

# Assessing the role of UK Science Parks in foreign TMT firm site-selection exploratory firm-level evidence from the M4 Corridor, Oxfordshire and Cambridgeshire

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# Assessing the Role of UK Science Parks in Foreign TMT Firm Site-Selection

## Exploratory firm-level evidence from the M4 Corridor, Oxfordshire and Cambridgeshire

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## Abstract

Technology, Media and Telecommunications firms (TMTF) constantly search for sites in locations that provide best access to talent, customers, markets and suppliers. The UK is a 'most favoured destination for European FDI and the world', with a full complement of sites, including Science Parks (SPs), Business Parks and specialist properties. This research analyses site selection in foreign TMTF that 'landed' in the UK in 2011/2012, and settled in the M4 Corridor (M4C), Oxfordshire or Cambridgeshire, three of the UKs most technology-intensive sub-regions. With contrasting economic geographies and histories as poles of political, economic and institutional activity, and differing levels of SP penetration, the sub-regions present classic cases in how to attract technology. Oxfordshire and Cambridgeshire are well defined as discrete geographical areas, with world-renowned centres of basic and applied research excellence, successful innovations and a history of policy interventions, *inter alia*. The M4C is less well defined geographically, with less evidence of research and innovation but a more recent history of inward migration and growing reputation for mature Information and Communications Technologies (ICTs). This exploratory research examined site selection issues from a new perspective to engage with all key stakeholders to uncover the role played by science parks. The research makes several new contributions to science park research, including a conceptual framework that captures the nexus of issues around TMT site selection and UK science parks (including unfamiliarity with a key SP construct (development strategy); a clear typology of TMT firms based on *a priori* knowledge of SPs (suggesting a disconnect between SP additionality and claims, and TMTF initial siting preferences); the SP strategy most commonly deployed; the most popular reason(s) for siting in SPs and for not siting in SPs); and a differentiated and improved understanding and explanation of the settlement pattern of foreign TMTF in the target sub-regions.

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**Berkeley, N., Woodcock, A. & Seymour S. (2013)** Lessons from Coventry University Technology Park (CUTP) and its engagement with SMEs, 30th World Annual Conference on Science and Technology Parks, Recife, Brazil, Oct. 14th -18th.

**Topazly, Y. & Seymour S. (2015)** The Impact of UK Postgraduate Education on Entrepreneurial Aspirations of Russian & Kazakh Students, Institute of Small Business and Entrepreneurship, Jul/Nov. 2015

**Seymour S. (2016)** Conceptualising the Site Selection Strategies of Foreign TMT Firms in the UK, Journal of Organisational Studies & Innovation (forthcoming).

## Glossary of Key Terms

**Asset power**: additional resource requirements to enable more effective competition, operations, enforcement of contracts, marketing costs, achievement of economies of scale, etc.

**Barriers to entry:** "the existence of high start-up costs or other obstacles that prevent new competitors from easily entering an industry or area of business"[1].

**Business Park**: "an area where company offices and light industrial premises are built"[2].

**Convergence**: the "merging of hitherto separated markets, removing entry barriers across industry boundaries" (Lind, 2004).

**Creativity**: "the state or quality of being creative" or "the process by which one utilises creative ability".

**Cluster:** '...concentration(s) of firms in particular sectors and localities … fairly small geographical areas (often labour market areas) which are over-represented with jobs in relation to the national average within one or several adjacent ... sectors' (Isaksen, 1996, p.1).

**Distance (geographic)**: "the amount of space between two things, points, lines, etc" or "the state or fact of being apart in space, as of one thing from another".

**Distance (psychic)**: 'the degree to which a firm is uncertain of the characteristics of a foreign market' (Kogut & Singh 1998, p.3).

**Enterprise Zone**: areas set up by the Government to support the growth of businesses with '100% business rate discounts', 'simplified local authority planning', 'superfast broadband', '100% enhanced capital allowances (tax-free)' and "world class business facilities and transport links"[3].

**Entry mode**: "an institutional arrangement that makes possible the entry of a company's services, technology, human skills, management or other resources into a foreign country" (Chen 2005, p. iii).

**Foreign TMT firm**: a firm involved in one or more of the following sectors - Technology, Media and/or Telecommunications that is headquartered outside of the UK.

**Industrial district**: a "sizable and spatially delimited area of trade-oriented economic activity with a distinct specialization" (Markusen 1996).

**Industrial location**: "location of industry is concerned with the least cost location, so that again transport costs are a crucial element in the location decision; location decisions may also be based on economies in transport, wages and infrastructure" (http://www.csiss.org/classics/archive).

**Industrial settlement**: the choice of a sub-national region in which to operate a business.

**Industrial site selection**: the choice of premises from which to run the business on a day-to-day basis.

**Local Enterprise Partnerships**: "partnerships between local authorities and businesses, (which) decide what the priorities should be for investment in roads, buildings and facilities in the area"[4].

**Location Quotient**: "calculated as the quotient between the local share of employee jobs in a specific industry and the local share of national employee jobs" (ONS 2010).

**Parent firm: "**A company that controls other companies by owning an influential amount of voting stock or control. Parent companies will typically be larger firms that exhibit control over one or more small subsidiaries in either the same industry or other industries"[5].

**Plant**: "a place where an industrial or manufacturing process takes place" or "the equipment, including the fixtures, machinery, tools, etc., and often the buildings, necessary to carry on any industrial business: a manufacturing plant". http://dictionary.reference.com/browse/plant

**Regional Innovation System (RIS)**: a system 'in which firms and other organisations are systematically engaged in interactive learning through an institutional milieu characterised by embeddedness' (Cooke et al. 1998, p.2).

[1] http://www.investopedia.com/terms/b/barrierstoentry.asp#ixzz3l8DbaPYS Accessed 08.09.15
[2] http://www.oxforddictionaries.com/definition/english/business-park Accessed13.05.15
[3] http://enterprisezones.communities.gov.uk/about-enterprise-zones/ Accessed 18.04.15
[4] https://www.gov.uk/government/publications/local-enterprise-partnerships-map Accessed 08.09.15
[5] http://www.investopedia.com/terms/p/parentcompany.asp#ixzz3l9a4KGJj Accessed 08.09.15

**Science Park**: "a business support and technology transfer initiative that encourages and supports the start-up and incubation of innovation-led, high-growth, knowledge businesses; provides an environment where larger and international businesses can develop specific and close interactions with a particular centre of knowledge creation for their mutual benefit" (UKSPA 2014).
**Sub-region**: "a division of a region"[6].
**Subsidiary firm**: "a company whose voting stock is more than 50% controlled by another company, usually referred to as the parent company or holding company"[7].
**TMT**: Technology, Media and Telecommunications.
**TMT firm**: a firm involved in one or more of the following sectors - Technology, Media and/or Telecommunications.
**Wholly-owned Subsidiary firm**: "a company whose common stock is 100% owned by another company, called the parent company. A company can become a wholly owned subsidiary through acquisition by the parent company or spin off from the parent company. In contrast, a regular subsidiary is 51 to 99% owned by the parent company"[8].

[6] http://www.oxforddictionaries.com/us/definition/american_english/subregion Accessed 08.09.15
[7] http://www.investopedia.com/terms/s/subsidiary.asp#ixzz3l9anGJgT Accessed 08.09.15
[8] http://www.investopedia.com/terms/w/whollyownedsubsidiary.asp#ixzz3l9dsMTlb Accessed 08.09.15

## Glossary of Acronyms

**BBSP** Bristol & Bath Science Park
**BSP** Begbroke Science Park
**BUSP** Brunel University Science Park
**CAQDAS** Computer Assisted Qualitative Data Analysis Software
**Cambs** Cambridgeshire
**CEO** Chief Executive Officer
**CFO** Chief Finance Officer
**CSO** Chief Strategy Officer
**CR** Critical Realism
**CRE** Corporate Real Estate
**DIY** Do it yourself
**EEDA** East of England Development Agency
**ECE** Electric Cloud Europe
**EMEA** Europe, Middle East, Africa
**EMDA** East Midlands Development Agency
**EU** European Union
**FEPRO** Funding for European Projects
**FDI** Foreign Direct Investment
**FS** Forward Swindon
**FT** Financial Times
**GDP** Gross Domestic Product
**GCGPLEP** Greater Cambridge & Greater Peterborough Local Economic Partnership
**GP** Granta Park
**GVA** Gross Value Added
**HEI** Higher Education Institution
**ICT** Information & Communication Technologies
**IBB** Invest in Bristol & Bath
**IBM** International Business Machines Inc
**IASP** International Association of Science Parks
**IPR** Intellectual Property Rights
**ILT** Industrial Location Theory
**JLL** Jones Lang Lasalle
**LEP** Local Enterprise Partnership
**LQ** Location Quotient
**MD** Managing Director
**M4C** M4 Corridor
**OECD** Organisation for Economic Co-operation and Development
**Oxon** Oxfordshire
**O2C** Oxford to Cambridge Arc
**OLEP** Oxford Local Economic Partnership
**OSP** Oxford Science Park
**Oxon** Oxfordshire
**PLI** Plant Location International
**QCA** Qualitative Content Analysis
**RDA** Regional Development Agency
**RSIP** Reading Science & Innovation Park
**SEEDA** South East England Development Association
**SSC** The Self Service Company
**SSM** Site Selection Magazine
**SJIC** St. John's Innovation Centre
**SP** Science Park
**SV** Silicon Valley
**TMT** Technology, Media and Telecommunications
**TMTF** TMT Firm(s)
**TRL** Technology Readiness Level
**TVBLEP** Thames Valley Berkshire Local Economic Partnership
**TVEP** Thames Valley Economic Partnership
**TTWA** Travel to Work Area
**UNCTAD** UN Conference on Trade & Development
**UKSPA** UK Science Park Association
**UK** United Kingdom
**UKTI** UK Trade & Invest
**USA** United States of America
**USP** Unique Selling Proposition
**WoS** Wholly-owned Subdiary
**WTO** World Trade Organisation

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## 1.1 Setting the Research Scene

This thesis explores the role of UK Science Parks in the site selection decisions and process of internationalising foreign Technology, Media and Telecommunications (TMT) firms from the perspective of the firm and by reference to the UK's main technology-intensive regions, Oxfordshire, Cambridgeshire and the M4 Corridor (M4C). The UK is an advanced economy with a high penetration of science parks and an attractive destination for TMT companies, particularly in the aforementioned sub-regions. This research analyses site selection in foreign TMT firms that 'landed' in the UK in 2011, and settled in one of the technology-intensive sub-regions. This chapter introduces the thesis, its structure and issues that underpin this exploratory study, and provides a concise context and rationale for the research in four sections that outline the arguments which are elaborated throughout. Section 1.2 explains the research context and rationale by reference to Science Parks (SPs). Section 1.3 explains research problematisation and section 1.4 justifies the research, first by explaining and then discussing the impact of Critical Realism, underpinned by the research agenda. Section 1.5 introduces and situates the TMT sector within the wider contexts of internationalisation, location, settlement and site selection in the UK. Finally, section 1.6 closes the chapter with a thesis chapter outline and summary explanations of the purpose and content of each chapter.

## 1.2 The Context and Rationale for UK Science Parks

Heriot-Watt and Cambridge Universities both claim to have built the UK's first Science Parks in the early 1980s, which this research defines, using the comprehensive UK Science Park Association's (UKSPA) definition (s.3.6.2):

> "a business support and technology transfer initiative that encourages and supports the start-up and incubation of innovation-led, high-growth, knowledge businesses; provides an environment where larger and international businesses can develop specific and close interactions with a particular centre of knowledge creation for their mutual benefit; and has formal and operational links with centres of knowledge creation such as universities, HEIs and research organisations".

In this research, 'science parks' include technology parks, research parks and innovation centres but not 'business parks', which are taken to mean "area(s) where company offices and

light industrial premises are built"[9]. From the 1980's, UK science parks have evolved through three generations, in which the first phase "encompasses the initial planning and agreement, the acquisition of funds to commence operations"; the second phase focused on "steady growth, involving the acquisition of further premises for multi-occupancy"; and the third 'more mature' phase "when stakeholders recognise that the science park is capable of playing some wider, desirable and differentiating role in the economies as technological development" instruments (Allen 2006). UKSPA was founded in ~1982 and has 'presided' over this evolution, as its membership has grown steadily to ninety one science parks[10], distributed across the country (Figure 1.1), hosting more than 4,100 tenant firms with more than 60,000 employees (Monck 2014; UKSPA Annual Report 2014-2015).

| Period | Number of Science Parks per period |
|---|---|
| <1980 | **2** |
| 1980 - 1989 | **14** |
| 1990 - 1999 | **13** |
| 2000 - 2009 | **15** |
| 2010 - 2015 | **7** (projected: 14) |

**Table 1.1: Trend of Science Park construction in the UK** (Monck 2014)

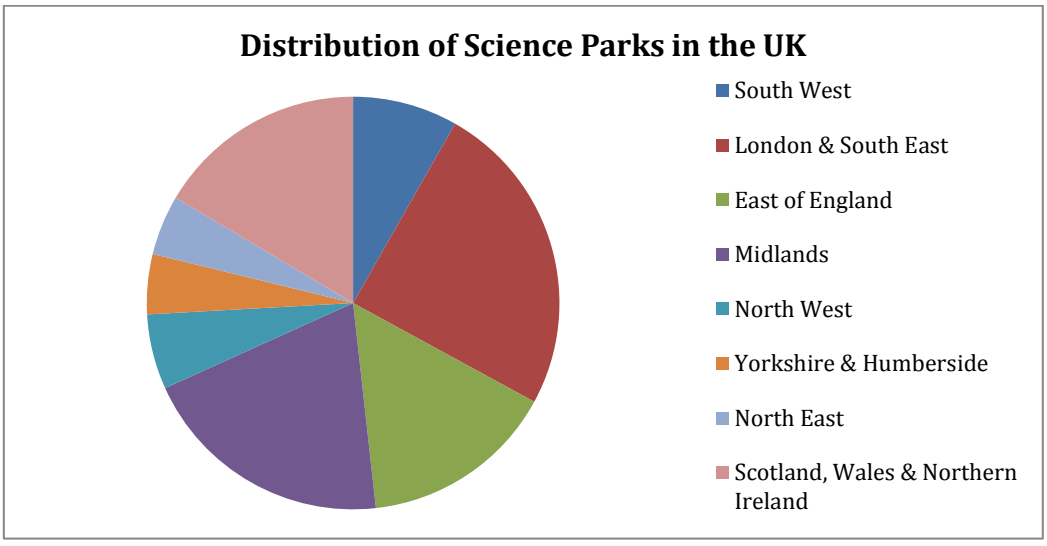



**Figure 1.1: UK Science Parks by Region[11]**

The evolution of science parks has left a variety of claims in its wake (ss.3.6.4 and 3.6.5), for example, as conduits for research links with HEIs, greater R&D efficiency and higher growth rates for tenant firms and 'hotbeds' for technology innovation including the development of

[9] http://www.oxforddictionaries.com/definition/english/business-park Accessed13.05.15
[10] The total number also includes 28 Innovation Centres and 12 Bio-incubators.
[11] Adapted from: http://www.ukspa.org.uk/members/our-members Accessed 03.03.15

technology based firms, specifically. This final claim is a key claim given that it positions science parks as an 'ideal type' host and environment for technology firms. At this point, it is important to note that 'science park' (SP) is being used in a generic way to include technology and research parks and innovation centres.

Therefore, this study is designed as a multi-level, exploratory qualitative research to assess this overarching claim from the perspective of prospective tenant firms; specifically, it examines the nexus of issues around inward-bound foreign TMT firms and how such firms select sites for operations upon landing in the UK. The study is conducted from the level of the firm by reference to three sub-regions, and analyses the perceptions and views of key stakeholders in the process, including foreign TMT firm executives, UK science park Managers, public and private influencers (plant location, site selection) and science park experts. To examine the role of UK science parks, the research builds on plant location literature by making a distinction between industrial location, settlement and site selection, thereby arguing that firms go through three phases in the 'landing stage' of the internationalisation process and make three linked strategic choices:

1. Locational choice of a country from which to operate;
2. Settlement choice of a sub-national region in which to operate a business; and
3. Site selection choice of premises from which to run the business on a day-to-day basis.

This study is contextually about the first choice (UK as country) but empirically about the second (the UKs three most technology-intensive sub-regions) and third choices (SP or not), which represent the 'end game' of location. It zeroes in on the last choice (whether onsite or offsite in a science park in one of the sub-regions) and specifically on the role science parks play in the process for foreign TMTFs. The research, thus, progresses from international business to strategic management, particularly UK science park management, and specifically how parks effect 'development', whether consciously and proactively or subconsciously and passively. By focusing on science park development strategy, the research places a lens on science park management to examine one of its main claims in a previously unexamined way, from a new perspective and using a new set of stakeholders. Specific research aims, objectives and questions are outlined in section 1.5.

## 1.3 Why the TMT Sector?

Three main sectors comprise TMT, Technology (meaning Information and Communications Technologies, ICT), Media and Telecommunications. These sectors are characterised by 'the variety of new technological products and services being launched', the 'ever-increasing pace' at which the products are launched and 'the surging complexity of markets and how companies win' (Hacklin et al. 2013, p.1). This 'booming' sector sometimes includes 'Entertainment' (c.f. electronics), which represents "perhaps the most dramatic example of convergence (s.2.2.1), and is sometimes referred to as the "TIME" industries" (Ibid, p.1).

Whilst it is relatively straightforward to portray convergence of the TMT sectors 'on paper', it is much more difficult in practice, where firms often add services without much fanfare and operate 'below the radar', particularly in cases where companies known for one sector (for example, Telecoms) become involved in another (for example, the sale of media or IT services). Section 2.2.1 contains examples of the types of activities these firms undertake, for example, the integration of different technologies, in a single device or system that leads to new media or telecommunications services.

This steady stream of innovation has resulted in product/services bundles which are marketable across international boundaries with relatively less customisation, thus presenting huge opportunities for growth, which TMT firms have pursued through internationalisation. Section 2.2.2 discusses TMT Firm internationalisation, in particular, the propensity of this sector to grow at a faster rate than traditional sectors and to pursue market share quite proactively, if not aggressively, which often takes them overseas. Sections 4.4.3 and 4.4.4 introduce the TMT data source and the instruments used to elicit and analyse data (Appendix 4.3 contains statistics on the international movement of TMT firms in 2011-2012). Section 5.2.2 discusses why the UK is an attractive destination for these types of firms. The first stage of empirical research focuses exclusively on TMT, particularly, the parent firm, subsidiary firm and choices regarding UK entry and subsequent settling and site selection.

## 1.4 Research Problematisation

For Emirbayer & Mische (1998, p.998), problematisation 'consists in the recognition that the concrete particular situation at hand is somehow ambiguous, unsettled, or unresolved', resulting in research areas that are 'unterminated, unfinished, or not wholly given' (1998

citing Dewey 1985, p.15). Whether approached definitionally or descriptively, science park remains a problematic concept that traditionally has been promoted as an ideal environment for an 'ideal-type' tenant firm, usually meaning technology-based or enabled firms, which are believed to be an ideal fit for the science park environment for three reasons:

1. Technology-based firms are knowledge-based, and naturally require less personnel and space (SPs have a limited space in a finite area);
2. Technology-based firms are highly mobile with no heavy industrial plant and machinery to install or move (SP infrastructure is not designed for industry);
3. Growth-oriented technology firms tend to grow steadily and/or rapidly, so require flexibility in leases and grow-on space (a common attribute of SPs).

This exploratory research 'tests' this proposition in a differentiated and unique way by examining the relationship between science parks and technology-based firms from the perspective of foreign TMT firms that have landed in the UK. It is differentiated because most science park studies have been conducted from the perspective of 'captive tenant firms' or firms in the vicinity of the park and are usually limited to a comparison of two or three science parks (s.2.7 and Appendix 1.1). The study is 'extreme' in its approach because the nominal recruitment distance (NRD) for science park tenants increases the farther one travels from a science park to the headquarters of the prospective tenant firm. So whereas recruiting start-ups to incubate involves no 'distance' at all, recruitment of regional, national or international firms involves recruitment from an increasing distance. This research has selected the maximum possible nominal recruitment distance to initiate this study by focusing specifically on foreign TMT firms that have expanded to the UK, a key differentiator underpinning the study. In the areas of technology clusters, generally, and science parks, specifically, two subjects that have co-evolved for more than sixty years, this issue may seem to have been resolved, given the number of studies on technology clusters and science parks. However, despite the well-trodden area of research, particularly the latter, there are at least five specific areas that remain 'unterminated, unfinished, or not wholly given' (Ibid 1985), including the first outlined above.

Second, given that a variety of intermediaries, public and private, exists between a firm's decision to locate its operations and its eventual site selection, there is no consistent inclusion in the literature of expert-practitioner views and expertise when it comes to how sites like science parks are chosen. Chapter 3 addresses *inter alia* this lack of methodological imagination, which is a concern for researchers, policymakers and practitioners.

Third, development strategy is a key construct involving science park management which remains undeveloped. Whilst there have been attempts to assess linkages between properties and how they plan *a priori* to accommodate tenant firms (Ylinenpää, 2001; Cooke, 2004), these initial efforts have not been followed up. By not contemplating the implications of various strategic routes as set out by Ylinenpää, science parks can only achieve optimal success as timescales for achieving objectives are 'hit and miss'. This undeveloped issue is a concern first for practitioners and second for policymakers who are charged with managing and planning science park operations.

Fourth, in many cases, science parks create propulsive effects that help to rejuvenate regions and in other cases, science parks may or may not be the 'hotbeds of organic development' they are imagined to be even if they set out with this exact goal in mind. Whilst incubation of new firms may have been an original raison d'être, more recently, science parks have set out expressly to attract established firms, in preference to or to supplement new firms.

Finally, although there is a plethora of publications on various aspects of science parks, publications tend to lack methodological imagination and be dated (s.3.7.3). For example, studies have focused on technology innovation and entrepreneurship (Filatotchev et al 2011; Yang et al 2009; and Fukugawa 2006); the growth of employment (Chen et al 2006; Dettwiler et al 2006; Link & Scott 2006; Lofsten & Lindelöf 2005; 2004; 2003); and HEI/R&D linkages (Ratinho and Henriques 2010; Link & Scott 2003), but routinely have focused on the science park or the onsite tenant firm as the unit of analysis, usually in comparison with offsite firms. Of forty six studies analysed since the 1980's, thirty four post-2000 and thirteen pre-2000 studies, ~32% focused on the science park as the unit of analysis (Chen 2005; Link & Scott 2003; Monck et al 1988) and ~65% focused on direct comparisons of onsite/offsite firms (Appendix 1.1). In particular, how properties are managed and seek to engage with prospective tenants has been ignored largely. It could be argued, therefore, that the area is ripe for fresh thinking at a time when national appetites for science parks are undiminished in the EU, UK, China and developing world. Starting with a problem is consistent with critical social science (see Chapter 3) which "is often identified as having four stages:

(i) identifying problems - unmet needs, suffering, false beliefs
(ii) identifying the source or cause of those unmet needs, false beliefs, etc
(iii) passing to a negative judgement of those sources of illusion and judgement; and
(iv) favouring (ceteris parabus) actions which remove those sources" (Sayer 1997, p.474)

In summary, these 'unterminated' issues, the need for primary research and new conceptual thinking in the area enhance the current importance and timing of this study. Whilst the large volume of published material on science parks has left few areas unexplored on the one hand, simultaneously, it has left key questions and issues unresolved, for this proven effective economic development policy instrument.

### 1.4.1 The Rationale and Impact of Critical Realism

In addition to the above 'unterminated' issues, science park research has taken a particular methodological path, which is understandable when studies contrast large numbers of offsite firms with onsite firms (Appendix 1.1). However, this mainly positivist research has 'locate(d) causal relationships at the level of events' (s.4.2.1), thereby missing or ignoring the reasons why certain decisions have been taken, for example, to site off or on science parks. In contrast, Critical Realism locates causation at the level of the 'generative mechanism', which makes it ideal for underpinning the conceptualisation of this research.

Specifically, Critical Realism offers a methodological framework that is genuinely sensitive to 'spatial and temporal context', and a 'major reason' for its popularity amongst human geographers (Jarvis & Dunham 2003, p.250). This research emphasises analysis of subjective accounts of TMT firm principals, expert-practitioners in related fields and UK science parks by 'getting inside' situations, and producing "detailed analysis of the insights generated by such encounters and the insights revealed in impressionistic accounts" (Ibid, p.6). Second, Critical Realism generally lends itself to qualitative methods, driven by induction, which advocates an objective reality formed by events and their underlying causes, about which definitive knowledge can never be acquired.

This exploratory research will examine the behaviours and actions of foreign TMT firms in a way that could not be done by 'looking at the numbers' but instead by examining three 'structural' and four 'contingent' relations that impact location, settlement, siting decisions and actions (s.4.2.2):

| Structural Relations | Contingent Influences |
|---|---|
| **Parent firm internationalisation strategy** | **Science Parks** (and other specialist commercial properties) |
| **Subsidiary firm settlement strategy** | **National, regional and local agencies** (UKTI, LEPs) |
| **Subsidiary firm site selection strategy I** (based on function/purpose of site, product portfolio and/or stage of life cycle of firm) | **Professional services providers** |
| | **Labour Market, Customer Markets and Suppliers** |

**Table 1.2: Summary of TMT Firm Structural & Contingent Relations**

Finally, CR is particularly well suited to case research (s.4.5), including the issue of particularity, which is important for this research and its main outputs, two detailed case reports, which "must be able to stand on (their) own (and) offer the key opportunity to understand a phenomenon in depth and comprehensively" (Easton 2010, p.119). The need for new conceptual thinking in the field enhances the current importance and timing of this study.

## 1.5 Research Agenda (Aims, Objectives and Questions)

The purpose of this qualitative study is to explore the role played by UK science parks in the site selection decisions of 'landed' foreign TMT firms, *i.e.* internationalising firms that have chosen the UK as an overseas location and which, in selecting a sub-region for its initial presence, have multiple options for siting operations, including science parks. At this stage in the research, the role played by science parks is generally defined as 'science park intervention' (Adapted from Creswell 2009, p.114). The overriding aim is to explore whether UK science parks play a positive and proactive role in the site selection process and if so, the extent of that role in firms' site selection. This broad aim is underpin by four research objectives to explore these issues in more detail:

1. To identify the key issues in settlement and site selection of foreign TMT firms in the UK;
2. To examine the extent to which UK science parks influence the site selection decisions of foreign TMT firms by reference to science park strategic alignment, in particular, stated and actual development strategies;
3. To develop a comprehensive typology of foreign TMT firms in the UK; and
4. To develop a conceptual framework to capture the nexus of issues relating to foreign TMT firms and UK science parks.

Objectives one and three examine and classify the dataset of TMT firms that landed in the UK[12], from the unique perspective of site selection. Objective two addresses unresolved issues of definition, meaning and analysis of the concept of development strategy and the issue of strategic alignment in properties. Objective four sets out to capture the issues that result from the combination of the two units of analysis, foreign TMT firms and UK science parks. These research objectives, in turn, are driven by one major and three subsidiary research questions:

***What is the role played by UK science parks in the site selection of foreign TMT firms?***

1. What are the key criteria and process in site selection of foreign TMT firms in the UK?
2. What is the current understanding of development strategy as it relates to UK science parks?
3. How can foreign TMT firms be classified from the perspective of site selection as far as UK science parks are concerned?
4. How can the nexus of issues between foreign TMT firms and UK science parks be effectively captured?

Current research has either focused exclusively from the limited perspective of one or perhaps two science parks and has analysed science parks from a narrow methodological view, excluding key stakeholders and resulting in conceptually weak and confusing outcomes, insufficiently engaged in problematising the concept(s) comprehensively. The above research agenda and units of analysis (landed foreign TMT firm and the UK science park) differentiate the study by focusing on science parks from the perspective of 'landed' foreign firms, key stakeholders and on the crucial issue of development strategy alignment, which has been ignored in the literature over the past fourteen years.

## 1.6 Chapter Summary

In closing, this research is important and of interest to science park management, property planners/developers, investors and policymakers because it focuses on a set of issues and questions that go to the heart of the development curve of technology properties. The perspective of UK-bound TMT firms enables analysis of the actions and aspirations of science parks and findings will benefit policymakers, researchers, public stakeholders (particularly,

[12] For this research, the Deloitte Fast 500 series of databases are used for the year 2010-2011.

at the local and regional levels) and private developers and investors. Can the well-trodden research area of science parks still yield new knowledge? Do technology properties have strategies for development that can be articulated and shown to align with tenant mixes? Can technology properties do more to attract foreign TMT firms specifically, or are they merely reacting to the movements of these firms? These and other issues will be explored in this thesis which is outlined next.

### 1.6.1 Thesis Chapter Outline

The thesis comprises of eight chapters, which introduce the thesis; critically analyse the relevant literature in two stages; explain and justify the methodological basis for the study; contextualise and present the research findings; and summarise the thesis with a parsimonious set of theoretical propositions. The rest of the thesis is structured as follows.

**Chapter 2** is a 'contextual' literature review that outlines the review process and describes sub-topics that contextualise the research, by addressing macro issues around the first unit of analysis, foreign TMT firms, including but not limited to: the TMT sector; Industrial Location Theory; Internationalisation; Plant Location and doing business in Europe and the UK. The overall purpose of the chapter is to provide spatial and temporal context to the study in accordance with Critical Realism by addressing components of the structural environment of 'causal powers and liabilities' that create the necessary relations for TMT site selection (s.4.2.3.1). Where appropriate to draw links with the empirical study, critical analyses are conducted and summarised.

**Chapter 3** then critically analyses the sub-topics that address the target sub-regions and the second unit of analysis, UK science parks, including but not limited to: Industrial Districts and Technology-intensive Regions; UK Corporate Real Estate and Site Selection; Science Parks and doing business in the UKs most technology-intensive regions. The purpose of this chapter is to examine the particular combination of contingent circumstances, meaning science parks and all the related influences that represent the joint 'cause' of an actual event or outcome, in this case, a site selection decision (s.4.2.3.2).

**Chapter 4** explains the methodological basis for the study, justifies the philosophy of science choice, Critical Realism (CR), and explains the methods used to 'operationalise' the critical

realist conceptual framework. This includes discussions of the demands imposed by CR, choices of research methodology (ideographic), strategy (inductive) and method (qualitative), research process, methods and case study research design.

**Chapter 5** is the first of three research findings chapters, which presents secondary findings, sets the scene for Chapters 6 and 7 and contextualises findings using two sources of data that address overarching issues common to the target sub-regions: preliminary qualitative content analysis of secondary data, including strategic Government and practitioner reports and qualitative analysis of detailed qualitative interviews of expert-practitioners in plant location, corporate real estate, site selection and crucially, UK inward investment.

**Chapter 6** is the second research findings chapter, which presents the first detailed qualitative firm-level findings from the M4 Corridor. Analysis is presented from four sources of primary and secondary data: (i) qualitative analysis of responses from questionnaires to ten foreign TMT firms that settled in the M4C; (ii) qualitative analysis of responses from telephone interviews with expert-practitioners in the fields of TMT, inward investment, plant location, site selection, corporate real estate, science parks and LEPs; (iii) qualitative analysis of responses from questionnaires to the three respondent M4C science parks; and (iv) qualitative content analysis of relevant Government and local strategy and policy documents.

**Chapter 7** is the third research findings chapter, which presents the second detailed qualitative firm-level findings from Oxfordshire and Cambridgeshire. Analysis is presented from four sources of primary and secondary data: (i) qualitative analysis of responses from questionnaires to two foreign TMT firms that settled in Oxfordshire and Cambridgeshire; (ii) qualitative analysis of responses from telephone interviews with expert-practitioners in the fields of TMT, inward investment, plant location, site selection, corporate real estate, science parks and LEPs; (iii) qualitative analysis of responses from questionnaires to the five respondent science parks; and (iv) qualitative content analysis of relevant Government and local strategy and policy documents.

Finally**, Chapter 8** closes the thesis by reflecting on the research process and agenda, discussing key findings, contributions and limitations of the study, and suggesting directions for further research, including theoretical propositions for science park development.

**End of Chapter One**

# Chapter Two

## Literature Review I

### TMT Sector, Internationalisation, Location and Doing Business in Europe/UK

## 2.1 The Structural Environment of TMT Firm Site Selection

This chapter reviews and describes the contextual considerations for the first unit of analysis, foreign TMT firms, by focusing on literature that examines the target sector (TMT), industrial location, classification of economies (to situate the UK economy) and the attractiveness of doing business in Europe and UK (to reinforce the case for internationalisation to the UK). As implied in section 4.2.3.2, what causes TMT firm site selection cannot be explained solely without also considering the precise context of contingent circumstances that mediates their effects, and, therefore, represents the 'joint cause' of actual events or outcomes". Most of the issues are outside the empirical scope of this study but descriptions are necessary in order to complete the contextual environment[13].

This chapter explains what constitutes relevant literature, and then outlines the review process and how the chapter is structured. Hart (1998, p.13) defines a literature review as 'the effective evaluation ... of available documents in relation to the research being proposed' and argues that its aims are to 'demonstrate skills in library searching, to show command of the subject area and understanding of the problem and to justify the research topic, design and methodology'. Creswell (2009, p.25) states its main purpose more simply: "to share with the reader the results of other studies that are closely related to the one being undertaken". A key challenge is to identify the relevant literature to establish the importance of the study which Blaikie (2001, p.71) suggests can proceed in one of two ways: via an 'open-ended' reading exercise to decide what is relevant or by 'put(ting) a boundary around a body of literature, be it theory, published research or reports'. This research adopts a variation of the latter approach.

The literature is 'ring-fenced' by linking the review to research question(s), thus necessitating research questions *a priori* and making for a more efficient process. This research identifies broad themes which are grouped according to subject and explored from the general to specific, first in relation to foreign TMT firms; internationalisation; location, regional and siting choices; and then in relation to UK science parks. The relevant literature includes information on TMT and convergence, international business (location theories, location decisions), regional development (including a review of the three UK regions, Oxon, Cambs and the M4 Corridor), followed by site selection and science park themes. This broad

[13] Where there is scope for critique, issues will be critically analysed, however, for most of this chapter, descriptions of facts are presented to contextualise the research.

literature is necessary in order to cover the many 'outlets' for publications on the nexus of issues between foreign TMT firms and site selection choices in the UK, which include the contextual and 'internal' issues of science parks, regional and location-specific issues of international business. There are challenges in combining these topics, however, including six decades of literature on science parks but a relatively small amount of literature on site selection, which the distribution of material reflects. The literature review closes with summaries of the current state of knowledge, a discussion of areas for further research and a statement of the research agenda.

### 2.1.1 Segmentation of the Literature Review Themes

This 'contextual' literature review covers themes which are grouped into six main sections, three that address the first unit of analysis, foreign TMT firms (TMT sector; Industrial Location Theory; and Global Economies, Internationalisation and Locational Choices), and three that address the context and phenomenon of UK Science Parks (Regions, Industrial Districts and Technology-intensive Regions; UK Corporate Real Estate and Site Selection and Science Parks). The rest of the chapter describes the context and critiques the issues relating to the phenomenon and closes with a summary of the current state of knowledge on TMT, industrial location theory, location strategy, internationalisation and attractiveness for doing business in Europe and the UK.

## 2.2 Technology, Media and Telecommunications Firms

As noted in section 1.5, this research focuses on the TMT sector so it is important to understand the origins of the sector and how the sector has leveraged outcomes to be a global industrial power. TMT was born of convergence, so implications for this research are discussed, including what qualifies a firm as TMT; the propensity of TMTs to internationalise and the current trends in global location of TMT, as 'mapped' below in Figure 2.1.

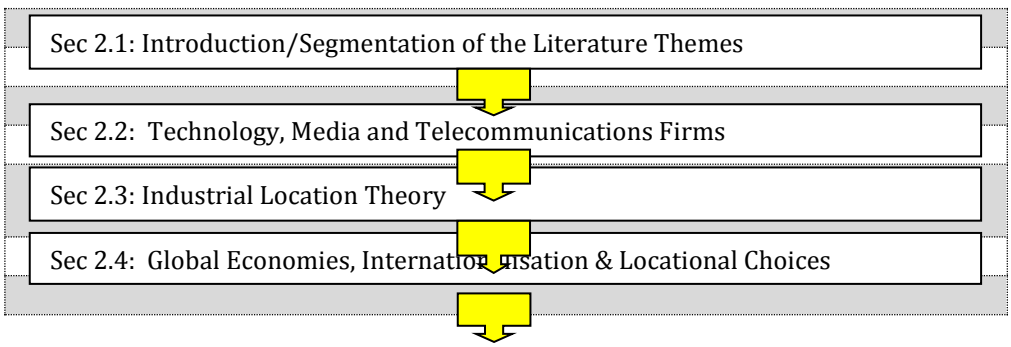



**Figure 2.1: Overview of Literature Review**

### 2.2.1 The Drivers of TMT Convergence

Convergence first appeared in the business literature in the mid-1980s (Porter & Millar 1985) with a steady stream of articles through 2000 when "peer-reviewed articles from the mid-1990s onwards (for example, Harianto & Pennings 1995, Katz 1996, Greenstein & Khanna 1997, Gambardella & Torrisi 1998, Mueller 1999, Bohlin *et al*. 2000, Wirtz 2001, Stieglitz, 2003); as cited in Lind (2004, p.2) noted that with few exceptions, "these articles only use the term without a systematic reflection about its definition" (see definition, s.2.2). Lind (2004, p.2) defined convergence as the "merging of hitherto separated markets, removing entry barriers across industry boundaries" and offered "the popular illustration of convergence (as) four circles representing the IT, telecom, media and consumer electronics industries moving into each other, creating one big "converging industry" (citing Brand 1987 and Wirtz 2001 citing Negroponte).

