is known as the differential. High technology figures are also used to estimate the strength of representation (compared to the national average) of the high technology sectors. This is done by calculating the location quotient for each local authority in ROSE. The method used to calculate rates of change and location quotient are detailed in Chapter 3.

Once isolated the 'differential' and location quotient data is converted into mappable data using GIS technology. The differential and location quotient results are mapped thematically. Chapter 3 provides a more detailed explanation of how this occurs.

4.3 The Base Case

This has two components; the existing known geography of high technology clustering in the South East, and sub-regional economic disparity. These indicate the heterogeneity of the South East region, contrary to the impression given by region-wide statistics and reviews (see ONS, 1999, SEEDA, 1999, English Partnerships,1998, DTI, 1999).

The two components of the base case were described in detail in the Literature Review, and are briefly summarised below.

4.3.1 The Known Geography of High Technology Clustering in the South East

The incidence of clustering in the South East has been explored by several commentators, including Simmie and Sennett, 1999, Hall et al, 1987, SEEDA,1999 and GOSE, 1999. Together, the results of these findings suggest that there is clustering throughout the region, indeed, the results of Simmie and Sennett (1999) alone identified clustering in every county under analysis. The summary findings of each of these sources is provided in table 4.1 below.

Table 4.1: Summary of Results of Clustering Studies in the South East (High technology clusters in bold)

Source: Simmie and Sennett, 1999, Hall et al, 1987, SEEDA, 1999, GOSE, 1999

County	Source			
	GOSE (1999)	*SEEDA (1999)*	*Hall et al (1987)*	*Simmie and Sennett (1999)*
Beds				Rubber and Plastic Products, Fabricated Metal Products, **Machinery and Equipment, Office Machinery and Computers, Electrical Machinery/Apparatus, Medical Precision Instruments,** Motor Vehicles, trailers,**Computers and Related Activities,R & D**
Bucks	**Electronics and electrical industry, telecommunications, air transport**	Business Services, **Electrical/Electronic Engineering, Information and Communications Technologies, Defence,** Distribution, Creative Industries, Tourism	**High technology concentration**	Tobacco Products,Rubber and Plastic Products **Machinery and Equipment,Office Machinery and Computers, Electrical Machinery, Radio/TV Communications,** Medical Precision Instruments, **Telecoms,** Financial intermediation, Insurance and Pensions, **Computers and related activities**
Berks	Business services, **Electronics and electrical industry, telecommunications,** chemical industries, distribution, **air transport**	Business Services, **Electrical/Electronic Engineering, Information and Communications Technologies,** Distribution, **Air transport,** Creative Industries	**High technology concentration**	Food Products and Beverages, **Office Machinery and Computers,** Radio TV Communications Equipment, **Medical Precision Instruments, Telecoms,** Insurance and Pensions, **Computers and Related, R & D**
East Sussex	Banking and Finance			**Office Machinery and computers,Electrical Machinery, Medical Precision Instruments,** Water Transport, **Post and Telecoms,** Financial Intermediations, Insurance and Pensions Computer and related activities
Essex				**Machinery and equipment, Office Machinery and Computers, Electrical Machinery, Radio/TV Communications, Medical Precision Instruments** Insurance and Pension, Computers and related activities, R &D
Hants	Banking and Finance, **electronics and electrical industry, chemical**	**Electrical/Electronic Engineering, Information and Communications Technologies, Defence, Pharmaceuticals,** Port	**High technology concentration**	Tobacco Products, **Machinery and Equipment, Office Machinery and Computers, Electrical Machinery, Radio/TV Communications, Medical Precision Instruments,** Other transport equipment, Water Transport, Insurance and Pensions, Computers

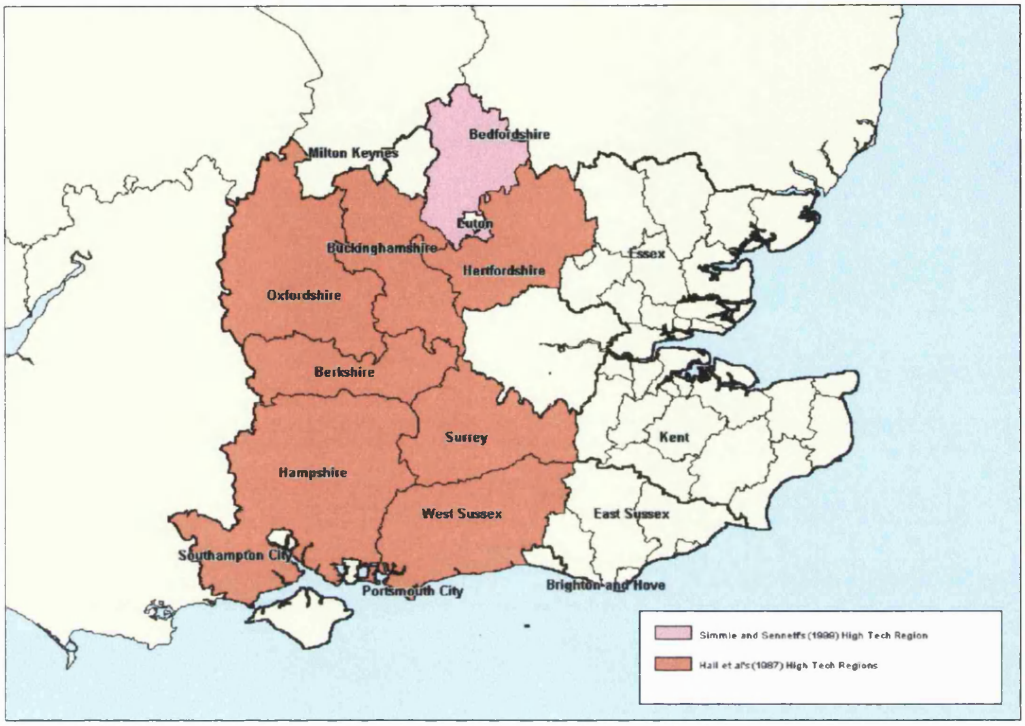
	industries, pharmaceuticals	Activities, Tourism		and related activities
Herts			**High technology concentration**	**Chemical and chemical products, Office machinery and computers, Electrical Machinery Radio/TV communications, Medical Precision Instruments, Post and Telecomms**, Insurance and Pensions, Computers and related activities, R & D
Kent	Banking and Finance, **chemical industries, pharmaceuticals,** paper and pulp	**Pharmaceuticals,** Port Activities, Paper & Pulp, Tourism		**Chemicals and chemical products, Medical Precision Instruments**, Water Transport Insurance and Pensions, **R & D**
Ox	Publishing, **biotechnology, medical instruments,** motor racing, multi-media	Business Services, **Electrical/Electronic Engineering,** Publishing, **Medical Instruments, Biotechnology,** Motor Racing, Tourism	**High technology concentration**	Rubber and plastic products, **Office machinery and computers, Electrical Machinery/Apparatus, Medical Precision Instruments,** Motor Vehicles **Computer and related activities, Research and Development**
Surrey	Banking and Finance, Business Services, **air transport**	Business Services, **Electrical/Electronic Engineering, Defence, Medical Instruments, Biotechnology, Air transport**	**High technology concentration**	Tobacco products, Office machinery and computers, **Electrical Machinery/Apparatus Medical Precision Instruments, Telecoms** Insurance and Pensions, Financial Intermediation Auxilliary, **Computers and related activities,R & D**
West Sussex	Banking and Finance, **pharmaceuticals,** multi-media	**Electrical/Electronic Engineering, Pharmaceuticals, Air transport,** Creative Industries	**High technology concentration**	**Chemicals and chemical products, Machinery and Equipment, Electrical Machinery/Apparatus, Radio/TV Communications, Medical Precision Instruments,** Other transport equipment, Financial Intermediation, Insurance and Pensions, Financial Intermediation Aux., **Computer and related activities**
Cambs				Food products and beverages, rubber and plastic products, **Machinery and Equipment, Office machinery and computers, Radio TV Comms, Medical Instruments,** Motor Vehicles, **Telecoms,** Insurance and pensions, Financial Intermediation, **R&D, Computers**
Greater London				Water transport, Post and telecommunications Financial Intermediation, Insurance and Pensions Financial Intermediation Auxiliary, **Computer and related activity**

High technology clustering should be isolated from clustering generally. The baseline case must provide a geography of high technology clustering as this is most directly comparable with the emerging geographies of high technology researched for this study.

This is difficult due to the differing methodologies and definitions of high technology used by each of the commentators. While Simmie and Sennett (1999) concentrated on high technology firms, and used the location quotient methodology and SIC figures to identify their clusters, their definition of high technology is more extensive than used for this study in incorporating both 'low tech' as well as 'high tech' sectors. It therefore logically identifies more clusters than will be identified in this study. It is perhaps not surprising, given this wider definition, that every county has some high technology clustering.

In comparison, the methodologies used to identify clusters by SEEDA (1999) and EEDA (1999) are not transparent, and are not in the public realm but are based on unpublished work undertaken

Figure 4.1: Existing Geography of Clustering in the South East
Source: incorporating results of Hall et al (1987) and Simmie and Sennett (1999)

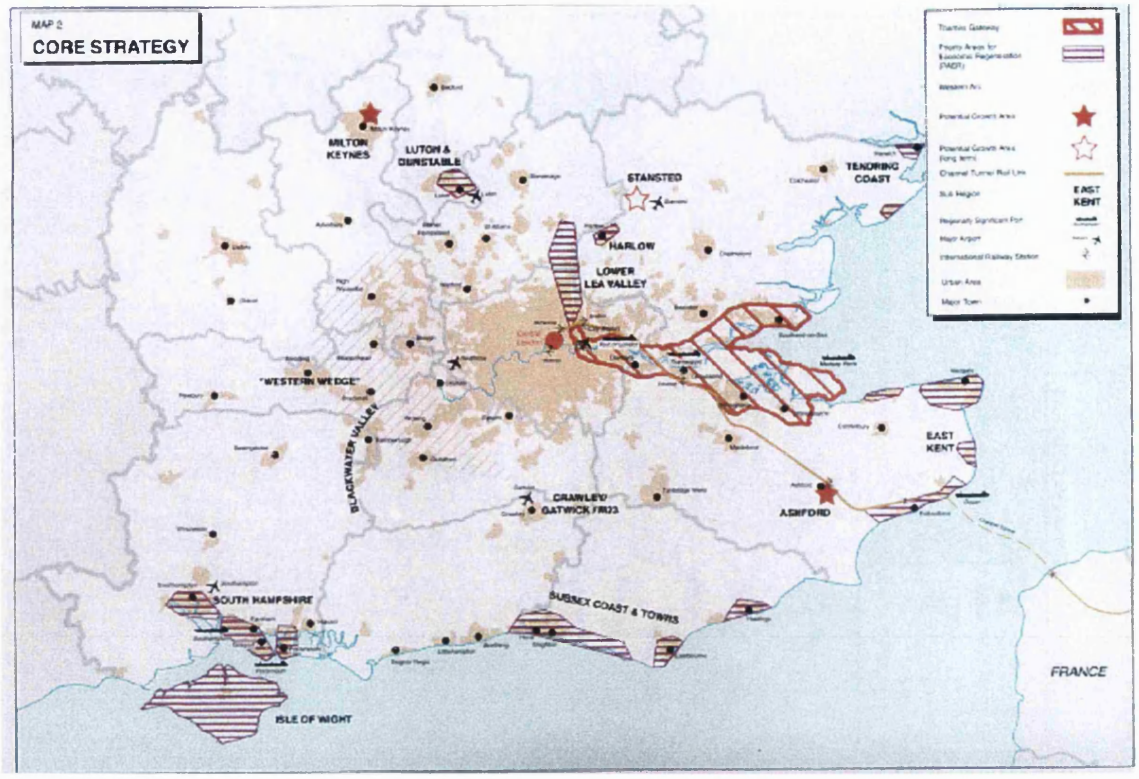


4.3.2 The Economic Geography of the South East

Despite being the most prosperous region in Great Britain, the literature review exposes regional economic diversity within the South East; there are pockets of prosperity as well as pockets of poverty and deprivation.