Several writers (for example, Hacklin 2013 and Stobbe & Just 2006) agree with Lind that convergence may be defined generally as the coming together of two different entities to perform complementary functions or the same function, and specifically, in the contexts of TMT, 'the integration of two or more different technologies, (media or telecommunications) in a single device or system'. It is this latter characterisation with which end-users are most familiar because increasingly, convergence is manifested as the ability to perform multiple tasks concurrently on a single device, which effectively conserves space, power and time.

The impact on this sector makes it relevant for this research, where convergence is taken as the process by which the technology (mainly ICT), telecommunications and media have merged over the past two decades and become a route to growth. Convergence is occurring more discriminately at different levels, for example, at the infrastructure, product and services levels. Stobbe & Just (2006) argue that "innovations drive convergence" but drivers of convergence in TMT also emanate from additional sources, including general technological advancements (for example in storage or transmission capabilities); product convergence (change in product features resulting from new technologies); open architectures and standards (which allow many different contributors to affect an outcome); policy and

regulatory reforms (such as in licensing to sell 3G and 4G telecommunications services); and socio-cultural changes (for example, in end user demands). Stobbe & Just (2006, p.4) identified three additional drivers, the first of which it claims is a

> "prerequisite for convergence; the full digitisation of contents and networks; the increasing penetration of broadband internet access; and the short life cycle of mobile devices, particularly mobile phones which encourages convergence".

Through farther development or integration of existing technologies, new functionality can be acquired, whether in improved infrastructures, more versatile end-user devices or spin-off services from each. The resulting savings of space, reduced size of devices and lower costs come at an initial trade-off in quality; however, reduces this over time. This led Hacklin et al. (2013) to define convergence as "a process of qualitative change that connects two or more existing, previously distinct markets". In summary, convergence has evolved from a coming together of related industry sectors to the increased interoperability of technologies to the most recent form as a 'qualitative change in markets'. This has brought several sub-sectors together under one umbrella, which has resulted in a plethora of new services and service bundles for the consumer. Figure 2.2 represents convergence in its most contemporary form as an outcome of customer needs driven by technological facilitation.

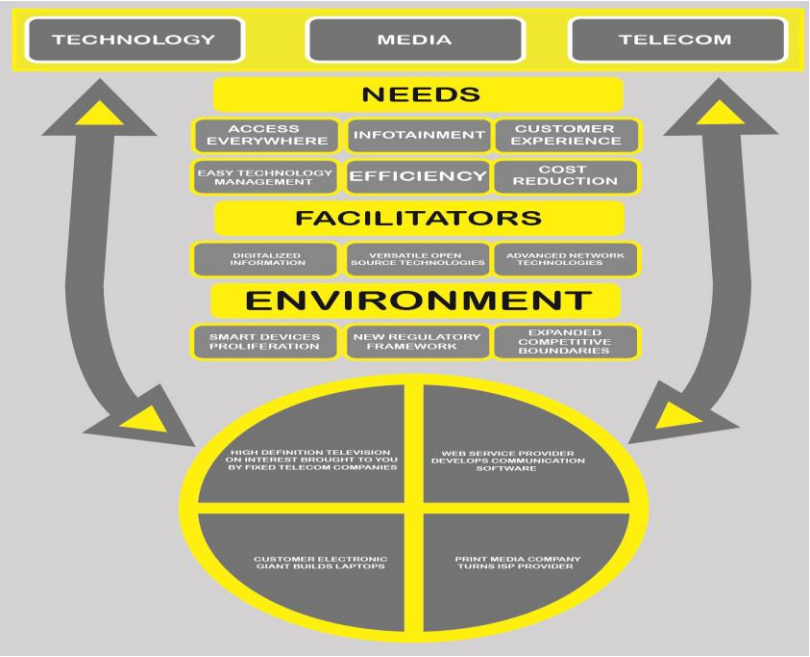



**Figure 2.2: TMT Convergence**[14]

[14] Adapted from: http://www.mu-sigma.com/analytics/solutions/verticals-technology.html 27.04.14

### 2.2.2 UK Firm Classification, TMT Internationalisation & Global Location Trends

How the UK classifies firms, how TMT firms internationalise and how the TMT sectors move around the world are addressed in this section because firm size is often an important consideration for science parks. Evidence of classification is done from UK and European levels and trends in TMT firm internationalisation are presented from global location studies. In most developed economies, there is an agreed way of classifying firm size using two or more criteria from those listed below. The UK uses turnover, balance sheet total and number of employees (Companies Act 2006, Sec. 382, p.175)[15], whereas the EU classifies firm according to turnover, number of employees and capital employed. The UK can use at least five other criteria as well in cases where it may be difficult to classify a particular firm using basic criteria:

- Annual sales turnover;
- Average number of employees employed by the company in a year;
- Amount of capital employed (the amount of money invested in a business);
- Balance sheet total; and/or
- Market share[16].

TMT Firms, in particular, tend to grow at a faster rate than traditional sectors and tend to be quite proactive, if not aggressive in pursuit of market share, which often takes them to overseas markets (BNPRE 2012; Woodford & Kuljanin 2013). Evidence of the level of internationalisation activity is the establishment and growth of practitioner-based studies and programmes to track such activity from large multinational Professional Services firms and Legal Services Providers, such as Herbert Smith, Linklaters, Ernst & Young, McKinsey, KPMG, IBM and Deloitte.

The most comprehensive of these is a global database (Technology Fast 500) published by Deloitte Services LP, a division of Deloitte Tohmatsu Touche, which, for twenty years, has published the fastest growing TMT firms from three global regions. The Deloitte Technology, Media & Telecommunications (TMT) practice publishes its proprietary data, starting with North America (U.S., Canada) in 1995 and now practised on a global scale, with two additional regional areas of focus: 'Asia-Pacific' and 'Europe, Middle East and Africa' (EMEA).

[15] For a breakdown of firm size for the EU and UK, see Chapter 4.
[16] Employees and Balance Sheet adapted from Companies Act (2006, p.175).

The programme selects 500 of the fastest growing TMT firms in each region from a variety of TMT sectors, including hardware, software, semiconductors, media, telecommunications, life sciences and emerging areas, such as clean/green technology[17].

The propensity of some firms to internationalise is a natural contributor to Globalisation and "is believed to be particularly pertinent to high technology industries" (Bürgel *et al.* Undated, p.3; Edgerton 2007) for whom strategies for internationalisation could include a means to achieve economies of scale, stay abreast of the competition or launch products simultaneously in several markets "in order to maximise international returns in dynamic markets subject to fierce and immediate competitor responses".

Over the past two decades, researchers have found that many 'high-tech start-ups are 'born global', meaning they internationalise from the outset (Keupp & Gassmann 2009; Jones, Coviello, & Tang 2011; Kiss, Danis & Cavusgil 2012 as cited in Cannone & Ughetto (2014). Cannone & Ughetto (2014) concluded that the presence of a small and competitive domestic market and the scalability of the product have a positive effect on the probability of a start-up to internationalise from its inception. They also observed

> "The niche strategy and the network relationships built up by the entrepreneur are key drivers for an early internationalization and the scope of international expansion", as well as "the experiential knowledge and international commitment of an entrepreneur" and "the diversity of team competences and organizational flexibility".

These have a significant impact on a firm's degree of 'born-globalness', although it was interesting that they did not find this 'a fundamental precondition' for early internationalisation (Adapted from Cannone & Ughetto 2014, p. 274). Internationalisation continues unabated, for example, in the focus year of this research (2011),

> "global foreign direct investment (FDI) inflows rose by 17%, to US$1.5 trillion, surpassing their pre-crisis average, based on UNCTAD estimates and despite turmoil in the global economy".

IBM (2012, p.6) reported 'the transport equipment sector remains the dominant investing sector', with 'business services' and 'ICT' 4th and 5th respectively, and 'the USA continues to be the number one investing economy in other parts of the world and typically determines the

[17] The Fast 500 Programme (2011) is the basis for this research; for a summary of the Deloitte Methodology, see Chapter 4 and for how firms were selected for this research, see Chapter 3.

global trend' (2012, p.7)[18]. UNCTAD (2012) reported "FDI inflows increased in all major economic groupings – developed, developing and transition economies". Developing and transition economies accounted for half of global FDI in 2011 (on a record high, ~US$755 billion and driven mainly by robust greenfield investments) whereas "FDI flows to developed countries also rose by 18 per cent" on 'cross-border merger and acquisitions (M&As)', part of which 'appears to be driven by corporate restructurings and a focus on core activities, especially in Europe" (Adapted from Global Investment Trends Monitor, No. 8, 2012, p.2). UNCTAD also confirmed that 'FDI flows to Europe increased by 23 per cent' and noted 'large-scale swings (from contraction in 2010 to expansion in 2011 or vice versa) were observed for a number of major FDI destinations, including Denmark, Germany, Italy, Sweden and the UK' (2012, p.3). This is confirmed by the Ernst & Young Attractiveness Survey (2011) which showed that "Europe remains the largest regional destination for FDI, albeit with a reduced share; a quarter of all consumption and investment takes place within its expanding borders". The Ernst & Young Report also confirmed "the UK and France remain FDI leaders in Europe" and 'the greatest number of projects in Europe come from automotive, business services, software and machinery, with the latter two, creating the most jobs' (2011, p.4).

The FDI Report (2014, p.2) confirmed the global growth of the communications sector, which experienced a rise of 12.2% on the back of strong growth in 2013 of the top three sub-sectors, wireless telecommunications, data processing and hosting, and wired telecommunications. When combined, FDI in the top three sub-sectors totalled $50bn and accounted for 81% of FDI in the sector and 8% of total global FDI. Wireless telecommunications experienced a 134.81% increase in capital expenditure to $20.88bn in 2013 and a 62% rise in project numbers to 197".

Clearly the global movement of firms in the sector has implications for space because firms have to site operations somewhere. According to recent UK research by BNP Paribas Real Estate (BNPPRE), in which 'more than 100 senior real estate decision makers within Greater London from TMT companies' were interviewed, 'London was ranked by TMT professionals as the world's second most important TMT centre behind New York (and) ahead of Los Angeles, Paris, Hong Kong, Berlin and the Silicon Valley'. The BNPPRE research predicts growth for the sector,

> "with 54% of firms surveyed expecting to increase headcount in London over the next three years, which translates to an additional 1.2m sq ft of demand above what the

[18] For a more detailed look into the home countries of these firms and the destination countries, please see Chapter 4, Appendix 4.4).

> sector's current average take-up through churn – equivalent to two Shard Towers' (2012, p.1).

In total, BNPPRE forecasts the 'TMT sector office take-up to reach 4.65m sq ft by the end of 2014 - equivalent to eight Shards' (2012, p.2). Dan Bayley, MD of Central London at BNPPRE, commented:

> "The predicted growth of the sector is good news, as TMT steps up to fill part of the gap left by financial services firms. Although, unlike the financial services sector which was centred around the City, TMT companies do not have one preferred location …" (2012, p.2).

This finding reinforces Colliers (2013) observation:

> "TMT companies often congregate together in cities where creativity and innovation are encouraged, that provide an advanced digital infrastructure and invest in the quality of their educational institutions to attract top talent from around the world" and "European investment in digital infrastructure is having a positive impact on attracting TMT companies" (p.4).

These findings confirm that TMT generally and ICT specifically are at the forefront of global movements of firms and to the UK, thus making this sector an appropriate choice for the study. It is also clear that the UK is still a favoured destination for TMT and will continue to attract the sector. Next a brief analysis of industrial location theory is conducted to contextualise the global movements of TMT.

## 2.3 Industrial Location Theory

Many industrial locational and new economic geography theories have been proposed over the past 100 years or so and been analysed in a number of studies (for example, Weber, Hoteling, Lösch and Dunning) in Schemenner (1979, 1982, 1988), Galbraith and De Noble (1988), Blair and Premus (1987) as cited in Yang 2004 (see Appendix 2.1).

As a result of globalisation and other factors such as the transition from manufacturing to services, many theories are less relevant but three of these relatively contemporary theories may still be relevant to this research: Lösch's Profit-Maximisation Theory, Dunning's Ownership, Location and Internalisation (OLI) Framework and the Hymer-Kindleberger Hypothesis.

### 2.3.1 Three Industrial Location Theories: Losch, Dunning and Hymer

Lösch's (1954) Profit-Maximisation Theory is based on choosing a correct location for a firm where net profit (defined as the difference between sales income and production costs) is greatest. Building on Weber, Lösch introduced a new variable, sales income, and the proposition that a single best location exists provided immediate differentiation from Weber, because of the Substitution Principle, in which

> 'It is possible to replace a declining amount of one factor by another or increase transport cost while reducing land rent. With substitution, a number of different points may appear as optimal locations' (Zhang 2001, p.251).

Lösch (1954) also concluded that location could be in an area of profit maximisation possibilities, rather than a single point, so location anywhere in the area ensures some profitability. His 'spatial margin of profitability' defines the perimeter of this area because all points on the perimeter represent where total revenues equal total costs of producing a good. Lösch (1954) contemplated the spatial influence of consumer demand in his model, thus giving it greater flexibility and wider applicability. Lösch's theory may resonate with TMT firms which often internationalise in search of profits. This question is included in the qualitative questionnaire for TMT firms.

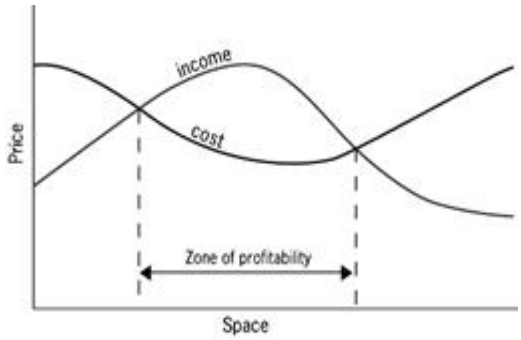



**Figure 2.3: Lösch's Profit Maximisation Theory**

Hymer-Kindleberger's hypothesis focuses on foreign firms which necessarily have disadvantages vis-à-vis domestic firms (for example, market knowledge, communication, contacts, etc), so they must possess firm-specific advantages if they are to engage in foreign production (Hymer 1960, p.48). Hymer (1960, p.69) sought to clarify the FDI concept:

> "FDI is not about the transfer of capital - it is about the international transfer of proprietary and intangible assets - technology, business techniques, and skilled personnel".

Hymer's contributions to the development of the FDI concept and firm-specific advantages (FSA) contemplate TMT and the sector's attempts to internationalise, so are relevant to this research. Dunning's (1998) Framework is based on a triad of variables "ownership, location and internalization (OLI) for determining foreign direct investment (FDI) and MNE activity", which Dunning likens to "a three-legged stool; each leg is supportive of the other, and the stool is only functional if the three legs are evenly balanced. In so far as the third leg completes this balancing it may be regarded as the most important, but there is no reason to suppose one leg performs this task better than another" (Dunning 1998). Dunning's three 'legs' are three sets of advantages,

> (i) Ownership-specific advantages from the owner, including corporate governance, IPR, social and human capital, processual know-how, or new and emerging technologies;
> (ii) Location-specific advantages from different locations that have different resources, institutions, social capital and regulation affecting revenue and production costs; and
> (iii) Internalisation or 'relational' advantages from transferring ownership advantages across national boundaries within a firm, (Dunning & Lundan 2008).

Ownership advantages require identification of institutions (formal and informal) at the level of the firm and the advantages derived from them, in order to distinguish these from the asset and transaction-based advantages (Dunning & Lundan 2008 p.580). The internalisation factor explains 'the firm's propensity to internalise cross-border structural or endemic imperfections in the intermediate goods market' (Ibid p.587).

The OLI framework argues 'the more O and I advantages possessed by firms and the more L advantages of creating, augmenting, exploiting these advantages from a location outside its home country, the more FDI will be undertaken'[19]. Whilst Dunning successfully expanded the location debate from transaction costs one criticism that may reasonably be made of OLI is that although it purports to explain what a firm would do when involving itself in cross-border business, it may have much more explanatory value in discussions about the boundaries of the firm and its institutional relationships. The empirical examination of ILT are outside the scope of this research but a brief review of the above three theories, add to the contextual picture.

[19] http://thanabut.blogspot.com/2007/08/dunnings-oli-theory-for-fdi-patterns.html 091111

### 2.3.2 Critiquing Industrial Location Theory

Many theories gained popularity in the 'manufacturing age', at a time when producing tangible goods and certain costs (like transaction) were a major consideration. Because of the manufacturing focus, one question arises as to the applicability of ILT in new industries such as the tertiary industry. Given that the focus of this research is TMT, an industry which is mainly services-based and one that is squarely within the 'post manufacturing age' (Feinman 2006), it could be concluded that the theories have limited applicability in explaining how services-based firms in general and TMT firms in particular, choose locations and sites when settling into locations. However, following the general decline of interest in ILT following the peak in the 1950's, there has been followed more recently by an upturn in interest from academic researchers and commentators.

McCann & Sheppard (2003, p.649) argue that *'*new academic fashions, new international institutional arrangements, new communications technology and new developments in data availability, have all renewed the need for a redevelopment of analytical industrial location theor*y'* and in so doing, have identified a number of reasons or possible explanations for this renewed interest. The authors (Ibid) argue for the methodological basis of traditional industrial location models to be reconciled with recent models of clustering, the new economic geography literature, and also for more 'aggregate systemic levels of analysis*'*, drawing three conclusions:

> '.... specify the transactions-cost assumptions underlying these various approaches; adopt broader definitions of spatial transactions costs; and incorporate environmental characteristics within an orthodox location-production type of framework'.

McCann & Shepherd's balanced analysis is contrasted with the more sharp critique of Massey (2006), who posited powerful arguments relating to the geographical perspective of firm-level decisions, how a firm's behaviour is influenced by macro considerations and space, as it relates to the economy. Massey (2006, p.33) concluded that '....the separate existence of an entity called industrial location theory is itself open to question' and argued that 'many of the classic theories of industrial location have proceeded as though the object of study was an abstract firm - one without effective structural relationships to the rest of the economy'. Massey's (1973, p.33) conceptual critique expands the remit of industrial location:

> 'Most industrial location theory' deals essentially with some form of "abstract" space. (For) Lösch, for instance, distance is the only quality of space considered as

locationally significant. In fact the space of industrial location is the product of a complex historical process. It is also a political and institutional space'.

This important point recognises relatively recent trends such as globalisation which have defined new relationships. Massey also claimed there is a 'presumed separation of spatial behaviour from the economic system as a whole' but that 'the two are intimately related at all levels', however, she does not argue that globalisation could explain the integration of location and economic decisions which might address her three main criticisms:

(i) '… it is rarely valid to retain a complete distinction between the specifically locational decision of the firm and all its other economic decisions';

(ii) '…the nature of a firm's behaviour will be influenced by its position within the total economic structure'; and

(iii) '…the spatial shape of the economy is the result not only of specifically spatial forces, but also of the a-spatial dynamic of the economic system having a spatial manifestation' (Ibid 1973).

Capello (2011, p.3) seeks to clarify the objectives of ILT as seeking to explain spatial distribution of activities in space in order to 'identify the factors that influence the location of activities, allocation of territory and the functional distribution of activities in space, inter alia. In summary, this renewed interest in industrial location theor*y* recognises contemporary trends and the explicit links with globalisation are welcomed. However, the new interest does not make explicit the extent to which location 'ends'; this research makes a distinction between location, settlement and site election in an attempt to atomise what happens once a firm has landed in another country.

## 2.4 Global Economies, Internationalisation & Locational Choices

To situate the UK economy in relation to this research, this section reviews how global economies are classified and the state of knowledge of internationalisation, particularly, location criteria, strategy, planning and entry alternatives. To illuminate further the context, 'doing business in the EU and UK' are discussed to close the section.

### 2.4.1 Classification of Global Economies

The Global Entrepreneurship Monitor (GEM) started in 1997 to 'improve our understanding of the relationships between entrepreneurship and national development' (p.4). In its 10th Annual Report (2008), world economies were categorised into three types:

(i) factor-driven economies;
(ii) efficiency-driven economies; and
(iii) innovation-driven economies.

Generally, developing economies fall into the first two categories, with developed economies like the UK, falling into the final category. According to GEM, innovation-driven economies are 'mature, wealthy and increasingly services-oriented to supply a high-income society' (p.8), which clearly situates the UK and confirms its appeal to an internationalising sector like TMT.

### 2.4.2 Location Selection Criteria & Process

In 1998, Fahri and Cem analysed previous research and identified twenty-three factors that underpin location selection decisions. Fahri and Cem's seminal work produced a detailed framework of factors that had been the focus of empirical research, which added further value to their work. Although comprehensive, Fahri and Cem's analysis did not include factors identified by Dunning (also 1998), particularly his OLI framework, in which Dunning (1998, pp.49-50) argued that three factors 'impinged upon the capabilities and strategies of MNEs, and the locational attractions offered by particular countries ...' His first and second factors repeat several in Fahri and Cem's list, but his third extends it:

> 'The growing significance of firm-specific knowledge intensive assets in the wealth-creating process, and the kind of customized assets, *e.g*., skilled labor and public infrastructure'.

Also absent from Fahri and Cem's analysis is any indication of the industries involved, in particular, no mention of the services sector, which has seen the brunt of the internationalising movement in recent years or arguments as to why the changes have occurred and why certain factors are important (or not) to this rising sector. Ten years later, Fouberg *et al.* (2009, p.398) argue that industrial production has changed as a result of post-Fordism ('a more flexible set of production practices'), time-space compression ('the notion that some places in the world are more connected through communication and

transportation technologies than ever before') and a global division of labour ('corporations can draw from labour around the globe for different components of production'). Manufacturing has experienced deindustrialisation ('a process by which companies move industrial jobs to other regions with cheaper labour') in most advanced economies and has given way to services ('tertiary') industries, which 'do not generate an actual, tangible product' but 'encompass the range of services that are found in modern societies' (Ibid 2009, p.404). Two services sub-sectors are

> 'Quaternary industries for the collection, procession and manipulation of information and capital' (including finance, administration, insurance, legal and computer services) and 'quinary industries for activities that facilitate complex decision making and the advancement of human capacities' (including scientific research, higher education and high level management), (Ibid 2009, p.404).

Quaternary and quinary industries are the focus for this research, although as noted, many TMT firms also make products. Next, location strategy, selection techniques and trends are discussed, and how firms analyse and plan location choices, which includes considering competing options, such as weighing the incentives offered by Governments (Wheeler and Mody, 2002), trying to pre-judge how cultural differences may be bridged and considering the actual costs of extending the boundaries of the firm into a new jurisdiction, *inter alia*.

In the same year as the Fouberg study (2009), Ernst and Young developed an Attractiveness Study which analysed twenty five factors. Ernst & Young's (2009, p.7) Attractiveness Study confirmed that the 'main reason companies change or add locations is in response to a change in their market - its scale, place, nature or diversity' but 'what rivals are doing, as well, as quality and price also matter' (Ibid, p.7).

Location decisions depend on proximity to markets, transport mobility and telecommunications infrastructure. The study also confirmed 'companies need physical assets and workers' and that 'skills, labor availability and costs are measured against productivity for the best mix'. In addition, the study found that taxes and laws 'can directly or indirectly shape the flexibility and profitability of an investment' and that 'tax burdens and incentives, legal and regulatory factors and public incentives all matter'. The fourth set of issues relate to 'environment and region'**,** particularly, 'the operating environment, and the extent to which it offers a company the means to develop' but also 'the availability of capital and financial markets, specific expertise, innovation and research and quality of life'(Ibid,

p.7). The E&Y findings contribute to the breadth and diversity of the location literature, and to better understanding of the thematic bases of the studies; the twenty-five factors can be grouped into seven factor-based themes. Appendix 2.1 is an adaptation of Fahri and Cem (1998) which includes Dunning, Ernst & Young and others who have contributed to the location debate since 1998.

Appendix 2.1 lists factors that underpin location selection decisions and the researchers who dedicated time and effort to research the factors (Ibid 1998). The themes of local government, area/region and factor costs are taken up by Estrin et al. (2007); Wheeler & Mody (1992; 2002); Heil (2006); and Dunning (1998), amongst others. Estrin et al. (2007 citing Henisz 2003; Peng 2003; Dunning & Lundan 2008) argue that the size of the challenge facing the adjustment of firms into new markets is correlative to the difference in the foreign business environment from the home environment:

> "Multinational enterprises (MNEs) have to adjust to the multifaceted institutional environment of each country in which they operate. This adjustment is more challenging, the greater the difference between the foreign business environment and the MNE's home environment".

The above authors re-state the concept of 'distance', confirming Shenkar (2001), Kostova & Roth (2002) and Tihanyi et al. (2005), who found that distance is

> 'of central interest to scholars' because 'the more distant a host country is from the organizational centre of a(n) MNE, the more it has to bridge differences in culture, in laws and regulation, and in organizational practices and routines'.

The adaptation effort of MNEs, therefore, is magnified in situations of great differences (Estrin et al. 2007, citing Johansen & Vahlne 1977; Kogut & Singh 1988; Kostova & Roth 2002). Wheeler & Mody (2002) have identified 'international location tournaments', in which 'governments compete for foreign investment with tax and other short-run incentives' but that 'short-run incentives have limited apparent impact on location choice', so '.... high-cost tournament play is unnecessary for countries with good infrastructure development, specialized input suppliers and an expanding domestic market'. Local governments may then be better consumed with ensuring that enterprise support infrastructures are in place, rather than spending time conceiving attractive short-term financial and tax incentives. Heil (2006) agrees that 'the top five location factors for global companies are costs, infrastructure, labor characteristics, government and political issues, and economy' and that 'key sub-factors' include

> "the availability and quality of the labor force, the quality and reliability of transportation, the quality and reliability of utilities, wage rates, worker motivation, telecommunication systems, record of government stability industrial relations laws, protection of patents, availability of management resources and specific skills, and system and integration costs".

Heil (2006) suggests two additional important factors, however, 'the host country market size' and 'global economic considerations'. The revised list of location factors is extensive but not deemed exhaustive because the factors tend to ignore, for the most part, services, particularly quinary and quaternary sectors. This research will test specifically for the above factors as they relate to TMT firms in the target sub-regions, which boast many of the factors listed in Appendix 2.1. This research will identify and seek to examine location factors in a UK context. Having considered location in a particular country or sub-national region, location strategy is addressed next.

### 2.4.3 Location Strategy

Helms (2006) defines location strategy as "a plan for obtaining the optimal location for a company by identifying company needs and objectives, and searching for locations with offerings that are compatible with these needs and objectives. Generally, this means the firm will attempt to maximize opportunity, minimise costs and risks"[20]. Heizer (2006) and Render (2006) agree that the objective of the location strategy is 'to maximize the benefit of location to the firm' and as such, is 'one of the most important decisions a firm makes because it has a 'long term impact and such decisions are difficult to change'. Also, depending on the type of firm, it may have to consider other aspects of prospective locations, so a location strategy will take into account a wide range of factors, including but not limited to those in Appendix 2.1 and which may be supplemented with facilities and logistics considerations, political risk factors, psychic distance and trade zones.

#### 2.4.3.1 Location and the Rise of the Services Sectors

The rise of the tertiary industry has led to new influences on location. Foubert *et al*. (2009, p.405-406) link the distinction of tertiary services to new or emerging location patterns.

[20] Adapted from "Location Strategy." Encyclopedia of Management. Ed. Marilyn M. Helms. Vol. 1. Gale Cengage, (2006). eNotes.com. http://www.enotes.com/location-strategy-reference/location-strategy 18.11.11

Tertiary services 'relate to transportation and communication and are closely tied to population patterns and the location of primary and secondary industries'. Quaternary services are more diverse because of the nature of the information 'collection, processing and manipulating' services, which can be tied to a 'locus of economic activity' or 'can operate almost anywhere as long as they have access to digital processing equipment and telecommunications'. Finally, quinary services such as governmental seats, universities and corporate headquarters, tend to concentrate around 'nodes of quinary activity' and are heavily influenced by historical location decisions, for example, universities and seats of government. If there is a link between services and choice of location, TMT firm services would fall largely under tertiary and quaternary services and depending on the types of services and the focus of activities, an internationalising firm may elect to locate in or near a 'locus of economic activity' or 'almost anywhere' but getting it wrong can be costly, so a strategy is essential.

### 2.4.4 Internationalisation and Entry Modes

There is an established literature to support the general proposition that firms seek attractive markets that have the greatest market potential and lowest investment risk; 'Market potential (size and growth) has been found to be an important determinant of overseas investment' (Heil 2006; Terpstra & Yu 1988; Forsyth 1972; Weinstein 1977; Khoury 1979; Choi, Tschoegl & Yu 1986). An internationalising firm has a number of alternatives available to it for entering an overseas market. Johanson & Vahlne (1977) had defined internationalisation as a process in which firms gradually increase their international involvement, whereas Driscoll (1995) identified three entry modes:

(i) export entry modes,
(ii) contractual entry modes and
(iii) investment modes.

Bradley (1995) also believed that foreign market entry strategies usually accord with the sequential stages of exporting, competitive alliances, acquisition/foreign direct investment (Cited in Donglin & Fang 2007, p.185). However, Muller-Stewens & Lechner (1997 as cited in Keegan and Schlegelmilch 2001, p.320) argued there are at least six ways to enter markets, including exporting with the help of another company or agent (direct and indirect), licensing of its products, franchising, joint ventures, acquisition of one or more firms and setting up a wholly-owned subsidiary. Each option has different implications for ownership and control

and for resourcing; exporting requires the least amount of resources and enables the least amount of control, whereas acquisition and wholly-owned subsidiaries, require the most resources but yield the most control.

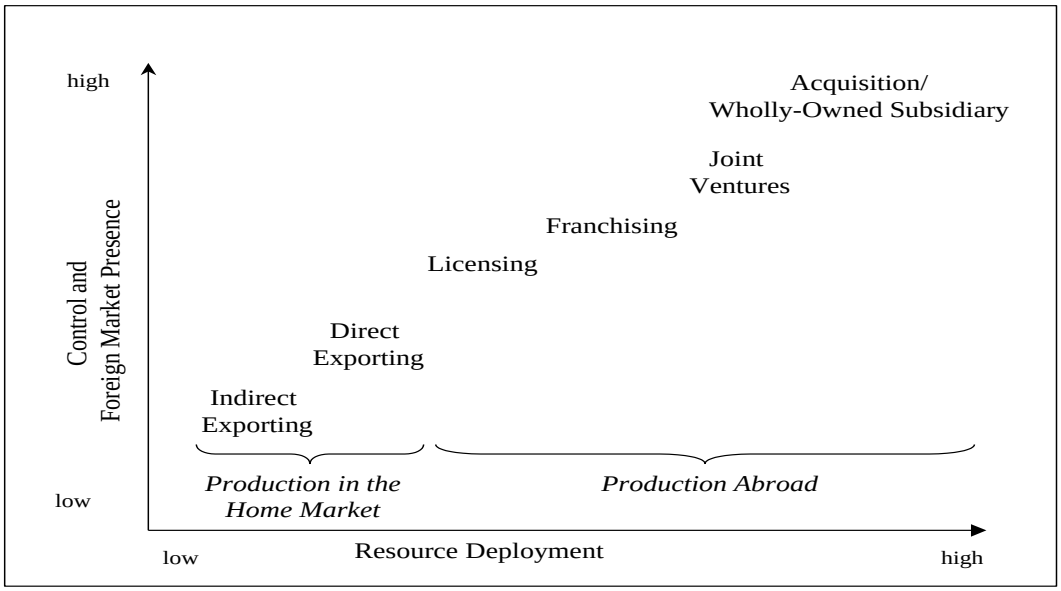



**Figure 2.4: Market Entry Alternatives**[21]

Ten years later, Wu & Zhao (2007) citing Andersen (1993) argued for four different modes of entry to an international market:

> (i) no regular export activities;
> (ii) export via independent representatives (agents);
> (iii) establishment of overseas sales subsidiary; and
> (iv) overseas production/manufacturing units, these modes following a sequence from low to higher degrees of internationalization' (p.184).

This research relates to a large TMT firm, Huawei, which may or may not follow traditional internationalisation paths, as implicated in Wu & Zhao's (2007) finding in their study, that

> "the Uppsala internationalization model cannot adequately reflect the features of the internationalization in hi-technology firms" and that 'hi-tech firms usually do not strictly follow the "stage" theory', 'often employing the modes of joint ventures, FDI or contractual entry modes to enter a new international market' (p.191).

Wu & Zhao (2007) also confirmed Turnbull (1987), Bell (1995) and Gurau (2002) who found that the "establishment chain" theories cannot fit to the hi-tech and service areas. Technology

[21] Adapted from Müller-Stewens & Lechner (1979) as cited in Keegan & Schlegelmilch (2001, p.162)

firms may also possess additional resource requirements to enable more effective competition and operations. Several authors support this view (for example, Agarwal & Ramaswami 1992; Kumar 1984; Buckley & Casson 1976): 'firms need asset power in terms of resources and multinational experience in order to engage in international expansion and to successfully compete with host country firms' and 'resources are needed for absorbing the high costs of marketing, for enforcing patents and contracts, and for achieving economies of scale' (Hood & Young, 1979). 'Asset power' is a function of firm size, which 'reflects its capability for absorption of these costs' (Buckley & Casson 1976; Kumar 1984). Agarwal & Ramaswami (1992) found that 'larger and more multinational firms showed a greater tendency to enter foreign markets', 'they may choose any entry mode' and 'they show a preference for a sole venture mode over a joint venture mode' and that 'firms preferred sole venture in markets that were perceived to have higher market potential' (pp.4-6). Finally, a firm's multinationality ('the number of countries in which a firm has subsidiaries', Caves & Mehra, 1986), psychic distance ('the degree to which a firm is uncertain of the characteristics of a foreign market', Kogut & Singh 1998, p.3) between home and destination country and level of multinational experience all have a significant influence on entry choice. 'Firms without foreign market experience are likely to have greater problems in managing foreign operations' (Caves & Mehra, 1986).

This uncertainty is linked to psychic distance and culture because 'differences in national cultures have been shown to result in different organizational and administrative practices and employee expectations' and the greater the cultural distance between the two countries, the more 'distant' their organisational characteristics on average' (Bendix 1956; Lincoln & Halson 1981). Taking all of the above considerations into account, Kim & Hwang (1992) characterise these factors as either 'environmental or transaction-specific' and argue that a third set of factors need to be considered, 'global strategic considerations', 'namely the strategic relationship (the firm) envisages between its operations across borders, in reaching its entry mode decision' (pp. 29-30).' Clearly, this third set of considerations must be reserved for large MNEs with a 'footprint' in multiple countries. In summary, the literature identifies various ways to enter foreign markets.

These entry choices are driven largely by asset power, multinationality, experience, need for ownership and foreign market presence and cultural distance. Agarwal & Ramaswami's (1992) found that larger MNCs showed a greater tendency to enter foreign markets and they choose any entry mode, thus confirming Muller-Stewens & Lechner, both in terms of

resources and control required. With regard to internationalising TMT firms, Wu & Zhao (2007) found that the "establishment chain" theories cannot fit to hi-tech; however the finding is based on the study of a single company at a single point in time.

### 2.4.5 Barriers to Entry for Internationalising Firms

Barriers to entry are defined as

> "The existence of high start-up costs or other obstacles that prevent new competitors from easily entering an industry or area of business. Barriers to entry benefit existing companies already operating in an industry because they protect an established company's revenues and profits from being whittled away by new competitors"[22].

Some research (Chaplin 2009; Gallup 2007; Fleiss 2007) has identified a range of barriers, which 'can be broadly categorised as:

> (i) resource barriers,
> (ii) information and network barriers or
> (iii) legal and procedural barriers' (Chaplin 2009, p.3).

'Resource barriers relate to finance, management time and other resources available to the firm' (p.3), information and network barriers include 'lack of knowledge of foreign markets (Gallup 2007 as cited in Chaplin 2009, p.4); limited information to locate/analyse markets, inability to contact potential overseas customers and identify foreign business opportunities (Fleiss 2007 as cited in Chaplin 2009, p.4); obtaining basic information about an export market, identifying who to make contact with in the first instance, building relationships with key decision makers and establishing an initial dialogue with prospective customers' (Kneller and Pisu 2006 as cited in Chaplin 2009, p.4). Procedural barriers include 'dealing with legal, financial and tax regulations and standards (Kneller and Pisu 2006), regulations in other countries (Gallup 2007 as cited in Chaplin 2009, p.4). These regulations include product standards, compliance procedures, patent and trademark issues (Fleiss 2007, as cited in Chaplin 2009, p.5). The findings in the OECD Report (2009, p.8) are helpful; it includes two tables on 'barriers ranked by SMEs' and 'barriers ranked by member economies'[23] and are summarised below in Table 2.1. Cross-referencing the two sets of ranking reveals that both the Member States and SMEs rank three factors highly, *i.e.* in the top four: 'shortage of

[22] http://www.investopedia.com/terms/b/barrierstoentry.asp#ixzz3l8DbaPYS Accessed 08.09.15
[23] 'The specific OECD countries covered by the investigations include Australia, Canada, Finland, Ireland, Korea, Spain, Sweden, Turkey, **UK** and USA' (p.9).

working capital', 'limited information to locate/analyse markets' and 'identifying foreign business opportunities', which suggests the barriers may not be unique to SMEs.

| | SME Description | OECD Member State Description |
|---|---|---|
| 1 | Shortage of working capital to finance exports | |
| 2 | Identifying foreign business opportunities | |
| 3 | Limited information to locate/analyse markets | |
| 4 | Inability to contact potential overseas customers | Inadequate quantity of and/or untrained personnel for internationalisation |
| 5 | Obtaining reliable foreign representation | Lack of managerial time to deal with internationalisation |
| 6 | Lack of managerial time to deal with internationalisation | Inability to contact potential overseas customers |
| 7 | Inadequate quantity of and/or trained personnel for internationalisation | Developing new products for foreign markets |
| 8 | Difficulty in matching competitors' prices | Unfamiliar foreign business practices |
| 9 | Lack of home government assistance/incentives | Unfamiliar exporting procedures/paperwork |
| 10 | Excessive transportation costs | Meeting export product quality/standards/ specifications |

**Table 2.1: Description of Barriers to Entry – OECD Members & SMEs (2009)**
RWF = Rank-weighted factor

Barriers to entry for internationalising firms are important to this research and are checked early in the research to confirm existence in a UK context. This research focuses on TMT so it is important to examine whether other issues not mentioned above but specific to the nature of technology are relevant, such as intellectual property rights (IPR). Chaplin (2009) found that 'although most of the firms indicated that they were concerned about IP issues in at least some of the overseas markets in which they were active, this was not perceived as a significant barrier to overseas business activity, and would not necessarily prevent a firm from entering a specific overseas market' (p.9). In summary, the literature identifies a range of barriers to entry, including resource, information and network, and legal/procedural barriers. In addition, operational barriers exist such as shortage of working capital and limited market intelligence. However, for TMT, there are special additional considerations as well, including a main consideration, IPR protection, which did not feature as a significant entry barrier.

#### 2.4.5.1 The Implications of Liability of Foreignness

The 'unfamiliar foreign business practices' mentioned in Appendices 2 and 3 herald a raft of issues that confronts foreign firms in new markets, considered under the general heading of

'liability of foreignness' (LoF) and first observed by Hymer (1960, 1976), which Sethi & Guisinger (2002) now define as

> "The aggregated effect of the firm's interaction with all elements of the international business environment, not merely in the initial entry mode decisions but throughout its foreign operations"

Whereas Eden and Miller (2004) argue "the key driver behind LoF is the institutional distance (cognitive, normative and regulatory) between the home and host countries". LoF has several major implications for migrating firms. First, 'firms operating in foreign countries face extra costs compared to local firms due to unfamiliarity with the local environment' (Kindleberger 1969; Hymer, 1976; Zaheer 1995 as cited in Chen 2006, p.288), so must necessarily consider how to manage lack of knowledge, which has become a 'prerequisite for successful multinational operations'. Second, overcoming LoF has become a 'firm-specific advantage' for many firms, which Dunning (1988) argued includes 'branding, technological superiority, managerial expertise and marketing knowledge, *inter alia*. Third, 'the degree of foreignness affects the choice of entry mode' although there is no consensus on the exact nature of the relationship, with disagreement over whether a Joint Venture (JV) or wholly-owned subsidiary is the preferred entry route. However, the Sethi & Guisinger (2002) definition suggests that focus on entry mode is merely part of the task. Despite changing perceptions of this established international business phenomenon, it is clear that migrating firms need to be aware of LoF and its implications for successful multinational operations, whatever the prevailing definition or interpretation.

### 2.4.6 Supra-National Attractiveness: Doing Business in Europe

The attractiveness of doing business in Europe can be summarised from four recent studies by global professional services providers (E&Y 2010, 2011; Colliers 2012) and UNCTAD. Ernst & Young[24] conducted a longitudinal survey over nine years to track real versus perceived national attractiveness across the world[25]. The E&Y 2010 and 2011 studies confirm the position of Europe as a leading destination for FDI and report several key findings in this regard (also confirmed by UNCTAD 2012). When considering the most critical factors to

[24] This sub-section draws heavily on the E&Y Attractiveness Survey, one of the most current and complete ongoing attractiveness studies available publicly.

[25] Ernst & Young's 2011 European attractiveness survey is based on an original two step methodology that reflects first, Europe's real attractiveness for foreign direct investors, based on Ernst & Young's European Investment Monitor (EIM) and second, the "perceived" attractiveness of Europe and its competitors for a representative panel of 812 international decision-makers (2011, p. B).

consider in 2010, companies view highly transport and logistics infrastructure (63%), telecommunications infrastructure (62%) and stability and transparency of the political, legal and regulatory environment (62%). The 2011 E&Y Study also noted that

> "Though China is rated the world's most attractive investment region with a score of 38%, Europe ranked a close second — awarded a score of 35% by investors".

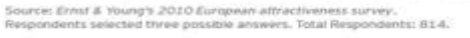



26

**Figure 2.5: E&Y 2010 European Attractiveness (FDI vs. Investors)**

UNCTAD (2012) reported inflows to Europe of US$347bn (2010) and US$426bn (2011). As shown below, China has increased its 'investors' perception' score to 43%, with Europe closely behind at 37% but Europe maintains its lead position for FDI inflows in 2012 (albeit at a lower inflow of US$293.5bn). When respondents were asked which 'business sectors they perceived would drive European growth over the next two years', ICTs led the list at 34%. Below are the results for the Ernst & Young's 2010 Perceived Attractiveness Survey in which respondents chose the top three business sectors.

[26] http://www.ey.com/GL/en/Issues/Business-environment/2013-European-attractiveness-survey Accessed 05.05.14




[27]

**Figure 2.6: E&Y 2010 European Attractiveness (Perceived Growth)**

The 2010 findings were confirmed by the 2011 Survey, which confirmed that "despite Europe's slow economic growth compared with other regions of the world, investors came back to Europe", where "total announcements of new investments and expansion of existing facilities rose to 3,757, matching pre-crisis levels". This was reflected in the increase in jobs (10%) and projects. The 2011 E&Y survey also reported a bright future for Europe: "looking to the future, companies see economic conditions in Europe improving" with an interesting addendum:

> "But while the total number of projects has risen, leading to more jobs being created, investors continue to scale back the size of individual projects. As a result the average number of new jobs per project has remained flat" (2011, p. 14).



**Figure 2.7: E&Y 2010 European Attractiveness (FDI in Europe by Region)**

[27] http://www.ey.com/GL/en/Issues/Business-environment/2010-European-attractiveness-survey---Europe-new-attractiveness-model---Action-3 Accessed 15.01.12

As noted above in s.2.2.3, 'TMT companies tend to congregate in cities where creativity and innovation are encouraged' that 'European investment in digital infrastructure is having a positive impact on attracting TMT' (Ibid 2012, p.4). The result of these investments has been 'the emergence of several leading IT clusters', which saw 'Europe dominate Fortune Magazine's 7 Best New Global Cities for Startups based on a combination of creativity and capitalism' to go with London: Zurich, Stockholm, Dublin, Copenhagen, Oulu, and Eindhoven.

#### 2.4.6.1 National Attractiveness: Doing Business in the UK

Studies by financial and professional services providers such as E&Y, UNCTAD, Colliers and the Financial Times (FT) confirm the UK is still a favoured FDI destination and in most cases, the top destination for European FDI inflows. E&Y (2012, p.16) confirmed the UK received 728 'projects' (2011), which generated 21,209 jobs, representing a 19% share of the total, with France a distant second (562 projects, 14,922 jobs) and Germany a close third (560, 12,044). By 2013, the number of UK projects had risen to 796 for "a total value of $26.51bn, accounting for almost 20% of FDI in the region" whilst overall "FDI into Europe declined, falling 12.08% to $137.26bn on the back of a 6% decline in project numbers to 4,166", thus confirming that the UK remains the leading destination for FDI in Europe (The FDI Report 2014, p.2).



Source: *Ernst & Young's European Investment Monitor*, 2013. Source: *Ernst & Young's European Investment Monitor*, 2013.

**Figure 2.8: E&Y 2010 European Attractiveness (Projects and Jobs)**

Throughout the past decade, the UK has maintained its position as Europe's top recipient of FDI projects, peaking in 2013, when the UK 'secured more investments and a higher market share of projects across Europe than in 2012 or 2011', and showed a continuing rise "against

the background of the first decline since 2008 in total projects at the European level" (Ibid, 2012). Ernst & Young (2012) identified a number of UK country-specific advantages which may be responsible, including "taxation, trade missions and support for SMEs", "the country's financial flexibility, policy regime for start-ups, and entrepreneurial culture" which cross-border investors find attractive[28]. However, the E&Y Report (2012) warns that

> "the UK cannot compete for every opportunity, so it needs to define a strategy for where to focus its efforts in terms of sector, function and region" because the country cannot rest on its laurels and must act now, "while the UK is still leading the way as Europe's top FDI location".

### 2.4.7 Settlement Pattern of Foreign TMT Firms in the UK (2011)

The above sub-section confirmed the UK as a leading destination for FDI generally and for foreign TMT firms to do business, specifically, and as an appropriate contextual choice for this study. The below figure illustrates where the full dataset of foreign TMT firms sited in the UK upon landing in 2011.

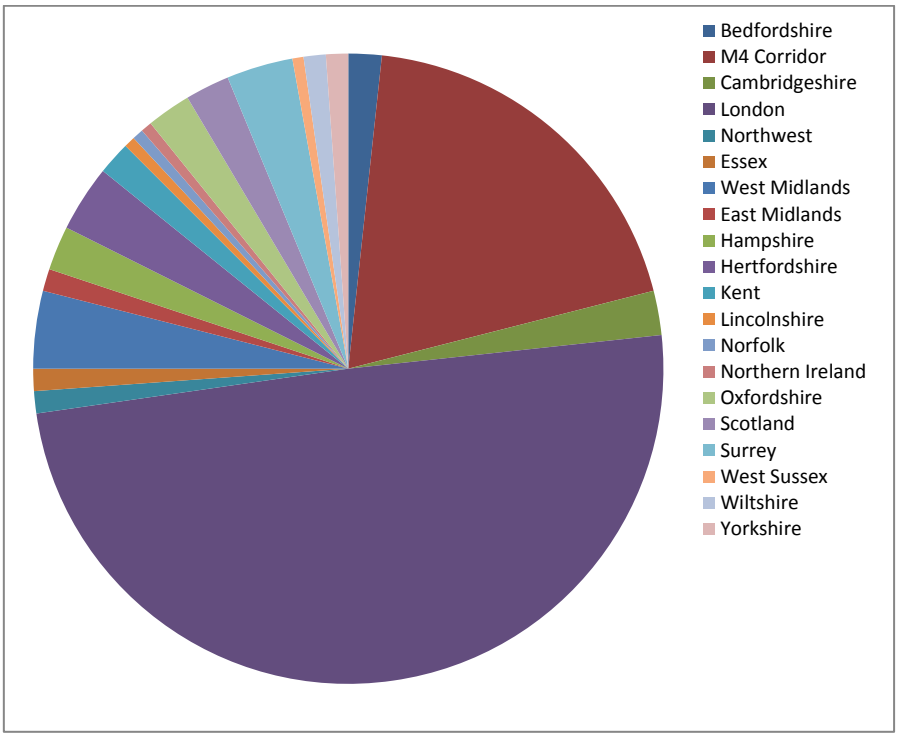



**Figure 2.8: Actual Settlement of FTMTFs in UK (2011-2012)[29]**

[28] http://www.ey.com/UK/en/Issues/Business-environment/2013-UK-attractiveness-survey 05.05.14
[29] Pattern based on counties to preserve the three sub-regions in this research

## 2.5 Chapter Summary

This chapter presented the contextual issues necessary to enrich the study by examining the provenance of TMT, internationalisation and the ease of doing business in Europe, the UK and the target regions. The literature demonstrates that TMT firms are prone to rapid growth as a result of aggressive pursuits of market share, and a propensity of internationalisation. The fast growing TMT sectors tend to be proactive and aggressively pursue market share, which often takes them overseas.

What causes TMT to select sites in the UK cannot be explained solely without also considering the precise context of circumstances, so this chapter analysed related sub-topics and explored issues to illuminate this research context, namely the TMT sector, its inherent tendency to internationalise and the attractiveness of the destination environment. As briefly explained in the chapter introduction, Critical Realism requires an understanding of the structural or necessary relations (as reflected in TMT parent, subsidiary firms and the process firms go through seeking growth) in its quest for causal explanation. In particular, necessary relations between the parent and subsidiary are based in the parent's internationalisation strategy, with clear 'events' or outcomes:

(i) The parent's **country choice** (locational) and **entry mode** for the subsidiary;

(ii) The subsidiary's **sub-national/regional choices**;

(iii) The subsidiary's **choice of site** (premises).

However, only in conjunction with the particular combination of contingent circumstances can necessary relations explain what caused these events or outcomes, so Chapter Three focuses on science parks and examines a range of topics that relate to the phenomenon, from a UK perspective.

## End of Chapter Two

# Chapter Three

## Literature Review II

## Settlement & Site Selection of Foreign TMT Firms in the UK in relation to Science Parks

## 3.1 The Contingent Environment of TMT Firm Site Selection

This second literature review chapter critically analyses the sub-topics specific to the primary unit of analysis, UK science parks, against the backdrop of TMT settlement and site selection. The relevant literature includes information on the target UK regions; UK corporate real estate; site selection considerations and science parks. Literature is again drawn from a range of disciplines including economic geography, regional studies, real estate, international business and strategic management that underscore the multidisciplinary nature of the research.

In a critical realist construction of the research environment, the above sub-topics form the bases of 'contingent relations' which comprise of the sets of relations implicated in the adoption of site selection strategies by UK-bound foreign TMT firms. The 'final event or outcome' directly implicates Science Parks because subsidiary firms have to choose a potential site for operations. Therefore, this chapter explores relations based on regional policy, UK economic development policy; corporate real estate and site selection criteria and process, all of which impinge upon UK science parks.

Issues relating to the phenomenon of science parks and settlement and siting-specific issues of international business present challenges in bringing these topics together, including the fact that there are six decades of literature on science and technology parks but a relatively small amount of literature on site selection, the 'end game' of location. The distribution of material and critical analysis in the two review chapters reflects this imbalance. The rest of the chapter is laid out as follows:

- Review of general themes relating to regions, industrial districts and technology-intensive regions (specifically the three UK technology regions under study) and site-selection (corporate real estate, methods and approaches);
- Review of science parks literature themes (history, ownership, management and development strategies); and
- Summary of the current state of knowledge.

## 3.2 Regions, Industrial Districts & Technology Regions

The review of themes ranges from a general discussion of regions, including a historical review of industrial districts, to UK regional policy, agglomeration, regional innovation

systems and the 'siliconisation' of the world, before progressing to corporate real estate, site selection and finally, specific science park-related themes.

### 3.2.1 The Region and Regional Policy

This and the next sub-section are important to this research project because it establishes a conceptual and physical boundary for the research, the sub-national region, the origins of which go back to the 1870's and the modern importance of which goes back to the 1950's when 'academics and government began to look at economic development from a regional perspective' in light of 'pressure to disaggregate national economies as a basis for policy and planning' (Higgins & Savoie 1988, p.35). Castells (1998, p.26) argues for a regional focus because regional governments are 'more dynamic agents of negotiation, representation and strategic initiative'. The sub-national 'region' ultimately bounds the contextual focus of this study because '... as the analytic periphery is reached, the information is of decreasing relevance to the case study' (Yin 2003, p.163).

A review of the literature indicates that there is a lack of consensus on the definition of a region. For example, the region can be defined generally as 'a bounded area possessing some sort of unity or organizing principle(s) that distinguish it from other regions' (Johnston *et al*. 2000, p.687) or as defined by Cooke *et al*. (1997, p.480): *"...* territories smaller than their state possessing significant supra-local governance capacity and cohesiveness differentiating them from their state and other regions". Scott and Storper (1992, p.5) view the region as a 'territorial aggregation of plants which partake of a common developmental trajectory' and within which, plants 'may be geographically dispersed or agglomerated, and any one region may contain a multiplicity of agglomerations'. Regional policy aims to promote and effect positive regional development, generally regarded as a sustained increase in overall regional well-being, individual well-being and economic output, using criteria such as GDP growth, per capita real incomes, full employment, wide selection and high quality of jobs and lifestyles (Hoover 1970, p.254).

Perhaps it should matter little whether growth is state-driven or locally-driven, though for reasons peculiar to certain regions, a 'locally-nuanced perspective' (Scott & Storper 2003, p.584), would be preferred, for example, Basque Country (Mondragon), Alpes-Maritimes (Sophia Antipolis) and Finland (Technopolis), where different approaches have proved successful using different combinations of resources.

Various initiatives have been used as regional policy tools, including but not limited to high technology (or scientific) labour markets and science parks (see s.2.7.4). The literature is inconclusive on science parks as drivers of local economic development, with some writers (for example, Massey 1992; and Felsenstein 2004) rejecting parks as effective regional development instruments. The use of high technology labour markets tells a slightly different story because "the quality of the labour force in a locality is the single most important component of local competitiveness" for the simple reason that "the highly skilled are attracted to particular locations by the presence of other professionals whose movement between employers is a crucial factor in transferring technology within regions or localities" (Simmie et al. 2002 as cited in Lawton Smith 2011, p.2). The absorptive capacity (Cohen & Levinthal, 1990) of the highly skilled promotes localisation by "drawing in, assimilating and translating new knowledge and applying it commercially" (Hommen & Doloreux 2003, p.15).

#### 3.2.1.1 UK Economic Development Policy (Regionalism to Localism)

Upon taking office in 1997, one of the key components of the Labour Government's 'economic development strategy' was the establishment of the Regional Development Agencies Act (1998) and the subsequent (April, 1999[30]) launch of eight RDAs which had 'five statutory purposes:

1. To further economic development and regeneration
2. To promote business efficiency, investment and competitiveness
3. To promote employment
4. To enhance development and application of skill relevant to employment
5. To contribute to sustainable development'[31].

When the Coalition Government took office in 2010, however, a different idea for achieving growth was conceived, which saw RDAs closed on 31st March 2012 (then) fully dissolved as legal entities on 01st July 2013. With 'ambitions to achieve greater spatial and industrial balance across England', the new 'local growth' agenda put local economic development under the control of thirty-nine Local Enterprise Partnerships (LEPs), 'as part of a wider programme of Government support for regional growth' as set out in a White Paper (28th October, 2010). Unlike RDAs, 'LEPs are non-statutory bodies, and have a great deal of discretion in how their membership is composed, though they must be chaired by a business person and at least half of their members must be from the private sector'.

[30] A ninth RDA was established in a separate legislation for London in July 2000.
[31] DBIS website, England's RDAs, http://webarchive.nationalarchives.gov.uk/+/http://dti.gov.uk/policies/economic-development/regional-support/rda-boards Accessed 07.11.13

LEPs have assumed many responsibilities of Regional Development Agencies (RDAs), have responsibility for Enterprise Zones and have three 'key priorities':

1. Shifting power to local communities and businesses
2. Increasing confidence to invest
3. Focused investment (Adapted from Ward, 2014).

With devolved responsibilities for planning, setting local priorities and creating the 'right mix' of local conditions, LEPs now cover all areas of England.

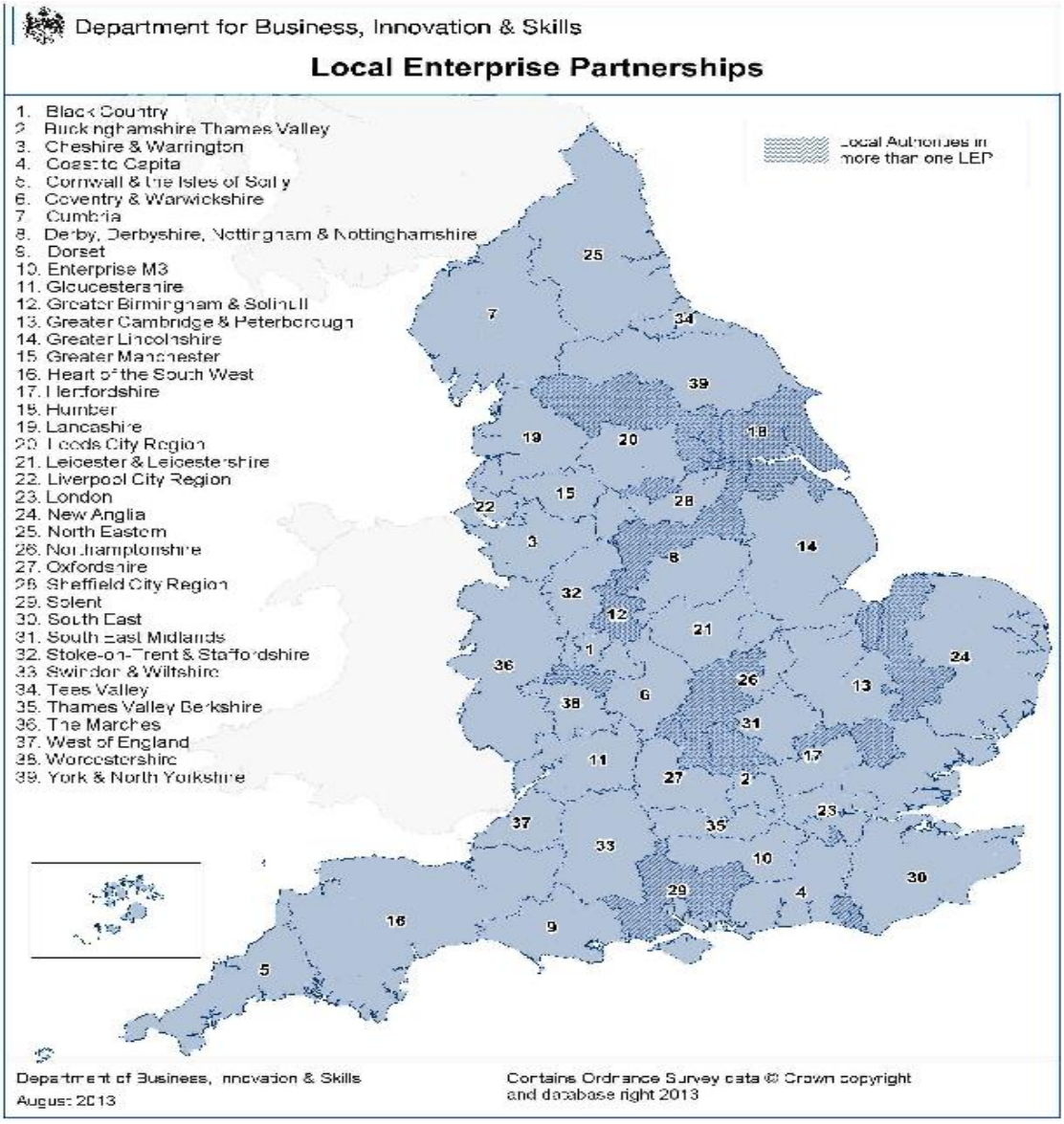



**Figure 3.1: Map showing LEPs in England**[32]

[32] http://www.bis.gov.uk/assets/biscore/economic-development/docs/l/leps-map-april-2012.pdf Accessed 13.03.14

Although still considered in the infant phase, LEPs have already attracted criticism (for example, Hackett 2012; Hildreth & Bailey 2012; Bentley et al 2011). Hackett (2012)[33] noted that LEPs are 'working hard to find local solutions which draw in extra investment and utilise local skills and expertise' but he that 'government's strategy to rebalance the economy is not working' (and) 'the consensus view among the experts is that the LEPs will not be able to match the RDAs and lack the resources and clout to address the growing economic regional divide'. Bentley et al (2011) criticised the supposed 'new localism' and argued that it "is not localism at all but recentralisation in disguise, that the problem of recentralisation risks being exacerbated by a fragmentation of LEPs into small territorial units, and a lack of resources". Indeed, the authors think "the move to set up LEPs is profoundly anti-regionalist and is re-centralisation in disguise, given that many economic development functions are being taken back to Whitehall". Hildreth and Bailey (2012) concluded:

> 'The resulting 'bottom up' configuration of LEPs can be criticised – just as RDAs were – as having inappropriate boundaries and scales. Moreover, quite how the 'duty to cooperate'[34] is to be enforced is far from clear: just how will stronger places be incentivised to cooperate with weaker places?'

The shift in UK economic development policy has implications for incoming firms so this research will examine empirically the configuration, constitution and the 'duty to cooperate' to understand better the effectiveness of this new policy instrument.

### 3.2.2 The Origin(s) of Industrial Districts

A second important contextual issue for this study is the industrial district, which was first identified in the literature around 1870 and can be taken as a specific manifestation of regional economic activity; it can be defined as

> "… a socio-territorial entity which is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area" (Becattini 1990, p.38) or alternatively, as a "sizable and spatially delimited areas of trade-oriented economic activity with a distinct specialization" (Markusen 1996).

[33] Director of the Smith Institute, http://www.insidehousing.co.uk/report-attacks-local-enterprise-partnerships/6520658.article Accessed 31.03.14

[34] The duty to cooperate places a legal duty on local planning authorities, county councils in England and public bodies to engage constructively, actively and on an ongoing basis to maximise the effectiveness of Local and Marine Plan preparation in the context of strategic cross boundary matters (created in the Localism Act 2011). Accessed 18.04.15

Becattini (1990) has developed the most comprehensive overview of the origins of industrial districts, bringing together a group of distinguished scholars to comment on the historical and contemporary role of industrial districts. Beccatini draws attention to the influential thinking of Marshall, one of the most influential economists of his time, who first used the term in his seminal work, The Principles of Economics (1890). Marshall differentiated between two types of industrial districts: one that represents an evolution of the "centers of specialized skills" from the pre-industrial age and another created intentionally and in an organized fashion as the result of the spillover of some manufacturing and craft activities from the industrial cities typical of English capitalism at the end of the nineteenth century (1999, p.89). Over time, other theorists in this field have proposed alternative models, including Piore and Sabel's (1984) 'new industrial district' (NID), 'based on the phenomenon of successful expansion of mature industries' in Emilio-Romagna, Italy and the

> "role of small, innovative firms, embedded within a regionally cooperative system of industrial governance which enable them to adapt and flourish despite globalizing tendencies" (1996, p.294).

Just over ten years later, Markusen (1996) identified additional models, including "the hub-and-spoke district ('regional structure revolves around one or several major corporations in one or a few industries'), the satellite industrial platform ('comprised chiefly of branch plants of absent multinationals'), and the state-centered district ('a major government tenant anchors the regional economy')". Markusen's analysis (1996) questions the 'Marshallian' and 'Italianate' versions of the NID on the grounds *inter alia,* that they are too internally focused and fixated on small firms. The models share some degree of 'stickiness'[35] but Markusen (1996) argues that the newer models reject the NID small firm emphasis choosing "instead (to) demonstrate the power of the state and/or multinational corporations" and to focus on exogenous drivers, which allow "increased networking across districts" which then "emerge as a result of multiple forces, including industry structures, corporate strategies and public policies".

This research examines foreign TMT firms (and naturally, the product focus and size of firms in terms of financial and human resources), as well as the sub-national contexts in which they settle.

[35] 'connotes both the ability to attract as well as to keep, like fly tape, and thus it applies to both new and established regions' (1996, p.294), *c.f.* 'slipperiness'

### 3.2.3 Regional Agglomeration Determinants and Effects

Regional agglomeration and theory are also important for this research from a tangential perspective because the study is eventually about the co-location of similar types of firms (TMT) in one of three sub-national regions. Agglomeration theory contends that external economies converge to promote growth in clusters through linkages to factor inputs (Marshall 1890; Porter 1998), which suggests an application to science parks, since science parks may be considered managed agglomerations of technology. External economies, on the other hand, derive from concentrated production activities and are defined as 'economics of density in production' (Verhoef & Nijkamp 2002, p.158).

More recently, Shaver & Flyer (2000, pp.1175-1178) have proposed that urbanisation externalities arise as a consequence of agglomeration of unrelated actors (*i.e.* general economic activities) and localisation externalities arise as a consequence of related agents or agents engaged in similar activities or from production or demand. Relevant to this study are the 'similar activities', particularly those that are 'technological' in nature (also referred to as spillovers) (Fujita & Thisse 2002, p.8). Technology agglomerations began to develop, first in the 1950's, and emerged on national, sub-national (regional) and local scales, and consequently, the past thirty-five years or so have seen increased interest in the clustering phenomenon, as evidenced by several major publications (for example, Porter 1990; 1998; Castells & Hall 1994). In addition, similar important publications dealing with aspects of agglomeration emerged in the 1990's (for example, Krugman 1991 on trade; Enright 1994; Saxenian 1994 on Silicon Valley; Feldman 1994 on entrepreneurship; Markusen 1996 on industrial districts; Audretsch & Feldman 1996 on spillovers; Baptista & Swann 1998 and DeBresson & Hugh 1999 on cluster-based innovation/innovative clusters). Very clear manifestations of 'regional technology clusters' exist in the UK, in Oxfordshire, Cambridgeshire and the M4 Corridor, three sub-regions that have generated significant interest and attention (s.3.4).

### 3.2.4 Regional Innovation Systems in a UK context

One manifestation of regional clustering, particularly in developed countries like the UK, is the emergence of innovation systems, particularly and most readily identifiable at the regional level. A regional innovation system (RIS) describes a system of actors, firms, networks, technological capabilities and related institutions in a sub-national area, the aim of

which is to promote regional innovative capabilities or as defined by Cooke *et al*. (1998, p.2), a system 'in which firms and other organisations are systematically engaged in interactive learning through an institutional milieu characterised by embeddedness'. According to Lawton Smith & Waters (2011, p.963), "definitions of RIS have at least three points in common, boundaries; governance; and industrial specialization/clustering and associated interactive learning processes". Building on Cooke & Piccaluga's work (2004, p.513), Benneworth *et al*. (2008) created a stylised model of an 'ideal-type' RIS as shown below, which promotes 'understanding (of) the uneven geography of the knowledge economy'. Cambridge is cited as an 'ideal type' RIS, implying that other sub-national regions like M4C suffer 'deficits' and are missing certain key elements. At a conceptual level, it is not entirely clear how the RIS concept would apply in a localised UK economic development policy, particularly when RIS require competitive advantage to be produced regionally and whose resulting interactions create supporting regional institutions. Doloreux (Undated p.19 citing Doloreux 2003) expresses a similar concern:

> "*There is far too much emphasis on 'local' institutional landscape without a satisfactory breakdown of what the institutions are or how they interact in different systems, scales, or levels of inter-relation*" (Ibid).



**Figure 3.2: Benneworth's ideal-type Regional Innovation System (OECD 2008 adapted from Cooke et al. 2004)**

The address of this conceptual challenge is beyond the scope of this research, which focuses on just some of the RIS elements, namely 'knowledge producers' (universities, by way of ownership of Science Parks), 'knowledge exploiters' (businesses including those that have migrated to the areas), 'local innovation assets' and 'technology transfer' organisations in the form of Science Parks.

## 3.3 UK High Technology Super Regions

The UK's technology-intensive regions have been widely documented (for example, Keeble 1989; SQW 2000; Kenney 2003; Miles 2008). This sub-section summarises the rather broad literature and presents the regions in terms of attractiveness to foreign TMT firms for doing business. The M4 Corridor, Oxfordshire and Cambridgeshire are home to four 'Silicons': Silicon Corridor (M4), Silicon Gorge, Silicon Spires (Oxford) and Silicon Fen (Cambridge). The challenge is to summarise the literature whilst capturing the similarities and differences between them. Oxfordshire and Cambridgeshire are presented, followed by the M4C.

### 3.3.1 'Siliconisation' in Oxfordshire and Cambridgeshire

Silicon Fen is "the area in and around Cambridge (which) consists of many new high-tech and IT companies"[36], many of which were spun out of Cambridge University by graduates and academic staff. The proliferation of firms produced by the "extraordinary ecosystem of science and technology-based firms … a highly networked community, a world class university and innovative financing"[37] became known as the Cambridge Phenomenon in the 1980's, although the process had started in the 1960's. Success has bred success as the area

> "has functioned as a honeypot attracting venture capitalists, big consultancy firms, bankers and other specialist organisations that attend to the needs of growing firms in complex industries"[38].

On the other hand, Silicon Spires takes its name from the 'Oxford Spires', and is not so well defined, neither as a technological ecosystem nor a geographical area. Instead the better known 'Science Vale' is located to the south of the City, between Wantage and Didcot. Despite lacking the distinction of 'Fen', 'Spires' is endowed with its share of technology and skills, having chosen to focus on four specialisms: ICT (hardware, software and telecoms); Bioscience and Medical technologies; Engineering and Electronics (including motor sports) and Physics-related technologies (SQW 2013, p.22). These four areas are distributed across the county but 'no clear spatial pattern' exists (2013, p.23).

[36] http://www.siliconfen.com/sfstory.php Accessed 05.12.14
[37] http://www.theguardian.com/technology/2013/dec/01/silicon-fen-cambridge-global-success-university Accessed 05.12.14
[38] http://www.theguardian.com/technology/2013/dec/01/silicon-fen-cambridge-global-success-university Accessed 05.12.14

### 3.3.1.1 Doing TMT Business in Oxfordshire and Cambridgeshire

Oxfordshire and Cambridgeshire counties are located to the northwest and northeast of London, respectively, at the heart of each of which are two world-renowned universities. The attractiveness of Oxfordshire is presented first, followed by Cambridgeshire, and as before, the purpose is to establish these sub-regions as places for foreign TMT firms to do business.

Oxfordshire is a roughly triangular-shaped county sandwiched between the M4 and M40 Motorways to its south and northwest, respectively (Figure 3.3). The Science Vale Enterprise Zone consists of ~1,000 acres of property and 'comprises of the Harwell Oxford Campus and Milton Park' (2013, p.2), located to the south of Oxford, roughly half-way to London.

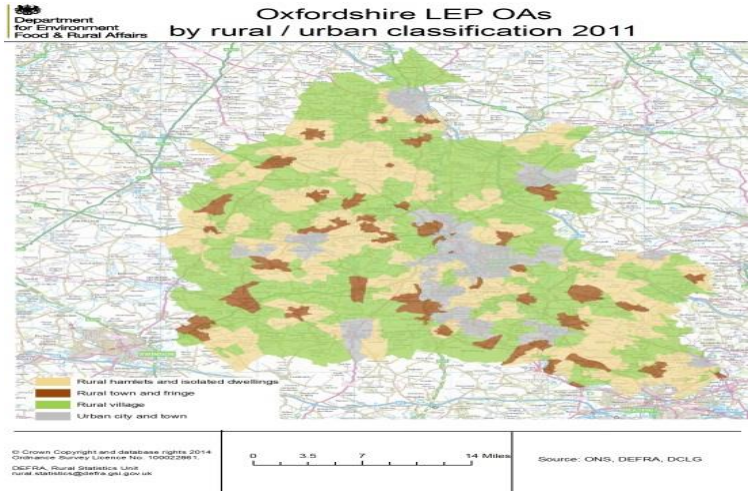



**Figure 3.3: Oxfordshire County/LEP**

According to SQW, Oxfordshire boasts six clear and well-established assets to support the growth of high technology:

- A 'global brand', steeped in history and backed up by image, reputation and quality of life;
- A sound university base, focused on world famous Oxford University;
- A unique grouping of 'big science and other (important) research facilities' involved in cutting edge research in the Science Vale;
- An established scientific/technology labour market, boasting a 'highly skilled labour force, with a higher proportion of graduates than any other UK county';
- A diverse high-tech enterprise stock of approximately 1,500 firms, which employ ~43,000 people; and
- A 'superb strategic location, 40 miles from Heathrow Airport ….. and 50 miles from London' (Adapted from SQW 2013, p.1).

The report argues 'high technology development would not have taken place without this infrastructure' and 'it remains the underpinning factor' (2013, p.13). The region also boasts a clear technological focus, based on four 'distinctive but overlapping technologies', namely 'bioscience, medical technologies and pharmaceuticals'; physics-related technologies, including 'cryogenics, instruments and magnets'; 'engineering, electronics, and motorsport'; and 'telecoms, computer hardware and software' (Ibid, p.22).

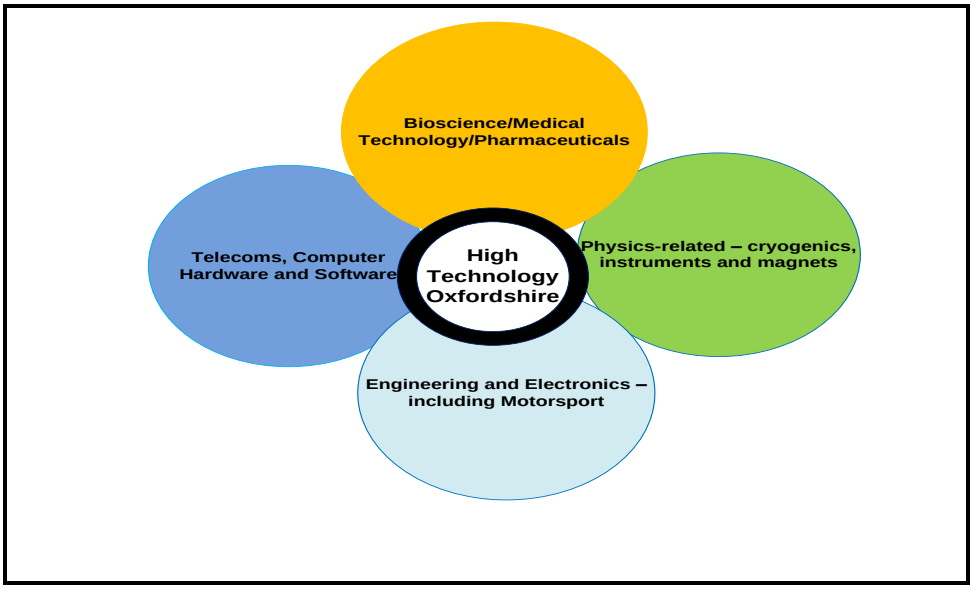



**Figure 3.4: Oxfordshire's core overlapping technologies** [39]

Like Oxfordshire, Cambridgeshire boasts a clear technological focus, based on three 'converging revolutions' (Barrell, 2006):

(i) Biotechnology (Pharmaceuticals, Genomics, Bioinformatics, Proteomics, Bioelectronics, Microfluidics, Nanobiotechnology and Drug Delivery);
(ii) Information Technologies (hardware, software and communications); and
(iii) Nanotechnology (Electrical, Structural, Biomedical, Energy and Environment) (Ibid, 2006).