This thesis seeks to examine the extent to which variations in the geography of high technology at local level match sub-regional economic disparity. There are several possible sources explaining sub-regional differences within the South East economy. For the purposes of this research the review of the South East economy was restricted to six region-wide analyses, as provided by SEEDA (1999), EEDA (1999), GOSE (1999), Regional Trends (1999), English Partnerships (1998) and the existing and emerging RPG's for the region. A review of these sources formed part of the literature review for this thesis, the results of which are summarised below.

Figure 4.2: Core Diagram for Planning in the South East
Source: RPG 9 (2000), draft.



Even at this basic strategic level, it is possible to identify linkages between the identified geography of high technology clustering and the economic geography of the region. High technology clustering occurs to the west of the region, in its most prosperous, populated and over-developed part, characterised by higher GDPs per capita (see table 2.x) and intense pressure for land. It would be reasonable to expect that the examination of high technology clustering at local level will follow this pattern, and demonstrate a concentration of high technology clusters in the west of the region, particularly in those areas in the Western Arc.

4.4 Location Quotient (LQ)

The location quotient (LQ) is used here to measure the representation of the high technology sector in the South East. LQ were calculated for each of the ninety eight local authorities in the ROSE region. These are reproduced in full in appendix 4.1. Table 4.3 below lists the top ten over-represented districts in the high technology sector.

Table 4.3: The ten most over-represented districts in the high technology sector in ROSE (measured by location quotient).
Source: SIC Data, NOMIS

Rank	District	Location Quotient
1	Havant	4.72
2	Harlow	4.39
3	Medina	4.17
4	Eastleigh	3.94
5	Rushmoor	3.63
6	Dartford	3.45
7	Surrey Heath	3.33
8	Dover	3.18
9	Uttlesford	3.16
10	Worthing	3.115

Table 4.3 shows that there are several districts within ROSE that are considerably over-represented in the high technology sector. The national average representation of the high technology sector is 2.35% of total employment (see table 4.1, Appendix 4.3). Three districts, Havant, Harlow and Medina enjoy a representation over four times that national level with the high technology sector representing about ten percent of total employment in all three districts. In addition, Worthing, Uttlesford, Dover, Surrey Heath, Dartford, Rushmoor and Eastleigh are over-represented by over three times the national average.

In comparison, table 4.4 below also shows that there are several districts within ROSE that are under-represented in the high technology sector, compared with the national average. Brentford, Gillingham, Chelmsford, Maidstone and Eastbourne have the lowest representation (in descending order), with LQ ranging between 0.09 (Brentford) and 0.22 (Eastbourne) respectively.

Compared with table 4.3, it is immediately apparent that the degree of under-representation is significantly less than levels of over-representation. For example, whereas Havant is over-represented by over four times the national average, all those authorities that are under-represented in the high technology sector have some representation and are therefore, logically, do not have a value under nought. These results show that not all districts within ROSE enjoy an over-representation in the high technology sector, and therefore do not all have high technology clusters.

Table 4.4: The ten most under-represented districts in the high technology sector in ROSE (measured by LQ).

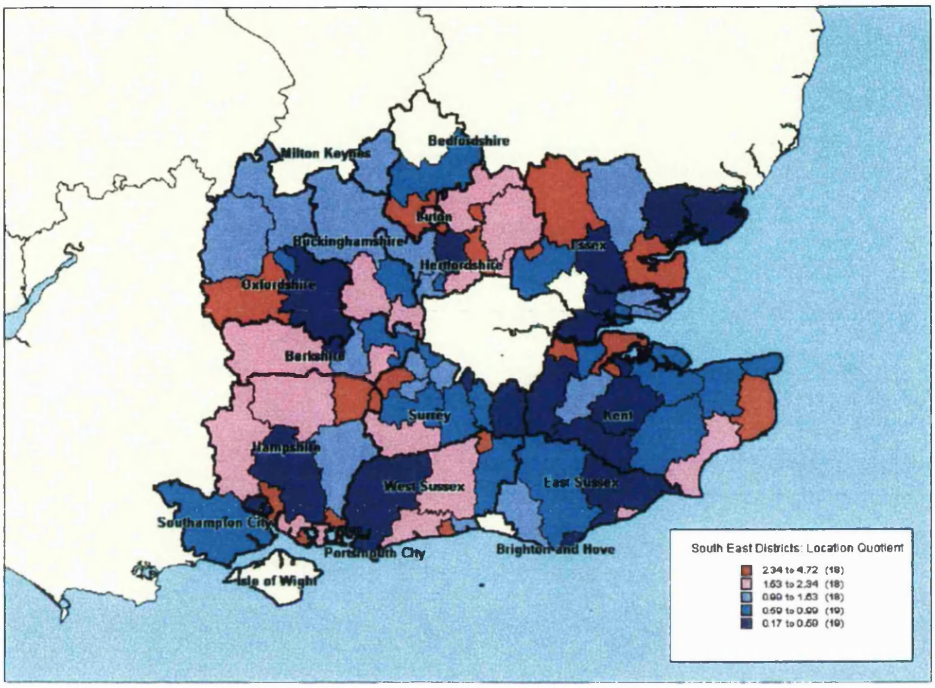
Rank	District	Location Quotient
89	Thurrock	0.33
90	Tunbridge Wells	0.28
91	Epsom and Ewell	0.28
92	Southampton	0.26
93	Tandridge	0.26
94	Eastbourne	0.22
95	Maidstone	0.19
96	Chelmsford	0.18
97	Gillingham	0.17

This is reinforced, when looking at the LQ for all ninety eight ROSE districts (see table 4.1, Appendix 4.1). Only fifty-five of them, or fifty six percent, have values greater than one. In other words, fifty six percent of ROSE districts are over-represented or have clustering in the high technology sector compared to the national average. Clustering only occurs in approximately half of ROSE districts. This is evident in Figure 4.3 below, which shows the geography of high technology clustering, based on location quotient calculations. Those with lowest LQ (0.17-0.59) are represented in dark blue, those with the highest representation (2.34-.4.72) are in red.

Figure 4.3 shows a complex geography of high technology clustering at local authority level. It has the following characteristics:

- There is no obvious east-west dichotomy, in which the west of ROSE is over-represented and the east of ROSE under-represented in the high technology sector in comparison with the national average. Instead the geography of high technology clustering, based on location quotient analysis, is characterised by pockets of over-representation and under-representation.

Figure 4.3: Thematic Mapping of Location Quotient Data (Source: Mapinfo and Annual Employment Survey data, ONS).



- With a few exceptions, including Dartford, Rochester, Maldon and Dover, the east of the region has the highest concentration of under-represented districts. These are concentrated in Kent and East Sussex, as well as in parts of Essex.

- The geography of over-representation or clustering is more complex, transcending east-west geographical boundaries. The analysis of LQ exposes that parts of ROSE to the north of region, specifically West Essex and Hertfordshire are significantly over-represented. Another pocket of over-representation (albeit a less clear one) extends to the West and South West of London, incorporating parts of Berkshire, Oxfordshire, Surrey and West Sussex.

- The western half of ROSE also has pockets of less well-represented districts. These are found in parts of Berkshire and Buckinghamshire (as was), as well as districts in the south of Surrey

4.5 Rates of High Technology Employment: The Local Differential

4.5.1 Results

This section examines the geography of high technology that arises from calculation of the local differentials between 1991 and 1997. This is a measure of the health of the high technology sector in the local economy. Differentials were calculated for each of the ninety eight local authorities in the ROSE region. These are reproduced in full in Appendix 4.2. Table 4.5 below lists the ten authorities that have experienced the greatest local job growth in the high technology sector, and the percentage rate of change in job numbers between 1991 and 1997.

Table 4.5 shows that there are several authorities which have experienced significant increases in high technology jobs between 1991-1997, as explained by local economic circumstances rather than national economic trends. Indeed, any increase in total number of high technology jobs is due to local economic growth, because the national rate of change for the high technology sector between 1991 and 1997 was a decrease of –0.08% of total high technology employment (see appendix 4.2).

Table 4.5 shows the local differential as a percentage as well as total job numbers. All of these authorities have experienced growth in the high technology sector significantly above the national or structural rate (-0.08%) of change, suggesting that the high technology sector is growing, and clustering, contrary to national trends in these authorities. This is particularly the case for Rochester, with a 650 percent increase in total high technology job numbers attributed to the local economy. This converts to about 2,740 new jobs. Other authorities which have experienced local growth in high technology jobs include (in descending order) Worthing, Dover, Vale of White Horse, Portsmouth and Bedford.

Table 4.5: The top ten high technology authorities in ROSE by differential job numbers.
(Source: Annual Employment Survey Data, NOMIS, calculated by shift share analysis)

Rank	District	District Differential (Job Numbers) (1991-1997)	District Differential (% change), excluding structural economic change 1991-1997.
1	Rochester	2742	656
2	Worthing	2075	230
3	Dover	1860	274
4	Vale of White Horse	1611	127
5	Portsmouth	1572	53
6	South Bedford	1444	110
7	Harlow	1371	55
8	Uttlesford	1308	202
9	Eastleigh	1268	41
10	Havant	1239	44

Note that all of these have experienced differing percentages of locally attributed change in the sector, the differential job total reflects the large size of the high technology sector in the first instance. For example, while Eastleigh's high technology workforce differential is 1268 new jobs, the district differential percentage increase was only 41 percent. This is in comparison with Uttlesford, whose 1308 locally attributed jobs arose due to a differential percentage increase of 202 percent. What this difference indicates is that Eastleigh had a higher number of high technology workers in 1991, and therefore a reduced differential percentage increase was necessary to increase the numbers significantly.

Table 4.5 shows that there are several local authorities in the South East that have achieved significant increases in local high technology employment between 1991 and 1997, and that this is in addition to the effect of structural change at the national level. However, when looking at all x local authorities, the situation is different. The average differential job number for the South East region is a loss of around 130 jobs. This suggests that the average local differential percentage change is closer to the national average of 0.08%, and that the high technology sector in the South East, while growing in certain locations at very fast rates, is also experiencing some decline.

Table 4.6 below shows that there are several districts within ROSE that have experienced a dramatic decline in high technology job totals between 1991 and 1997, and this is explained by a

local rather than a structural decline in the sector. All of these districts have experienced differential percentage change at a rate far lower than the national average. Chelmsford, Welwyn Hatfield, Three Rivers, Gosport and Reading have all lost between around 3,600 and 1,600 jobs in a six year period. These dramatic job losses are probably best attributed to the Peace Dividend and the subsequent retrenchment of the defence industry (Simmie, 1997 and Hall, 1993), and also to the consolidation and rationalization of the pharmaceuticals sector, particularly in Hertfordshire (Eli Lilly, 2000, RTP, 1999).

Looking at the results for all local authorities in the South East, about fifty percent of them experienced an increase in high technology jobs attributed to local economic growth in the high technology sector. This therefore is contrary to the predictions of SEEDA (1999), English Partnerships (1998), and GOSE (1999) which identify the South East region as an area of high growth in the high technology sectors despite national trends. Infact, as with the analysis of location quotient, the differential analysis exposes a complex and varied geography of high technology growth, characterized by sectoral decline as much as increase.

Table 4.6: The bottom ten high technology authorities in ROSE by differential job numbers.
(Source: Annual Employment Survey Data, NOMIS, calculated by shift share analysis)

Rank	District	District Differential (Job Numbers 1991-1997)	District Differential (% change, excluding structural component,1991-1997)
89	Chelmsford	-3631	-92
90	Welwyn Hatfield	-3193	-52
91	Three Rivers	-2844	-81
92	Gosport	-1734	-60
93	Reading	-1663	-65
94	South Buckinghamshire	-1559	-57
95	Spelthorne	-1531	-63
96	Bracknell Forest	-1514	-40
97	Crawley	-1334	-23
98	Dacorum	-1296	-42

Figure 4.4 maps the differential figures, in job numbers, for each local authority in the South East. This is therefore mapping the extent to which local economic factors (or at least factors other than

the national macroeconomic factors) have influenced the high technology sector in the South East. It indicates the economic health of the sector in the local economy.

The resulting geography of high technology has the following characteristics:

- Areas which have experienced the greatest decline in high technology job numbers are generally found to the west of the region, immediately outside the Greater London boundary. Districts in South Hertfordshire, East Berkshire and East Buckinghamshire are particularly evident.

- Immediately outside this inner ring of districts is a band of authorities with higher growth in high technology jobs, many of which fall into the highest category of job increase (coded red, increase of between 610 and 2,750 jobs). This outer band extends from Uttlesford in Essex, west through North Hertfordshire and South Bedfordshire, through Aylesbury Vale, the Vale of White Horse, West Berkshire and the Test Valley, extending across as far as Horsham in West Sussex. An isolated pocket of high technology sector growth is also found in East Kent, centring on Dover.

- Generally, authorities in the east of the region have not experienced the same locally attributable rates of change in high technology job numbers. Whereas local authorities to the west are more inclined to experience a dramatic increase or decrease in job numbers due to local economic restructuring, with the exception of Dover, Medway and Hastings, changes in local high technology job numbers in the East of the region have fallen into the mid-ranges of the analysis. These authorities have experienced locally attributable changes varying between a loss of 620 high technology jobs and an increase of 610 jobs.

Sennett, 1999, and Hall 1993, GOSE (1999) and SEEDA (1999) apply to growing or declining high technology sectors.

The following main observations can be made:

- The high technology geography of differentials reveals a more complex geography than that indicated by Figure 4.1. Although some districts within the 8 counties have experienced significant job growth in the high technology sector, there are authorities that have experienced decline as well. This applies particularly to districts immediately on the periphery of Greater London.

- In accordance with Halls (1993) observation, there is a Western arc of high technology which in the 8 counties, but is clearly defined using differential statistics for specified authorities within those counties. This is the outer band referred to earlier. The figures suggest that the high technology sector in the outer band of authorities is growing, whereas they are declining closer in to London.

- Unlike in Halls (1993) analysis, the differential data shows that the high technology sector is growing in parts of the East of the region, most notably in Dover, Medway and Hastings. Parts of Essex are also experiencing very high growth (Uttlesford, Maldon). This suggests that there is an emerging geography of high technology clusters that post dates Hall's observations.

4.5.2.2 Comparison with Sub-Regional Economic Trends (Figure 4.2)

The result of the differential analysis is a geography of high technology which identifies districts where the sector is growing and declining. In places this mirrors the sub-regional geography of disparity as described in figure 4.2. When figure 4.2 is compared with figure 4.4, the following main observations can be made:

- With the exception of Runnymede, Spelthorne and Woking in North Surrey, the Western Arc area is characterized by a declining high technology sector. This suggests that that its infrastructural and land supply constraints have already possibly influenced the decline of the high technology sector.

Policies should not be targeted at these areas, as there is either no clustering in these areas (low representation), or, although there is evidence of some limited clustering (medium representation), the sector has declined significantly between 1991 and 1997. This trend shows the high technology sector is reducing, implying future decreases in the extent of clustering. These areas do not show significant promise as high technology areas.

The remaining eight categories indicate either high levels of existing clustering, and/or higher levels of growth in the high technology sector. They therefore show evidence of clustering occurring naturally, and are potential targets for cluster policies, including land use aspects. There are two kinds of possible policy approaches, one seeking to encourage future growth of emerging clusters (Growth Policy), and another which seeks to protect existing ones that are potentially showing early signs of decline (Protection Policy).

Protection Policy should be developed for 6 districts falling two categories: Declining/High Representation, Low Growth/High Representation. These districts are geographically dispersed, but typically are located immediately outside the Greater London boundary, and are exposed to greenbelt and other land constraints. One of these areas, Crawley, is identified as one of three 'hotspot' areas.

While these districts have a history of clustering, recent trends in the local economy indicate job losses in the same sector, which, if the trend continues will result in the dismantling of the cluster. In these areas, it is possible that the sector is declining for a range of reasons. It may be for non-local reasons, where a company is changing business operations, and/or shifting operations out of the region entirely.

Policy makers must identify why high technology companies are relocating out of the area, and the extent to which it is due to inherent problems of that district, whether it be limited land use supply, increasingly congested infrastructure, rising land prices. To retain flagship companies particularly, policy makers should consider identifying specific plots of land for their expansion, and encourage companies to forge links with local universities and other companies that tie them to the area.

At the same time, cluster policy should seek to replace lost high technology firms with a new generation of knowledge-driven firms; smaller, younger firms which, according to Vernon (1966), need proximity to similar firms, and education and training facilities, and the centre of London, to grow. Policy should therefore target small, emerging, innovative businesses, to replenish a potentially depleting high technology cluster. As a part of this, authorities should provide subsidised space for small businesses, both start-ups and emerging, as shortages in suitable stock, high rents and prohibitive lease terms are a disincentive in many of these areas (RTP, 1999, Simmie ed 1997).

There are about thirty districts which should adopt a **Growth Policy** for High Technology Clusters. These fall into the following 4 categories: high growth/ high representation, medium growth/ high representation, high growth/medium representation, medium growth/medium representation. Again, these districts are located throughout the South East region, those with the highest growth and biggest clusters found in areas outside the Western Arc, including parts of East of England, including Uttlesford, Dover, Harlow, and Medway.

In these areas, cluster policies should assume continued growth, and set aside additional land for high technology industry specifically. Authorities should also promote their area as a high technology location. In areas of the highest growth and biggest clusters, authorities should discourage dependency on one or two large firms, and encourage smaller and newer knowledge-driven businesses to locate there. As a part of this, as for the Protection policy, authorities should provide subsidised space for smaller businesses, including start ups and other smaller companies, to overcome existing stock shortages, high rents and prohibitive lease terms. It may be that in some of these areas, particularly to the East of the region, the main problem is one of 'poor' image, in which case policy should concentrate more on positive marketing both independently and through liaison with the RDA.

These districts provide suitable bases for Enterprise Hubs, as part of SEEDAs Clustering Strategy for the South East. These districts should take part in this strategy, and, as a part of it, research exactly what is required to develop a fully-fledged, improved cluster in the district. Now is the time to put in place a cluster policy.

Conclusions

Location quotient and differentials analysis has revealed a complex geography of high technology at local authority level, which, in both cases, adds to existing body of work at county level, and also has marked similarities with the sub-regional economic geography as defined in the RPG Core Diagram.

Key findings, taking both geographies into account, are:

- There are high technology clusters in the East of the Region

- The Western Arc, including 'hotspots', is an area of declining high technology clusters, forming part of an inner ring of under-represented districts immediately outside Greater London.

- An outer ring of high technology clusters is emerging at the periphery of the region along the M3, M4 and M1 corridors, as well as on the coastal rim, particularly in South Hampshire.

- Clusters can be defined at district level; dramatic differences in levels of representation and sector growth across district boundaries, particularly to the west of the region.

Section 4.6 has discusses the policy implications of this complex geography. Most crucially, cluster policy should not be targeted at all districts, just those with a growing sector and high clustering levels. Cluster policy should not try to create new clusters from nothing. This analysis has identified about 45 districts which should have cluster policies, and has distinguished between a **Growth Policy** and **Protectionist** Policy, depending on recent trends in the high technology economy between 1991 and 1997.

In the next chapter, Chapter 5, these policy implications will be expanded on following interviews with planners and/or economic development specialists in the top thirty high technology authorities. These thirty authorities, with positive LQ and positive differentials, are the districts with the greatest current potential for high technology clustering in the South East.

Chapter 5: Planning for high technology industries.