[39] Re-drawn from: Oxfordshire LEP Strategic Plan (2014; p.14)

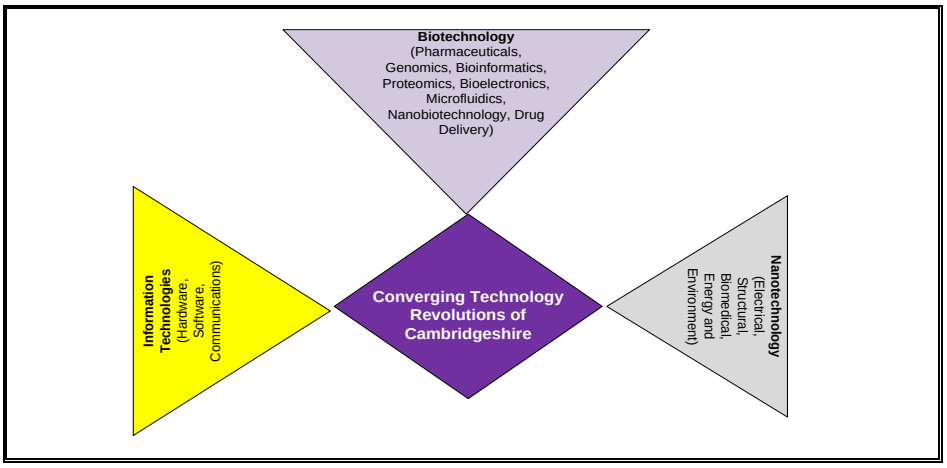



**Figure 3.5: Cambridgeshire's converging technology revolution** [40]

Cambridgeshire is a roughly triangular county, the second smallest in the UK, situated to the north northeast of London on the edge of the Great Fen, a former swamp north of the city[41]. Silicon Fen is 'within a 20 mile radius' of Cambridge, which has become famous as a centre of innovation due to links to its world class university. Silicon Fen 'stretches from Bury St. Edmunds, through Cambridge to the outskirts of Bedford'[42]. Cambridge has arguably grown to be 'the most successful university-anchored, high-technology district in Europe' (Kenney 2003, p.179) and the third rated in the world (MIT 2013).

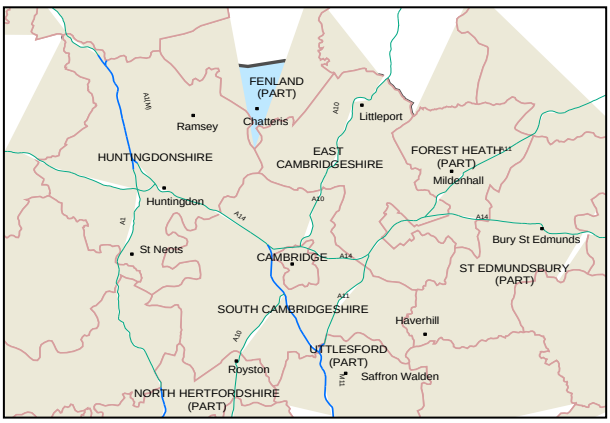



**Figure 3.6: Map of Cambridgeshire County**

[40] Drawn from Barrell, 2006 (Powerpoint Slide # 8)
[41] Adapted from http://www.cambridgeshire-community.org.uk/geography.asp Accessed 05.05.14
[42] Adapted from http://www.siliconfen.com/sfstory.php Accessed 01.03.14

Like Oxfordshire, Cambridgeshire has a well-established asset base to support the growth and development of high technology. Unlike Oxfordshire, it approaches this general initiative in different way; a recent publication lists the following as the main attributes of the region:

- A centre with a 'global profile in terms of its technology-based business community';
- A wide research community, encompassing Cambridge University and various world class science and research institutes;
- The development of Cambridge city as an important regional business and retail centre;
- The 'emergence of Cambridge as a regional hub for the public sector', essentially becoming the 'capital of the East of England';
- An important tourist destination;
- A diverse high-tech enterprise stock of ~1,400 firms, employing ~48,000 people;
- An established scientific/technology labour market, boasting more than 153,000 jobs; and
- A geo-strategic location, 63 miles north of London but only 45 minutes away by train (Adapted from SQW 2011, p.ii - iii).

This development has resulted in a 'leading functional knowledge-based cluster' with a large and growing 'entrepreneurial business community', participating in and contributing to 'local, regional, national and international programmes of innovation, change and new business creation' (Adapted from Barrell, 2006). In addition, the region has everything that competing regions have, including 'the ability to attract partnerships from major multinationals across the spectrum of technologies' because even though it is a small county, it maintains a collaborative culture[43]

> 'of Constructive Chaos in the Cambridge community of scientific and technological missionaries' who possess a 'sense of being part of something significant and special which is making a real impact on the world' (Adapted from Snyder 2005, p.3).

It is clear that Cambridgeshire is well-organised to generate and build on indigenous innovation efforts.

[43] These findings are contrasted with the results of analysing documents and focused telephone interviews in s.7.2.2)

### 3.3.2 M4 Corridor 'Siliconisation'

Silicon Corridor refers mainly to the eastern 'half of the English portion of the M4 Corridor and immediate environs, and is directly responsible for a significant contribution to the UK's economic output:

> "the region stretching along the M4 and M3 motorways, as far as Swindon and Winchester, produces 8% of Britain's economic output; as much as the metropolitan areas of Manchester and Birmingham combined" (July 26th 2014).

This is different from Silicon Gorge, which sits in the western area between Bristol/Bath and the River Severn, and which refers to the agglomeration of technology-based firms and related research and supplier firms and activities in the triangle formed by Bristol/Bath, Swindon and Gloucester. Though relatively smaller and less well known than other silicons in the target regions, the Gorge reportedly started as far back as 1972 when Fairchild Semiconductor constructed a plant (Marston et al, 2010). This section summarised the literature on the UK technology-intensive areas that have assumed the 'silicon' label, first in Oxfordshire and Cambridgeshire, then in the M4 Corridor. What they all share in common are well established universities, agglomerations of technology and related firms, many of which are foreign, and a history, meaning the clusters are mature or maturing. Sections 6.1.3 and 7.1.3 present analyses of the technology agglomeration patterns in the M4 Corridor, Oxfordshire and Cambridgeshire.

#### 3.3.2.1 Doing TMT Business in the M4 Corridor ('Silicon Corridor')

The M4 Corridor is the name given to the area on either side (north/south) of the M4 Motorway, which stretches from Heathrow Airport, West London, to Bristol (a distance of 106 miles) and then across the River Severn to Newport in South Wales[44]. The M4 Corridor (a.k.a. Silicon Corridor) includes geographically Silicon Gorge, the technology sub-region around Bristol, an increasingly attractive settlement choice for foreign TMT firms to do business. The M4 Corridor became famous as home to some of the world's leading technology firms and links to several universities, including Brunel, Reading, West London, Bath and Bristol. The M4 Corridor boasts clear and well-established assets to attract and retain high technology, which the Thames Valley Berkshire LEP has prioritised under four 'economic strengths':

[44] For this study, the M4 Corridor means London to Bristol/Bath.

1. "A highly skilled labour force", with a high proportion of postgraduates;
2. "Advanced sector development", with a deep enterprise stock of large foreign TMT firms, including Intel, Oracle, Panasonic, HTC, Vodafone, Microsoft, Adobe, SAP, Citrix, Lexmark, Pioneer, LG, Nvidia, Dell, Symantec, Novell and Huawei, employing thousands of people.
3. "Proximity to Heathrow Airport" and an excellent strategic location close to London Heathrow (excellent air links to the World)
4. "Accessibility to and from London and the rest of the country" (very good road and rail links), Adapted from TVBLEP Plan 2013, p.7).

Whilst the TVBLEP does not mention universities, there is also a sound university base, including Reading, Bath, Bristol and Brunel, famous in their own right for teaching and research.

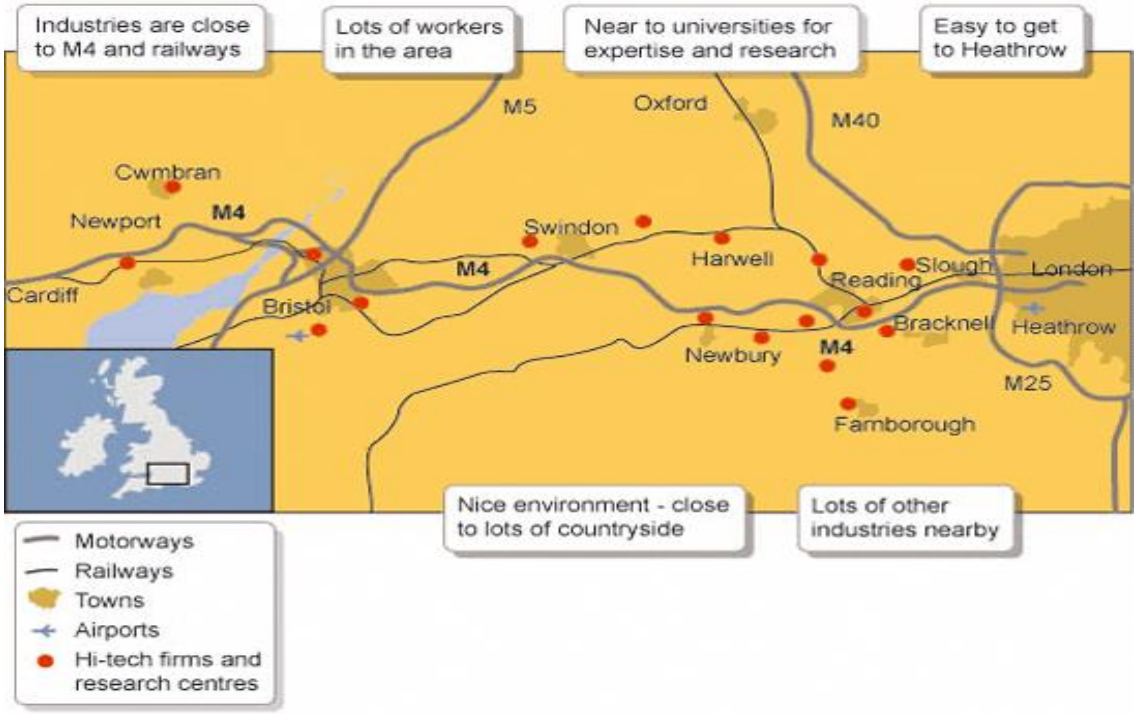



**Figure 3.10: Main route(s) of M4 Corridor**

## 3.4 UK Corporate Real Estate & Site Selection

Having decided on a location (country) by whichever means or method at its disposal, a firm must then turn its attention to finding a place to settle (region) and then a site from which to operate that is appropriate to strategic aims and operational demands. The literature on site selection, unlike location decisions, however, is relatively limited and regularly conflated with location. This section presents three relatively short sub-sections on UK corporate real estate

(CRE) and how the UK classifies its commercial property (s.3.5.1); the search/criteria, process and methods used by firms to search for property (s.3.5.2); and an examination of general siting considerations for TMT firms (s.3.5.3).

### 3.4.1 Classification of UK Commercial Property

The UK classifies commercial property according to the Town and Country Planning (Use Classes) Order (1987), which explains the meanings of the various classes and reasons for the classifications. The Schedule lists four classes, A, B, C and D, which describe respectively the types of businesses and business activities that are allowed in the properties. The 'nature of use' of UK properties is defined by the local authority that has jurisdiction over them[45]. Two classes (B1 and A2) and uses ('financial and professional services' and 'business') relate to science parks but only tenuously.

### 3.4.2 Site Selection Search and Criteria

As a starting point, Schmenner's (1982) seminal work produced a list of factors from his research of corporate plant location, which identified six dominant requirements of a firm when searching for a plant location:

1. 'Competitive labor costs.
2. Degree of and/or potential for labor unionization.
3. Proximity to markets.
4. Proximity to supplies or resources.
5. Proximity to other corporate facilities.
6. Quality of life concerns' (as cited in Rabianski *et al*., 2010, pp.11-12).

In subsequent years, other researchers (Plaut & Pluta 1983; Bartik 1985) identified additional considerations, including 'business climate, taxes, employment base, unionization, and services'. Thirteen years later, Fahri & Cem (1998, p.324) quantified the importance of twenty-seven factors in business site selection, which they reduced further to six key considerations, two of which are of immediate importance to this review. First, they found that 'the most important element in influencing business site selection decision is the availability of skilled labor' and second, that the finding on skills implicated technology 'since many of the responding companies were high-tech businesses, requiring skilled labor is not

[45] http://www.startinbusiness.co.uk/info_advice/regulations/uk/property Accessed 26.05.12

unusual' (p.324). When the twenty-seven factors were factor-analysed, they 'resulted in the discovery of six factors that underlie business location decisions':

1. 'Cost, start-up cost and the cost of running a business' including construction price, land prices, cost of utilities, real estate tax rate, and state tax rate.
2. 'Quality of life or standard of living', including 'availability of college/universities, education of residents, availability of recreational facilities, cost of housing, and availability of industrially zoned land';
3. 'Accessibility via highways and airways', including 'proximity to major (US) airports, highways, and availability of local airport';
4. 'Resources', including 'unskilled labor, water, industrial parks, local investment incentives and the state regulatory environment';
5. 'Business environment', including suppliers, competitors, distributors, financing and transportation; and
6. 'Existing buildings' (p.326).

Rabianski et al. (2010) take a more sophisticated approach to site selection from the real estate perspective and claim that three trends, consolidation, globalisation and e-business, 'have increased the complexity of the site selection process and compressed its temporal nature' (p.3). The first, consolidation, has 'rippled across many industries, including corporate users and real estate service providers', creating 'instantaneous and unavoidable real estate surpluses and/or imbalances' which are difficult to dispose of, in the short term (p.3). The second, globalisation, requires that 'workplace and other real estate needs of firms' are managed in a 'more diverse and broad scope' because 'corporate operations, business and corporate practices (are) complicated, and 'policies and cultures' need to be reconciled (p.4). Even where companies are not operating globally, 'globalization can also impact site selection decisions, as globalization changes business, consumer and competitive market balance' (p.4). The third trend, e-business, has amplified the complexity of the site selection process and threatens to have 'even more dramatic implications on site selection' because it is 'shifting attention away from rigid workplace solutions to ones that are more flexible in terms of the quantity and quality of real estate, in addition to making it more difficult to assess real estate needs and implications' (p.6).

In summary, the site selection literature reveals numerous factors that firms take into account when selecting corporate sites but 'location' is still the broad label applied. Received wisdom is that most firms take a systematic approach to site selection. Criteria can range from costs to quality of life to disaster potential considerations and differ between industries

but decision makers should always be mindful of strategic aims and objectives, because what may make sound financial sense in the short term may not be the best decision for the longer term growth and development of the firm[46]. This research will examine the site-related issues with specific relevance to the TMT sector and with a view to the process and methods adopted by firms.

#### 3.4.2.1 Site Selection Processes and Methods

This section summarises the findings of two studies of site selection approaches, and four papers that deal specifically with site selection methods. Firms employ a range of methods and processes to search for properties to accommodate operations. Schmenner *et al*. 1982 outline a decision-oriented process and Nourse (1992) sets out a logical sequence of decisions and fact-finding. Based on his analysis of Fortune 500 firms involved in corporate plant location decisions, Schmenner et al. (1982 as cited in Rabianski et al., 2010) identified a complete site selection process, involving eight sequential decisions:

1. 'The decision to seek a new site …
2. Decisions relating to size and operational requirements for the plant …
3. Decisions relating to the design and engineering of the plant ….
4. Decisions relating to the key location criteria used in developing a "must" list (conditions which have to be met at any new location) and a "wants" list (remaining location factors that are desirable but not essential).
5. Regional location selection decision(s) to designate candidate regions using the "must" and "wants" list.
6. Decisions to include specific available, desirable sites … to form a list of alternative sites for evaluation.
7. Decisions to reduce the number of alternative sites for site-specific analyses.
8. Site selection decision ….' (Adapted from 2010, p.12)

Schmenner et al's (1982) list includes generic actions and implies a 'do-it-yourself' process without need for or involvement of 'external services providers'. This research will examine specifically the involvement of external parties in the decision process. Nourse (1992) noted that certain considerations that related to manufacturing environments, such as 'a maximum threshold for number of employees or prohibitions against on-site expansion', 'do not apply to corporate administrative office space location decisions'. This recognition reflects the

[46] Adapted from http://www.continuitycentral.com/feature0179.htm Accessed 29.11.11

inferences drawn above (s.3.5.2) that factors and considerations are industry-specific and may even differ from firm to firm. Nourse also noted that 'administrative office space may be situated in diverse geographic locations for political reasons' and 'administration may avoid areas with low unemployment levels to prevent the firm from influencing wage rates that could cause economic disruption in the community' (Ibid, p.13). His seven-stage process differs slightly from Schmenner et al. (1982) because Nourse contemplates the need for fact-finding about size requirements and geographic area between decisions:

1. 'Initiation of decision to expand or relocate facilities;
2. Determination of size and design of facility;
3. Determination of geographic area to target for search;
4. Search for sites in target area;
5. Evaluation of alternative sites;
6. Negotiation for an option to obtain the preferred site; and
7. Submission of capital acquisition request for corporate approval' (p.13).

Rabianski et al. (2001) conclude that the actual selection of a site is 'the step that finalizes the location decision' (p.13). Four key papers have explored methods for selecting sites and are significant for this research. First, Schmenner, Huber & Cook (1987) claim to 'introduce two innovations to the empirical study of plant location: (1) division of the decision into stages, and (2) use of plant-specific characteristics to either magnify or temper factors defined at the state level'. The research tests relationships between expected profitability and site selection as it relates to state and firm characteristics 'through a series of multinomial logit models'. The research claims that 'the plant location decision can be usefully approached as a staged process and that geographically defined differences are not sufficient, by themselves, to explain why some states do better than others in attracting new plants'.

Friedman et al. (1996) analyse 'the location decisions of foreign multinational corporations using a conditional logit model' and consider 'the establishment of new manufacturing plants and analyse the site selection of all MNCs, Japanese MNCs, and European MNCs. Their research finds that 'access to markets, labour market conditions, state promotional efforts to attract foreign investment, and state and local personal taxes are significant favours in the location decision'. Finally, the study finds that 'the decision determinants for Japanese and European MNCs are different'. Hoffman & Schniederjans (2003) argue that 'a critical concern for firms pursuing global expansion strategies involves facility site evaluation and selection' but that 'for expansion to be successful, corporations must identify countries and facility sites that offer a good fit with the firm's overall corporate strategy'.

Their study presents a two-stage model that 'combines the concepts of strategic management, the technique of goal programming and micro computer technology' to provide managers with a 'method for evaluating global facility sites and making selection decisions'. It claims to 'extend the existing literature on corporate facility site evaluation by applying a computer optimization model to facility site acquisition in a way that has not been done before'.

Finally, Bhattacharya et al. (2004) argue that the 'selection of a particular plant location is an important issue when the attributes of the location are conflicting in nature and they have units that cannot be compared'. The authors propose 'the Multiple Criteria Decision-Making (MCDM) methodology (which) makes it possible to select the optimal plant location that fits best for the investor'. They argue that their methodology 'provides a strong decision support system to plant site selection problem and ranks locations using the methodology and claims that it 'give(s) a clear indication about the appropriate application and usefulness of the model for potential uses in plant location selection'.

Corporate real estate personnel, on the other hand, tend to take a systematic approach to selecting sites as reflected in the above studies, which represent a cross-section of methods for selecting corporate sites. The studies range from generic qualitative actions to specialised quantitative tools and techniques to assist decision making, however, the studies all employ quantitative tools and techniques to assist decision making, including a conditional logit model; a two-stage model that relies on goal programming; a multi-criteria decision-making methodology; and multinomial logit models, which focus on the choices available to the respondents. Whilst the studies shed light on the methodological tools normally in use in site selection, they are all of specific single sites and cover particular industries, therefore cannot make claims to universal applicability necessarily, nor can the findings claim to get into the 'lived experiences' of managers who make the decisions, which this study aims to do.

### 3.4.3 The Unique Siting Requirements of TMT firms

Colliers International (2012, p.3) report that "TMT space requirements differ from traditional occupiers on a variety of levels. They need access to more power and faster broadband to ensure their business runs smoothly. They look for more dense space that allows for hot desking and less conventional offices". The report also states that TMT companies "look for creative space where they can design unique common areas to create a sense of community, foster staff communications and have fun" and quite interestingly, that "TMT requirements have evolved over the years" (Ibid, p.3). This obviously has resonance for science and

technology park environments, because it suggests accommodating environments have also to change to meet the evolving requirements of TMT. The report states that there are 'common requests' from TMT firms to enhance the work environment: "to allow for more light and a better work environment". In addition, Colliers (2012, p.5) notes that one of the changes to the work environment has been due to the impact of 'Generation Y', a major outcome being their

> 'Growing influence on technological advancement, notably the use of mobile computing and communication devices, coupled with changing corporate employment structures, particularly an increase in Alternative Working Strategies (AWS)'.

This 'impacts upon the need for offices in several ways', in terms of space (reduction in demand); orientation (need for increased flexibility and attention to work life balance); sustainability (space which 'conforms to standards'); and data centers (greater demand), Ibid; p.5. Finally, Colliers makes the interesting point: TMT firms "are also migrating into key hubs and central locations that foster innovation and attract top talent"[47]. Their unique space requirements can be summarised as follow:

- "access to more powerful and faster broadband to ensure their business runs smoothly";
- "more dense space that allows for hot desking and less conventional offices";
- "creative space where they can design unique common areas to create a sense of community, foster staff communications and have fun"; and
- enhanced work environments "to allow for more light and a better work environment" (Colliers 2012, p.3).

There are several key implications for TMT firms; first, property will be more costly for TMT firms (*i.e.* higher rentable values and rents); but, because more dense space can do, TMT firms will require less space per person and third, business continuity is a critical concern for TMT firms. Finally, if the siting requirements of TMT are always evolving, then the potential accommodating environments, such as Science Parks, also need to be flexible to meet these changing needs.

[47] Adapted from: http://www.colliers.com/-/media/files/emea/emea/brochure/emea-tmt-brochure-2012.pdf Accessed 27.04.14

## 3.5 Science Parks as a Specific Siting Option for TMT Firms

This section discusses science parks in a UK context and related issues relevant to this research, including ownership and management; development strategies; and critical success factors, all leading to an examination of science parks as a specific siting option for internationalising TMT firms. The analysis accepts that 'science park' as a construct remains challenging for several reasons and addresses the issue in section 3.6.2 but starts with a brief history of science parks.

### 3.5.1 A Brief History of Science Parks

The existence of science parks can be traced to Stanford Industrial/Research Park (1951), when Stanford University commissioned a(n) R&D lab 'on the edge of campus' to create facilities for the start-ups out of the University[48]. Shortly afterward, four new science parks were built (three in the USA, one in Russia), between 1952 and 1960, and in the subsequent decade, a further 2% of all science parks were created (to 1969) with another 2% by 1979 (Link & Link, 2003; IASP, 2002). Figure 3.13 summarises park formation from 1960 to 2000 and again, to 2006/7. By 2008, the International Association of Science Parks (IASP) was 'boasting 400 members in 70 countries worldwide' (Mitra 2012, p.206), confirming that science parks had become a global phenomenon with representation on every continent.

In contrast to the early years, the 1980s and 1990s could probably be described as the 'decades of the science park', because from 1980 to 1999, there was a rapid increase in science parks (accounting for 30% and 48% of all parks created, respectively). If 1980 to 2000 were the decades of the science park, then the year of the science park was 2000, the single biggest year for science park creation, when 18% of all parks were created (IASP 2002). The literature offers no explanation for the increased activity in this particular year. Of all parks created by 2001, 26% of tenant firms were involved with ICTs, 20% with biotechnology/life sciences and 19% with electronics/computers (IASP 2001). In 63 years, science parks have become institutionalised[49] in the pursuit of regional development in many countries (Castells & Hall, 1994; Kung 2001; IASP 2002).

[48] https://www.stanford.edu/about/history/history_ch4.html Accessed 03.04.15
[49] 'Given the character of an institution or incorporated into a structured and usually well-established system' http://www.wordreference.com/definition/institutionalised Accessed 20.08.11.

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**Figure 3.11: Creation of Science Parks (IASP, 2007)**

The IASP brings together experts in the field of science parks and provides a global network and forum for members, highlighted by several major conferences each year, including a 'world conference' once per year[50]. International science park growth can be shown in the IASPs membership growth chart from 2001 to 2013[51]:

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**Figure 3.12: International Growth of Science Parks (IASP, 2015)** [52]

Several publications highlight the effectiveness of the science park environment for tenant firms, the pervasiveness of the phenomenon and the ineffectiveness of UK parks (Monck et al., 1988; Castells & Hall, 1994; Massey et al., 1992). Additionally, other publications focus on the effect of the science park environment on innovation and entrepreneurship, links with

[50] The 32nd World Conference will be in held in Beijing in Sep-2015; http://www.iasp2015beijing.cn/dct/page/70003 Accessed 05.04.15
[51] N.B. Not all 398 IASP members are Science Parks
[52] Taken from: http://www.iasp.ws/facts-and-figures Accessed 26.02.15

HEIs and properties as regional instruments (Aydalot & Keeble 1988; Westhead & Storey 1995; Westhead 1997; Gönel, 1999).

Previous science park research has focused on a wide range of issues, from demographic and physically descriptive studies (Monck et al., 1988; Link & Link, 2003) to innovation and entrepreneurship (Westhead 1997, Lai & Shyu, 2004; Siegel et al., 2003; Wallsten, 2001) and regeneration (Goldstein & Luger, 1991; Jowitt, 1991). Some publications examine science parks in relation to models of innovation and the link between basic research, applied research and technology commercialisation (Westhead & Storey 1995; Link & Scott 2002; Siegel et al., 2003), whilst others paint less complimentary pictures of the properties as 'business failures' (Massey et al., 1992) and opportunistic 'property responses' to technology advances (Gower & Harris, 1994), thus leaving few areas unexplored. Except for a few of these studies (for example, Monck, Massey), the focus is on science parks in other countries (mainly US), so the next section examines the development of science parks in the UK.

#### 3.5.1.1 Development of Science Parks in the UK

Science Parks first emerged in the UK in the early 1980s, with Cambridge and Heriot-Watt Science Parks claiming to be the UK's first; and which made a total of two by the end of 1982. The UK Science Park Association (UKSPA) was founded shortly thereafter and experienced a steady growth in membership (see Table 1.1). According to UKSPA (2011[53]),

> 'there is (still) a strong regional and local focus to their establishment' (and) 'Science Parks remain diversified and specifically cater for local needs, and are not part of a national 'one size fits all' model'.

According to another view, "within the European context, the UK is the country in which science parks have been implemented and analysed in a more systematic way" mainly driven by two changes, one in the macro-environment and the other in the technological micro-environment (Vedovello 1997, p.493). The first "is the reduction of financial support to British universities from traditional sources (Government)", a trend that started in the 1970s, accelerated in the 1980s and recently up to 2010; and the second "relates to the lack of technological dynamism within the British industrial sector" which resulted in increasing reliance on improving industrial performance through the better exploitation of scientific and technological resources" (Ibid 1997, p.493 citing Jones & Dickson 1985; Monck et al. 1988; Massey et al., 1992). UK science parks promised 'at least a partial solution to these problems',

[53] UKSPA, Chief Executive

so long as they were co-located with universities and generating 'closer linkages' (Ibid). Forty per cent of UK science parks are located in London and SE England, the general area covered by this research.

### 3.5.2 Defining Science Park - a Problematic Construct

The problems with the science park as a construct begins with the lack of a consensus definition, which is elusive in the literature. Antiroikko (2004) argues that the absence of consensus reflects a lack of conceptual clarity, which hinders knowledge development. Each major organisation has its own definition, as do many major publications (AURRP; UKSPA; IASP; Castells & Hall 1994; Link & Link 2003; Kung 2001 and Phan et al., 2005). The IASP (2002)[54] definition focuses on wealth creation for an unspecified 'community' whereas Castells (1994, p.2) puts all science and related parks together as 'technopoles'. Link & Link (1998) prefer the Association of University Related Research Parks (AURRP) definition, which focuses on Science Park attributes ('components') but gives no further insight as to why the AURRP definition is preferable.

Kung (1997, p.1) collected more than thirty related terms from the research literature (1984 to 1994) from which he distils three terms but offers no definition, though he made several uncomplimentary observations about the concept and its related terms, including '… these terms were loosely defined and used interchangeably without clear distinction'. UNESCO offers a very specific definition: "a property-based initiative with an organizational entity, which is established to assist the growth of knowledge-based firms normally resident on site and knowledge-intensive activities" but seems unsure of its choice so points to four organisations '… where one can find different definitions of Science Park': IASP, UKSPA, AURRP and the British Council[55].

In addition, there are at least two other definitions; UK Trade Invest (UKTI) defines science park as a business support and technology transfer initiative that is innovation-focused and a platform for international firms with formal ties to HEIs[56], whereas the EU focuses on incubation and job creation and defines science park as 'a place where newly created firms are concentrated in a limited space. Its aim is to improve the chance of growth and rate of survival ....' (European Union, 1990). MacDonald (1987) implies that science park is a generic term '…which is used to describe the following package: (1) a property-based initiative close

[54] IASP International Board, Feb-02 www.iasp.ws Accessed 19.02.05
[55] http://www.unesco.org/new/en/natural-sciences/science-technology/university-industry-partnerships/science-and-technology-park-governance/concept-and-definition/ Accessed 26.02.15
[56] http://www.invest.uktradeinvest.gov.uk/rd/sciParks/index.cfm Accessed 13.01.05

to a place of learning and (2) one which provides high quality units in a pleasant environment' (cited in Löfsten & Lindelöf 2002, p.861). Perhaps UKSPA provides the most comprehensive definition, as noted in section 1.2 as the preferred definition for this research.

Finally, Phan et al. (2005, p.166) propose a definition, which is more complete because it expands the remit of properties: 'property-based organizations with identifiable administrative centers focused on the mission of business acceleration through knowledge agglomeration and resource sharing'. The multiple definitions expose two conceptual weaknesses; they demonstrate a lack of consensus on the one hand, and point out inconsistencies on focus, on the other. Several versions provide for formal HEI collaboration but even basic collaboration is not always the case and this requirement would exclude many privately owned science parks. For example, Westhead & Storey (1995, p.345) concluded 'the vast majority of links developed with local HEIs are generally informal ones' and cite Hakansson's finding that 'collaborative relationships evolve organically and informally'.

Second, few definitions (AURRP, MacDonald and Phan et al.) contemplate explicitly the property aspect of science parks, whilst other definitions are very specific and exclusive. Antiroikko (2004, p.303) sums up the inconsistency and confusion in the subject area:

> 'Even though this research field has developed rapidly within the last 20 years, this conceptual field is far from clear. One basic problem is that the naming of parks has not been based in any clear set of criteria, which leads to confusion between the names used and the factual features of high-tech formations'.

Unclarity of definition frustrates meaning, which, in turn, frustrates knowledge development. 'Science park' has become a common label but, the lack of a common definition lies at the heart of the uncertainty and conceptual confusion. Finally, science parks have been adopted as a policy tool in many world regions (now in more than 70 countries[57]) and understandably so, since regional development is arguably the most profound effect of a property which the well-publicised successes of Stanford Research Park, Research Triangle Park and Sophia Antipolis evidence. Despite this, however, science parks have been dismissed *inter alia* as opportunistic real estate initiatives (Gower & Harris 1994), 'political quick-fixes' (Jowitt 1991) and 'business failures' (Massey et al. 1992). Whereas some researchers find evidence of regional propulsive effects or no conclusive proof either way, two decades of literature have discussed science parks in terms of drivers of local economic development, with several writers rejecting them as effective economic development instruments.

[57] http://www.iasp.ws/web/guest/by-country Accessed 16.05.14

The various interpretations suggest that the debate on 'science park-led local economic development' is still in flux whilst the concept itself remains mired in confusion and so still in need of further empirical research.

### 3.5.3 Ownership, Management and Development Strategies of UK Science Parks

In order to address science park ownership, three dimensions need to be considered; number, type and profit-orientation of owners:

1. Science parks have one, two or more shareholders (*i.e.* have a sole owner, joint owner or consortium structure);
2. Science parks have one or more of five organisational types as owners (*i.e.* HEI (*e.g.* Cambridge University); Plc company (*e.g.* MEPC), Ltd company, State-owned Corporation or the State); and
3. Science parks operate for profit (usually but not necessarily private) or not for profit (usually but not necessarily public).

With regard to the last of these, European level data show that "in the period 2000 – 2012 the central estimate sector of public capital investment into the EU's STPs is circa €4.8billion alongside private sector investment of €6.9 billion[58]. In addition to ~€12 billion, public sector investment has extended to 'revenue grants' (€1.7 billion) for 'professional business support and innovation services' over the same period, again with a significant private sector input of about €1.3 billion. These very significant levels of public sector investment in science parks "shows little sign of abating in the short and medium term" (Adapted from EC RUP 2013, p.4).

Regarding management of science parks, a small team (five to ten members) is fully capable of managing and representation at governance level is largely limited to three sets of stakeholders: owners, investors and HEI representatives, where HEIs are owners (Seymour 2006, unpublished). Central to the empirical focus of this research is how science parks plan and implement development strategy, as defined by Ylinenpää (2001), who created a much more comprehensive and important concept than is first apparent by a layman's use of the term because it has wider connotations such as contributing to regional development. Despite the fact that Ylinenpää first clarified the concept more than a decade ago, the science park literature has little to say about 'development strategy', yet there has been much

[58] There are no similar estimates for the UK but proportions are believed to be the same, if not slightly higher for private.

discussion about incubation, a key consideration of development strategy as evidenced by the fact that ~92% of science parks have some incubation.



**Figure 3.13: Key Activities of Science Parks (IASP, 2015)** [59]

However, science park-led economic growth cannot be solely a result of 'growing firms from scratch', since there is at least one other generally acknowledged way of generating science park-led growth by attracting firms (Elstrom et al. 1997). There is also mention of how to attract firms but no real examination of the variations in approaches that could arise in development strategy. Ylinenpää (2001, p.8) specified "utilising a larger, normally multinational hi-tech corporation as a locomotive to boost development is not the sole avenue to success" but the author (Ibid) identified two distinct strategies:

> (i) "to focus on creating as favourable conditions as possible for commercialisation of research-based ideas in the form of spin-out companies from universities and other HEI's (an 'incubator strategy'); and
>
> (ii) to attract established and larger corporations to locate knowledge-intensive divisions or units in a park and close to the expertise and the recruitment base which a university represents (an 'attraction strategy')".

The two very clear strategies are further qualified: the 'first strategy requires devotion to developing an organisation that identifies and supports potential business concepts and products from a university' and is characterised by 'an interest in management support, mentoring systems, seed capital, early business training and flexible premises' which 'allow tenant companies to grow' (Ibid). The 'second strategy has more emphasis on the need for the Science Park to engage in facilitating recruitment of established firms, since this is often a strong argument for attracting existing companies to the Park.

[59] Taken from: http://www.iasp.ws/facts-and-figures Accessed 26.02.15

This strategy also involves more emphasis on tailoring premises according to the specific needs of the company, either by offering bespoke tenant-solutions or by offering land where the company may build its own premises. A key finding of the research is the following conclusion (2001, p.9):

> "Science Parks similar to Porters (1980) reasoning on the risk of being 'stuck in the middle' should avoid combining strategies that are built on different logics and require a different set of measures to be implemented".

Appendix 3.1 summarises the key characteristics of science park development strategies. Ylinenpää's was the first and only comprehensive attempt to address the specifics of science park development strategy explicitly. Given the above limited coverage in the literature, the field would benefit from further research on two fronts:

(i) to establish clarity in the strategic options facing science park managers; and

(ii) to establish linkages, if possible, between science park strategic options and the managerial decisions taken by firms (particularly, TMT) settling into the UK with regards to where and why they settle.

Increased clarity in development strategy options and deeper understanding of managerial decisions of TMT firms would benefit immediately science park managers and regional policymakers.

### 3.5.4 Critical Success Factors and Success of Science Parks

The factors that influence science parks can be viewed in two ways: those that contribute directly to or cause the initial formation and those that contribute to or cause success. Of the first, many factors have been promoted in the literature as contributing to or significantly influencing the initial and continuing development of science parks (Monck et al. 1988; Massey et al. 1992; Castells & Hall 1994; IASP 1998). Six prominent factors feature in the literature: visionary personality, HEI involvement, HEI collaboration, HEI proximity, technology innovation and entrepreneurship and public sector support. In addition several success factors exist: image and reputation and the factor inputs to the competitive diamond.
The presence of a visionary personality to conceive and catalyse initial formation of science parks can be traced back to Stanford Professor Fred Terman, the forerunner to a rich tradition of visionaries including Romeo Guest, and Robert Hanes at Research Triangle Park (Link & Scott 2000), Pierre Lafitte at Sophia Antipolis and Professor Bugliarello at MetroTech

(Bugliarello 1995). Second, the literature suggests four determinants that relate to HEIs, which are presumed to be both necessary and sufficient for science park development (AURRP 1998; Link & Link 1998). Several definitions explicitly include HEIs (see section 3.6.2), which may appear in several guises as owner (sole or part), supplier of intellectual capital to meet labour demands (Charles 2003) or a nearby source of facilities (*e.g.* wet laboratories and library).

Third, there are several well-known science parks that are co-located with HEIs in order to facilitate collaboration or expressly created HEIs for the purpose (for example, St John's Innovation Centre/Cambridge University; Surrey Research Park/Surrey University; and Heriot Watt Science Park/Heriot Watt University). The collaboration is 'assumed to encourage innovation and production' (Westhead & Storey 1995, p.346), but whilst the university-industry link is highly promoted as a formal and beneficial association and some studies find evidence of mutual benefits (Westhead & Storey 1995 on NTBF survivability), others have found that the association may not meet expectations (Felsenstein 1994).

A fourth determinant is HEI proximity or adjacency, which figures in the location decisions of many science parks or alternatively, in development decisions. In the UK,

> 'proximity of the science park in relation to the HEI or research centre has been highlighted as an important factor affecting the potential performance of the science park development' (Gower and Harris 1994, p.26).

Whilst many HEIs have spawned science parks, several technology centres also have created universities as a key part of their development plans (for example, Nice University by Sophia Antipolis and Cyber University by the Malaysia Super Corridor). Either way (whether HEI or science park is prior), proximity is considered a key determinant and influencer. Massey et al. (1992, p.39) show, however, that HEI proximity is neither a necessary nor sufficient condition since many parks had less and less contact with the educational institution and 'real research links (do) not seem to be increasing over time as one might possibly expect with the maturing of the park-HEI relationship'. Other practitioners also suggest that HEI proximity may not be a key factor. Hansson et al. (2004, p.2) conclude 'it seems that Science Parks have generally failed to play a noteworthy function in establishing network relations between university researchers and firms'. Nonetheless, many new parks situate in close proximity to HEIs (or create HEIs) in the hope that the theorised benefits of proximity will be realised. In addition to the HEI-related determinants, at least two others exist: public sector

support and technology innovation and entrepreneurship (Felsenstein 1994; Westhead 1997; Link & Scott 2003; Miller 2004). Another well-publicised determinant is public sector support, which includes a range of federal, national, regional and municipal organisations and programmes that may include

> 'subsidies of the physical development of parks, public financing of R&D, government grants and loans, public sector contracts, financing of start-ups and privileged access to publicly funded research' (sec. 3.6.3; Gower & Harris, 1994; Massey et al. 1992, p.209).

It is argued that public support and continuing involvement is a crucial ingredient to science park formation and success in the UK (Ibid 1992). In the UK, for example, during the busiest period of park development in the mid-1980s, 62% of the total spending was contributed by the public sector (Gower & Harris 1994, p.27, quoting UKSPA data)[60]. This 'high degree of public dependence' in the UK and other countries, however, is not evident everywhere and other parks have been developed solely from private investment. Also, the public generosity does not appear to have been replicated in other jurisdictions such as the US and some European countries, including Finland, Denmark and The Netherlands, or indeed, all parts of the UK.

In addition to the determinants identified above, some writers have identified success factors for a park once operational (Monck et al. 1988; Massey et al. 1992; Castells & Hall 1994, Ylinenpää 2001). Ylinenpää (2001, p.12) quotes a 1998 IASP study and the 1988 Monck study to argue that 'the single factor most evidently related to successful Science Parks … is a favourable image'. This claim clearly depends on how success is measured; if by number and growth of tenant firms attracted, then the claim is plausible and can be substantiated by surveying tenants. If success is measured in another way, however, for example by the quantity and quality of basic research successfully commercialised, then the claim may be more difficult to validate. Because success occurs a posteriori, it implies that new parks cannot be successful or that success would be difficult to assess in newly built parks.

Additional success factors include accessibility issues such as a proximate market for goods and services, access to buyers and suppliers, venture funding, a talented workforce, a good telecommunications infrastructure and an attractive working and living environment (Ylinenpää 2001, p.2). Other Porter-derived recipes for success build from initial basic factor

[60] N.B. Gower and Harris (1994) include government, local authorities and HEIs in the public sector.

inputs but Antiroikko (2004, p.297) argues that the ingredients are necessary but not sufficient: '(the) cultural context in which these elements materialise' is what is essential, not necessarily any individual element. This view is supported by Ylinenpää (Ibid), who agrees that 'most of the characteristics may be regarded as necessary but not sufficient factors for being successful'.

Finally, a(n) UKSPA-commissioned report contradicts previous research by implying that the region must exist a priori. It found that "the most important single factor affecting the performance of individual (UK) Science Parks is the state of the Sub Regional Knowledge Economy within which they are operating", the sub-national knowledge economies being defined as:

> 'Knowledge Heartland Economy' ("all elements of the sub regional knowledge economy are fully established and pathways working well");
> 'Developing Knowledge Economy' ("most elements of the sub regional knowledge economy are established with some pathway or capacity restrictions"); and
> 'Economic Development Priority Area' ("major elements of the sub regional knowledge economy and/or pathways are either missing or constrained") Angle Technology (2003, p. II).

In summary, many factors contribute to or significantly influence the initial and continuing development of science parks. However, a key concern in respect of these well-publicised factors is whether factors are necessary and/or sufficient conditions for the successful development and continuing operation of science parks (Ylinenpää 2001; Antiroikko 2004), which is not clear from the above arguments.

### 3.5.5 The Additionality of Science Parks

This final sub-section discusses science parks in terms of their attractiveness for TMT firms and the additionality provided to tenant firms ("the extent to which activity takes place at all, on a larger scale, earlier or within a specific designated area or target group as a result of the intervention", Additionality Guide 2008, p.3). As noted in sub-section 3.5.3, the space requirements for TMT firms contrasts sharply with that of 'traditional' firms 'on a number of levels', including but not limited to 'access to more power and faster broadband', 'more dense space that allows for hot desking and less conventional offices' and 'creative space where they can design unique common areas to create a sense of community'. In addition to these

current considerations of the physical workspace, several previous studies have focused on comparative company performance and the performance of onsite and offsite technology-based firms. Various researchers have alleged that science parks have not made any real difference to university commercialisation, that no proof exists that firms would not have started anyway or that there is no discernible difference between onsite firms and offsite firms (Felsenstein 1994; Westhead 1997; Löfsten & Lindelöf 2002; Wallsten 2001).

However, other studies have found the opposite (Westhead & Batstone 1996; Siegel et al 2003 on UK university science parks; Angle 2003). The most important and relevant to this research is the UKSPA-commissioned study by Angle (2003), which looked specifically at comparative company performance with regards to UK science parks, and found that onsite firms out-performed off-site firms, in terms of 'company performance'; 'innovation performance'; 'location characteristics and perceived benefits'; 'Science Park service provisions and usage'. On the first comparator, 'company performance', Angle (2003, p. IV) revealed four findings on growth ("science park based companies have higher growth rates than similar companies at other locations"); number of employees ("a higher proportion of On-park companies reported having 10% more Full Time Equivalent employees (FTEs)); turnover ('greater number of On-park companies reported having turnovers higher than Off-park companies'); use of external funding ("On-park companies utilised venture capital, public sector and angel finance to establish their businesses to a significantly higher degree"); and access to finance ('less of a problem') and not a constraint for on-park firms (2003, p. IV).

Comparing 'innovation performance', Angle found 'significant differences between similar companies located on and off science parks' in new product development and launch ("Off-park New Technology Based Firms (NTBFs) launched nearly twice as many new products on average than On-park NTBFs"); new service development ("On-park NTBFs launched significantly more new services than their off-park counterparts"); highly qualified staff ("On-park NTBFs have a significantly higher proportion of Qualified Scientists and Engineers (QSEs) than Off-park companies"); and R&D investment ('no difference between the intensity of investment in R&D in On-park and Off-Park' firms), Ibid. However, the study reported significant differences in terms of innovation performance 'between Science Park companies depending on their sub regional economic environment', finding that "On-park NTBFs located in Knowledge Heartland Economy Areas produce almost double the number of patent applications than Onpark NTBFs in Developing Knowledge and Economic Development

Priority Areas" and that "NTBFs located in Economic Development Priority Areas launched the most products of all regional areas" (see section 3.6.4 above).

On 'location characteristics and perceived benefits', Angle (2003) published three key findings on 'attractability' ("Science parks attract a statistically higher proportion of NTBFs than Offpark locations"); 'appeal' ("the most important factors in attracting clients to a Science Park location are the physical attributes"); and "image enhancement' ("67% of companies considered that their Science Park location had added to their overall market image"), inter alia (Ibid, p.III). Angle's (2003) final comparator, 'Science Park service provisions and usage', revealed two findings that seem at odds with the above, on 'service usage' ("On-park organisations made more use of the basic office services than the more specialised business and technology services"); 'perceived benefits' (the majority of organisations do not feel that a Science Park location provides them with any perceived benefits in relation to "access to new markets, technological development, research linkages and capital networks/finance", "competitors located off Science Parks", "access to technology transfer opportunities", "business networks, distribution channels, supply chains and On-park business interactions", HEI linkages ("41% of the On-park companies had a "link" with a university or research institution and of these, 90% indicated that their link was with a local university of research institution") and "Informal connections with academics and universities were identified as the most common link but only 26% of On-Park companies with linkages to universities and research institutions considered them to be strong").

Other studies have produced similar findings. In an 'extensive quantitative survey', Dettwiler et al. (2006) focused on the correlation between facilities management (FM) and the entrepreneurial environment, finding that for new technology-based firms, "FM indirectly contributes to beneficial scenarios for interaction, interfirm relations and networks that can be found particularly in Science Parks". The authors (2006) argued that FM is "a contributory background element in the enhancement of the entrepreneurial environment, which is one explanatory factor of the superior performance and growth of NTBFs located inside Science Parks". Yang et al (2009) found that technology-based firms located within science parks are, in comparison to their counterparts located outside of science parks, are significantly more efficient in terms of R&D investment and enjoy a 'slight advantage in R&D for firms in the science park, as a result of the clustering effect of proximate similar firms and research institutions'. More recently, a small study in Norway found that

> "NTBFs based on SPs exhibit higher Top Management Team (TMT) performance and polychronicity compared to their counterparts outside" but did not find any "evidence for the influence of location while considering the effect of innovation speed" (Omolo 2011, p.43).

In summary, the additionality of science parks has been questioned in some contexts, but on balance the evidence suggests that science parks do contribute over and beyond the 'reference case'[61], if judged against the main criteria of 'scale' (increase in firms, jobs, spinoff economic activity); 'timing' (have regenerated areas); 'specific area or group' (technology firms, HE and research institutions); and 'quality' of outputs such as R&D and FM. Given that science parks offer a particular environment and TMT firms are seeking a particular type of accommodation, it should mean that a natural synergy or 'fit' exists.

This section examined the history of the science park phenomenon and reviewed key related aspects, such as raison d'etre/purpose; ownership, management and control; development strategy; critical success factors and the additionality offered by science parks. What is clear is that conceptual confusion remains and whilst ownership of science parks is clearly profiled, the concept of development strategy has not been given much coverage since its first publication. This research places development strategy at its heart in order to establish the role played by science parks in the site selection of foreign TMT firms, which itself, implicates a development strategy. Next, the literature is examined for current states of knowledge for the main subject areas summarised in this and the preceding chapter closes with a presentation of limitations as areas for further research.

## 3.6 Chapter Summary – Synthesising the Literature

The current literature on the areas that this research will focus empirically, are limited in several ways: for location, settlement and site-selection of foreign TMT firms, studies tend to be focused at the 'country' level, *inter alia*; and for science parks, studies tend to be limited in terms of methodology, in particular, positivist and science park as unit of analysis (*c.f.* tenant firm). With studies consistently overlooking the final stages of location, settlement (and therefore, the sub-national region) and site-selection, they leave a knowledge gap that means the subject area is never complete. With studies consistently having been conducted from the tenant perspective, it limits the extent to which the phenomenon of science parks can be best

[61] What would happen anyway

understood and explained. The volume of research on science parks has not been accompanied by a similar level of methodological creativity and diversity of perspective. Location study limitations are summarised in 3.7.1 and science park study limitations, in 3.7.3. Section 3.7.2 summarises the literature on the target sub-regions.

### 3.6.1 Location, Settlement and Site Selection (Foreign TMT firms)

Four main limitations are evident from the location literature:

1. Location studies tend to focus at the level of location, that is, the country or 'supra-region' and not so much 'sub-national' settlement (regional level) or site selection at the final level (premises) or whether in relation to this research, on/off a science park, specifically, s.2.4;
2. The reasons why firms choose certain locations are well covered in the literature but why firms may choose a particular site is not addressed, see s.2.4.2;
3. Location studies of selection methods tend to be limited by methodology (quantitative methods) and driven by software; and
4. Location studies are increasingly being conducted by professional services providers and published in 'practice' or 'applied policy' publications, which suggests that research focuses on 'practice-based' and not conceptual issues, see s.5.2.

### 3.6.2 UK Technology-intensive Regions

The existence of technology regions are rooted generally in industrial districts of the late 19th century but can trace their beginnings to Stanford Industrial/Research Park (1951), which became the progenitor of Silicon Valley. Since Silicon Valley, there has been a proliferation of technology regions around the world with a stream of 'Baby Silicons' across the U.S. and then a stream of 'me-too' Silicons across the world, including the UK. Three UK 'Silicons' are central to this research and are the focus of this section, Silicon Corridor (M4), Silicon Gorge and Silicon Fen (Cambridge).

The M4 Corridor boasts clear and well-established assets to attract and retain high technology; and likewise, Oxfordshire and Cambridgeshire boast clear and well-established assets to support the growth of high technology. The two counties also boast clear technological foci (s.3.3.1.1). One issue for this study is to assess how landing foreign TMT firms view and act on this obviously comprehensive and well-conceived value proposition.

### 3.6.3 UK Science Park Knowledge

A consensus definition of 'Science Park' is elusive and this is reflected in the multitude of definitions that populate the literature. Each major organisation has its own definition, as do many of the major publications. The absence of definitional consensus suggests conceptual unclarity, which hinders knowledge development in the field. In the UK, all manner of science parks exist, including but not limited to science, technology, research parks, and innovation centres. UK science parks are owned by the full complement of owners, including one or more of all five organisational types; one, two or more; and operate for profit or not. UK science parks host a range of tech-based and enabled firms, from local new ventures to established overseas firms; however, it is not clear to what extent the current tenant mixes of UK science parks reflect the main strategies identified in the literature. Several key limitations in previous science park studies can be summarised from the literature. Early (pre-2000) studies (Aydalot & Keeble 1988; Monck et al., 1988; Westhead & Storey 1995; Westhead 1997; Gönel 1999) tended to focus on the effect of the science park environment on innovation and entrepreneurship, links with academia and properties as regional policy instruments, section 3.6.1. Other early studies (Jowitt 1991; Massey et al. 1992) and Link & Link (2003) also examined science parks in terms of regional propulsive effects, s.3.6.2.

Several of the above studies are limited by depth (number of sites studied, so single or a pair of sites), breadth (big singular issues) or geography (single country or region within a country, or a comparison of two regions/countries)[62]. Many of these constrained studies focused on a direct performance comparison between onsite and offsite firms (see Appendix 1.1). The relatively few studies (for example, Goldstein & Luger 1991; Ylinenpaa 2001; Lai & Shyu 2004) that venture beyond the single-site are basic two- or three-site comparisons, which create uncertain bases for empirical generalisations in the absence of further study but could be the basis for analytical generalisation, s.3.6.2. Other publications (Westhead & Storey 1995; Link & Scott 2002; Siegel et al. 2003) examine science parks in relation to models of innovation and the link between basic research, applied research and technology commercialisation.

This links to the final observation that many works are applied policy publications (Angle 2010) rather than academic research, which suggests that science park research tends to focus on 'practical' and not conceptual issues, and the majority of science park studies are

[62] As noted previously, this research will not address that gap because it is UK-focused.

limited methodologically, meaning they tend to be based on case analysis (phenomenon, not context) and conducted from the perspective of the tenant firm as the unit of analysis). For a summary of selected previous science park research, see Appendix 1.1.

### 3.6.4 Exposing the Gaps and Areas for Further Research

This chapter analysed themes in the literature relating to foreign TMT firms and UK science parks. Themes were grouped into five main sections, three of which focused on the 'context' (the region; world technology regions; UK technology regions) and two of which focused on the phenomenon (UK corporate real estate and site selection; and science parks as a specific siting option for TMT). There are two broad gaps in the literature: the first relates to internationalising TMT firms and unclarity around the last of the three sets of choices as outlined in section 1.1; the second relates to unclarity around the strategic alignment of science parks, given the wide documentation of the phenomenon as ideal environments for technology. The discussion of issues relating to science parks and site selection, inter alia, has exposed several areas for further research. The literature advises that TMT firms are prone to internationalisation and this propensity for expansion has led firms to search of markets all over the world, including Europe, the UK and London, which are at the forefront of migration trends. However, it is not clear why TMT firms make settlement and site selection choices, particularly, the last of these and the process used for making the selections? It is also not clear whether UK-bound foreign TMT firms that site operations in a particular sub-region or science park have a definable profile (size, stage of development, sector, product, etc)?

The literature revealed that UK Science Parks, on balance, produce additionality and implies that parks are ideal environments and therefore, siting choices for TMT firms, especially new firms; also, that UK science parks host a range of technology-based and enabled firms, from local new ventures to established overseas firms. However, it is not clear to what extent the current tenant mixes of UK science parks reflect clear strategic choices of the properties as set out in the literature (Ylinenpaa 2001, p.8). Therefore, it is not clear whether UK science parks have a defined development strategy that can effectively be readily articulated or implemented. Neither is it clear whether UK science parks play a role, meaning do they figure in search and selection decisions of TMT firms? Finally, it is also not clear what role is played by UK science parks in the site-selection of foreign TMT firms which land in the UK.

The above gaps form the basis of the research agenda, which comprises of four research objectives and four research questions (section 1.4). In summary, this chapter considered the phenomenon under study, UK Science Parks, by focusing on the region and regional policy; world technology regions to contextualise the phenomenon of technology-intensiveness; UK technology 'super regions'; UK CRE and site selection and science parks to make the case for SPs as specific siting options for TMT firms.

## End of Chapter Three

# Chapter Four

## From Critical Realist Philosophy to Methodology

## 4.1 Introduction to Research Methodology

This chapter discusses the philosophical basis of the study, describes and justifies the methodological stance, strategy, methods and research design. It bridges the preceding literature reviews with the empirical Chapters (5, 6 and 7) which follow, with:

- A summary description of the structure and research process;
- Rationales for the philosophical and methodological choices;
- Justification of critical realism (CR) and the choices it imposes, including research strategy, research methods, design, process and quality;
- An initial conceptual framework to underpin intellectually the research and uncover 'what is what' about the role of UK science parks in the site selection decisions of internationalising foreign TMT firms; and
- A detailed description of each phase of the research process.

This chapter is organised in seven sections and structured as follows. Section 4.1 introduces the chapter, explains research ethics, and justifies the philosophy of science choice, Critical Realism. Section 4.2 defines and discusses CR (s.4.2.1), then summarises the demands it imposes on this research (s.4.2.1), particularly with regard to choices of research methodology (ideographic), research strategy (inductive) and research method (qualitative). Sub-section 4.2.3 explains conceptualisation and presents the initial conceptual framework. Section 4.3 discusses the link between philosophy and research strategy and justifies the inductive research strategy. Section 4.4 presents the research methods and process (data preparation, instrumentation, collection, reduction and analysis). Section 4.5 discusses and justifies choices relating to the case study research design (two detailed case studies). Section 4.6 discusses research trustworthiness, along with how threats to the research are managed. Section 4.7 summarises the research methodology and closes the chapter.

### 4.1.1 Research Ethics

Following Coventry University's online risk-based approach to the conduct of research, this research employed three data collection instruments that were adjudged to be of 'medium-high', 'medium-high' and 'low' risk, respectively. Medium to high risk arises when 'human participants are involved in the research and/or when using primary data'; low risk research involves 'no human participants and/or secondary data'; and desk-based research involves

'materials already in the public domain and does not involve human participants'[63]. Each questionnaire was subjected to the 'Good Practice Checklist' (Document RC12/9 2013, p.13) and for each stage of the multi-stage research process, an Ethics Form was completed to record the planned data collection, informed consent for each instrument, and the content incorporated into the opening section of each. Below is a summary of the research projects assessment results.

| Ref | Title | Risk level | Module | Status | Stage |
|---|---|---|---|---|---|
| **P7696** | Survey of Foreign TMT Firms and selected UK Science Parks | Medium to High | BES027 | Approved | Finished |
| **P14915** | Interviews of Science Park Stakeholders | Medium to High | BES027 | Approved | Finished |
| **P4036** | The Role of UK Science Parks in the Site Selection of Inward-bound TMT Firms | Low | BES027 | Approved | Finished |
| -- | Various documents (see sec. 3.4.4.5) | Desk-based | BES027 | Approved | Finished |

**Table 4.1: Research Projects Ethics Summary**

Ethical concerns are important in social research and the structured process enabled 'fieldwork' to be conducted without fear of risk to participants or exposure to physical or psychological discomfort. Care was taken to ensure that participants fully understood the nature of the study, both by the statement of informed consent and the verbal/written reminder that participation was voluntary. Participants were reassured that all information would be treated confidentially and offered the chance for anonymity.

## 4.2 Critical Realism and the Implications for this Research

It is important to consider the obligations that critical realism imposes on this research, particularly, in terms of ontology, methodology, strategy and methods. Critical realism is a relatively new philosophical approach to ontological, epistemological and axiological issues (Easton, 2010), so it is necessary to consider what demands it places on this research. The first is methodological because the objective is to "understand the social world by obtaining first-hand knowledge of the subject under investigation" (Burrell & Morgan 1978, p.6); this requires an ideographic approach which is based on this view, and which contrasts sharply with nomothetic studies, normally associated with positivism[64]. The approach places considerable emphasis on the individual (Grice et al. 2006, p.1191 as cited in Bendassolli 2013, p.9) and is associated with an interpretive perspective, which "focuses primarily on the qualitative, multi aspect, in-depth study of one or a few cases" (Larsson 1993, p.1515).

[63] https://students.coventry.ac.uk/ResearchDegrees/Pages/Ethics.aspx Accessed 17.08.14
[64] Taken from: http://www.fitconference.com/2009/thu01.pdf Accessed 29.07.14

### 4.2.1 What is Critical Realism (CR)?

Bhaskar (1978) argues that critical realism is based in three major distinctive characteristics: (i) a transcendental and dialectical character; (ii) the content of particular theses; and (iii) the fact that it is critical of the nature of reality itself, in the first instance social reality[65]. In Bhaskar's view, philosophy is like all knowledge, a social institution that relies on 'presuppositions about the nature of the world in which it is embedded' (cited in Easton 2000, p.119).

Bhaskar (1997) distinguishes between 'transitive' and 'intransitive' domains of knowledge: 'the nature of existence is not dependent on our thoughts' and 'our observation (or knowledge) of the world should not be conflated with or equated to the world or the essence of reality'. Collier (1994) explains the main difference: "theories about the world are transitive objects of knowledge, as they are about something" and "the world that our theories try to explain is intransitive, as it exists independently of theories". It is important not to conflate these two sets of questions about the nature of the world and how knowledge can be obtained about it, a fallacious approach often adopted by positivists.

Jarvis & Dunham (2003, p.249) view 'intransitivity' ("the idea that objects, causal mechanisms and events may exist and operate independently of human observation, experience and modes of reasoning", citing Bhaskar, 1978) as the distinctive feature of CR ontology, albeit one that results in a 'partially obscured reality' but one that produces a form of causal analysis superior to positivism.

In addition to a stratified ontology and dualised theory of knowledge, CR proposes a tripartite conception of reality: the domain of the empirical (comprising human experiences); the domain of the actual (consisting of events); and the domain of the real (containing the hidden 'structures' and 'causal mechanisms' that produce empirical events). Sayer (2000) argues that the 'real' in the CR sense does not imply an exclusive access to reality but 'conceptually distinguishes a realm of objective, independent social or natural reality, their constitutive forms and potency' (As cited in Anifalaje 2012, p.89). Sayer (1992) built on Bhaskar's ideas to advance the view that CR is a competitive theory of knowledge with eight key assumptions:

1. "The world exists independently of our knowledge of it;
2. Our knowledge of the world is fallible and theory-laden (and) concepts of truth and falsity fail to provide a coherent view of the knowledge-object relationship;

[65] Roy Bhaskar interviewed http://www.criticalrealism.com/ Accessed 30.01.12

3. Knowledge develops neither wholly continuously (as the steady accumulation of facts within a stable conceptual framework), nor discontinuously (through simultaneous and universal changes in concepts);

4. There is necessity in the world, meaning that objects, natural or social, necessarily have particular powers or ways of acting and particular susceptibilities;

5. The world is differentiated and stratified, consisting not only of events, but objects, including structures, which have powers and liabilities capable of generating events;

6. Social phenomena such as actions, texts and institutions are concept dependent, which require explanation, as well as understanding and interpretation;

7. Any kind of knowledge production is a social practice, which is influenced by the conditions and social relations of the production of its content;

8. Social science must be critical of its object; in order to be able to explain and understand social phenomena we have to evaluate them critically" (Sayer, 1992, p.5 as cited in Easton 2000, pp.119-120).

These key assumptions underpin four central tenets of CR's stratified ontology (Bhaskar 1989; Archer 1995; Archer et al. 1998; Lawson 1999; and Sayer 1992; 1997): stratification ('reality is stratified into three separable but interrelated domains: the real, the actual and the empirical'); causal explanation ('the identification of causal mechanisms that reside in the domain of the real and generate events in the domain of the actual'), differentiation ('emphasises an analytical and temporal distinction between structure and agency since the former is dependent on the activity of the latter, i.e. structure pre-dates agency') and emergence ('derives from interaction and its consequences which occur in time') (Adapted from Archer 1995, p.14).



**Figure 4.1: Bhaskar's (1978) three domains of reality** (As cited in Tsang 2014, p.126)

Causal explanation takes centre stage in CR, which "directs attention towards identification of structural and causal mechanisms residing in the real domain" (Archer 1995, 2010). In this study, the domain of the real allows for the study of structures and mechanisms that generate events and causal explanation that focus on the identification of process, approaches and the eventual siting outcomes of foreign TMT firms ('event'). Finally, this exploratory study recognises that events (or outcomes) are what critical realists investigate, that is the external and visible behaviours of people, systems and things as they occur, or as they have happened', Easton 2000, p.120) and are prone to change over time as emergence occurs and structure and agency re-order.

### 4.2.2 Rationale for Critical Realism

This study adopts Critical Realism (CR) for three reasons; first, to widen the methodological scope of science park-related and firm migration research for this exploratory study; second, to align with the general field of study (economic geography, see below); and third, to align with the chosen research design (case study). As noted, adoption of a critical realist view requires an interpretivist perspective in which the domains of knowledge produce two main implications:

> "i) the nature of existence is not dependent on our thoughts; and
> ii) our observation (or knowledge) of the world should not be conflated with or equated to the world or the essence of reality" (Bhaskar 1998 cited in Anifalaje 2012, p.89).

As noted in section 3.7.3, previous science park research has taken a narrow methodological scope, a narrow empirical scope (focused on one, two or three properties only) and conducted mainly from the perspective of the properties. Research has shown that science parks boast a strong relationship with TMT firms of all sizes (s.3.6.3), so the field is not as rich as it could be because studies have failed to capture the experiences of science park relationships from all perspectives (large, medium, small firms, including new firms; domestic, local firms and foreign firms, etc).

On the other hand, firm migration studies in the IB literature have focused on different sectors and produced processes and decision-making criteria but not specifically for services firms or for TMT firms (s.2.4.3.1). Firm migration research has been practised from a narrow methodological scope also, almost always quantitative in nature. Finally, given the exploratory nature of this research and the combining of two units of analysis, it makes sense to use an approach that enables flexibility whilst producing a robust research framework.

The implication is that science should be understood as an ongoing process to allow future improvement of 'initial findings'; in this way, knowledge creation would not be about 'snapshots' of 'coincidences between a postulated independent and dependent variable' but open-ended to ensure constant development because

> "whilst empiricism, and positivism more generally, locate causal relationships at the level of events, Critical Realism locates them at the level of the generative mechanism, arguing that causal relationships are irreducible to empirical constant conjunctions of Hume's doctrine" (2014, p.2).

Contrasted with positivism and its unyielding focus on empirical methods, attempts to discover social laws analogous to the natural sciences and its *'*absolute insistence on the separation of facts and value*s'* (Popkin & Stroll 2001, p.510), CR does not seek statistical generalisation, but analytical generalisations). Indeed, Bhaskar (1978, p.13) has argued that positivism *'…* cannot show why or the conditions under which experience is significant in science'. Pratt (2004, p.2) agrees that positivism and its key principle, falsification, should be rejected "due to it (being) highly plausible that a mechanism will exist but either

a) go unactivated,

b) be activated, but not perceived, or

c) be activated, but counteracted by other mechanisms, which results in it having unpredictable effects".

In other words, important related findings may be missed or go unnoticed and this is what could have happened in previous science park studies (Appendix 1.1).

Further, the general field of this study lends itself to Critical Realism, which became "a major touchstone for economic geographers" who were struggling inter alia with "the perceived lack of explanatory power accorded to positivist descriptions of economic restructuring" in the late 1980s (Pratt 2004, pp.9-10). Several problems were identified in the 'old debate of regional geography', including:

1. How space should be regarded: "spatial effects should be considered social effects …. but "space only has effects via the particular objects, with causal powers, that constitute it";
2. How space should be analysed: "just because spatial relations are constituted by social and natural objects it does not follow that spatial relations can be reduced to their constituents"; and
3. The localities debate: "the tension between analysis and narrative, or between law-seeking and contextual approaches" (2004 citing Sayer 2000).

Specifically, Sayer "accuses positivists of focusing upon temporal succession but neglecting synchronic relations" which leads to "positivists making a fallacious link between the unique and the independent, and that regularity between events equals interdependence" (Ibid; p.10). By liberating causality from Hume's constant conjunctions in a specific space and time, Sayer argues for an approach to causality that "recognises variety and interdependence, whilst at the same time cautioning that many interdependencies tend to be unique and not transferable" (Cited in Pratt 2004, p.10).

Finally, this research employs a case study research design, which provides a logic consistent with previous science park studies, but different in not applying a positivist approach to gather and analyse data. Case study design is chosen not for statistical generalisation, but because the critical realist underpinning allows the 'abstraction of findings such that valid analytical generalisations can be made that apply to similar contexts' (Klein & Meyers 1999; Sayer 2000; Yin 2003). Easton (2010, p.119) confirms that CR is 'particularly well suited as a companion' to case study research because "critical realists argue for the use of causal language with thinking" (and) "it justifies the study of any situation, regardless of the numbers of research units involved …"

In closing, Pratt (2004 citing Pratt 1995) argues that "critical realism requires some basic philosophical rethinking on behalf of users, and that there is no 'off the shelf' 'toolkit' but that this may be the point: "to re-think the way we do research rather than follow 'business as usual" (p.7). This can be done with more versatility and by taking a different view of causality from positivism; a generative view, which leaves open the opportunity for debate about "the 'necessary' or 'internal' relations that constitute the 'causal powers' of things" (p.5).

### 4.2.3 Conceptualising foreign TMT Firm site selection in the UK

The preceding discussion paves the way for a conceptual framework, in which identified themes (part derived from initial concepts and part taken from the prior literature) can explicate and operationalise the actions and behaviours of foreign TMT firms, UK science park managers and key stakeholders in the process, such as economic development personnel. Operational indicators are 'working definitions' created from concepts which are revised and updated at the final stage of research by identifying emerging relationships between concepts. For example, 'site specific advantages' consists of 'macro level' and firm-level considerations, and links directly to the major research question to form a basis for

assessing the nexus of issues around TMT firm site selection and UK science park development activities. The initial conceptual framework (Figure 4.2) follows this logic by identifying the necessary relations and causal mechanisms which generate a causal tendency for foreign TMT firms to site in UK science parks, and the contingent influences on the process (Adapted from Jarvis & Dunham 2002, p.250).

#### 4.2.3.1 Necessary Relations, Causal Mechanisms and TMT Firms

At the core of the application of Critical Realism are two kinds of dependent entity relationships: necessary 'derive directly from the nature of the bodies involved' and contingent occurs when "it is neither necessary nor impossible that they stand in any particular relation" (Sayer 1992, p.89 as quoted in Easton 2010, p.121). In terms of TMT firm migration, parent and subsidiaries have necessary causal relations since the latter cannot exist without the former, and the site selection of a subsidiary could not take place before location and settlement took place.

Jarvis & Dunham (2002, p.250) argue that 'the starting point for applying critical realism is to ask fundamental questions about the nature of the object of study, (which) are designed to isolate particular 'sides' to an object, to identify what is it about the object of inquiry that causes change that is 'necessary' for certain outcomes or events to occur'. With respect to foreign TMT firms, firms develop products that are marketable beyond home country borders, so pursue overseas markets. On the other hand, science parks are oriented to accommodate such firms (s.3.6.5), so position themselves to be attractive to such prospective tenants, the ideal outcome being firms settling 'on-site'. Therefore, necessary relations constitute the 'structural environment' of 'causal powers and liabilities' which, for this research, comprises of four sets of 'internal corporate' relations that may be implicated in the adoption of site selection strategies by UK-bound foreign TMT firms. In particular, necessary relations exist between the parent and subsidiary and are based in the parent's internationalisation strategy, on several 'levels', with clear 'events' or outcomes:

(iv) The first set of internal corporate relations determines the **country choice** (locational) and **entry mode** for the company;

(v) The second set of relations determines the **sub-national/regional choices** (settlement) for the subsidiary;

(vi) The third set of relations determines the **choice of site** (premises) for the subsidiary (whether the subsidiary sets up 'on- or off-site') based on several possible criteria.

| Drivers of Change | Causally necessary (internal) relations | Effects/Events |
|---|---|---|
| **Parent firm internationalisation strategy** | Determine choice of country | Decisions on **Location** (country) and **Entry Mode** |
| **Subsidiary firm settlement strategy** | Determine choice of region | Decision on **Settlement** (sub-national region) |
| **Subsidiary firm site selection strategy I** (based on function/purpose of site, product portfolio and/or stage of life cycle of firm) | Determine choice of site (premises) for the subsidiary | Decisions on **actual site** based on **site particulars** required (function/purpose, size, type of personnel, market(s) and customer accessibility) |

**Table 4.2: TMT Firm Structural (Necessary) Relations**

"Entities are, however, defined in terms of their necessary relations" (Easton 2010, p.121). The development strategies adopted by UK science parks are a product of the conscious decisions of science park principals and managers to attract TMT firms. A realist framework designed to understand the business development behaviour of science parks and TMT firms, therefore, could begin by identifying the necessary causal powers and liabilities which empower or incentivise individuals in both sets of organisations to act, or encourage them to behave in particular ways. In so doing it is important to reveal how the necessary properties may accord TMT decision-makers with a particular intentionality or capability to produce certain site selection strategies or science park managers with a particular intentionality or capability to conceive the strategies they employ.

#### 4.2.3.2 Contingent Influences, Causal Powers and Liabilities on TMT Firms

Jarvis & Dunham (2002, p.250) counsel that necessary relations are of little explanatory value without also considering "the precise context or the particular combination of contingent circumstances that mediates their effects, and, therefore, represents the joint 'cause' of actual events or outcomes". This second group of relations is "contingently related conditions (which) are never inert, but are themselves the product of causal processes and have their own causal powers and liabilities" (Sayer 1992, p.140 as cited in Easton 2010, p.121). These relations may affect one another, and are therefore, generalisable between decision-makers, unlike necessary relations that affect one another.

Contingent relations constitute the 'contingent environment' which, for this research, comprises another four sets of relations that are implicated in the adoption of site selection strategies by UK-bound foreign TMT firms. Each set of relations either empowers or hinders decision-makers and forces them to behave in particular ways, so it is the 'conjuncture with

contingent conditions' that force these powers and liabilities to realise actual events or outcomes (Adapted from Ibid 2002, pp.250-251). In this research, contingent relations exist between the subsidiary firm, influences and influencers that help the subsidiary to choose between potential sites for operations (for example, SPs). For this reason, they are 'external' relations, based on supply chain, commercial property, labour market and other considerations, explained and summarised in Table 4.3[66]:

(i) The first set of relations exists with **Science Parks** and **other specialist properties** in the built environment, which influence the eventual subsidiary site, whether in a specialist or general commercial property and the reasons for the decision.

(ii) A second set of relations exists with **national, regional** and **local agencies** (public) that seek to 'manage' inward investment generally, and regional and sub-national site search and selection decisions, specifically;

(iii) A third set of relations exists with **professional services providers** (private) that influence local commercial property decisions of the subsidiary, including helping the subsidiary decide where to site operations based on agreed important considerations (labour market); and

(iv) The fourth and final set of relations of external relations exists with **partners** and the **sectoral supply chains**, and determines which markets, suppliers, labour and customers will be proximate, based on the subsidiary's products.

| **Drivers/Influencers of Change** | **Contingent (external) Influences** | **Effects/Events** |
|---|---|---|
| **Science Parks** (and other specialist commercial properties) | On TMT parent and subsidiary by commercial property providers, including SPs | **Site, site-specific advantages and operating environment particulars** (lease, facilities, accessibility, proximity, etc) |
| **National, regional and local agencies** (UKTI, LEPs) | On TMT parent and subsidiary by public agencies | **Region/Sub-region** |
| **Professional services providers** | On TMT parent and subsidiary by private professional services providers | **Locale** (labour market, general accessibility and proximity) |
| **Labour Market, Customer Markets and Suppliers** | On TMT parent and subsidiary by sectoral supply chains, channel partners, customers , etc | **Markets, Sectors and Segments of Customers** (B2B/B2C) |

**Table 4.3: TMT Firm Contingent Influences**

[66] Of course, there is always the possibility that a firm can 'do it themselves', in which case the number and complexity of these relationships and influences is reduced.