5.1 Introduction

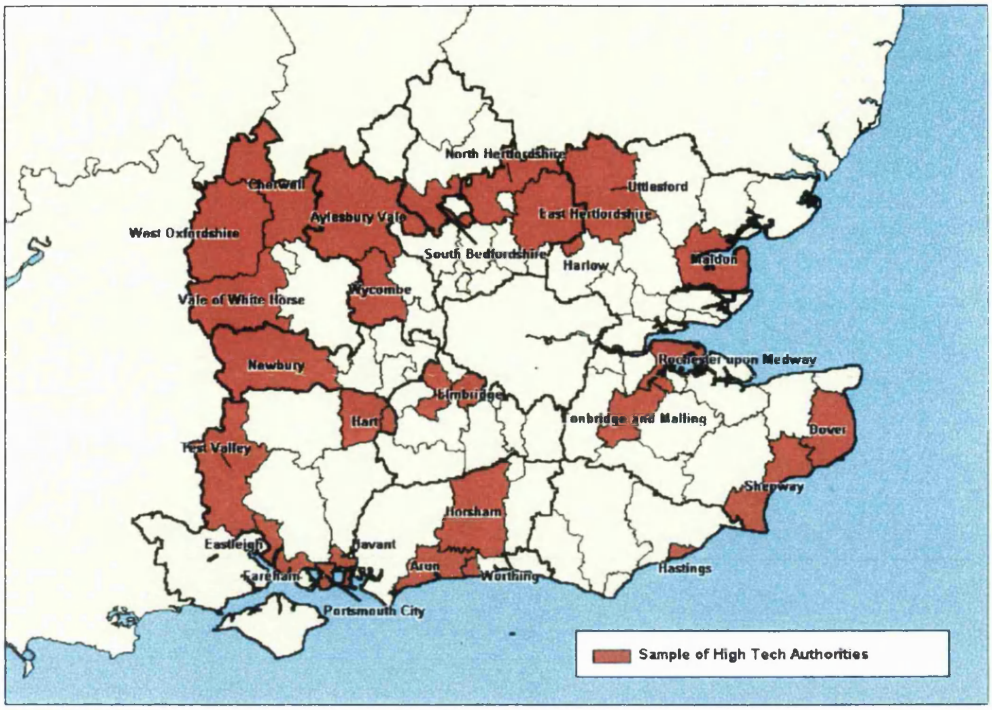
Despite its reputation as the most prosperous region in the UK, there are wide variations in the concentrations of high technology industries in the South East. It is by no means a homogenous prosperous region, but instead, different parts of the region have very different high technology characteristics. Furthermore, those authorities with high concentrations of high tech industries are found in districts not generally associated with prosperity and wealth, Hastings, Dover, Shepway and Maldon fall into this category.

The clusters literature suggests that clustering in high technology industries should be encouraged in areas where it already exists (Porter, 1998, Simmie and Sennett, 1999, Vernon, 1966, Dicken 1998, DTI, 1998). It is in these areas therefore that cluster policies should be introduced, including their land use components. The review of cluster policy up to October 1999, establishes that, while regional and national cluster policies encourage cluster formation, there is little guidance about exactly what this entails in land use terms at a local level. The most informative policy available is SEEDA's network of 'Enterprise Hubs', conceptualised as a series of agencies and programmes working closely together (sector groups, government organisations, business start up programmes) (figure 2.9). The only reference to land use implications is the requirement for flexible premises for start ups, and the intention to locate the enterprise hubs throughout the region (SEEDA, 1999).

Therefore, while cluster theory suggests that clusters should be encouraged where they already exist, there is no guidance about how planners should incorporate cluster policy into the land use decision making process. Indeed, while there has been recent guidance on several aspects of planning policy, including sustainable development, housing and transport, planning policy guidance for commercial spaces has not been updated since 1992.

In the absence of clear planning policy guidance, this thesis seeks to identify land-use components of clustering to test whether the existing planning system can effectively foster clusters. While the recent proclamations of the DTI (1999), Sainsbury (1998) and RTPI (1998) suggest an incompatibility between the planning policy agenda and clustering policy in five key

Figure 5.1: Location of the top high technology authorities in the South East
Source: Mapinfo and Nomis Data



The sample authorities are generally located on the outer rims of the region, with the majority to the west of London, although some are found to the east of the region, contrary to earlier analysis of high technology concentrations (Simmie and Sennett, 1999, Hall et al, 1987). This stage of the research further investigates the extent to which differences in local economic geography, as manifest in the local planning process, affects the ability of a local authority to plan for cluster development.

A survey was designed to investigate how economic spaces are planned at local authority level, and the extent to which it facilitates clustering. The survey has two parts, a contextual set of questions (Questions 1-4), followed by questions relating specifically to the planning system, the extent to which clustering is facilitated, and reform is necessary. Section 3.13 describes the

survey design in greater detail, a copy of the questionnaire is provided in Appendix 5.2, and a copy of the coded questionnaire is provided in Appendix 5.3.

The results of the structured interviews were coded, tabulated and graphed. The results are presented in the remainder of this chapter. Analysis is both quantitative and qualitative, drawing on extracts from individual responses where appropriate.

5.3 Context

This first section of the questionnaire provides the economic context for the chosen high technology areas. Questions are asked on the general attractiveness of the district, the nature of existing clustering, major economic sectors and the general demand for sites.

The results of Chapter 4 indicate it is likely that results will identify the high technology sector as key to each district, and that high concentrations of clustering also exist. Views on the general attractiveness and demand for sites are likely to vary depending on the geographical location of the district. According to GOSE (2000) areas to the west are over-populated and characterised by constrained land supply, in contrast the East of the region is comparatively under populated with fewer land shortages.

Results of each question discussed in turn below.

5.4 Question 1: The Business Location

This asked districts the advantages and disadvantages of the area as a business location. It is unprompted. It seeks to identify exactly what it is about the South East region that makes it attractive to businesses, and the extent to which regional and sub-regional characteristics are considered important. This potentially has implications for the optimum size of clusters.

There are two aspects to the question, treated in turn below.

Other lesser popular transport related answers include responses about good train services (3: 11%), good ports (4: 15%), and good local roads (3:11%). The comparatively low rating of the train service is not surprising, given the continued reliance of businesses on road transport as opposed to public transport. Authorities on or close to the south coast identified port activity as important. The emphasis on the strategic road network as opposed to the local road network suggests that businesses are attracted more by region-wide transport networks that enable travel both within and between regions, rather than small scale local road infrastructure. Local authority officers perceive the regional transport picture to be of greater importance than the local.

Cluster theorists identify the need for high quality transport links, including airports and road infrastructure, as a key requirement of clusters (Porter (1998), Simmie and Sennett (1999), the DTI (1998) and Sainsbury (1999). These results therefore endorse this theory, and suggest one of the reasons why these districts have concentrations of high technology. Importantly, however, not all respondent authorities have high quality transport links, as is seen in the next section. High quality transport links therefore are only one land use component of clustering, but not essential.

In addition, to transport related advantages, a second set of advantages are site specific ones- relating to the high quality environment, whether it be good quality stock, the presence of executive housing or leisure opportunities. Ten respondents (38% of respondents) identified that the district had a high quality working environment. Cluster theorists and policy makers identify this as a key land use characteristic for a successful cluster (table 2.11).

The skills of the local labour force seemed unimportant as an advantage of the area, with only three authorities of the 26 rating it. This is perhaps surprising given the suggestion of demand based cluster theorists that the labour market is the main reason for clusters to form (Morgan, 1994, Simmie and Sennett, 1999, Storper, 1995).

Finally, eleven respondents (42%) identified that the region's proximity to London was one of its main advantages as a business location. This reflects the world-city status of London, and its importance as a major worldwide centre of trade and commerce (Llewelyn Davies, 1995, Halls and Castells, 1994). Again, this answer reflects the view that authorities consider region-wide strategic factors as being the main attraction of the region to businesses- strategic transport and London being the most common responses. Only two authorities suggested that the proximity of

similar businesses is an obvious advantage of the area to a would-be investor. This suggests that clustering occurs in many of the sample authorities on a demand-led basis; co-location is a necessary consequence of locating close to London.

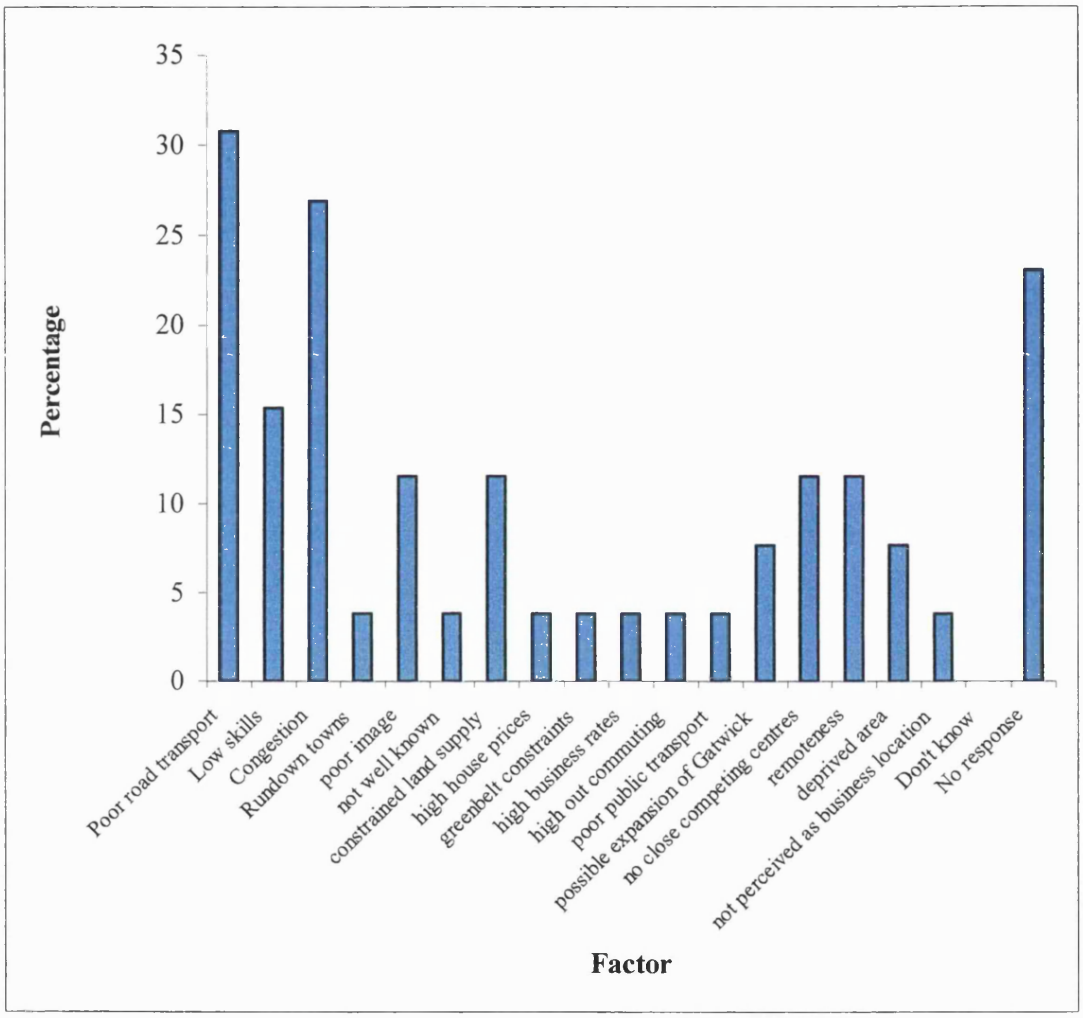
5.4.2 Key Disadvantages of the District as a Business Location

While local authorities perceived advantages to their areas, twenty respondents, about 70 percent of the total sample, identified that their area had disadvantages as a business location. Transport related factors provide the greatest locational disadvantages (figure 5.3). Over 30 percent of respondents (8) identified that their areas had poor road transport, and over 25 percent of respondents (7) cited congestion as a problem in their areas. Other commonly cited responses include low labour skills, remoteness and the poor image of the area. In total over 17 disadvantages were identified.

These responses reflect two situations- local authorities which are experiencing overheating of the local economy and the disadvantages of that (congestion, high house prices, constrained land supply, high business rates), and those that are genuinely unattractive as locations within the South East because of their geography. This latter group include coastal authorities suffering from remoteness, deprived areas, a poor image, and a lack of competing centres. Again, this reiterates the heterogeneity of areas in the South East, and the real existence of deprived rather than prosperous areas. It also reiterates that areas with comparatively high concentrations of high technology industries are not necessarily the most prosperous areas, contrary to common perceptions.

The responses provide an insight into the locational logic of firms, albeit from the opinion of a local authority officer. For most districts their proximity to strategic transport routes (roads/airports) and proximity to London are its key attractions. Crucially these potential reasons for clustering are not a function of the land use planning system but are more a product of the South East geography, or in the case of strategic road networks, are the responsibility of strategic policy makers. Potentially, the town planning system at local level only has a limited role therefore in fostering clusters. However, the fact that clustering occurs in some areas with poorer transport connections, such as Dover and Hastings, implies that accessibility and proximity to London are not the only explanations for high technology clustering.

Figure 5.3: Key disadvantages of the District as a business location



5.5 Question 2: The Economic Sectors

This asked respondents about key sectors in their local economy. Chapter 4 identified the sample authorities as locations with the highest concentrations of high technology in the South East. This question tests the extent high technology is perceived to be a major sector in the local economy.

The question is unprompted. No definitions of terms were provided. The answers identify a range of sectors that only broadly apply to the SIC categories, instead reflecting a more fluid understanding of economic sectors at local authority level. This question is not seeking a definitive answer on the breakdown of employment by sector; but instead is testing the extent to which knowledge driven or high technology companies are perceived to feature.

An overriding majority of respondents (76% or 20) cited high technology as a major sector in their local economy. This therefore reinforces reality, as the interviewed authorities have been established as the top thirty high technology employers in the South East. Several other responses identify specific high technology sectors, including: plastic polymer manufacturers, optical industries, contact lens industry, pharmaceuticals, defence and R & D. (Figure 5.4).

Figure 5.4: Notable economic sectors

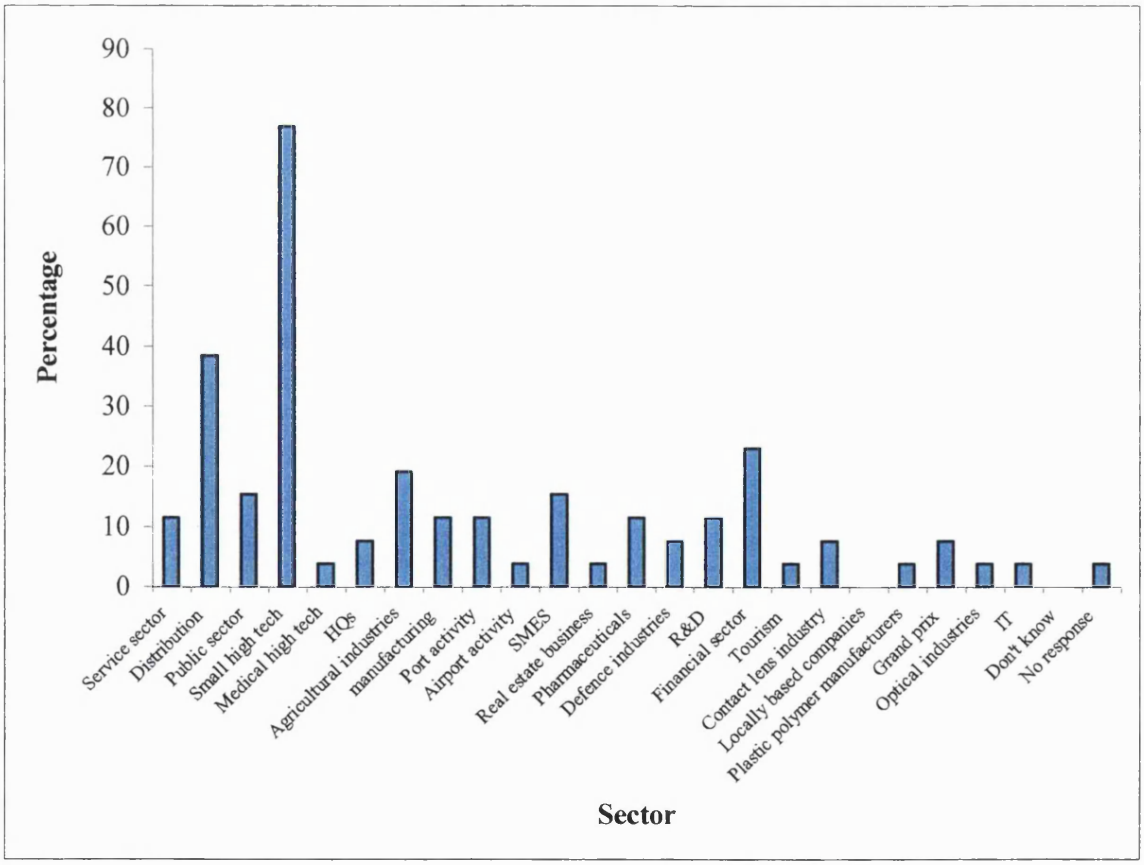
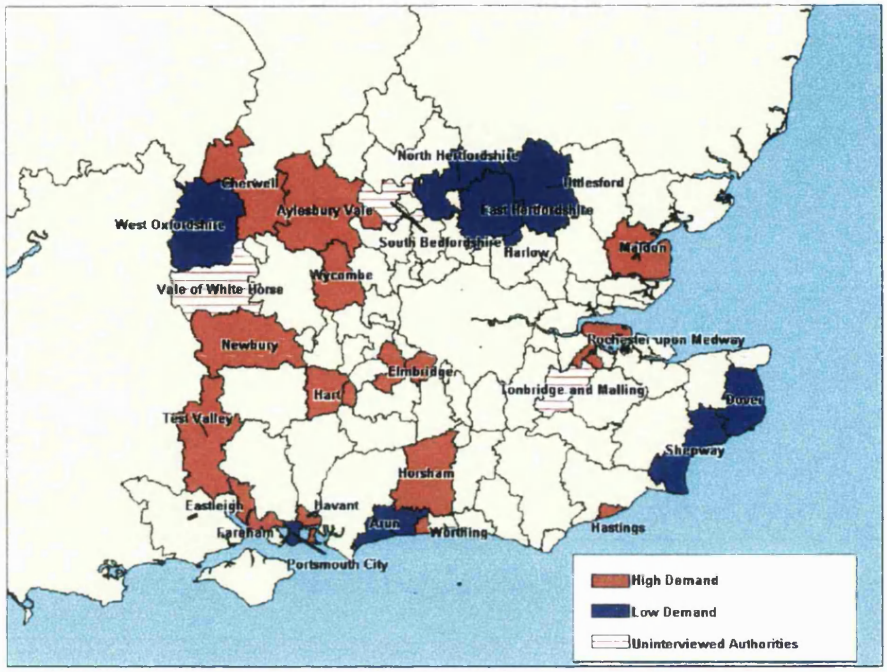


Figure 5.5: Demand for Sites in Interviewed Authorities



high demand levels, despite already having high concentrations of the high technology sector. Seemingly, high technology companies do not obviously seek to locate in these districts. With the exception of Arun, Portsmouth and West Oxfordshire, those to the west of the region have higher demand for land, suggesting that these areas are continually under pressure from additional investors.

What is uncertain therefore is, if some authorities do not experience a high demand for their land, yet there has been a dramatic growth in high technology employment between 1991 and 1997 and there is already a cluster in place, how is that growth and sectoral presence accounted for. Potentially, in these peripheral locations one major high technology employer provides the total for the authority. This is the case in Dover, where Pfizer accounts for nearly all high technology employment in the district.

The review of cluster theory reveals that the presence of high technology firms in West Berkshire (Newbury) and surrounding districts does constitute a cluster, albeit a larger and demand based version.

Respondents are unused to cluster terminology and do not apply it in their understanding of the economic geography of the region. The results of question 4 reveal that, generally, planning authorities perceive clustering to be something beyond their policy remit. However, in practice local authorities are familiar with clusters but use different terminology, referring to high technology sectors instead. Clusters are perceived as localised geographical concentrations.

The size of the cluster, and the fact that they are more likely to be district wide than localised, has implications for the ability of the existing planning system to plan for them. The larger the cluster the more likely it is that the planning system as structured is able to accommodate it as there is less pressure for close proximity and the increasing likelihood that the land use requirements will fit in with existing settlement patterns.

With its policies identifying suitable sites for employment space, monitoring systems and local plan policies, it provides an established method of determining land uses that, if high quality sites were selected and particular sectors targeted, could be tailored to foster clustering. This is tested in the next section, analysing the main bulk of survey responses.

5.8 Operation of Planning System

The survey provided information on how the existing planning system provides for high technology development, and clusters specifically. It also, asks authorities the extent to which, in their view, additional guidance and reform, is required for clusters. The questionnaire was designed to ask questions with implications for clustering without setting out the logic behind it. In this way, responses are not informed by any simplified perceptions of clustering.