#### 4.2.3.3 A Realist Conceptual Framework

"The theoretical framework governs the difference between necessary and contingent, as all events need to be explained by a combination of necessary and contingent relations. Additional concepts are derived from gaps in the literature, research objectives and questions (summarised at the end of Chapter 3). The main relevant gaps supplement the above to be used as the basis for conceptualisation; first, the limited coverage in the literature on TMT firm migration (or of studies focused on firms 'coming from a great geographical distance'); second, the wide coverage of science parks in the literature has not been accompanied by wide methodological choice or research approaches (s.3.6.2); and third, given the limited coverage in the literature on strategic development options facing science park managers, the concepts should promote improved explanation and understanding of managerial decisions with regards to the final site selection and the reasons for those selections by firms such as TMT (s.3.6.5). Finally, given the absence of coverage specifically in the science park literature on the choice of science parks as sites for foreign TMT firms and the process and reasons for making such a selection, the field would benefit from further research on two key fronts:

(i) The approaches, process and bases for site selection decisions of foreign TMT firms settling in the UK; and

(ii) The nature of the involvement of science parks in the site-selection process.

Improved explanation and understanding in these two areas would add to the general international business site selection literature and to the specific science park literature, thus benefitting immediately science parks, corporate real estate and plant location planners (s.3.5). Finally, Miles & Huberman (1994, p.18) define a conceptual framework as "a visual or written product that explains, either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables and the presumed relationships among them".

However, this CR-driven research demands a particular type of conceptualisation, characterised by entities, processes and events because 'particular attention must be paid to processes in critical realist accounts' (Easton 2010, p.120). Since "all events need to be explained by a combination of necessary and contingent relations" (Ibid), the conceptual framework is comprised of three necessary and four contingent sets of relations. Figure 4.2 depicts the initial conceptual framework of TMT firm site selection and UK science park 'intervention'.

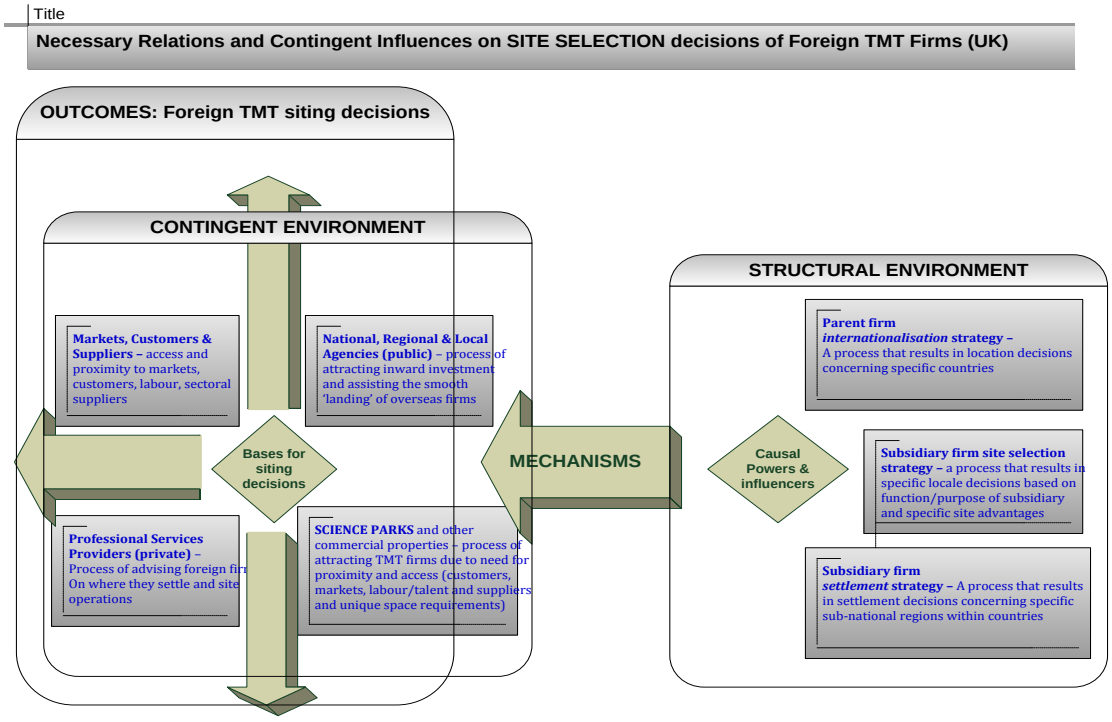


**Figure 4.2: Initial Conceptual Framework** (Adapted from Jarvis & Dunham 2003, p.153)

"Objects, or more generally entities, provide the basic theoretical building blocks for CR explanation and can be organisations, people, relationships, attitudes, resources, … ideas and so on … they can be human, social or material, complex or simple, structured or unstructured" (Easton 2010, p.120). The entities in this research are the foreign TMT firms (parent, subsidiary) and science parks that are at the centre of siting decisions in this study.

"Events or outcomes are what critical realists investigate, that is the external and visible behaviours of people, systems and things as they occur, or as they have happened" (Ibid). In this research, events are the initial siting decisions of foreign TMT subsidiaries. The below table lists and defines the realist concepts and summarises the key relations and influences on foreign TMTF settlement and site selection in the UK.

As explicated by Sayer (2000, p.15), "events arise from the workings of mechanisms which derive from the structures of objects, and … take place in geo-historical contexts". All three 'entities' (three levels of strategic choices by parent and/or subsidiary firm) are geographically-driven and occur in a predetermined staggered succession over a period of time. The below table summarises and defines the key concepts that underpin the 'event' of foreign TMTF site selection.

| Construct/concept | Definition |
|---|---|
| **Attraction strategy** | A development strategy that *"involves more emphasis on tailoring premises according to the specific needs of the company, either by offering bespoke tenant-solutions or by offering land where the company may build its own premises"* (Ylinenpaa 2001, p.9). It *'emphasises the need for the Science Park to engage in facilitating recruitment, since this is often a strong argument for attracting existing companies to locate to the Science Park'.* |
| **Development strategy** | A plan for increasing the occupancy rate of a technological property, by creating favourable conditions for incubating and growing NTMTFs or attracting and accommodating ETMTFs; a corporate-level strategy with clear directions (attraction, incubation and hybrid), **s. 2.7.4** |
| **Established TMT firm (ETMTF)** | An established medium to large TMT firm whose core products and services are dependent upon proven technological and market knowledge and expertise. |
| **Foreign TMT Firm FTMTF)** | A TMT firm that is headquartered outside the UK |
| **FTMTF (Plant) Location** | The selection of countries by firms for expanding operations to sell more products and services |
| **FTMTF Settlement** | The selection of regions/sub-regions within a country by firms to set up operations |
| **FTMTF Site Selection process** | The process by which firms select specific sites with a region/sub-region from which to operate |
| **Geographical focus** | Sectoral composition of the SP based on the origin of the tenants |
| **Hybrid strategy** | A development strategy that is comprised of both incubation and attraction (often in unequal proportions, *e.g.* 20%/80%) |
| **Incubator strategy** | A development strategy that *'focus(es) on creating as favourable conditions as possible for commercialisation of research-based ideas in the form of spin-out companies from universities and other HEI's'* (Ylinenpaa 2001, p.8) |
| **New TMT firm (NTMTF)** | A new TMT firm whose core product is dependent upon a high degree of technological state-of-the-art knowledge (Derived from Ferguson and Olofsson, 1992, p.6) |
| **Nominal Recruitment Distance (NRD)** | The distance between a given SP and the place of origin of the firm that the SP seeks to or actually recruits; 'nominal recruitment distance' (NRD) increases from zero (incubated firms) to 'maximum'. |
| **Science Park** | '*property-based organizations with identifiable administrative centers focused on the mission of business acceleration through knowledge agglomeration and resource sharing*' (Phan et al. 2005); in this research, taken as one of a selection of siting options for TMT firms, **s.3.6.2** |
| **Science Park Development Cycle (SPDC)** | The SDLC is based on development strategy and can take one of several routes: (i) incubator/grow/retain; (ii) incubator/grow/release; (iii) attraction (with some as 'anchor tenants'); and (iv) combination or hybrid (using elements of both of the above) , **s.3.6.3** |
| **Science Park Intervention** | The extent to which science parks influence the site-selection decisions of landed foreign TMT firms in the UK by leveraging one of the above development strategies: (i) incubator/grow/retain; (ii) incubator/grow/release; (iii) attraction (with some as 'anchor tenants'); and (iv) combination or hybrid |
| **Site Specific Advantages (SSA)** | Advantages that accrue to a specific business site, based on macro considerations, physical infrastructural offerings and market considerations such as proximity to customers |
| **Strategic 'gap'** | The difference between stated and actual outcomes in a development strategy, **s. 3.6.3** |
| **TMT (sector) focus** | Sectoral composition of the SP based on the technological products of the tenants, |

**Table 4.4: Concepts underpinning Site Selection of FTMT Firms (UK)**

## 4.3 Research Strategy

Research strategies 'provide different ways of answering research questions' but it is important to note that 'each strategy has a philosophical and theoretical ancestry ...' and its principal aim is '... to achieve the best procedure(s) for dealing with a research topic ... particularly for answering research questions' (Blaikie 2001, pp.100-101; p.122). Generally, inductive research strategies pursue exploration, description and prediction and are particularly useful for answering 'what' research questions (Ibid, pp.121-124), of which this research has three (of four).

Inductivism is also the clear strategic choice for Critical Realism[67] because it represents the 'common-sense' view of science involving four essential stages: observation, analysis, generalisation and further testing (Ibid, p.103). Without theories to prove or disprove, models or ideal types to construct, inductivism serves this exploratory research through three principles: 'data accumulation, induction and instance confirmation' (Ibid, pp.102-110). This section will justify an inductive approach for this research by explaining induction, addressing its main criticisms and discussing the way this research applies induction.

First, Mill (1868, p.313) concluded that 'what induction is and what conditions render it legitimate, cannot be but deemed the main question of the science of logic – the question which includes all others'. Induction is first and foremost a 'process of inference', which proceeds from the 'known to the unknown', so that inferences, not necessarily conclusions, can be drawn about an entire class based on what we know to be true about its members. Mill (1868, p.74) concluded that 'generals are but collections of particulars, definite in kind but indefinite in number' and contended that the strength of induction lies in its ability to provide a sound basis for inference by extrapolating from particular cases to an entire class. Therefore induction is a simple and practical way to remove the complexity from the search for knowledge.

However, critics question the leap made by inductive reasoning from 'singular observational statements to general theoretical statements'. This research recognises that despite induction's best efforts, the generalisations it makes cannot be guaranteed to be true because of this 'problem of induction'. Thus, this research employs a particular variant of inductivism, qualitative induction, which "consists of assembling certain qualitative features of the

[67] Critical Reasoning limits the choices of research strategies to induction or abduction.

investigated sample in such a way that this combination of features resembles another (that is already available in the repertoire of knowledge of the interacting community) in essential points" (Reichertz Undated, p.303). This qualitative inductive approach allows inferences to be drawn of the presence of other features from the existence of certain qualitative features in a 'sample' of foreign TMT firms and UK science parks and is explained in section 4.4.1.

### 4.3.1 Implications of Induction for Research Methods and Design

Strategic imperatives weigh heavily on data collection, analysis methods and design choices in social research. In particular, choice of strategy influences directly the observer's role, data collection and analytical techniques. For induction, the researcher is a 'detached observer', who seeks not 'to threaten the objectivity of the research' (Ibid 2001, p.52). Inductivism lends itself to a qualitative approach, "contend(ing) that the work does not consist of proposing and testing hypotheses (but that) "the primary interest is to achieve understanding" (2013, p.1). This is consistent with the methods employed in the research to gather data from a range of stakeholders from qualitative questionnaires, interviews and documents. This research adopts Van Maanen's (1983, p.9) definition of qualitative research:

> "an umbrella term covering an array of interpretative techniques that seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world" (As quoted in Madureira Undated, p.2).

Consequently, this research adopts an inductive strategy, driven by a conceptual framework to capture the starting and emergent concepts from the analysis. This research recognises arguments that question the power of qualitative research, for example, that "qualitative induction is not a valid but only a probable form of inference" and "qualitative induction is the basis of all scientific procedures that find, in collected data, only new versions of what is already known" (Reichertz, Undated, p.304). However, qualitative research provides the advantage of generating a rich pool of concepts and "of being capable of operationalization" (Ibid, p.304) and when combined with critical realism, moves closer to the realisation that we can never acquire definitive knowledge.

Additionally, qualitative research approaches generally, and induction particularly, can provide eventually as rich an understanding as deduction because deductive theories, "being transitive objects, provide our best approximation to the truth about the world as an

intransitive object …. can be wrong about their intransitive object" (Bhaskar 1997, p.36). This position is not helped by the existence of rival theories, which are all focused on the intransitive object, thus not offering a wider interpretation of the possibilities. Collier (1994) argues the point very effectively; "rival scientific theories necessarily have different transitive objects, or they would not be different; but they are not about different worlds, otherwise how could they be rivals?" (Collier 1994, p.51 as quoted in Lee 2013, pp.75-76).

The second general implication of induction for this research is how the research design, case study, will be conducted. Yin (2009, p.27) recommends a five component case study design that addresses four questions: 'what questions to study, what data are relevant, what data to collect, and how to analyze results'. This study employs a qualitative inductive case study research design in line with this approach, driven by a conceptual framework.

## 4.4 Research Methods and Process

This section discusses the research methods and process used to implement the research design, including data preparation; instrumentation and data collection; and finally, data reduction and analysis. Schwandt (cited in Guba & Lincoln 2000, p.262) argues that to study a methodology is 'to study a way of knowing', and that methodology and epistemology are inextricably linked. This link typifies its relevance to this research, which seeks to establish understanding of a particular nexus of issues (inward-bound foreign TMT firms and UK science parks) and not to explain or predict future behaviours of these objects.

Burrell and Morgan (1979) acknowledge a range of methodological options, but concentrate on two options in particular, depending on the position of the social researcher in the subjective-objective debate. This research takes a subjectivist orientation and an ideographic methodological approach (1979, pp.2-3), "based on the view that one can only understand the social world by obtaining first-hand knowledge of the subject under investigation" and allowing "one's subject unfold its nature and characteristics during the process of investigation" (Ibid, p.6). This research synthesises a methodological approach that aligns the Critical Realist philosophy of science with an ideographic methodology, qualitative inductive research strategy and qualitative case study research design.

### 4.4.1 Justifying a Qualitative Approach[68]

As noted, the primary interest of qualitative research is to achieve understanding (Verstehen in the tradition of Kant), of a particular situation, individuals or groups of individuals (for example, settlement behaviours of foreign TMT firms in the UK), rather than to explain and predict future behaviours. This section describes and defines 'qualitative', the main preoccupations of qualitative research and justifies the qualitative approach taken by addressing the main criticisms and advantages of a qualitative approach.

'Qualitative' implies "an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured in terms of quantity, amount, intensity, or frequency" (Denzin & Lincoln 2000, p.8) and describes data, data collection, methods, research and paradigms but the key association is epistemological, which focuses on subjective approaches to knowing the social world. Two practical differences between the methods is the much wider range of 'qualitative empirical materials' available to the qualitative researcher (Denzin & Lincoln, 1994), the comparison between 'structure-before' and 'structure-after' in the data (Punch 1998, p.60). Qualitative approaches are

> "less likely to impose restrictive a priori classifications on the collection of data" and are "less driven by very specific hypotheses and categorical frameworks and more concerned with emergent themes and idiographic descriptions" (Cassell and Symon 1994, p.4).

Denzin & Lincoln (2000, p.3) conclude that "qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret phenomena in terms of the meanings people bring to them". However, qualitative research is preoccupied with several key issues; 'seeing through the eyes of the people being studied'; 'description and the emphasis on context' (see below); 'emphasis on process'; 'flexibility and limited structure'; and 'concepts and theory grounded in data' (Bryman & Bell 2007, pp.416-421).
Qualitative data collection include observation, qualitative questionnaires, qualitative interviewing and documentary analysis, the latter three of which are applied in this research. Qualitative data reduction methods include 'coding', 'developing themes' and 'typology construction' (Blaikie 2001, p.236), which this research uses as bases for pattern matching and data displays. Qualitative analytical techniques include data displays, pattern matching

[68] A case could be made for 'mixing methods' due to the 'emergency use' of two 'e-surveys' to collect data in the early stages of the research; this is discussed briefly at the end of sub-section 4.4.3.1

and description, with a particular concentration on 'analytic induction, categorisation, typification and typologies' (adapted from Ibid, p.237), again applied in this research.

In this research, qualitative analysis of questionnaires, interviews and documentary data involves three steps: 'describing, classifying and connecting' the data from questionnaires, interviews and documents (Ibid 2001, p.240 citing Dey, 1993). Classification 'breaks data into bits (and) assigns these bits to categories or classes which bring these bits together again ...' (Ibid quoting Dey 1993, pp. 44-45) and coding involves 'concepts and categories' for which data displays (matrices) are used to connect categories to 'discover regularities, variations and singularities in the data' (Blaikie 2001, p.240). Finally, data displays and analytical templates provide the content for 'thick descriptions' of the cases (Ryle 1949; Geertz 1973; Holloway, 1997; Lincoln & Guba 1985)[69], a way of:

> "describing a phenomenon in sufficient detail (so) one can begin to evaluate the extent to which the conclusions drawn are transferable to other times, settings, situations, and people" (Lincoln & Guba 1985).

Thick description contrasts with 'thin description' or superficial accounts and refers to "the detailed account of field experiences in which the researcher makes explicit the patterns of cultural and social relationships and puts them in context" (Holloway, 1997). Thick description is also a way of achieving a type of external validity (s.4.6.2).

However, it is acknowledged that "qualitative methods inherit many of the tensions intrinsic to inductive reasoning" (Bendassolli 2013, p.2) and have been accused of 'hyper-valuing observational statements' (Ibid 2013, p.1). A third criticism is that "qualitative researchers tend to prioritize logic emerging from experience, preferring to expand knowledge from it as opposed to using a priori, deductive concepts" (Ibid, p.2).

The primary counter-argument of qualitative researchers centres on the purpose of qualitative research which is to understand the phenomenon and not to produce generalisations (in terms of law-like statements). Rosenberg (2000 cited in Bendasolli 2013, p.7) noted that if qualitative research does only this, it "runs the risk of being purely descriptive and its explanation just an abbreviation for situated empirical observations". Notwithstanding, qualitative research holds several advantages for social research; it can help to 'refine existing theories; confirm or falsify hypotheses; develop new inductive

[69] http://www.qualres.org/HomeThic-3697.html Accessed 23.03.15

theories; present counterfactual inferences and even make inferences, in the sense of prospective causal explanations" (Ibid, 2013, p.8). In addition, qualitative methods hold a number of specific advantages for this exploratory research, which examines processes that underpin TMT firm site selection decisions. Cassell & Symons (1994, p.1) judge qualitative methods to be very appropriate to research questions focusing on organisational processes (or) outcomes, and trying to understand both individual stakeholders and group dynamics. One main advantage for exploratory research is the flexibility of open-ended questions that allow probing of respondents, who can respond in their own words, rather than to a finite number of fixed responses. Qualitative questioning also "allows the researcher the flexibility to probe initial participant responses – that is, to ask why or how" something happened. This flexibility allows researchers to probe deep into responses and yield much more meaningful resources by encouraging elaboration[70].

### 4.4.2 The Qualitative Research Process Outlined

The research process that drives this research design covers eight phases over six stages, (the research process is diagrammed below in the sequence it is conducted):

(i) Pilot study of two UK science parks and three foreign TMT firms, hosted in the parks;
(ii) Qualitative questions to explore twelve (of a pool of thirty six) foreign TMT firms that settled in the UK in ~2011 to gather responses on site selection;
(iii) Focused telephone interviews to examine qualitatively the views, perceptions and experiences of sixteen expert-practitioners to gather feedback on the range of issues attending my research, including TMT firms (Deloitte), plant location (IBM), corporate real estate and site selection (Jones Lang Lasalle, Site Selection Magazine), UK science parks (UKSPA) and one well-known international Science Park expert (Sweden) to test findings more widely;
(iv) Qualitative questions to explore the views, perceptions and experiences of seven UK Science Park Managers in the three target regions (to elicit responses to the range of issues raised in initial rounds of data collection) and to analyse data for evidence of science park development strategy alignment;
(v) Following analysis of the above data, a final stage (phases 6 -7) of focused telephone interviews of principals in the five Local Enterprise Partnerships of the M4C, Oxfordshire and Cambridgeshire were conducted to fill gaps in the analysis.

[70] Qualitative Research Methods: A Data Collector's Field Guide, Family Health International, Undated: p.4

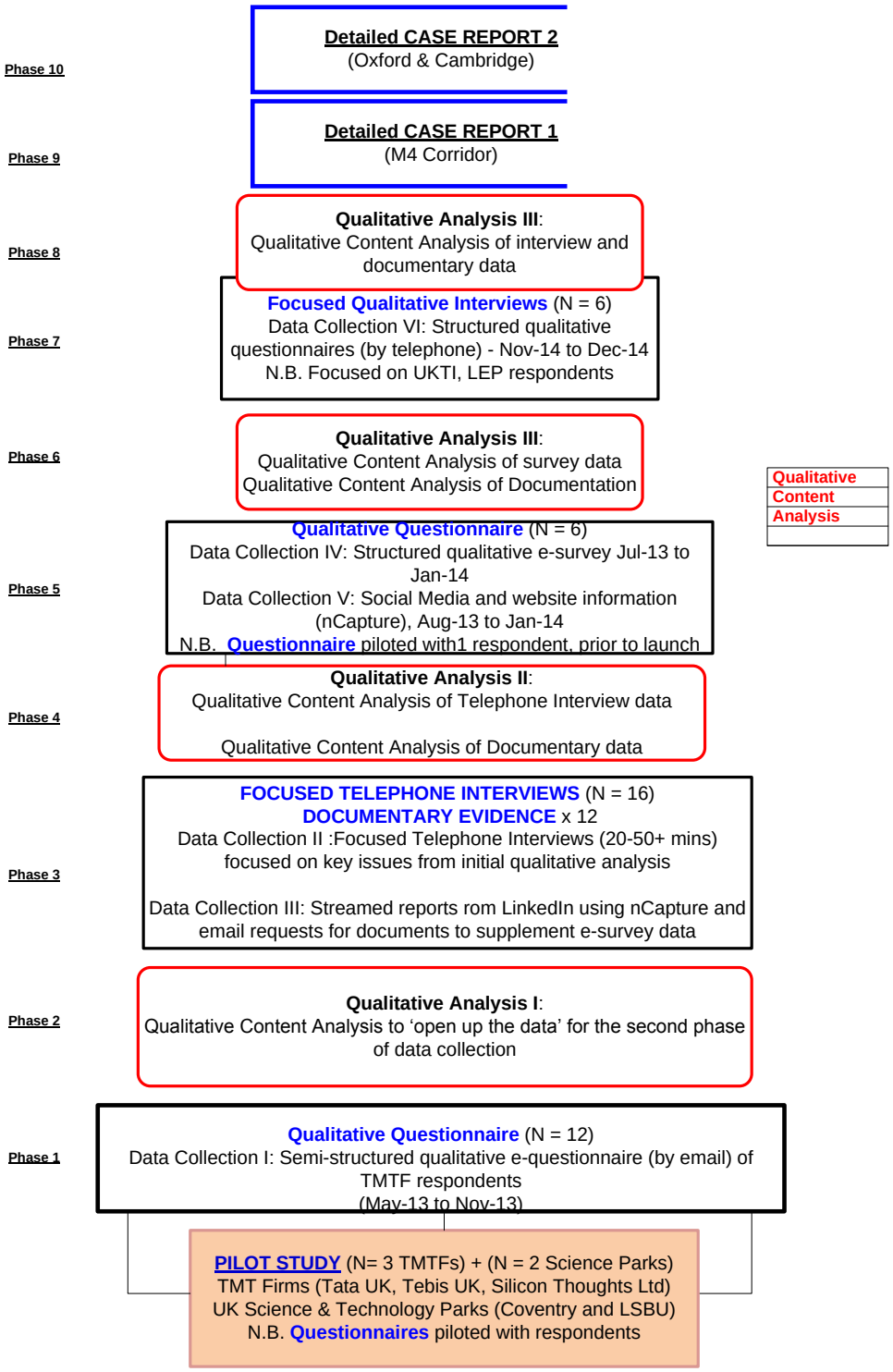


**Figure 4.4: Specific Research Process Outline**

### 4.4.3 Research/Data Preparation

This section discusses units of analysis, target regions, data types, timing, sources, identification, recruitment and timing of research.

#### 4.4.3.1 Units of Analysis, Target Regions, Data Sources, Types and Timing

As noted previously, this research is built on two units of analysis, UK-bound foreign TMT firms and UK science parks, both of which have well-defined populations. The M4 Corridor, Oxfordshire and Cambridgeshire are three of the most documented technology-intensive regions in the world and historically, have been very attractive locations for TMT firms to do business. In common with the original technology-intensive region, many around the world have assumed the label 'silicon' (s.2.4.5); the UK regions of this study implicate four 'silicons': 'Silicon Corridor' (M4), 'Silicon Gorge' (part of M4 Corridor), 'Silicon Spires' (Oxford) and 'Silicon Fen' (Cambridge).
One unintended but beneficial consequence of the reduced dataset was the increased likelihood that company principals would be users of modern social media, particularly LinkedIn, because the USA was the most popular country of TMT firm origin. LinkedIn provided details for at least one principal for 28 of 36 TMT firms and 12 of 20 science parks.

The search for data covered a wide range of options, including but not limited to Dunn & Bradstreet[71]; FDI Intelligence[72]; UKTI Invest[73]; and Oxford Intelligence (OxInt)[74]. For reasons mainly relating to prohibitive costs and limited use (for example, OxInt: £5,000 for a 12-month subscription), the search was continued and eventually led to data being identified from two principal sources, the Deloitte LLP database of fast-growth TMT firms[75][76][77] and Companies House (CH)[78]. The resulting dataset was compiled from three Deloitte LLP (Deloitte) databases, cross-checked with CH data. The initial dataset was generated from three global Deloitte databases, covering Europe, Middle East and Africa (EMEA); North America; and Asia-Pacific totalling 1,500 fast-growth TMT firms.

[71] http://www.dnb.co.uk/scores-data/marketing-database All accessed 06.12.11
[72] http://www.fdiintelligence.com/
[73] http://www.ukti.gov.uk/home.html
[74] http://www.oxint.com/
[75] http://www.deloitte.co.uk/fast500emea/
[76] http://www.deloitte.com/fast500asiapacific
[77] http://www.deloitte.com/us/fast500/
[78] http://www.companieshouse.gov.uk/toolsToHelp/freePublicDataProduct.shtml

This population was rationalised, first by removing UK TMT firms, then checking the remaining firms for a UK presence (produced 160 firms) and before finally checking those UK-based firms for addresses in either of the target regions. The final dataset comprised of thirty six foreign TMT firms that had expanded to the UK and settled in one of the target regions. As presented in the table below, ten UK science parks were implicated in the dataset by the thirty six TMT firms of which twelve TMT firms responded, ten of which settled in the M4C and two in Oxfordshire and Cambridgeshire. Of the science parks implicated, eight are in Oxfordshire and Cambridgeshire; two are in M4 Corridor; five are 'science parks', three are 'innovation centres', and two are 'research parks'.

| Science Parks | Type | UK Region/Position |
|---|---|---|
| **1. Babraham Research Campus**<br>www.babraham.com<br>Cambridge CB10 1X | Research Park | Cambridgeshire<br>52°03'26.8"N 0°14'15.4"E |
| **2. Begbroke Science Park****<br>http://www.grantapark.co.uk/<br>Begbroke Hill, Woodstock Road OX5 1PF | Science Park | Oxfordshire<br>51°49'04.0"N 1°18'24.0"W |
| **3. Bristol & Bath Science Park****<br>www.bbsp.co.uk<br>Emerson's Green, Bristol BS16 7FR | Science Park | South Gloucestershire<br>51°30'17.2"N 2°29'02.8" W |
| **4. Brunel University Science Park****<br>http://www.brunel.ac.uk/business/science-park<br>Kingston Lane, Uxbridge UB8 3PH | Science Park | Middlesex<br>51°31.8"N<br>-0° 28.1"W |
| **5. The Oxford Science Park****<br>http://www.oxfordsp.com/<br>Robert Robinson Avenue OX4 4GA | Science Park | Oxfordshire<br>51°42'59.4"N 1°13'05.0"W |
| **6. Cambridge Science Park**<br>http://www.cambridgesciencepark.co.uk/<br>Milton Road, Cambridge CB4 0FZ | Science Park | Cambridgeshire<br>52°13'57.6"N 0°08'54.9"E |
| **7. Culham Innovation Centre**<br>www.culham-ic.co.uk<br>D5 Culham Science Centre, Abingdon OX14 3DB | Innovation Centre | Oxfordshire<br>51°39'28.0"N 1°13'43.2"W |
| 8. **Granta Park****<br>http://www.grantapark.co.uk/<br>Great Abingdon, Cambridge CB21 6GP | Research Park | Cambridgeshire<br>52°07'01.6"N 0°13'33.4" E |
| **9. Milton Park Innovation Centre**<br>http://www.mepc.com/miltonpark<br>99 Park Drive, Milton Park OX14 4R | Innovation Centre | Oxfordshire<br>51°37'18.7"N 1°17'40.7"W |
| **10. St. John's Innovation Centre****<br>http://www.stjohns.co.uk/<br>Cowley Road, Cambridge CB4 0WS | Innovation Centre | Cambridgeshire<br>52°14'09.3"N 0°09'08.5"E |
| **11. University of Reading Science Park****<br>http://www.grantapark.co.uk/<br>Whiteknights, Reading RG6 6AH | Science Park | Berkshire<br>51°27'27.4"N 0°56'44.2" W |

**Table 4.5: UK Science Parks in target sub-regions**

** Actual respondents

As noted, information on foreign TMT firms was derived from Deloitte publications, cross-referenced with Companies House data, and information on UK science parks, from the UK Science Park Association (UKSPA) database. The sources are appropriate for this research because all incoming firms must register with Companies House within 18 months of settling in the UK (Companies House, 2010) and the UKSPA database contains the details of all UK science parks. The Deloitte data represents the 'population' of foreign TMT firms and the UKSPA data represents the 'population' of science parks, which Saunders et al. (2009, p.212) define simply as "the full set of cases from which a sample is taken". Deloitte data is chosen for four main reasons:

(i) The study has been running for ten years and is the most comprehensive of its kind;
(ii) Accessibility and completeness of information which covers all regions of the world;
(iii) It operates on a wide and comprehensive definition of TMT; and
(iv) Sole focus is TMT.

UKSPA is chosen for three main reasons:

(i) Accessibility and completeness of information about UK science parks;
(ii) National reach of the organisation; and
(iii) Primary focus on science parks and related organisations.

'Necessary criteria' are defined for the first unit of analysis, the TMT firm (and its site selection considerations), and the second unit of analysis, UK science parks, which are situated in the two sub-regions.

| Necessary criteria (TMT firms) | Necessary criteria (UK Science Parks) |
|---|---|
| 1. TMT Firm headquartered outwith the UK | 1. SPs in one of the sub-regions |
| 2. From one or more of the TMT sectors | 2. Operational as of 2011 |
| 3. Migrated to UK in 2010/2011 | 3. An identifiable tenant base |
| 4. An identifiable management contact | 4. An identifiable management contact |

**Table 4.6: Confirmation of Data Selection Criteria (TMTFs & SPs)**

The remainder of this section briefly addresses considerations for the 'quantitative' method of survey. As noted in section 4.4.1, a case could be made for 'mixing methods' due to the 'emergency' introduction of two 'e-surveys' to collect data in the early stages of the research[79]. Yin (2009, p.108) equates survey with a 'third type of interview' which can be used in qualitative case study design as long as it 'follows both the sampling procedures and

[79] The start of the research was frustrated by ~17 months of 'false starts' (~Nov-2011 to May-2013) to find data and gain access to respondents by post, email then telephone. When LinkedIn provided immediate access in ~May-2013, the research was started in earnest but this meant that data had to be collected in a much shorter time frame, hence the use of two e-surveys.

the instruments used in regular surveys' but would be considered as only one component of the data. De Vaus (2002) argues that the main factors that limit the extent to which a sample is unbiased and therefore useful, are population and quality, which are based on whether:

(1) 'the sample is representative of a wider population';
(2) 'the wider population is properly defined'; and
(3) 'the sample is drawn from a population using probability sampling methods' (p.149).

Section 3.6 revealed that academic science park studies have relied on far smaller sample sizes (the median is two)[80]. Second, 'sampling error is a function of the absolute size of the sample and the degree of diversity in the population' because where there is considerable population diversity, the chances of sampling error increase (DeVaus 2002, p.150). Third, the samples of science parks and TMT firms are representative because of little difference from the UKSPA population or the full TMT pool from which the samples were taken. They are 'random' because all properties and firms in the target sub-regions had an equal probability of being selected (Creswell 2009, p.233).

Both primary and secondary data are utilised in this research; qualitative surveys of TMT firms and UK science parks, qualitative telephone interviews of a range of stakeholders and documentary evidence from a range of sources. The surveys and interviews yield primary data, and along with the documentation, the multiple sources enable 'data triangulation', which enhances construct validity and creates a 'most important advantage' of developing 'converging lines of inquiry' (Yin 1994, p.92).

| **Instrument** | **Data form** | **Advantages** |
|---|---|---|
| 1. **Qualitative Questionnaires** (a semi-structured self-administered e-questionnaires) | Primary quantitative and qualitative data from the first primary unit of analysis (foreign TMT firms) | Costs savings; accessibility across distance; and the number of TMT firms that could be contacted at any one time |
| 2. **Focused Telephone Interviews** (based on several versions of a pre-issued set of semi-structured questions) | Primary qualitative data from 16 expert-practitioners (on TMT, plant location, site selection, science parks and UK inward investment) | Accessibility across distance (several respondents overseas[81]); costs savings; relatively short and at the convenience of the respondent |
| 3. **Qualitative Questionnaires** (a semi-structured self-administered e-questionnaires) | Primary qualitative data from the second primary unit of analysis (UK science parks) | Able to explore issues in more depth/customise discussions |

[80] There are no previous studies of migrating TMT firms as they relate to science parks.
[81] Los Angeles, Toronto, Atlanta, Lulea (Sweden) and Brussels.

| | | |
|---|---|---|
| 4. **Documentation** (based on targeted searches of specialist databases) | Secondary qualitative and quantitative data from a wide range of documentary evidence (on TMT, plant location, site selection, science parks, UK inward investment and UK firm settlement patterns) | Able to explore related issues in more depth and elaborate earlier findings |
| 5. **Focused Telephone Interviews** (based on one version of a pre-issued set of open questions) | Primary qualitative data from 5 LEP practitioners in Oxfordshire, Cambridgeshire and M4C | Accessibility across distance and based on availability and at the convenience of the respondent; costs savings; relatively short |

**Table 4.7: Data Sources and Forms**

The cross-sectional research design confines it 'to the present time' (Ibid 2001, p.239), 2010 to 2011, which has several advantages. Besides time and cost savings, data can be collected from firms and science parks in close sequence and because of the exploratory research, the study is limited by time and focus, so a cross-sectional, single sector (TMT) study is appropriate.

### 4.4.4 Instrumentation, Recruitment and Data Collection

This section discusses instrumentation and summarises data collection tools and techniques. Research instruments are discussed in the sequence in which they are applied, starting with the pilot surveys, which were used to design the questionnaires for the qualitative e-surveys, and telephone interviews.

This research employs four qualitative questionnaires for e-surveys of TMT firms, Science Parks, and interviews of expert-practitioners in two phases. Questionnaire one targets foreign TMT firms (off-site and on-site science parks, respectively). Questionnaire two targets expert-practitioners in the fields attending this research (TMT, plant location, CRE, etc), so the questionnaire was modified slightly for each category of expert[82]. Questionnaire three targets UK Science Parks in the target regions and questionnaire four was designed to fill gaps exposed in the analysis and targets specifically and solely local economic development practitioners (LEPs). Questions appear in Appendices 4.4 through 4.8.

[82] All expert questionnaires contained the same core questions, with a few questions modified.

| Qualitative Questions | Version | Target respondent |
|---|---|---|
| **1. TMT Firms** | 1A | Onsite firms |
| | 1B | Offsite firms |
| **2. Expert-practitioners** | 2A | TMT firms |
| | 2B | Plant location |
| | 2C | Corporate real estate |
| | 2D | Site selection |
| | 2E | Science parks |
| | 2F | M4 Corridor |
| | 2G | Oxfordshire and Cambridgeshire |
| **3. Science Parks** | 3A | M4 Corridor Science Parks |
| | 3B | Oxon & Cambs Science Parks |
| **4. Expert-practitioners** | 4 | LEPs in target regions |

**Table 4.8: Schedule of Research Instruments**

In a qualitative study, a researcher designed instrument needs a small scale pilot test to "refine the questionnaire so that respondents will have no problems in answering the questions and there will be no problems in recording the data" (Saunders et al. 2009, p.394). In addition, the test 'enable(s) assessment of the questions' validity and the likely reliability of the data" (Ibid). Piloting helped to refine questions for firms and science parks and preceded the main research to correct issues with the data collection techniques.

The purpose of Questionnaire 1 is to uncover specific details on foreign TMT firms that have located to the UK and explore site selection from the perspective of the foreign TMT firms and the reasons for locating, settling and siting or not siting in a science park (see Appendices 4.4 and 4.5). Questionnaire 2 explores the contextual issues of TMT firm migration and settlement with expert-practitioners on issues relating to the TMT sector, plant location, CRE, site selection and the three sub-regions, inter alia (see Appendices 4.6). Questionnaire 3 explores issues relating to UK science park development and leverage earlier findings for 'convergence'. The questionnaire comprises of twenty-three questions (Appendix 4.7). Following two stages of analysis, a relatively short questionnaire (4) was created to fill a gap in the research by interviewing principals in the five (5) Local Enterprise Partnerships (see Appendix 4.8).

Finally, bias threatens when anything is done that results in 'unwarranted assumptions about the subject matter' being made and can frustrate construct validity (Yin 1994, p.92). To address this threat, questions are 'triangulated' by duplicating the use of key questions (in telephone interview questions).

### 4.4.5 Phases of Research and Participants

The first phase of data collection focused on foreign TMT firms (Questionnaire 1) and elicited information cost-effectively, efficiently and over a short period of time for reasons explained above (s.4.4.3.1). In this research, the first e-survey collected data from TMT firms by email and is the first main source of evidence.

| No | Company | Address |
|---|---|---|
| 1 | **Sequans Communications** | 155 Wharfedale Road, Winnersh Triangle, Reading RG41 5RB<br>www.sequans.com |
| 2 | **The Selfservice Company** | 9 Queensway, Stem Lane Industrial Estate, New Milton BH25 5NN<br>www.selfservicecompany.com |
| 3 | **iCIMS Ltd** | Davidson House, Forbury Square, Reading RG1 3EU<br>www.icims.com |
| 4 | **Electric Cloud Europe** | 1650 Arlington Business Park, Theale, Berkshire RG7 4SA<br>www.electric-cloud.com |
| 5 | **PROMISE Technology** | Albany House 14 Shute End, Wokingham, Berkshire RG40 1BJ<br>www.promise.com |
| 6 | **CommVault** | Apex Plaza Forbury Road, Reading RG1 1AX<br>www.commvault.com |
| 7 | **GENBAND** | Westacott Way, Maidenhead, Berkshire SL6 3QH<br>www.GENBAND.com |
| 8 | **Kentico Software Ltd** | 22-24 Broad Street, Wokingham, Berkshire RG40 1BA<br>www.kentico.com |
| 9 | **Sangoma Technologies** | Atrium Court, The Ring, Bracknell, Berkshire RG12 1BW<br>www.sangoma.com |
| 10 | **Telogis Ltd** | 2 Arlington Square, Downshire Way, Bracknell RG12 1WA<br>www.telogis.com |
| 11 | **Retail Logistics Excellence - RELEX Oy** | St John's Innovation Centre, Cowley Road, Cambridge CB4 0WS<br>www.relex.fi |
| 12 | **NetLogic Microsystems Inc (Broadcom)** | Unit 406, Cambridge Science Park, Milton Road, Cambridge CB4 0WW<br>www.broadcom.com |

**Table 4.9: TMT Firm Participants (e-survey)**[83]

The second phase of data collection focused on expert-practitioners (Questionnaire 2) using focused telephone interviews, which hold several major advantages over other data gathering techniques (Thomas and Purdon, 2004). For example, in this research, the telephone enabled data to be collected from an internationally dispersed sample cost-effectively and efficiently. One disadvantage is the need to keep interviews concise but as Bernard (2000, p.236) observed, 'once people agree to give you their time, you can keep them on the line for a remarkably long time'. Expert questionnaires were emailed to all respondents beforehand.

[83] A full list of TMT Respondent details is in Appendix 4.5.

| Area of Expertise | Expert Position/Organisation/Country/City |
|---|---|
| ○ **TMT Industry** | Deloitte/USA/California: Vice Chairman and U.S. TMT Industry Leader<br>Deloitte/Canada/Toronto: Director of Research |
| ○ **Plant Location** | IBM/Belgium/Brussels: Global Leader of IBM-Plant Location International<br>IBM/Belgium/Brussels: Senior Managing Consultant - Plant Location International |
| ○ **Corporate Real Estate/Site Selection** | Jones Lang Lasalle/UK/London: Regional Director EMEA Research<br>Site Selection Magazine/USA/Atlanta: Managing Editor, Site Selection Magazine |
| ○ **UK Inward Investment** | UKTI/UK/Reading (Interview 1): Partnership Manager South East Investment Services Team<br>UKTI/UK/London: Head of Local Engagement, Investment Development Group |
| ○ **Oxon, Cambs and M4 Corridor** | Invest in Oxfordshire/UK/Oxford: Senior Partnerships Manager<br>UKTI/UK/Reading (Interview 2)<br>TVCC/UK/Reading: Head of Inward Investment & Reinvestment |
| ○ **Science Parks** | UKSPA/UK/Surrey: Chairman UKSPA<br>Goodman/UK/Cambs: Director of Science Parks<br>UKSPA/UK/Essex: Chief Executive Officer<br>FEPRO/Sweden/Pitea: Director (Developer of 'Science Park Paradigm') |

**Table 4.10: Expert-Practitioners - Focused Telephone Interviews**[84]

The third phase of data collection focused on UK Science Parks in the target sub-regions (Questionnaire 3). The second e-survey was designed to elicit information from science parks on their specific efforts and development initiatives in terms of enticing firms to settle 'on-site'. The questionnaire contains twenty-three questions in four sections and is the second main source of evidence. It was emailed to the following respondents.

| STP/Address/Target Region | Respondent/Title/Email/Website |
|---|---|
| **St. John's Innovation Centre**<br>Cowley Road<br>Cambridge CB4 0WS<br>**O2C** | Managing Director<br>www.stjohns.co.uk |
| **Granta Park**<br>Great Abington<br>Cambridge CB21 6GP<br>**O2C** | Director<br>www.grantapark.com |
| **Begbroke Science Park**<br>Begbroke, Oxfordshire OX5 1PF<br>**O2C** | Director<br>www.begbroke.ox.ac.uk |
| **Oxford Science Park**<br>Sadler Building<br>Heatley Road<br>Oxford OX4 4GE | Business Development Director<br>www.oxfordsp.com |

[84] For full details of Interviewee, see Appendix 5.5.

| | |
|---|---|
| **O2C** | |
| **Bristol & Bath Science Park**<br>Cowley Road<br>Cambridge CB4 0WS<br>**M4C** | Innovation Centre Director & Chief Executive<br>www.bbsp.co.uk |
| **University of Reading Science Park**<br>Whiteknights<br>PO Box 217<br>Reading, Berkshire RG6 6AH<br>**M4C** | Director<br>http://www.reading.ac.uk/working-with-business/busserv-facilities.aspx |
| **Brunel University Science Park** | Operations Manager |

**Table 4.11: Science Park Respondents (e-survey)**

The fourth phase of data collection focused on documentation from multiple sources to contribute to the richness of the cases (Yin 2003) because they

> 'inform the practical and political decisions which people make on a daily and longer-term basis and may even construct a particular reading of past social or political events' (May 1996, p.133).

This research values documents, in contrast to "the twin influences of positivistic methodologists and abstract theorists on social research", (which) led "either to documents being dismissed as "impressionistic" or to the type of data being regarded as crude empiricism" (Plummer 1990 as cited in May 1996, p.133). As such, it supplements qualitative questionnaire and interview data from TMT firms, science parks and expert-practitioners, with documentation from the three main data sources: TMT firms, including LinkedIn feeds (information used to complete company profiles and lends support to strategic and operational decisions of the company); areas of expertise (which amplifies the contextual decisions about firm settlement and site selection) and science parks (which adds information on strategic intentions and factual details of properties, and different perspectives on how the properties are managed).

Because firms stream company information (PR releases, product launches, events, etc) on a weekly (sometimes more frequent) basis, this proved a useful supplementary source of documents[85]. Documents amplified the 'macro' decisions about destinations in the UK for FDI and second, directly impact local policy so influence the siting decisions and process of foreign inbound TMT firms. The tools described above were chosen first out of a need to align with methods, then convergence as issues emerged from the early stage research.

[85] This research also gathered a range of documentation from experts, who suggested and/or offered local economic development documents from plant location and regional planning experts; and UK policy documents from inward investment specialists. In some cases, documents were recommended and in others, volunteered/sent.

Multiple data sources and methods promote data and 'methodological triangulation', which increase construct validity, an 'especially problematic (issue) in case study research' (Yin 1994; p.92 citing Patton, 1987). Finally, the documents added factual details about firms and properties and helped to illuminate policy decisions that affect firm siting and science park operations in the target regions. The full list of documents is shown in Tables 6.2 and 7.4.

The fifth phase of data collection was created following analysis to fill a gap in the research. This final phase was based on focused telephone interviews of LEP officials who were emailed a relatively short, open questionnaire on LEP constitution; effective resourcing and operation; perceived differences from RDAs; impact of the Local Growth Deal and process for inward investment/relationship with UKTI, inter alia. These questions strengthened findings by cross-reference with the real-life experiences and perceptions of key economic development personnel.

| Area of Expertise | Expert/Organisation) |
|---|---|
| ○ **Local Economic Development (Oxon/Cambs, M4C)** | CEO, OLEP<br>GCGPLEP<br>Chief Executive, TVBLEP<br>Projects Manager, Invest in Swindon<br>Business Manager, Invest in Bristol & Bath |

**Table 4.12: LEP Practitioners - Focused Telephone Interviews**

### 4.4.6 Data Reduction and Analysis

Data reduction utilised three tools: data displays, pattern matching and classical qualitative content analysis. The qualitative process is described, followed by tools and data interpretation criteria.

#### 4.4.6.1 Classical Qualitative Content Analysis

Qualitative Content Analysis (QCA) is a proven text interpretation method in case study research (Kohlbacher 2005, p.1), which achieved growing popularity since development by Mayring in his longitudinal study of unemployment in the early 1980's (Titscher et al. 2000, p.62 cited in Ibid 2010, p.3). Babbie (2001) defines content analysis as "the study of recorded human communications" (p.304) which Titscher et al. (2000) claim is "the longest established method of text analysis among the set of empirical methods of social investigation" (p.55 as cited in 2005, p.11).

Content analysis now includes "all those procedures which operate with categories, but which seek at least to quantify these categories by means of a frequency survey of classifications' (Ibid 2005, p.10 citing Titscher et al. 2000, p.55). Specifically, in this research, QCA assists with the interpretation of meaning from the content of text data, taken from questionnaires, interviews and documents. Coding categories are derived from Mayring (2000): "empirical, methodological controlled analysis of texts within their context of communication, following content analytical rules and step-by-step models, without rash quantification" (as cited in Ibid 2005; p.16). Mayring's approach defines "a qualitatively oriented procedure of text interpretation" (2003 pp.42-46 as cited in Ibid 2005, p.17-18), however, of more interest is his "sequential model of QCA" consisting of 'three distinct analytical procedures' which may be conducted independently or in combination, depending on the particular research question:

1. The first procedure involves summarising, in which the objective is 'to reduce the text material in a way that preserves the essential content and creates a manageable corpus by abstraction which reflects the original material by paraphrasing, generalising or abstracting and reducing'.
2. Explication is the second procedure, in which the material is 'explained, clarified and annotated' in a narrow context analysis, followed by a broad context analysis to produce an "explicatory paraphrase".
3. The third, final and most crucial procedure is structuring, which derives from classical content analysis[86] and the goal of which is to extract a particular structure from the material 'according to content, form and scaling' (Adapted from: Mayring 2002, p.115, as cited/translated in 2005, p.18-19).

In this research, two units of analysis were pre-determined, so the dimensions of the structuring were established and the system of categories fixed before 'definitions (were) formulated and key examples, with rules for coding in separate categories, agreed'. This iterative procedure allows the system of categories to be re-examined and revised, before finally processing results (Adapted from Ibid 2005, p.19).

[86]The basic difference between classical content analysis and structuring is the development and use of the coding agenda – see below.

**Figure 4.5: QCA Process outlined**
(Source: GLÄSER & Laudel 1999, p.4 as presented and translated in 2005, p.21)

Within the qualitative approach, "it is essential to develop the aspects of interpretation, the categories, as closely as possible to the material, and to formulate them in terms of the material", which necessitate the development of procedures of inductive category" (Mayring 2000 as cited/translated in 2005, p.22). In this research, codes are identified using a combination of 'in vivo' terms used by the respondents themselves and words allocated by the researcher to describe how respondents express a concept. The rule-based approach to structured communication, categorisation/feedback loops, subject-reference, pilot study and quality assurance, inter alia, 'guarantees that the whole empirical basis is systematically addressed and that the analysis is reproducible to a certain extent' (Glaser and Laudel 1999, pp.2-5 as cited 2005, p.18). Whilst Mayring does not include transcription, this research requires it because interviews need to be transcribed to produce the initial text for analysis,

and is done to "build theoretical sensitivity"; "bring the researcher closer to the data" and "provide a unique opportunity to critique and improve on the interview process" (Strauss & Corbin 1990).



**Figure 4.6: Model of inductive category development**
(Source: Mayring 2000, p.4 as presented and translated in 2005, p.23)

In closing, this research employed Mayring's QCA process to analyse the text data to establish what the data says (analysis) and means (interpretation) in three phases: Phases 2, 4 and before 6 after each phase of data collection (s.4.4.2).

#### 4.4.6.2 Data Displays and Pattern Matching

Yin (1994, 2003) recommends that once gathered, data must be linked to research propositions (objectives and questions, in this research), which become the groundwork for analysis. A 'promising approach for case studies is pattern matching, in which several pieces of information from the same case may be related to some proposition' (Yin 1994, p.25). To reduce the data, this research employs two data displays, which combine and order interview, questionnaire and documentary data by concepts and themes, to facilitate pattern matching (one way to address internal validity, Yin 2009, p.42), s.4.6.1.

The data display layout produces a unitary view of the data, which facilitates comparison and subsequently, pattern matching by making the data amenable to systematic row-by-column analysis. The evidence is assessed at each 'cross-section' and once assessed, checked for 'flow, location, and connection of events, acts, activities, meanings, participation, relationships and settings' (Bryman & Burgess 1994, p.8 citing Lofland 1971, pp.14-15). Pattern matching is first applied to within-case analysis, followed by cross-case analysis, following Miles & Huberman (1994 citing Patton, 1990) who argue that "within-case analysis should always precede cross-case analysis..." Within-case displays explore, describe, explain or predict, whereas cross-case displays explore and explain the comparisons and meta-analyses, thus allowing a more robust assessment than within-case analysis and the opportunity to produce more meaningful findings, particularly in respect of the key construct of 'development strategy' of each science park respondent.

## 4.5 Justifying the Case Study Research Design

Yin (2009, p.26) describes case study research design as "a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions" and recommends five components for a case study 'blueprint': "a study's questions; its propositions, if any; its units of analysis; the logic linking the data to propositions; and the criteria for interpreting the findings" (Ibid 2009, p.27). This study is underpinned by four research objectives and questions (s.3.7.4) driven by a critical realist methodological framework and a quality framework with conceptually-ordered displays (s.4.2). Yin (2009, p.9) suggests further that if research questions focus on "what" questions, "this type of question is a justifiable rationale

for conducting an exploratory study, the goal being to develop pertinent hypotheses and propositions for further inquiry".

To report findings, this study employs two detailed cases to identify and examine issues relating to the settlement patterns of foreign TMT firms in the context of UK science parks. Consistent with an anti-positivist approach, this research culminates in detailed case reports, intended to be "generalizable to theoretical propositions and not to populations or universes" and which do not seek to 'represent a 'sample' or to enumerate frequencies (statistical generalization)' (Yin 2003, p.10). Finally, the question of 'cases' is fundamentally underpinned by 'the philosophical distinction between realism and nominalism' (Ragin & Becker 1992, p.9) and the orientation of this research requires that cases, as represented by the sub-regions, are '... more or less empirically verifiable', 'exist prior to research and are collectively recognized as valid units' (Ibid 1992, p.9). Chapters 5 and 6 follow a mixed case reporting structure, adapted from Yin's (2009, p.176) 'linear-analytic' structure for exploratory case research, with elements of Creswell's (2009, p.193) recommended strategies for qualitative write-up (s.4.5.1.1). Case study research design can be classified in many different ways (Rosenberg 1968; Denzi 1970; Guba & Lincoln 1989; Yin 1994; 2003; 2009; Ragin & Becker, 1992), however, this research follows Yin and Creswell as noted, the former of whom describes a case study in two parts:

1. "an empirical enquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident"; and
2. "copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result; relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result; and benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin 2009, p.18).

Despite being widely accepted and used, case studies have attracted three main criticisms: 'the possibility of sloppy research'; 'not useful for generalizing'; and 'take too long and produce unmanageable amounts of data' (Blaikie 2001, p.218 citing Yin 1989, p.21). For reasons peculiar to this research, namely the research objectives *inter alia* to identify issues relating to site selection of foreign TMT firms and science park development strategies in two regions, case studies allow a unitary view of the data, which in turn, facilitates comparison. Measures to avoid 'sloppy research' are outlined in section 4.6.1. The amount of data collected is controlled because the number of TMT firms and science parks is limited by the

response rate and by the choice of only a 'matched pair' of regions (Hartley 2004, p.332). Each instrument is chosen to support case evidence building (s.4.4.4) and to prevent bias, which frustrates construct validity and threatens when anything is done that results in 'unwarranted assumptions about the subject matter' being made (Yin 2009, p.41).

Case research offers the 'key opportunity to understand a phenomenon in depth and comprehensively' (Easton 2010, p.119). By setting out to understand the real-life phenomenon of settling TMT firms in the regions in depth, whilst accounting for important contextual conditions of those regions, this makes the case study design both relevant and appropriate. Finally, the multiple-case design has distinct advantages, including 'more compelling' evidence so 'the overall study is regarded as more robust' (Yin 2009, p.53), however, this research makes three variations to Yin's approach (Table 4.12).

| | **Yin** | **Own** |
|---|---|---|
| (i) | Relies on a theory or hypothesis | Relies on a conceptual framework (s.4.2.3.3) |
| (ii) | Survey is a supplementary source of evidence | Two e-surveys are 'an essential source of case study information' (s.4.4.5) |
| (iii) | Employs a single deductive research strategy | Employs inductive strategy, as required by CR (s.4.3.1) |

**Table 4.13: Variation of Yin's (2009) Case Study Design**

#### 4.5.1.1 Case Study Write-up (Yin (2009) and Creswell (1995))

Case reports are based on elements of Yin's 'linear-analytic' structure and Creswell's qualitative write-up strategies, using data from multiple sources: the three main instruments (e-survey (foreign TMT firms); focused telephone interviews (expert-practitioners); and e-survey (UK science parks)) and documentary evidence. Creswell's qualitative write-up strategies (2009, p.193) and Yin's (2009, p.176) 'linear-analytic' structure, which claims to be 'the standard approach for composing (exploratory case) research reports', as summarised:

| **Yin's 'linear-analytic' elements** | **Creswell's qualitative write-up elements** |
|---|---|
| 'Issue or problem being studied' | Descriptions and themes from the data and presentation of themes |
| Findings from the exploration (data collected and analysed)' | Presentation of descriptions and themes that 'convey multiple perspectives from the participants' |
| 'Conclusions (for further research)' | Provision of 'an in-depth analysis of one or more cases' |

**Table 4.14: Combination of Yin's (2009) and Creswell's (2009) Case Report Design**

Creswell's write-up strategies include using 'quotes of varying lengths from short to embedded passages'; 'text in tabular form'; 'participant's words to form codes and theme labels'; 'intertwining of quotations with researcher's interpretations'; a 'narrative approach' (adapted from 2009, pp.193-194). There are drawbacks but the main benefit is that all data from all sources can be taken into account fully to enrich and strengthen the case reports.

## 4.6 Exploratory Qualitative Case Study Research

This penultimate section addresses research validity and reliability, which take on a unique perspective in a CR-driven, qualitative case-based exploratory study. This unique combination means that research methods, design and nature of research must be reconciled.

First, with respect to case study, Yin (2009, citing Kidder *et al*., 1986) defines quality as the 'criteria for judging the quality of research designs', which is based in four tests: external validity ('establish(es) the domain to which findings can be generalised'); construct validity ('establish(es) correct operational measures'); reliability ('demonstrat(es) repeatability of operations'); and internal validity ('establish(es) causal relationships')[87]. Second, with respect to the nature of the research, Yin's (2009) interpretation of validity for exploratory research is limited to external validity and construct validity. Third, this research employs qualitative methods which take a different view of validity and reliability.

Consequently, research methods (qualitative) and nature of research (exploratory) should take precedence over research design (case study) in conduct and in presenting findings. The remainder of this section explains how threats to quality are managed to ensure this case-based research is true to its stated purpose, starting with an explanation of the qualitative view of quality and closing with a table to summarise actions.

[87] … but which is more applicable to explanatory case studies.

### 4.6.1 Trustworthiness and Particularity[88]

Creswell (2009, p.190) defines 'qualitative validity' as meaning "the researcher checks for the accuracy of the findings by employing certain procedures while qualitative reliability indicates that the researchers approach is consistent …" and argues "validity does not carry the same connotations in quantitative research as it does in qualitative research, nor is it a companion of reliability or generalizability" (2009, p.190 citing Gibbs 2007).

Therefore, the discussion of 'validity' in qualitative research is misplaced and the focus should be on 'trustworthiness', the idea that validity "is based on determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers of an account" (Ibid, p.191 citing Creswell & Miller 2000) and for which there are four parallels with quantitative research:

- Credibility (a parallel for internal validity) is the confidence that a research has in terms of the truth of the research findings;
- Dependability (a parallel for reliability) is associated with the stability of the findings over a period of time;
- Transferability (a parallel for external validity) is the extent to which other researchers can apply the findings of this research to their own; and
- Confirmability (a parallel for objectivity) is the internal coherence of the data with regards to the interpretations, findings and recommendations (2009, p.191).

Generalisation also adopts a different feature in qualitative research, "the value of (which) lies in the particular description and themes developed in context of a specific site" so "particularity rather than generalisation is the hallmark of qualitative research" (Ibid, p.193 citing Greene & Caracelli 1997). However, in deference to the distinction made by Yin (2009, p.38) for exploratory case study research, this research accepts the view that external validity test deals with the issue of knowing whether a case study's findings*:*

> "….. are generalisable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a 'sample', and the investigator's goal is to expand and generalise theories (analytical generalization) and not to enumerate frequencies (statistical generalization)" (Yin 1994, p.35; 1989; p.21 as cited in Easton 2010, p.126).

[88] Threats to validity are drawn from the works of Kidder (1981, pp.21-22) and Blaikie (2001, p.193), both of whom quote Cook and Campbell (1979) and Yin (1994).
[88] http://www.socialresearchmethods.net/kb/introval.htm Accessed 151211.
[88] Yin (1994, p.33) argues that internal validity is 'not for descriptive or exploratory studies', which most business research is, but Remenyi et al. (1994, p.180) consider it a "fundamental pillar on which the validity of business and management research is based".

External validation is particularly relevant to this research, which seeks patterns of behaviour as a basis for developing generalisations about how UK science parks influence site selection of foreign TMT firms' site selection to a theory or theoretical framework about science park development. In this research, external validation is judged by the extent to which the account seems fairly and accurately to represent the data collected from the stakeholders in the two units of analysis and target sub-regions (Table 4.14). Second, construct validity concerns operationalisation or the effective conceptualisation and measurement of constructs and occurs if 'there is a close fit between the construct it supposedly measures and the actual observations made with the instrument' (Bernard 2000, p.50). Yin (2009, p.41-42) agrees that construct validation is about establishing 'correct operational measures for the concepts, ideas and relationships being studied'. This research employs several tactics to manage construct validation (Table 4.15).

### 4.6.2 Qualitative Reliability and Dependability

Qualitative reliability concerns consistency or repeatability in the researcher's approach, whereas dependability is associated with the stability of the findings over a period of time. Yin (2009, p.45) suggests the "use of a case study protocol to deal with the documentation problem in detail" and "the development of a case study database", which can be done by using multiple measurements or by operationalising as many steps as possible and 'conduct(ing) the research as if someone were always looking over your shoulder' (Ibid). Creswell (2009, p.190-191) suggests four additional steps which are unique to qualitative research, two of which are relevant:

1. "Check transcripts to make sure they do not contain obvious mistakes"; and
2. "Make sure there is no drift in the definition of codes …"

This research follows Creswell on and Yin on operational meticulousness and use of multiple instruments. Actions to manage threats in the research are summarised below.

| Threat to Research | Action Taken |
|---|---|
| **Trustworthiness** (External validity) | Thick description<br>Random selection of the sampling frame of TMT firms and STPs - the initial TMT database was reduced based on selection criteria and then all firms remaining in the sub-regions were contacted, similarly for SPs (Table 4.6) |
| **Trustworthiness** (Construct validity) | Piloting of e-surveys (TMTFs and SPs) – also addresses 'content validity'<br>Use multiple sources of evidence (to encourage convergence), s.4.4.4<br>Maintain a chain of evidence<br>Interview questions 'triangulated' across different versions of questionnaires<br>Expert-practitioners ('key informants') invited to review transcripts<br>One additional expert invited to comment on the case findings |
| **Dependability** (Reliability) | Case Study Protocol<br>Operationalised all key steps and research conducted as if 'someone looking over shoulder'<br>Cross-checking of codes |

**Table 4.15: Summary of planned actions to mitigate threats[89]**

## 4.7 Chapter Summary

This chapter discussed the multi-phase critical realist research methodology through which research plans have been operationalised and evaluated. It discussed why the research is done, why it is done in the way it is done, the issues encountered and what has been done to address them. Consistent with the critical realist research methodology and the need for interdependence of theory and method, the methodological framework and conceptual framework must be viewed as works in progress and are updated in Chapter 8.

## END of Chapter Four

[89] Adapted from Yin (2009, p.45)

# Chapter Five

## Research Findings I

### The Context of Site-Selection in Oxfordshire, Cambridgeshire & M4 Corridor

## 5.1 Introduction to Contextual & Secondary Findings

This first of three findings chapters presents contextual-level findings, mainly from secondary data that address overarching issues common to the target sub-regions in accordance with critical realist expectations that 'context' (spatial and temporal 'relevant circumstances') is important to realist causal analysis. The mainly descriptive findings explain the precise conditions or circumstances under which causal mechanisms have been activated and are derived from analysis of publications from strategic practitioners, Government and other organisations, supplemented with analytical findings from qualitative interviews of expert-practitioners in plant location, CRE, site selection and UK inward investment. Chapter 5 sets the scene for firm-level findings in Chapters 6 and 7 and is structured as follows.

Section 5.1 presents findings on internationalisation trends. Sections 5.2.1 and 5.2.2 build on section 2.4.6 and present findings on European and UK national attractiveness. Section 5.2.3 discusses 'doing business in the UK', supplemented with analysis of primary evidence from experts on policy influences on firm settlement in the target regions and the impact of LEPs on inward investment, *inter alia*. Section 5.3 presents findings on the UK specialist commercial property landscape in the target regions, supplemented with analysis of the UK technology property stock. Section 5.4 presents analysis of primary evidence from experts and foreign TMT firms on location, settlement and site-selection in the UK. Section 5.5 summarises findings and closes the chapter. Research profiles and documentary sources are listed in Table 5.1 in the order of interviews and documents that provided the basis for document analysis are listed in Table 5.2.

| DATE OF INTERVIEW/CITY | JOB TITLE/ORGANISATION | EXPERTISE/AREA OF CONTRIBUTION |
|---|---|---|
| **TMT, Plant Location & Site Selection** | | |
| 02.07.13<br>**Los Angeles, Ca. USA** | Vice Chairman and U.S. Technology, Media and Telecommunications Industry Leader & Global Technology Leader<br>**DTTL (USA)** | **TMT** |
| 05.07.13<br>**Toronto, Ont. Canada** | Director of Research<br>**Deloitte Canada** | **TMT** |
| 16.07.13<br>**Atlanta, Ga. USA** | Managing Editor<br>**Site Selection Magazine**<br>www.siteselection.com | **Site Selection** |
| 17.07.13<br>**Brussels, Belgium** | Global Leader-PLI<br>**IBM** | **Plant Location** |
| 23.07.13<br>**London, England** | Regional Director<br>EMEA Research<br>**Jones Lang Lasalle** | **CRE** |
| 09.08.13<br>**Brussels, Belgium** | Senior Managing Consultant –PLI<br>**IBM** | **Plant Location** |
| **Science Parks** | | |
| 30.07.13<br>**Guilford, Surrey, England** | Chairman UKSPA<br>Managing Director<br>**Surrey Research Park** | **UK Science Parks** |
| 09.08.13 | Director Science Parks | **UK Science Parks** |

| | | |
|---|---|---|
| **Norwich, England** | **Goodman's International**<br>Colworth Science Park<br>Harwell Innovation Centre | |
| 30.09.13<br>**Norwich, England** | Chief Executive Officer, UKSPA<br>**Chesterford Research Park** | **UK Science Parks** |
| 27.02.14<br>Pitea, Norrbrotten, Sweden | Director<br>**FEPRO** | **Science Parks** |
| **UK & Regional Inward Investment** | | |
| 16.08.13<br>**Oxford, England** | Senior Partnerships Manager (Oxon)<br>**Invest in Oxfordshire** | **Inward Investment (Oxfordshire)**<br>http://www.oxfordshirelep.org.uk/ |
| 19.08.13<br>**Reading, England** | Head of Inward Investment & Reinvestment<br>**Thames Valley Chamber of Commerce** | **Inward Investment (M4C)**<br>www.thamesvalley.co.uk |
| 19.08.13<br>**Reading, England** | Partnership Manager South East,<br>Investment Services Team<br>**UKTI/TVCC**<br>(Facilitated by Head of Investment) | **Inward Investment (M4C)**<br>www.uktradeinvest.gov.uk<br>www.thamesvalley.co.uk |
| 19.08.13<br>**London, England** | Head of Local Engagement<br>Investment Development Group<br>**UKTI**<br>(Facilitated by Assistant Director, Regional Directorate, UKTI) | **Inward Investment (UK)**<br>www.uktradeinvest.gov.uk |
| 02.09.13<br>**Reading, England** | Partnership Manager South East,<br>Investment Services Team<br>**UKTI** | **Inward Investment (UK)**<br>www.uktradeinvest.gov.uk |
| **Local Economic Development (M4 Corridor, Oxon & Cambs)** | | |
| 08.11.13<br>**Oxford, England** | Former Executive Director of O2C Arc<br>Economic Development Consultant | **Local Economic Development (Oxon & Cambs)** |
| 09.10.14<br>**Bristol, England** | Head of Product Development<br>**Invest in Bristol & Bath** | **Local Economic Development (M4C)**<br>www.bristolandbath.co.uk |
| 22.10.14<br>**Cambridge, England** | Economic Projects Manager<br>**Greater Cambridge & Greater Peterborough LEP** | **Local Economic Development (Cambs)**<br>http://www.gcgp.co.uk/yourlep/the-team/ |
| 06.11.14<br>**Swindon, England** | Economic Projects Manager<br>**Forward Swindon** | **Local Economic Development (M4C)**<br>www.forwardswindon.co.uk |
| 07.11.14<br>**Oxford, England** | Chief Executive<br>**Thames Valley Berkshire LEP Ltd** | **Local Economic Development (M4C)**<br>http://thamesvalleyberkshire.co.uk |
| 12.11.14<br>**Oxford, England** | Chief Executive<br>**Oxfordshire LEP** | **Local Economic Development (Oxon)**<br>www.oxfordshire.co.uk |

**Table 5.1: Contextual Research Participants**

| DOCUMENT | SOURCE | YEAR OF PUBLICATION |
|---|---|---|
| **Global, Supra-Regional and National Location Trends of Firms** | | |
| **UKSPA Annual Report** | UKSPA | 2014-2015 |
| **Doing Business 2015_Going Beyond Efficiency** | World Bank | 2014 |
| **Global Index Country Profiles on Globalization** | Ernst & Young | 2013 |
| **Global Investment Report** | UNCTAD | 2013 |
| **Global Location Trends, Annual Report** | IBM | 2013 |
| **Corporate Real Estate Challenges** | Gensler | 2013 |
| **Emerging Trends in Real Estate** | PWC | 2013 |
| **UK Business: Activity, Size and Location** | ONS | 2012 |
| **Business Population estimates for the UK and Regions 2012** | DBIS | 2012 |
| **UK Business: Activity, Size and Location** | ONS | 2011 |
| **UK Business: Activity, Size and Location** | ONS | 2011 |
| **Global Location Trends, Annual Report** | IBM | 2010 |
| **Global Investment Report** | UNCTAD | 2010 |
| **SIC 2007** | Companies House | 2008 |
| **UK Ease of Doing Business** | World Bank | 2004 - 2015 |

**Table 5.2: Sources of Secondary Contextual Data**

## 5.2 Internationalisation Trends, 2010 - 2013

Building on section 2.4.6, this section continues the discussion of spatial and temporal context in line with critical realist expectations. Analysis of four documents (IBM 2010; 2013; UNCTAD 2013; and E&Y 2013) revealed several findings on global location trends and analysis showed there is a general rise in investment across the globe following the 2008/9 recession. UNCTAD confirmed a rise in investment, from US$1.24 trillion (2010) to US$1.46 trillion by 2013, and that the major share (US$473t) came to the EU (2014, p.4). USA dominance and the rise of tertiary services have continued, with Europe and London being the top destination for projects:

1. The USA continues to be the top investing economy in other parts of the world and typically determines the global trends (2010; 2010; 2013);
2. Two tertiary segments (quaternary, quinary) have arisen (2013; 2013, Figure 2.6);
3. The main share of FDI came to the EU (2013; 2014, p.4);
4. ICT (6th) and business services (5th) are 'top ranking sectors by estimated jobs' for growth and employment' (2010; 2013).

In its third report on global location trends (2010), IBM analysed changes in the global economy and how 'these changes are reflected in the most recent trends in corporate location decisions' (p.3). The updated Global Investment Locations Database (GILD) has recorded information continuously for over 100,000 investment projects around the world since 2003. IBM confirmed the UK rank by 'estimated jobs' (7th), 'average value of investment projects' (5th) and London is the top destination city for projects (2013, pp. 3, 5, 10). E&Y (2013, p.2) confirmed "the UK remained the leading European destination for FDI in 2012" (s.6.1.3). The cross-referencing of these reports yields eight findings on the top twenty destinations by:

(i) Business support services;
(ii) Jobs in production;
(iii) Jobs in R&D;
(iv) Total jobs (estimated);
(v) Sectors by jobs (including the ICT sector);
(vi) Job creation through foreign investment in renewable energy;
(vii) Chinese and Indian investment; and
(viii) Number of investment projects.

In 2011, global FDI inflows rose to US$1.5 trillion, surpassing pre-crisis average, and despite turmoil in the global economy (UNCTAD). In this year, 'transport equipment' was the dominant investing sector, with 'business services' and 'ICT' 4th and 5th respectively. The IBM findings also confirm the importance and competitiveness of business services (4th) and ICT (6th) as 'top ranking sectors by estimated jobs' for growth and employment. 'The USA continues to be the top investing economy in other parts of the world and typically determines the global trend' (IBM 2012, p.7). FDI inflows increased in all major economy levels, developed, developing and transition economies, with developing and transition economies accounting for half in 2011 (Global Investment Trends Monitor, 2012).

The findings acknowledge the rise of at least two segments of tertiary services, including ICT, the focus of this research, and confirm the focus of the study is current, as it regards geography (UK location) and more importantly, that the sectoral focus is both relevant and important. These findings help to validate the importance placed on 'context', given that multiple considerations underpin the 'direction of travel' with regard to trends, sectors and country of origin, all internationalisation outcomes that relate to this research.

### 5.2.1 European Regional Attractiveness

This section continues the examination of research context with a review of European attractiveness for doing business. As noted (s.5.2), examination of Europe includes many UK references. Six issues relating to European FDI context are noteworthy; two relate to Europe's top ranking and four to UK prominence as a growing economic powerhouse within Europe:

1. Europe is the top region in the world for attracting FDI (Ibid 2011; 2012);
2. Companies consider at least seven critical factors when investing (Ibid 2011, p.10);
3. UK is one of the five 'winners' in Europe (Ibid 2011); and
4. UK maintained its leadership in FDI (projects and jobs), which grew by 7% and 6% respectively.

All publications (for example, E&Y 2011, IBM 2012) concur that Europe is the top destination for FDI, with a quarter of all consumption and investment taking place within its expanding borders, and that Europe was able to maintain its position due to seven critical factors that companies consider when investing:

(i) Transport and logistics infrastructure (63%)[90];
(ii) Telecommunications infrastructure (62%);
(iii) Stability and transparency of the political, legal and regulatory environment (62%);
(iv) The ability for companies to remain productive (57%);
(v) Making sure that labour pools are reliable (54%);
(vi) Finding skilled workers (50%); and
(vii) Maintaining competitiveness (50% cite labour costs, ranked only seventh; 2011, p.10)

There is also consensus that the UK (with France) remain FDI leaders in Europe with 'the greatest number of projects coming from automotive, business services, software and machinery, with the latter two, creating the most jobs' and seeing the 'largest swing from contraction to expansion' (E&Y 2011). Thus, it can reasonably be inferred that the UK is on the 'upswing' at the time of this study.

### 5.2.2 UK National Attractiveness

To showcase the UK's attractiveness, this section reports additional statistics from IBM's GILD, E&Y's Globalisation Index and UNCTAD's World Investment Report (2011). Findings relate to the UK and its ranking as an FDI destination, jobs, projects, strength of tertiary and ICT sectors, efforts by the UK Government to support ICT and the rapid growth of TMT, particularly in London, and crucially for this research, the increased demand for TMT space:

1. UK ranks 10th globally, having increased its composite score to 4.74;
2. UK ranked 7th by 'estimated jobs', 5th by 'average value of investment projects' and is "the most favoured destination for FDI in Europe and third worldwide";
3. London is the top destination city for projects and was ranked by TMT professionals as the world's second most important TMT centre behind New York;
4. Investors came to the UK for its strength in services and increasingly its industry, investing in business services (14% of projects), machinery and equipment (11%), computers (7%) and software (7%);
5. The ICT sector remains a robust sector, despite seeing a decline in rank and number of jobs created, but still is reportedly worth 'more than £150 billion per annum to the (UK's) economy', employing almost a million people (UKTI ICT Map for Investors, p.1).
6. UK Government has earmarked £200m for investment in technology and innovation centres throughout the UK over the next four years; and
7. The TMT sector is set to grow, 'with 54% of TMTs expecting to increase headcount in London over the next three years, translating to an additional 1.2m sq ft of demand above what the

[90] Percentage of respondents

sector's current average take-up and a projection for office take-up to reach 4.65m sq ft by the end of 2014.