5.9 Question 5 : Demand for Allocated Employment Sites and Frustrated Demand.

Question 3 asked local authorities about the general demand for sites in the district; this question focuses on allocated employment sites. It examines the nature of demand for allocated

employment land specifically, whether employment sites meet the requirements of would-be investors. Authorities were also asked about the specific nature of any frustrated demand.

This question had a low response rate, with only 19 answers. Of these, ten authorities considered they had sufficient land to meet market demand and did not suffer from a lack of sites for would-be investors. Examples include Harlow with a fifteen year supply of land, and Dover with an *'abundance of sites'*.

Nine respondents acknowledged evidence of frustrated demand in their districts, where the local plan provision was not sufficient or suitable to meet the requirements of those wanting to invest. Table 5.2 below provides the range of responses. Respondents were able to provide more than one answer.

Table 5.2: Why employment allocations do not meet market requirements

Nature of Frustrated Demand	Number of Responses
Insufficient land supply	5
Poor stock	4
High proportion of sites not market ready	7
No small sites in villages	4
No space for bad neighbour industries	1
Poor quality allocations	2
Greenbelt and countryside providing a constraint	2
No sites for small business	4
No larger sites	5

Respondents provided two different categories of answer, one relating to the amount of space available, and the other to the quality of that space and its suitability for particular employment uses.

For some authorities there is not enough employment land to meet demand. In Aylesbury and Elmbridge all sites are taken up immediately, Cherwell and Hart had a shortage of small business sites, and Horsham no sites for expanding local companies. Wycombe and Arun complained that employment sites were being lost to housing uses, and therefore further constraining supply. Between September 1998 and April 1999, EEDA received 144 enquiries about possible sites in the Maldon area, of a total of 244 ha, 220ha of these requirements were for sites of over 2 ha. Maldon does not have a single site over 2ha.

For others there is not enough of the right type of space. Arun has an employment allocation that has been in place for over 20 years, yet has not been taken up due to land ownership constraints and unattractive lease lengths. It is not attractive to any would-be developer. In Shepway, many allocations 'are not available'; requiring servicing and de-contaminating before they are market ready. These two examples demonstrate how the planning system allocates inappropriate sites of poor quality for employment use.

Another qualitative explanation for frustrated demand however cannot be attributed to the planning system. Havant and Elmbridge have a shortage of quality premises; in Eastleigh inward investors want new buildings on allocated sites, ready for occupation. The provision of buildings on employment sites is beyond the remit of the planning system. As Graham Tuck, of Eastleigh stated, "*Planners provide land, they have no expertise in buildings*". The inability to develop the land, unless council owned, therefore reduces the potential of the current planning system to foster clustering.

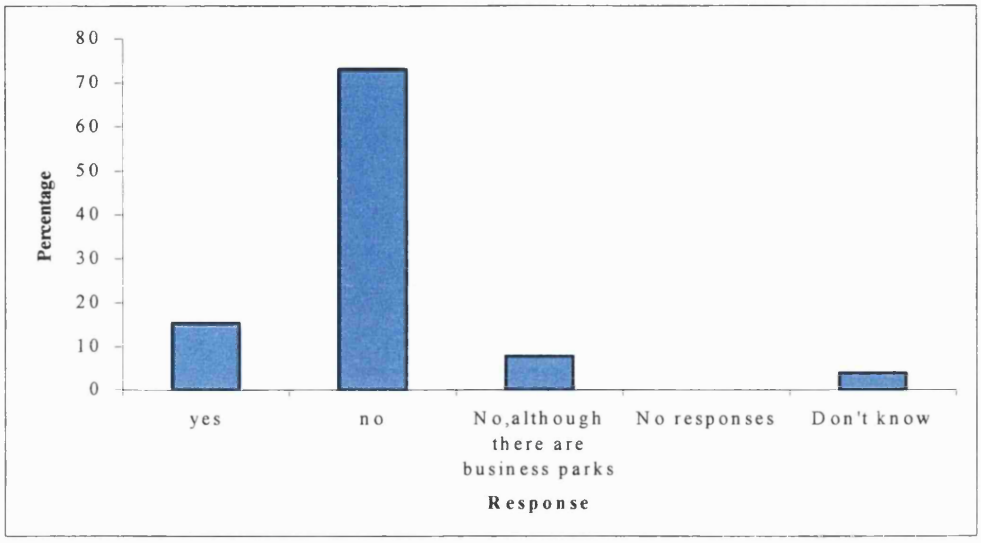
5.10 Question 6: Site Attributes of Major Employment Areas

Local authorities were asked to provide details about the site attributes of one or two major occupied and allocated employment sites in the district. These were to be suitable for high technology or knowledge-driven employers.

The purpose of this question is to identify the quantitative and qualitative requirements of knowledge-driven and high technology companies, and whether these requirements change when there are severe land pressures. This question therefore shows the extent to which the planning process has enabled high technology and knowledge-driven industries to find appropriate sites in a cluster location. Although respondents were asked to comment on sites appropriate for high technology, rather than on general employment sites, this did become difficult given the wide range of employment uses that local authorities allow on their allocated sites. Employment land allocations do not generally allocate specifically for one kind of use, instead for several.

Figure 5.7 below sets out the main factors that characterise employment sites for high technology businesses. These site specific factors are similar to responses to question 1. Major occupied employment areas tend to have good access (53%:14), be in a high quality (46%:12), often

Figure 5.7: Are sites allocated for high technology/knowledge-driven industries?



Land use policies can be used to target particular sectors and that in this way clusters can form. However, in practice, this is not considered the best approach for the local economy, as it fosters a monoculture. Hastings district employed consultants to do a study of employment land allocations and test which was desired approach with the local business community; whether to foster high technology or provide wider designations spanning the UCO. It was concluded that the latter approach was valid for meeting long-term economic objectives.

In reality it is difficult to allocate for knowledge-driven industries specifically as these cover a range of sectors and are defined more by the innovative processes they use (Section 3.3). As this terminology is used increasingly in place of high technology it may become increasingly impractical to target policies sectorally, as clustering is encouraged in all knowledge-driven industries, spanning the sectors.

5.13 Question 9: Small Firm Policy

The situation is different for small firms. Respondents were asked if they allocated specifically for small companies. Over 55% of respondents (15) acknowledged that they did have policies in place to foster small businesses, whereas 38% (10) did not. In policy making terms it is more acceptable to plan for small businesses, rather than particular sectors.

Interestingly, even those authorities that did not have a formal planning policy in place to foster small businesses had other initiatives in operation that fostered them. Rochester, Maldon and Eastleigh districts operated seedbed centres for starter companies, Aylesbury Vale and Cherwell provided small business support services. Planning and economic development policies are in place in nearly all the sample authorities.

This result is unsurprising. There is no obvious policy conflict between economic development and planning policy objectives at all policy scales. Local policy makers endorse national policy in recognising the significance of the small firm to economic diversity and also cluster formation (sector specific policies). The importance of the small firm to the economy also features in national and regional competitiveness policies, as well as national and regional planning policy. Local planning authorities have clear guidance from PPG 4 (1992) to plan for small firms (DETR, 1992).

The provision of space for the small firm is one of the identified land use attributes of clustering. In this one example, therefore, the planning system obviously complements cluster policy.

5.14 Question 10: Marketing

Respondents were asked whether they market their employment sites to the business community and how they do it. This question investigates the extent to which local authorities are proactive in the promotion of their allocated employment land areas. In an area where high technology or knowledge driven businesses are encouraged to cluster, it is logical to expect that an active marketing process will be in place to attract those businesses. This question importantly tests the extent to which mechanisms in place, not whether the area is already marketed as a high technology location. Results are presented in table 5.2 below; respondents were able to give more than one answer.

Fifty percent of respondents (13) did not undertake any marketing at all. The absence of local authority action is for one of four reasons. Local authorities may not have the budget to deal with marketing functions (North Hertfordshire). Secondly, they may encourage other organisations to market their district, as it is something that is beyond their remit (Horsham, Hastings). Thirdly, authorities may not want to market their district, because there is no request for it (Rochester). Finally, local authorities may not market their areas because they do consider it necessary. Runnymede and West Berkshire do not market because "*they do not need to*", in Woking there is "*nothing to market*", and it is county policy to not attract more employment to the area and so generate additional demand for housing. Clearly marketing should only be done when there are sites to market.

Table 5.3: Marketing Efforts of Local Authorities

Response	No of Authorities
No marketing	13
Have Development Briefs	4
Have promotional material for one/more sites	3
Have 'other'marketing	3
Have inward investment brochure	2
Promised development briefs not produced	1
Low key telephone promotion	5
Use website	1
Work with agents	2
Direct queries to other similar companies	2
Use estates manager	1
Have a schedule of available development sites	2
Don't know	0
No response	0

Generally, any promotional efforts of local authorities were restricted to small scale operations- for example, low key telephone promotion (1 respondent), using the website (2 respondents), and using development briefs (4 respondent). Development briefs are planning tools designed to provide site and planning detail to would-be developers about allocated sites. Although they serve as planning documents, they can also be useful as marketing documents provided that they are up to date. Despite the fact they are actually contained within national planning guidance, the survey results show that planning briefs are still not widely used as a method of disseminating information about a site.

including commercial uses but also other uses, including housing, transport and leisure uses, the concept can be sustainable and meet its objectives. As the respondent from Worthing put it, "*Clusters could fit if the government went the whole hog*".

The general conclusion appears to be that, in the absence of clear policy guidance, authorities are generally sceptical about the compatibility of planning and cluster policy. A cluster policy will only complement the planning system if it is part of an integrated approach to land-use development. If it is not, "*things could go horribly wrong*" (Graham Tuck, Eastleigh).

Finally, cluster policy and planning policy is not only incompatible because of divergent policy agendas. Planners do not have all the right tools to plan for clusters. Planners cannot grant planning permission because a proposed development is part of a high technology cluster. Instead, the planner grants planning permission according to use classes regulations and not SIC categories. (Eastleigh). This final point returns to the conclusion of question 8, it is not current planning policy to plan for particular sectors over others, but instead the planning system provides for a range of companies, of all sectors and sizes.

5.19 Question 15: Do you welcome a new PPG document to explain the planning implications of economic clusters?

This final question asked local authorities if they felt they needed additional planning policy guidance to plan effectively for clusters. Following the responses to question 14 it is probably unsurprising that most respondent authorities were keen for additional guidance, as "*clusters are all very academic at the moment*" (Medway).

Although many did not feel it warranted an entirely new PPG, 20 respondents (77%) recognised a need for additional guidance. Only four authorities considered guidance was not necessary; Dover, Worthing, Uttlesford and Shepway. Guidance however should only be provided *if 'it was not too generalised*' (Woking), and if there was proof that the planning system could effectively plan for clusters (Wycombe). Many authorities considered the best form for this guidance to be in a new version of PPG 4 (1992). Subsequent press releases from the DETR (2000) indicate that clusters PPG is forthcoming, but as part of a revised version of PPG 11, Regional Planning. This is yet to be published.

5.20 Conclusions

This chapter presented the results of a series of structured interviews with 26 of the top thirty high technology districts in the South East. The survey sought answers to the following three research questions.

- How does the existing planning system foster high technology employment and clusters?

- Is there a need for the reform of the planning system to effectively plan for clusters?

- What form should this reform take?

The main findings are summarised below. The concluding paragraphs answer each of the research questions.

The results confirmed that there are several aspects of clustering that the planning system at local level cannot encourage. These are listed below:

- Districts are attractive locations because of their proximity to London and to strategic infrastructure, motorways and airports. This is a function of their geographical setting and not influenced strongly by the planning system.

- The planning system does not have fundamental control of the market. This is evident when comparing the land use situations in two districts among the sample. Despite the presence of a high technology cluster, demand for sites in Dover is very low, there is an "*abundance of sites*". In contrast, Woking and Aylesbury Vale suffer from an acute shortage of sites. These differing market conditions strongly influence the current and future ability of businesses to cluster, with it being increasingly difficult to do so in areas with limited land supply. While market conditions exist separate to the town planning system however, it can influence the market due to its influence over land supply.

- The planning system does not directly control the type and size of any premises on employment sites. Through the planning application process, it may exert a strong influence, but ultimately the planner does not control when a development will be built. This again is

subject to market conditions. This analysis revealed that the nature of buildings on employment sites was a key aspect of the 'high quality working environment' required of clusters (table 2.11). The buildings should be already completed, should be modern in design. The planning process is unable to determine if and when this occurs, despite it being a component of land-use.

Results show that the planning system can foster clustering in four ways:

- Local authorities plan for small businesses, allocating sites and providing incubator centres. In addition, many authorities provide other business support services. This activity fits in with national planning guidance (PPG 4, 1992) and also with competitiveness policy at national and regional levels. Small businesses are essential to a cluster in providing additional knowledge and innovations which help sustain it (Simmie and Sennett, 1999, Porter, 1998, Camagni, 1991).

- Local authority planners and economic development specialists are able to market land proactively using a range of marketing tools, including the development brief. For clustering to continue in a region, it would be logical to promote the district to selected sectors. The results indicate that already many respondents engage in marketing activities. These mechanisms can be used to specifically target high technology sectors if they do not do so already. Obviously marketing only has effect if there is land to market.

- Planners have introduced qualitative monitoring techniques enabling them to not only quantify employment land allocations, but to also ensure the sites available meet the specific land use requirements of developers and investors, including the high technology sector. By identifying the qualitative requirements of the high technology sector, it is more likely that appropriate sites- well serviced, decontaminated, greenfield locations- will come forward. Qualitative monitoring processes, once in place, can accommodate requirements for clusters for several years ahead. Qualitative monitoring tools once applied can ensure there is enough land supply to fulfill the requirements of any growing cluster, subject to land constraints.

- The planning system is able to provide high technology companies with the land they require by meeting their qualitative requirements, subject to market conditions. Respondents have identified that a 'high quality working environment' for the high technology sector usually

comprises a business park. These require greenfield sites, good accessibility and high car parking provision. Some local authorities have sector specific allocations, although this policy approach is not commonly pursued due to conflicts with other aspects of planning policy.

The planning system does not necessarily support high technology clustering. Land Use planning policy deals with a variety of land uses of which employment land considerations are only one. Planning policy in the South East is defined by the sustainability agenda. The South East is a densely populated region, where there are many pressures for additional land uses and shortages of land supply. The planning system regulates the balance of land uses. Several respondents indicate that high technology growth is not a priority in their districts, simply because there is no more land. Ideal greenfield sites are held back to meet sustainability criteria, despite them potentially providing an ideal location for a high techology industry. Technically speaking therefore, in safeguarding other land uses, the planning system is not effectively fostering high technology growth sectors.

There is evidence that, even where there are allocated and unoccupied employment sites, the planning system prevents companies from finding ideal locations by interfering with the market. Examples of this is the allocation of two greenfield sites for three years before the local plan process is likely to permit take up, a second example is the allocation of unsuitable employment sites. Although the planning system is capable of allocating sites appropriate for clustering companies, there are examples where allocated sites have lain vacant for over twenty years. Similarly, there are examples of allocated employment sites that are not 'market ready' because they do not have the necessary physical infrastructure in place to develop them. These constraints severely limit the development capabilities of the high technology firm in the South East.

The planning system does not explicitly prioritise economic clustering. If anything it endorses the opposite, as part of the aim to provide employment land to support a balance economy of all sectors and all sizes (PPG 4, 1992). It is because of this that there are few examples of sector specific policies. Several authorities consider that clusters have nothing to do with them, because they explicitly conflict with other more important local agendas- namely regeneration or sustainability agendas. An example of this is Hastings, which, despite having some software companies located within the district, and ample vacant employment land, considers clustering irrelevant, and instead concentrates on achieving economic diversity and local employment.

Chapter 6: Conclusion and Recommendations

6.1 Introduction

This study builds on the existing research on high technology and clustering in two important ways:

- Providing a detailed geography of high technology at local authority level throughout the South East.

- Identifying the extent to which the existing planning system effectively plans for concentrations of high technology industries or clusters.

This chapter summarises the main research findings. It then outlines some limitations to the study, and concludes by considering recommendations for future research.

6.2 Findings

6.2.1 Stage 1 Research

The high technology geography of the South East, as calculated by LQ and differential methods, is more complex than investigations to date. The combined geographies, in table 4.8, have the following 4 characteristics:

- High technology clusters are found in the east and west of the region.

- The best performing high technology sectors are generally found in the outer rim of the region, including the south western coastline and the coastline of East Kent.

- An inner rim of districts on the immediate periphery of Greater London are characterised by lower LQs and negative differentials; these are areas of high technology decline.

- There are stark differences between the high technology characteristics of districts between districts, particularly to the west of the region.

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Windsor and Maidenhead	Wokingham	Aylesbury Vale	Chiltern	Milton Keynes	South Buckinghamshire	Wycombe	Brighton	Eastbourne	Hastings	Hove	Lewes	Rother	Wealdon	Basildon	Braintree
244	30	15	82	192	850	44	29	28	0	105	3	1	4	5	34
70	360	468	28	253	51	541	58	5	50	8	213	7	54	13	36
293	14	40	103	54	1	69	79	12	12	104	150	20	36	80	235
93	324	342	214	811	114	1,167	82	33	169	11	56	110	454	54	428
4	13	58	37	36	6	24	6	0	598	14	5	28	16	57	66
0	28	8	4	0	0	11	0	0	0	0	1	3	0	32	0
15	414	105	65	17	38	160	209	0	24	1	5	10	2	256	3
44	18	40	10	16	1	12	25	32	192	59	25	0	15	74	176
58	33	241	19	326	0	20	22	15	155	97	97	4	50	17	45
2	1	0	0	0	0	35	9	0	37	0	0	2	6	0	0
186	68	110	25	133	14	152	18	3	1	330	83	3	26	6	75
7	1	8	1	2	21	1	11	15	0	6	0	15	8	23	0
163	180	157	15	643	64	750	81	7	3	57	13	11	44	204	46
2	3	18	7	20	5	5	3	0	0	1	2	0	8	2	3
1181	**1487**	**1610**	**610**	**2503**	**1165**	**2991**	**632**	**150**	**1241**	**793**	**653**	**214**	**723**	**823**	**1147**
64578	51139	59910	27707	106011	27508	78051	65816	28374	26299	31750	28005	19094	35841	62947	39405
1.83	2.91	2.69	2.20	2.36	4.24	3.83	0.96	0.53	4.72	2.50	2.33	1.12	2.02	1.31	2.91
0.78	**1.24**	**1.14**	**0.94**	**1.00**	**1.80**	**1.63**	**0.41**	**0.22**	**2.01**	**1.06**	**0.99**	**0.48**	**0.86**	**0.56**	**1.24**

Brentford	Castlepoint	Chelmsford	Colchester	Epping Forest	Harlow	Maldon	Rochford	Southend on Sea	Tendring	Thurrock	Uttlesford	Basingstoke and Deane	East Hampshire	Eastleigh	Fareham
17	0	13	5	1	508	16	0	0	0	0	0	458	18	438	2
2	171	13	154	365	1,609	324	1	47	8	15	18	232	81	46	197
3	16	60	200	10	246	2	90	605	57	7	11	252	6	13	121
21	39	58	73	104	637	251	198	47	13	34	298	766	141	250	464
8	0	0	26	1	0	0	6	8	110	0	43	24	6	1,701	156
0	0	4	0	0	13	0	2	1	0	17	0	17	1	0	0
0	7	17	6	37	72	4	232	12	0	13	1,473	136	278	1,309	801
1	5	23	42	10	0	258	2	10	42	91	0	5	112	21	2
0	10	8	13	6	0	33	2	504	66	3	21	657	168	510	42
1	0	0	0	0	0	0	2	31	5	0	0	1	1	5	1
4	14	41	17	15	705	56	10	141	15	7	50	140	91	89	94
0	0	2	41	7	20	6	0	6	1	0	1	0	11	1	0
3	9	27	11	62	5	7	7	57	1	149	40	311	82	5	13
0	4	7	42	8	31	2	1	1	0	0	0	0	3	1	0
60	**275**	**273**	**630**	**626**	**3846**	**959**	**553**	**1470**	**318**	**336**	**1955**	**2999**	**999**	**4389**	**1893**
27194	16367	63220	60930	31280	37273	14894	18280	58531	29188	43835	26296	65886	34790	47373	37804
0.22	1.68	0.43	1.03	2.00	10.32	6.44	3.03	2.51	1.09	0.77	7.43	4.55	2.87	9.26	5.01
0.09	**0.71**	**0.18**	**0.44**	**0.85**	**4.39**	**2.74**	**1.29**	**1.07**	**0.46**	**0.33**	**3.16**	**1.94**	**1.22**	**3.94**	**2.13**

Gosport	Hart	Havant	New Forest	Portsmouth	Rushmoor	Southampton	Test Lley	Winchester	Broxbourne	Dacorum	East Hertfordshire	Hertsmere	North Hertfordshire	St.Albans	Stevenage
0	4	590	232	8	1	3	30	8	616	256	1,289	304	251	10	0
1	31	1,261	218	443	101	49	206	45	238	7	10	112	56	69	2
1,136	7	209	50	108	8	42	255	0	14	60	57	43	86	59	11
10	505	891	124	2,034	62	204	456	157	196	323	237	196	690	174	847
0	11	0	33	16	459	72	93	29	1	242	30	234	70	64	3
0	0	0	0	1	0	0	0	5	0	0	0	0	0	7	0
8	65	20	12	1,374	1,211	36	58	7	0	670	183	5	23	13	1,187
0	0	77	17	14	231	78	176	14	44	4	263	1	212	13	7
2	69	59	1	360	93	19	93	31	31	119	111	96	63	237	2
0	0	6	1	1	0	0	0	0	1	0	13	0	0	0	1
2	74	724	26	159	131	64	118	258	53	21	241	308	153	16	51
0	2	0	1	6	4	7	10	1	1	1	7	0	0	0	1
3	906	185	31	25	1,242	88	183	17	4	95	43	51	343	42	100
0	5	2	2	0	0	0	0	6	0	8	12	3	1	3	1
1162	**1679**	**4024**	**748**	**4549**	**3543**	**662**	**1678**	**578**	**1199**	**1806**	**2496**	**1353**	**1948**	**707**	**2213**
21160	24419	36275	51716	95114	41517	107165	46353	61975	27306	57948	50191	37444	43972	53450	32283
5.49	6.88	11.09	1.45	4.78	8.53	0.62	3.62	0.93	4.39	3.12	4.97	3.61	4.43	1.32	6.86
2.34	**2.93**	**4.72**	**0.62**	**2.03**	**3.63**	**0.26**	**1.54**	**0.40**	**1.87**	**1.33**	**2.12**	**1.54**	**1.88**	**0.56**	**2.92**

Three Rivers	Watford	Welwyn Hatfield	Medina	South Wight	Ashford	Canterbury	Dartford	Dover	Gillingham	Gravesham	Maidstone	Rochester Upon Medway	Sevenoaks	Shepway	Swale
7	11	1,718	0	1	131	0	2,516	1,854	0	0	35	16	3	0	35
142	290	70	1	0	0	90	8	5	5	12	10	10	27	21	5
191	204	46	5	1	128	38	81	4	69	16	44	109	83	863	51
8	191	787	2,534	9	89	15	3	254	8	24	12	2,756	72	11	67
23	10	15	10	1	10	0	0	13	2	207	0	6	2	11	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6	57	148	11	178	61	3	0	0	0	22	11	2	21	6	1
12	56	0	61	1	170	42	2	359	0	3	20	25	24	6	9
100	103	78	146	3	49	519	26	32	1	96	5	74	20	212	485
30	0	3	0	0	0	1	0	0	1	0	0	0	4	0	0
87	111	15	11	1	95	127	197	16	0	5	119	136	25	18	14
28	0	0	0	0	0	18	0	0	0	1	0	0	0	0	2
12	15	82	0	2	2	13	6	0	5	11	16	25	41	7	17
0	1	2	0	0	2	0	0	0	0	0	0	0	1	0	1
646	**1049**	**2964**	**2779**	**197**	**737**	**866**	**2839**	**2537**	**91**	**397**	**272**	**3160**	**323**	**1155**	**687**
20977	50995	51022	28357	12029	33420	46695	35060	33895	23198	24435	62432	48145	35266	31598	36076
3.08	2.06	5.81	9.80	1.64	2.21	1.85	8.10	7.48	0.39	1.62	0.44	6.56	0.92	3.66	1.90
1.31	**0.88**	**2.47**	**4.17**	**0.70**	**0.94**	**0.79**	**3.45**	**3.18**	**0.17**	**0.69**	**0.19**	**2.79**	**0.39**	**1.56**	**0.81**

Planning for the High Technology Clusters in the South East
Questions for Consultation

CONTEXT

1. What are the key advantages/disadvantages of the district as a business location (e.g. road access, population catchment)?

2. Are there any notable economic sectors in the district (consider sectors that are large, growing, provide examples of major employers)?

3. What is the general nature of demand for sites in the district? What is the pattern of enquiries?

4. Are there any high technology/knowledge driven clusters in the district?

OPERATION OF THE PLANNING SYSTEM

5. Do existing employment land allocations meet the requirements of would-be occupiers or is there evidence of frustrated demand?

6. Please outline the site attributes of one or two major employment areas in the district. For each, please describe when and why they were allocated for employment use, the type of commercial development considered appropriate, the site attributes (proximity to main transport routes, town centres, executive housing). Are the sites close to other similar companies? Is there a university nearby?

7. Consider one unoccupied employment site in the district. Why, in your view, is this site unoccupied? Are their constraints to its development (poor transport links, expensive rentals) or is there no demand for the employment use of the site?

8. Are there any sites allocated for knowledge driven industries/high technology firms in your local plan?

9. What planning provisions (if any) are in place to foster SME/incubator development in the District?

10. Is there a development brief and/or promotional material in place for all would-be occupiers of allocated employment sites? What other marketing activity, if any, takes place?

11. Briefly describe how employment land is monitored for the local planning process. Will there be a shortage of employment land in the local plan period? To what extent are qualitative aspects of employment land (i.e. its proximity to transport routes, urban areas, shopping facilities, its availability for occupancy) incorporated into this monitoring process?

12. What policies are in place to foster clusters?

13. Is there the potential for future clusters? If so, can you describe any suitable location. If not, can you please summarise why there is not the potential for cluster development i.e. no suitable sites, no obvious growth sector?

14. How well does the promotion of economic clusters fit in with the thrust of government policy (e.g. urban renewal, mixed use developments, sustainability, protection of the countryside).

15. Do you welcome a new PPG document to explain the planning implications of economic clusters?

MK/6.9.99

Appendix 5.2: Survey Coding

Response no	Question 1a: Advantages of the district as a business location?																				
	High quality environment	Ports	Strategic motorway network	Heathrow (airports)	Proximity toLondon	Proximity to Europe	Good train services	Close to Southampton Airport	Executive housing	Highly skilled workforce	Good local roads	Attractive industrial stock	Similar industries	Close to Portsmouth	Leisure opportunities	Close to Farnborough	Proximity to Ashford	Relationship with Thames Valley	Cheapest SE Labour Costs	Cheaper property costs	Don't know	No response
1	1	1																			
2			1	1																	
3	1		1		1	1															
4	1		1				1														
5	1				1			1	1												
6				1					1	1	1										
7	1		1	1						1	1										
8			1																		
9			1		1			1			1	1	1								
10			1		1			1	1												
11	1	1	1												1						
12	1	1	1	1																	
13																					1
14	1	1																			
15					1		1	1													
16			1		1					1											
17			1																		
18																					1
19	1				1									1			1				
20			1		1		1											1			
21			1		1			1													
22			1	1				1													
23			1	1					1				1								
24			1	1	1			1				1									
25			1		1														1		
26	1																		1	1	
Total	10	4	17	7	11	1	3	7	4	3	3	2	2	1	1	0	1	1	2	1	0	2
% of total sample	38.46	15.38	65.38	26.92	42.31	3.85	11.54	26.92	15.38	11.54	11.54	7.69	7.69	3.85	3.85	0.00	3.85	3.85	7.69	3.85	0.00	7.69

Response no	Question 1a: Advantages of the district as a business location?																					
	High quality environment	Ports	Strategic motorway network	Heathrow (airports)	Proximity toLondon	Proximity to Europe	Good train services	Close to Southampton Airport	Executive housing	Highly skilled workforce	Good local roads	Attractive industrial stock	Similar industries	Close to Portsmouth	Leisure opportunities	Close to Farnborough	Proximity to Ashford	Relationship with Thames Valley	Cheaper SE Labour Costs	Cheaper property costs	Don't know	No response
1	1	1																				
2			1	1																		
3	1		1		1	1																
4	1		1				1															
5	1				1			1	1													
6				1					1	1	1											
7	1		1	1						1	1											
8			1																			
9			1		1			1			1	1	1									
10			1		1			1	1													
11	1	1	1												1							
12	1	1	1	1																		
13																						1
14	1	1																				
15					1		1	1														
16			1		1					1												
17			1																			
18																						1
19	1				1									1			1					
20			1		1		1											1				
21			1		1			1														
22			1	1				1														
23			1	1					1				1									
24			1	1	1			1				1										
25			1		1														1			
26	1																		1	1		
Total	10	4	17	7	11	1	3	7	4	3	3	2	2	1	1	0	1	1	2	1	0	2
% of total sample	38.46	15.38	65.38	26.92	42.31	3.85	11.54	26.92	15.38	11.54	11.54	7.69	7.69	3.85	3.85	0.00	3.85	3.85	7.69	3.85	0.00	7.69

8 Any sites allocated for high technology or knowledge based industries?					9. Planning provisions to foster SME development?			
yes	no	No,although there are business parks	No responses	Don't know	Yes	No	No response	Don't know
	1				1			
		1				1		
	1					1		
1					1			
	1				1			
		1				1		
	1				1			
	1				1			
	1				1			
	1				1			
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1					1			
	1						1	
	1				1			
	1				1			
	1					1		
	1				1			
				1		1		
	1					1		
4	19	2	0	1	15	10	1	0
15.38	73.08	7.69	0.00	3.85	57.69	38.46	3.85	0.00

10. Development brief/promotional material/other marketing?														
No marketing	Have development briefs	Have promotional material	Have "other" marketing	Have inward investment brochure	Promised development briefs not produced	Have promotional material for one/same sites	Low key telephone promotion	Use website	Work with agents	Direct queries to other similar companies	Use estates manager	Schedule of available development sites	Don't know	No response
	1		1											
				1										
				1	1									
			1			1								
1														
1						1								
							1							
1														
	1													
	1							1	1					
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											1			
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		1												
	1					1								
1														
1								1						
1														
1														
1									1					
1														
1														
			1											
1														
13	4	2	3	2	1	5	1	2	2	1	1	2	0	0
50.00	15.38	7.69	11.54	7.69	3.85	19.23	3.85	7.69	7.69	3.85	3.85	7.69	0.00	0.00

11. Monitoring of employment land. Qualitative measures used?				
No	**Yes**	**Likely in the future**	**Don't know**	**No response**
	1			
1				
				1
1				
1				
1				
	1			
1				
	1			
1				
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	1			
1				
1				
1				
1				
	1			
1				
1				
				1
	1			
1				
	1			
1				
1				
1				
17	7	3	0	2
65.38	26.92	11.54	0.00	7.69

12. Are there any planning policies in place to foster clusters?			
Yes	no	Don't know	no response
	1		
	1		
	1		
	1		
	1		
	1		
	1		
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		1	
	1		
	1		
	1		
	1		
	1		
	1		
	1		
	1		
	1		
.	1		
0	24	2	0
0.00	92.31	7.69	0.00