Table 5.3 shows the improvement in UK composite score for globalisation from 1995 to 2012, which saw its ranking improve to 10th by 2012 (E&Y 2013)[91].

| Overall | Country | 2012 | 2009 | 1995 |
|---|---|---|---|---|
| 1↓ | Singapore | 7.81 | 7.29 | 6.04 |
| 2↑ | Hong Kong (SAR) | 6.31 | 6.90 | 5.50 |
| 3-- | *Ireland* | 5.63 | 6.87 | 5.08 |
| 4-- | *Belgium* | 5.49 | 5.82 | 4.51 |
| 5↓ | *Sweden* | 5.30 | 5.77 | 4.00 |
| 6↑ | *Denmark* | 5.19 | 5.77 | 4.36 |
| 7↑ | *Switzerland* | 4.96 | 5.62 | 3.92 |
| 8↑ | *The Netherlands* | 4.94 | 5.45 | 4.62 |
| 9↓ | Israel | 4.75 | 5.16 | 4.67 |
| 10↓ | *Finland* | -- | 5.14 | 3.76 |
| ↯ | | | | |
| **11↑10** | **UK** | **4.74** | 4.76 | 4.11 |

**Table 5.3: Globalization Index 1995 – 2012 Summary**[92]

E&Y's (2013) ranking of the UK means the country 'exceeded the global average by 0.64 points', largely due to 'capital and finance' and 'exchange of technology and ideas'. In comparison to other advanced economies, the UK slipped one rank and 'dropped 4 positions since 1995'. Below is a summary of UK performance in 2012 showing upward trends in five key metrics from the previous year.

| Overall Rank | Overall score | Trade | Capital | Labor | Technology | Culture |
|---|---|---|---|---|---|---|
| 10th ↑ 1 | 4.74 ↑ 0.03 | 5.89 ↓ -0.06 | 4.81 ↑ 0.02 | 4.83 ↑ 0.13 | 3.94 ↑ 0.07 | 4.06 ↑ 0.01 |

**Table 5.4: Summary of UK Globalisation Trends** (Taken from EY 2013)

Second, and of particular interest to this research, the E&Y (2011) survey confirmed the IBM (2010) finding that the UK is one of the five 'winners' in Europe, and concluded that the 'UK remains a highly attractive destination given its position as a global player in the world economy and its capacity to reform a difficult economic situation' (p.16). IBM's more specific look into the UK economy shows the best rankings achieved by the UK over the past two years when considering jobs, sectors and overall investment (Table 5.5).

| Location Metric (top destinations) | UK Rank |
|---|---|
| Number of investment projects | **London** ranks 1st of 20 cities |
| Chinese and Indian investment | 2nd/20 countries |
| Total jobs | 5th/20 (4th in 2009) |
| Top sectors | **ICT** is 5th (3rd in 2009)/10 sectors |

[91] http://www.ey.com/GL/en/Issues/Driving-growth/Globalization---Looking-beyond-the-obvious---2012-Index Accessed 03.07.14 1052

[92] Adapted from: http://www.ey.com/GL/en/Issues/Business-environment/Redrawing-the-map--globalization-and-the-changing-world-of-business---Countries Accessed 21.01.12 1252

| | |
|---|---|
| **Business support services** | 6th/20 (4th in 2009) |
| Jobs in R&D | 8th/20 (3rd in 2009) |
| Job creation through FDI in renewable energy | 8th/10 (down from 3rd) |

**Table 5.5: Summary of IBM Global Trends (2013, p.8)**

According to UNCTAD, the UK FDI stock is estimated at USD$1.086 trillion, an increase on the previous year, which is outperforming a declining European market. The UK has benefited from increased levels of investment in manufacturing, electronics and ICT[93]. Analysis of UKTI documentation confirmed *inter alia* two key findings, first ICT is one of the most important sectors to the UK (GDP contribution, jobs) and the UK is a top technology consuming and using market. These reports confirm the UK is globally competitive, becoming more competitive, and the ICT sector remains robust, which has implications for commercial space capacity and availability. Specifically, analysis by BNP Paribas Real Estate reveals that TMT demand for space is expected to grow significantly and TMT firms will congregate around locations that have an advanced digital infrastructure and invest in the quality of educational institutions to attract top talent from around the world. This is why London is ranked by TMT professionals as the world's second most important TMT centre.

These secondary findings are important because they situate the UK economy in terms of growth, and as an economy that is prepared for further services and ICT investment. In addition, the UK Government has targeted investment at space and facilities to accommodate TMT, which is expected to grow significantly, so it would be useful to confirm why this growing sector finds the UK business environment attractive. The implication of these findings for the conceptual framework is that strong evidence exists that the TMT sector is on the move and likely headed to the UK for any number of reasons, with the very strong implication that they require quality space, thus validating the research focus and unit of analysis.

### 5.2.3 UK Enterprise Stock (including Foreign Firms)

The UK has a large and growing technology enterprise stock which can be measured by firm registrations, foreign firm entries, 'new (technology) missions' and 'software investments' (Companies House, 2012). This information supplements the contextual picture of UK company activity and estimates the number of foreign and TMT firms in the country.

[93] As cited in http://www.londonpressservice.org.uk/lps/creativedesign/item/195420.html? Accessed 26.01.12

Analysis of the latest company data (DBERR 2009; Companies House 2009-2013; ONS 2011) yields five findings.

| | 2012/13 | 2011/12 | 2010/11 | 2009/10 | 2008/09 |
|---|---|---|---|---|---|
| **England & Wales** | 2,588.3 | 2,434.1 | 2,287.3 | 2,194.7 | 2,135.9 |
| **Scotland** | 166.5 | 157.1 | 133.9 | 129.7 | 129.6 |
| **Northern Ireland** | 38.8 | 36.2 | 34.2 | 34.7 | -- |
| **Great Britain** | 2,739.6 | 2,576.5 | 2,421.2 | 2,324.4 | 2,265.5 |
| **United Kingdom**[94] | **2,778.4** | 2,612.6 | 2,455.4 | 2,359.1 | -- |

**Table: 5.6: Number of Firms registered in the UK (2008 - 2013)**[95]

First, there is an obvious lack of agreement on actual firm numbers: Companies House reported ~2.36m firms in 2009 and a total of 2,778,400 three years later[96]; DBERR estimated the total number of firms at ~2.27m in 2009, whilst the ONS put the total number of VAT-registered firms at 2,080,000 firms at the end of fiscal year 2011 (05-Oct-2011)[97], a decrease of 0.9% from 2010 (Figure 5.1).

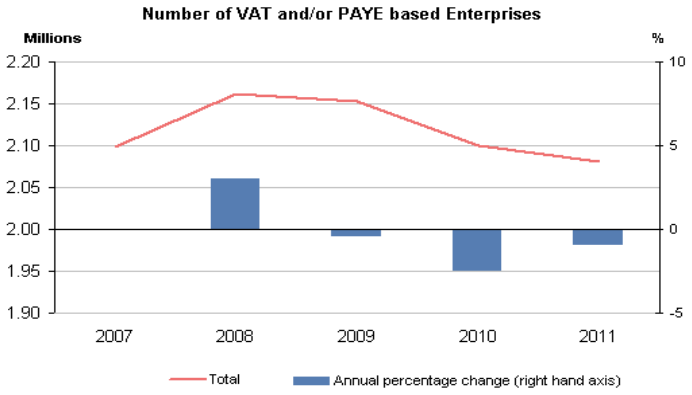


**Figure 5.1: Number of VAT-registered firms in the UK**

Whichever total figure is chosen, however, may be qualified further by the DBERR Report which found that only ~68% (or 1.55m) of all firms could be classed as 'active-live' (2009, p.5). So a better guide might be the proportion of VAT-registered businesses (since many businesses are sole proprietors or have no employees). Companies House estimated 10,489 overseas firms registered, which are defined as 'companies incorporated outside the UK' and which have registered a UK establishment(s) under Part 34 of the Companies Act 2006.

[94] Data does not make clear why 'Great Britain' was used until 2009 and then, UK thereafter
[95] Taken from http://www.companieshouse.gov.uk/about/pdf/companiesRegActivities2012_2013.pdf; p.5 Table A1 05.07.14
[96] This figure may be qualified further by a DBERR Report (Jan. 2009) which found 2.27m firms, of which ~68% or 1.55m firms were classed as 'active-live' (p.5). (http://www.ons.gov.uk/ons/rel/bus-register/uk-business/2011/sum-ukbusiness-2011.html) Accessed 29.01.12
[97] http://www.ons.gov.uk/ons/rel/bus-register/uk-business/2011/sum-ukbusiness-2011.html 29.01.12

From this figure, it can be estimated that if 68% of firms are 'active-live', then there were approximately 7,132 active foreign firms in the UK by end 2011(Table 5.7).

| | New Registrations | Registrations closed | **Registered at 31-Mar-2011** | **Est. number of *active* firms** |
|---|---|---|---|---|
| **Rest of UK** | 61 | 20 | 1,128 | |
| **Rest of EC** | 227 | 55 | 2,678 | |
| **Commonwealth** | 137 | 88 | 2,794 | |
| **Rest of World** | 182 | 83 | 3,889 | |
| **Total** | 607 | 246 | **10,489** | **7,132** |

**Table 5.7: Estimated Number of Foreign Firms registered in the UK (2011)[98]**

Several inferences can be drawn from the above data. First, inconsistency of data frustrates any definitive conclusions about actual numbers of firms in the UK. Second, three inferences can be drawn regarding size, ownership and sectoral focus of foreign firms:

1. There were ~2.8m firms registered in the UK in 2012 ('Effective numbers on register at end of period'), of which approximately 75% (or 2,080,000) were VAT-registered;
2. Only ~1.55m firms can be classified as 'active-live' at any time;
3. Of foreign companies registered, the greatest number migrated from the USA.

Of the aggregate figure of 10,489 or the estimated 7,132 active-live firms, it can be inferred that the firms are likely to be medium to large in size, so VAT-registered; privately held, so not compelled to publish financial information; and likely to fall into one of three SIC codes (58, 62 or 63), Figure 5.2. To get a fair estimate of the proportion of a particular sector of foreign firms that now 'reside' in the UK, this total figure (10,489) could be 'cross-referenced' with SIC codes, which were "first introduced in 1948 for use in classifying business establishments and other statistical units by the type of economic activity" (Prosser 2009, p.2). SIC codes were updated in 2007 and the new set of codes adopted 01-Nov-2011.

The assumption drawn on size is important because of the above data which shows that less than 5% of foreign-owned businesses are small or micro. This suggests that the UK enterprise stock is large, has a wide representation of foreign firms, mainly from the USA and Ireland, and foreign firms make a significant contribution to the UK economy. Finally, of the foreign companies registered, the greatest number migrated from the USA with 91 new registrations, 54 closed registrations and 2,449 registrations in total, followed by the Republic of Ireland (686) and Cayman Islands (593), which heads the 'Commonwealth'.

[98] Taken from http://www.companieshouse.gov.uk/about/pdf/companiesRegActivities2010_2011.pdf Table E1 28.01.12

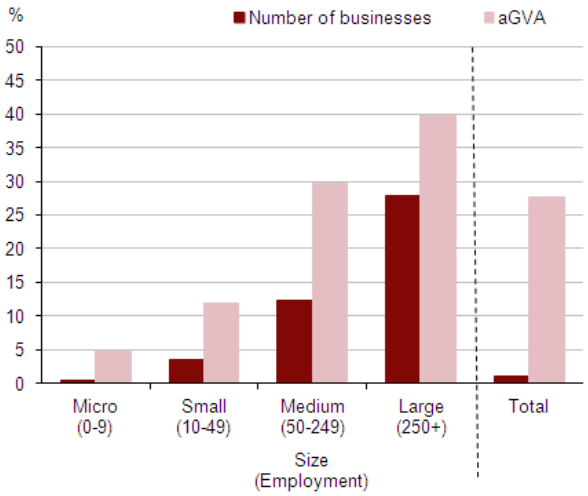


**Figure 5.2: Contributions of foreign-owned registered businesses to the UK Business Economy by employment size, 2011**[99]

In summary, whilst definitive conclusions about actual firm numbers cannot be drawn, these findings confirm that the UK is a top destination for international business and its enterprise stock is rich, diverse and growing, with firms from many countries. This validates the general subject matter and currency of this research, both in terms of national and sector focus.

### 5.2.4 Doing Business in the UK

To showcase the UK's changing business environment and a favoured destination for business, this section summarises data from the World Bank's Ease of Doing Business database, in particular, from data published between 2004 and 2015. Several key findings are evident from the various datasets, including three that relate to the business environment. The World Bank applies ten criteria - Starting a Business, Dealing with Construction Permits, Getting Electricity, Registering Property, Getting Credit, Protecting Minority Investors, Paying Taxes, Trading Across Borders, Enforcing Contracts and Resolving Insolvency. Averages of UK ranks over the past two years[100] confirm that the UK has improved in six of the ten criteria, albeit with scope for improvement in four (Figure 5.4).

Second, of actions taken by the UK Government over the past six years (2009 to 2015) to correct deficiencies, nine of thirteen actions (see Table 5.8) have resulted in improvements to

[99] Taken from: http://www.ons.gov.uk/ons/rel/abs/annual-business-survey/foreign-ownership/sty-abs-who-owns-businesses-in-the-uk.html Accessed 08.03.15
[100] This is when actions taken for the focus period (2011/2) should have taken effect.

the business environment, for example, reduced corporate income tax and modernised civil court procedures.

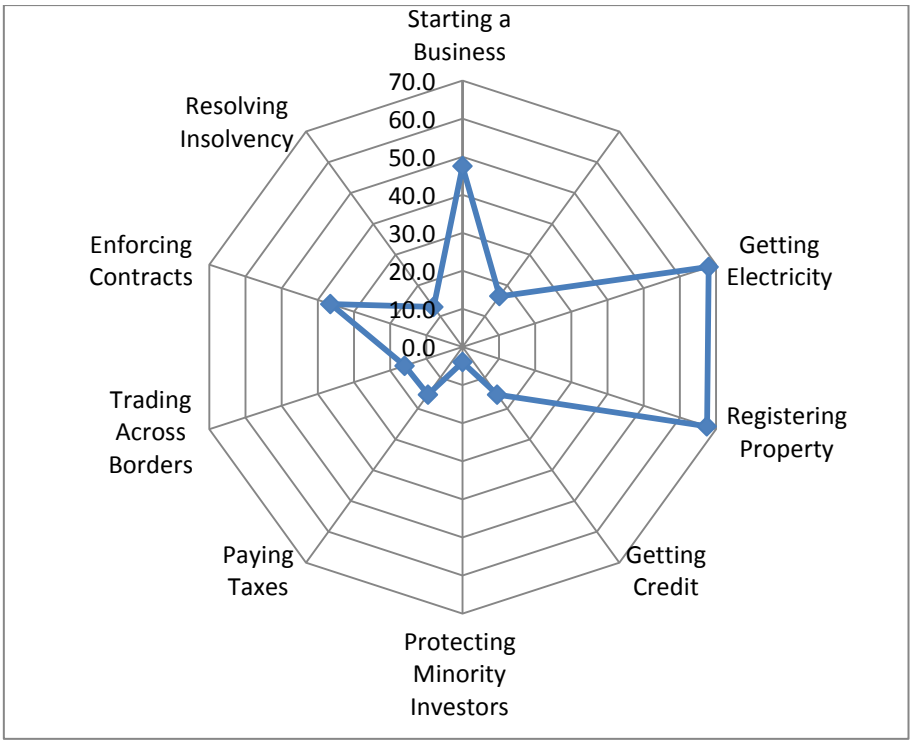


**Figure 5.3: Ease of Doing Business in UK, 2004 - 2015**

Analysis of World Bank data shows the impact, positive or negative, of government action:

| Criterion | UK Government action | Impact (+/-) |
|---|---|---|
| **Starting a Business** | Sped up tax registration | + |
| | Provided model articles for use in preparing memoranda and articles of association | + |
| **Paying Taxes** | Reduced corporate income tax rate | + |
| | Increased the landfill tax | - |
| **Registering Property** | Introduced electronic lodgement for property transfer applications | + |
| | Introduced automatic electronic processing of the land transaction return | + |
| **Dealing with Construction Permits** | Increased efficiency in the issuance of planning permits | + |
| | Wider use of approved inspectors | + |
| **Enforcing Contracts** | Modernised civil procedures in the commercial court | + |
| **Resolving Insolvency** | Streamlined bankruptcy procedures, favours the sale of the firm as a whole and improves the calculation of administrators' fees | + |
| **Labor Market Regulation** | Increased the severance payment obligation applicable in cases of redundancy dismissals | - |
| | Increased mandatory paid annual leave | - |
| | Increased redundancy costs of the severance pay applicable in cases of redundancy dismissals. | - |

**Table 5.8: Impact of actions taken by the UK to improve its business environment**[101]

[101] Extracted and adapted from http://www.doingbusiness.org/Custom-Query/united-kingdom 08.03.15

The net effect of changes has been an improvement in the UK's overall position for 'ease of doing business' by one place to 8th. Given the earlier findings, a reasonable expectation would be a continuing influx of firms into the UK based on an attractive (and improving) business environment and planned further investment in space and facilities to accommodate technology-based firms. These findings conclude the first general look into the context of TMT firm location selection to the UK and confirm that considerations raised are relevant to this research. Examination of context continues with 'macro influences' and a more detailed look into the UK business environment.

## 5.3 Macro Influences on TMT Firm Settlement in the target sub-regions

The Critical Realist conceptual framework (s.4.3.2.3) postulates that a set of 'contingent influences' exists in addition to an external 'structural environment', that is strongly implicated in TMT firm settlement. This subsection uses focused telephone interviews to interrogate the significance of the second of these 'influences', 'public agency support', in the form of LEPs, thus effectively opening the presentation of findings. The ramifications of this support for incoming firms are considered in regard to three issues: impact of economic development policy shift; success of the UK inward investment strategy; and the effect of LEPs on inward investment. Respondents were asked what effect the change from RDAs to LEPs has had on site selection and the negotiation process for inbound firms; and how LEPs have impacted the way stakeholders operate with regard to inward investment[102]. These findings inform the first set of contingent relations ('public agency support').

### 5.3.1 Regionalism to Localism - Impact of Policy Shift

LEPs have been heavily criticised by some authors (s.3.2.1.1) even though still in infancy; their viability in rebalancing the economy and the inappropriateness of boundaries and scales have been questioned. This sub-section presents primary findings on the changing economic development landscape, from the perspectives of key expert practitioners in the fields of inward investment (local and national levels) and LEP operations in the target regions. Four findings address the impact of the policy shift at an operational level, which relate to UKTI strategy, LEP budgets, way of working and the operational effects of a new way

[102] The inward investment experts who contributed to this part of the research are listed in Sec. 5.1.1

of working ('UK 1st' principle) and the investor experience; the variability and reduced budgets of LEPs; and increased complexity in working.

Content analysis of focused interviews produced a first point of general agreement that the 'UK 1st' principle is 'a good thing', mainly because it allows stakeholders to concentrate on attracting inward investment projects before deciding on where firms settle or site. The clear implication is that under the RDA's, the focus was sub-national and the competition for siting started immediately, which proved counter-productive as a whole. Under the new arrangement, once a project is underway,

> "Investors get a bespoke proposition and an account manager to ensure a smooth investor journey", which is different from the previous setup that created a more disjointed investor experience.

The clear differences between the sub-regions (s.3.4) expose the different modus operandi under a localist agenda. Under LEPs, the atomised structure has produced more local autonomy which allows smaller entities to be much more aggressive and able to attract more projects, once the handover reaches them. UKTI thinks the M4 Corridor 'might find it easier to attract firms' than Oxon and Cambs because it 'is probably bolder (and) less costly', which confirms the evidence from the dataset[103]. A third area of difference is the variable and in most cases, reduced budgets of the LEPs. For example, the GCGPLEP has a budget of £500K in 2013-4 whereas the TVLEP has a budget of £137m[104]. This means that LEPs must think more carefully and creatively about what sort of support to provide incoming firms because "the southeast generally doesn't have a lot of money to throw around like some of the northern locations". On the other hand, LEPs may be "positively competing for a different type of company (for whom money) is not the determining factor"[105].

Thames Valley enjoys a fairly unique situation in that its mandate for inward investment has remained relatively unchanged (TVCC #1, TVCC #2). Pre-LEP relationships (such as the TVB Chamber of Commerce, which was largely run through the old RDA) mean that a network is already in place. The Chamber has become the local delivery partner for the new LEP, taking responsibility for 'inquiry management, marketing and some element of the investor development'[106] but with much more of a county-focus. This unique way of working does not

[103] UKTI Head of Local Engagement, Telephone Interview, 19.08.13
[104] CE, TVLEP, Telephone Interview, 07.11.14; Economic Projects Manager GCGPLEP, 22.10.14
[105] Anonymous, Telephone Interview, 08.11.13
[106] Thames Valley Chamber of Commerce #1 & LEP, Telephone Interview 19.08.13

reflect what goes on in the West of England LEP, Oxon or Cambs, so it may not reflect the broader changes nationally.

Analysis of focused interview responses shows also that the changed economic development landscape has impacted inward investment at strategic and operational levels, first it is driven by a national strategy which places the country ahead of region or locale; second, by allocating budgets to LEPs, which are variable and competitively tendered; third, by directly impacting the investor experience through more direct interaction; and fourth, by going from nine to thirty nine entities, ways of working have been affected, making it more complex (s.5.3.2). For example, in Cambridgeshire, the new way of working has caused difficulties where seven unitary authorities have been brought together over a 'big area' with different economic geographies, priorities, and which are further subdivided into 12 localities. The operational effects produced by the revised structure under the new policy is

> "the biggest difference (because) each LEP has its own set of economic priorities and can set its own economic boundaries as well; economic geography is significantly different to where the old RDA would have been; within that, the priorities of each LEP are completely different; there are crossover areas, like skills, but even so there will be different approaches"[107].

In practice, this means coordination of personnel from each authority on four different levels, from CEO to operations, a detailed focus on sectoral differences and a constant juggling of different modus operandi. A sub-theme is that the increased complexity has probably created more confusion for companies because:

> "previously there were only nine regional areas; so for an inward investment offer, they were going to be pointed to a fairly large area, for example, 'the West Midlands or SE England" but now those areas have been "broken down into thirty nine little bits"[108].

One UKTI 'national view' was somewhat different; she thought there was an immediate focusing on the confusion caused by the change to LEPs:

> "I think actually it's kind of a high ground ….. what we're trying to address; it's probably a bit more confusing for companies now … because previously there were only nine RDAs; so for an inward investment offer, they were going to be pointed to a fairly large area. If you think of somebody from China, and they

[107] GCGPLEP Telephone Interview 28.10.14
[108] UKTI Telephone Interview 19.08.13

> decide on the West Midlands or SE England, it's probably a fairly manageable size for them".

The result of breaking down those areas "into thirty nine little bits" is a recipe for confusion:

> "because companies just want to know where's the best place to go; they don't really need to worry about which area, so in a way, we've got to focus on the localism agenda and make it work, but make it invisible to the inward investor" (UKTI).

This is complicated by the varying legacies on inward investment across so many localities because across thirty nine, they have varying legacies on inward investment and how well they deal with inward investors (UKTI). A safe assumption is that the policy instrument, itself, needs time to embed and settle, certainly, if it's going to be 'seamless for the inward investor, like it is in Germany', which has had that 'structure of quite devolved government in the regions for 'many, many years' and it is very well embedded. The key challenge remains to "find a way to make this work for everybody" because "if you look at Germany and the number of years they've had to get this right, we have a bit of a ways to go". Patently, this is more difficult than it appears because the investor

> "has to be able to see that he actually gets a different offer by talking to Oxfordshire from what he gets from Thames Valley, but he mustn't be bogged down in worrying about this is Oxfordshire, this is Thames Valley… It's a very fine line, it's a very clever trick that I think we're still working towards pulling off because it's brand new".

If investors 'just want to know where's the best place to go', the new policy could work, however, if 'we focus on the localism agenda, but make it invisible to the inward investor', which is a very 'tricky thing to do because across the thirty nine LEPs, they each have varying legacies'; there were nine of these RDAs and they didn't all just simply transfer knowledge to LEPs so, it's a tricky one[109]. However, because UKTI is taking control of more responsibility at the front end of the settlement/site selection process, this should alleviate the confusion for companies so long as a concerted and unified front is shown to companies until the 'last minute'. These findings help to validate the importance placed on public agency support as a key contingent influence of the conceptual framework, and specifically, the direct role played by UKTI and LEPs in foreign TMT firm site selection behaviour.

[109] Head of Local Engagement, Investment Development Group (UKTI), Telephone Interview 19.08.13

### 5.3.2 Success of UK Inward Investment Strategy

The second 'public agency' issue focused on the question, 'to what extent is the UKTI inward investment strategy working?' Primary findings from analysis of focused telephone interviews explored the views and perceptions of key expert practitioners (Table 5.1) to assess the strategy with respect to three considerations:

(i) the extent to which the strategy has been implemented successfully;

(ii) the constitution of the 'bespoke service', a critical component of the strategy; and

(iii) the nature of the relationships and partnerships, public and private[110].

In relation to this question, 'the strategy' means the two 5-year national investment strategies (2008; 2013) that were published by UKTI, Department for Business, Innovation and Skills (BIS) and Foreign and Commonwealth Office (FCO). The second strategy, in particular, builds on four 'pathways to growth', two of which address inward investment so are relevant to this study, 'targeted inward investment' to be met by an 'enhanced bespoke service for foreign direct investors', which includes 'in-depth analysis, predictive targeting and tailored business propositions' (2013, p.9). The interest is on 'building strategic relationships' through key account management and 'a new cross-government Strategic Relations Unit which will give key inward investors and exporters a seamless, "one stop" service and speedy resolution of bureaucratic obstacles to doing business' (2013, p.9).

Pathway 3 is 'a pipeline of high quality inward investment', relevant to this research because it marks the front-end of the bespoke service ('tailored business propositions, to create a pipeline of high quality inward investment projects'); it details how the 'regional support services for inward investors' will be delivered ('by an incentivised private sector partner'); and explains the 'new fast-track services for less R&D intensive investment projects' (2013, p.12). TVCC #1 (M4C) argued that 'the heart of the strategy is around securing the UK's position as a leading European location but a key challenge is the global competition that the UK faces from Europe and 'emerging markets'. He suggested that 'the principles of what UKTI are looking to achieve are obviously based on some element of market forces that are out of their control'. Despite this, he 'thinks that (the UK position) has largely been maintained and there has been a greater focus on looking to develop the UK position over and above what's

[110] For the inward investment (UKTI, TV Chamber of Commerce/LEP, Invest in Oxfordshire) experts who contributed to this part of the research, please refer to Appendix 1B.

traditionally been a positioning as a stepping stone into Europe' and 'which for some other companies (that he deals with) may be seen as an antiquated view of the world'[111].

TVCC #2 (M4C) concurred regarding 'the general process of positioning the UK as a primary location for inward investment from the 'UK 1st' principle' (which) 'attracts significant inward investment numbers'. He thought that all key publications consistently list Britain at the top which suggests the strategy is working and 'the UK is doing something right with the promotion of UK Plc'. As to what specifically has been working, it is 'a combination of government policy both in terms of hard and soft approach, vis-à-vis tax benefits, as well as the sort of offerings that are available in the UK, like established networks, including the Chambers of Commerce and LEPs, who are doing their bit', all of which are evidenced by the 'the increase of activity'. TVCC #2 conceded 'there is a broader as to how effective are the competition vis-à-vis France and Germany particularly'[112]. These excerpts provide insight into the thinking of those directly involved with inward investment and adds to context while providing specifics on how the strategy works.

Respondent C[113] (Oxon) agreed that the UK has seen some successes under its latest strategy and thinks that the organisation itself (UKTI) certainly produces 'good value' 'in terms of the overseas reach that it has, particularly in its target sector geography, which tends to be the US and Europe'. However, he counter-argued that this 'would have happened with investment anyway'? His organisation 'signed a memorandum of understanding with UKTI as a formal partner' and 'work with them very closely …. They provide leads from the overseas networks of British Embassies in various countries'. Having 'read the latest (UKTI) report', however, he was not entirely impressed; although 'very glowing in its praise of what is delivered and the actual success of the UK versus other parts of Europe', he expressed scepticism: 'actually makes quite startling reading of what they've actually achieved … I think we have to delve deep into the figures to find out how much each individual actually contributed'.

The bespoke service generated a balance of views, between the perception that the service is about 'after-care' or 'local hands-on' but that it has worked well and generally met client expectations. Respondent C understands the bespoke service to be about 'after-care activities' and having led that activity for one of the RDAs, he claimed familiarity with what it entails. According to him, (they) 'do joint visits with the UKTI staff to Oxfordshire companies; and certainly pick up the national issues, for example, staff recruitment, things like non-EU visas

[111] Telephone interview with Head of Inward Investment & Reinvestment, (TVCC), 19.08.13
[112] Telephone interview with Partnership Manager South East (UKTI & TVCC), 19.08.13
[113] Telephone interview with Invest in Oxfordshire, 16.08.13

and the need for that would come, plus also the issues around, for example, various tax incentives, from about water companies and any national grant schemes that might be coming up and then we cover the more local issues, which could include things like planning permission, university relations, staffing, etc. So, it does work, it works pretty well!'

This seemed to be the general consensus; TVCC #2 addressed the question 'from (a) UKTI perspective first and foremost'. He thought 'the principle behind it is if you're a foreign-owned business in New York, for example, and you're interested in investing in the UK, there is effectively a hand-holding process that exists from that initial discussion that may happen in New York all the way through to that company landing in Slough, Oxford or Reading, as well as then going into an aftercare programme'. This view clearly accords with the previous understanding of what the service is and how it works; it 'is based on individual business need, is not an all-encompassing standard response, is very specific to that business and includes sector specialists within the UK, geography specialists, as well as a fast-track team that can actually give a lot of service and support'. But whilst TVCC #2 thought the 'bespoke service is very good', he was quick to point out 'am not suggesting it is unique in the world, but it's certainly up there as one of the best services'[114].

TVCC #1 noted he had observed 'quite considerable change since 2008 in terms of how UKTI and the government's partners are providing local support', one thing that had changed significantly is an awareness within the national network of the role of the business community as well as policy organisations, so the service has become more 'commercial' with the 'recognition that organisations that represent the business community have a great deal to offer'. This partnership approach grew out of 'a recognition that UKTI and other government partners need to be working in partnership with companies'. Whilst TVCC #1 was sure that a driver was a need to reduce public spending, he thought there also was 'a recognition that there is a great deal of experience there, both within UKTI the professional services can learn from and vice versa'[115]. UKTI pointed out the network of colleagues in place in various markets around the world for new investment … they all work on understanding the investors' and liaising with partners; and the account manager structure'.

Finally, the core inward investment relationship is now three-way, 'between company, UKTI and LEP', which starts once the decision-making process of a company starts, by each contributing as an when necessary, so 'the UKTI would bring people in as and when

[114] Telephone interview with UKTI/TVCC, 19.08.13
[115] Telephone interview with TVCC, 19.08.13

necessary, and the LEP would bring in the relevant partners'. This way of working goes to the heart of the UKTI bespoke service but as noted above, has introduced more complexity into day-to-day operations.

In terms of strategic relationships, Respondent C characterised relationships according to who was involved in decision making at the crucial early stages. There is 'a number of accounts that are owned and managed by Ministers or it may tend to get taken down to a Senior Civil Servant, but on the whole, it works pretty well'. At the back end is the 'Partnership Manager, whose responsibility it is to smooth out any relationship difficulties that a LEP might be having with UKTI'. The general feeling is the relationships are developing and will get better with practice, particularly as the network of partner organisations grows; 'in terms of the relationships that we would link companies to, then clearly there's a whole host of companies that I would regard as being in our toolkit that we would seek to utilise because that would very much depend on the issues that the (inbound) company is facing'[116].

Another viewpoint was a simplification of the relationship building into 'formal and informal processes, particularly in terms of Oxford and Thames Valley', where 'informal and established networks exist' (TVCC #2). A formal process is one in which engagement with a foreign business gets to the local level of that network and the ability for people to know certain businesses and certain sectors which can provide that 'soft landing aspect' and which really 'makes a location attractive'. TVCC #2 was 'sure that's the case around the whole of the country', where formal networks are supported by 'a very, very strong informal network of contacts and organisations', that informality that exists around the formality is a real, strong selling point'[117].

In summary, despite quite a period of change for foreign companies entering the UK, the strategy and service have worked well, client expectations have been met and by a broad and increasing range of providers, public and private. Particular elements that worked well include after-care service, local/'hand-holding' and the account management structure. It is not clear the extent to which inward investment support is being handled by public versus private providers because whilst all leads through the UKTI are tracked, there are no official records of inbound foreign firms that either do it themselves or utilise private services. The number and type of stakeholders in UKTI relationships have grown, in some cases as much as four or five-fold, but these changes have been widely accepted as good for inward investment.

[116] Focused telephone interview with Invest in Oxfordshire, 16.08.13
[117] Telephone interview with TVCC #2 (UKTI & TVCC), 19.08.13

However, the view of the LEPs is that dealings with UKTI can be frustrating due to the present separation between 'trade' and 'investment', 'one day you're talking with someone from trade and the next, with someone from investment'. These findings suggest that the whole UK inward investment 'machine', though working well, is still in a state of flux and so, is performing sub-optimally as it seeks its right form, mix of strategic partners and sequence of activities, not to mention, stakeholders. These findings also validate the importance placed on public agency support as a key contingent influence on TMTF site selection, and on the role played by public agencies and the growing band of partners.

### 5.3.3 Effect of Local Enterprise Partnerships (LEPs) on Inward Investment

The third analysis focused on how LEPs have impacted the way stakeholders operate, with regard to inward investment. Analysis of focused interviews revealed three changes: the front end of the inward investment process has been impacted; there has been a forced collaboration between local groups (the 'duty to cooperate' principle); and inward investment has taken on a wider remit. These changes resulted in seven findings, three primary, from the perspectives of key expert practitioners in inward investment (at the local and national levels) and local economic development to establish the impact of the policy shift; and four findings involving the inward investment process, a consequence (possibly unforeseen but desirable) of LEPs, LEP prioritisation and the LEP's wider interpretation of 'investment':

1. The front end of the inward investment process
2. The impact of City Deal and 'duty to cooperate' principle '
3. LEPs prioritisation of inward investment and wider interpretation of 'investment'

The front end of the inward investment process, meaning initial enquiry to start of discussions about locale, has changed because the UK 1st principle removes the competitive element and ensures that all preliminary issues (sector, labour market, etc) are dealt with prior to handover. Indeed, the lead is often anonymous, even after being passed to the local authority; from that point, the process then becomes 'local':

> "it's much more local; the way we work, if we had an enquiry, we would tag the ones that are relevant, sectorally; whereas before, if you'd said Cambridge, you'd be dealing with the whole East of England, you can now home in much more and say Oxfordshire, Thames Valley or Greater Cambridge, Greater Peterborough, and

> before you'd be going down several layers after the RDA … and maybe Chamber of Commerce, that sort of thing, to get to that local level"[118].

From a spatial perspective, the 'economic geography of LEPs is significantly different' from RDAs. At an operational level, the teams are much smaller due to reduced resources but the inception of LEPs has 'started to bring people together', for example, in Oxfordshire where there 'was a disparate group of districts that had potentially some issues with working with the County Council'. The recent implementation of the 'City Deal'[119] has been important in providing the flexibility that has allowed the LEP to be the 'mechanism to get that cross-county organisation together … and put us on a trajectory for more partnership working'. The City Deal is all about increased autonomy, 'giving England's cities new powers and freedoms' that give the city control and responsibility over decisions and do what they think is best to promote economic growth, whilst deciding how public money is spent[120]'. City Deal and the duty to cooperate have forced local groups to collaborate.

Not all LEPs view inward investment with the same priority; this is partly because of the 'onus on the LEPs to do quite a lot of things that sometimes shift their focus away to other things'[121]. However, LEPs generally understand the value in what they're doing and see the direct links to attracting new businesses and FDI, both existing inward investment from those that are already in the locale, as well as 'brand new FDI', so in some cases, the value of existing re-investment into a LEP location is at least as important and cannot be underestimated. Second, the LEP structure has not necessarily resulted in a focus on inward investment because the focus could equally be on existing domestic investment (as in the case of West of England LEP, which 'markets West England both domestically and globally'[122]). But because LEPs are essentially 'left to their own devices' with greatly reduced budgets in some cases, they must seek investment wherever they can find it, so in some cases, this will have to be domestic investment as well (ss. 6.3.2, 7.3.2 for the particular experiences of LEPs in the sub-regions). Finally, LEPs have created a more efficient and team-based inward investment process, while forcing local groups that might not have been so inclined previously, to work together. Below is a summary of RDAs (s.3.2.1.1), LEPs and key differences between them, with a focus on the target regions. Of nine RDAs previously

[118] Head of Local Engagement, Investment Development Group (UKTI), Telephone Interview 19.08.13
[119] "City Deals are agreements between government and a city that give the city control to take responsibility of decisions that affect their area; do what they think is best to help businesses grow; create economic growth; and decide how public money should be spent" https://www.gov.uk/government/policies/giving-more-power-back-to-cities-through-city-deals 18.04.15
[120] https://www.gov.uk/government/policies/giving-more-power-back-to-cities-through-city-deals 17.03.14
[121] UKTI & Thames Valley Chamber of Commerce, Telephone Interview 19.08.13
[122] Head of Product Development, Invest in Bristol & Bath, Telephone Interview 09.10.14

covering England, four covered the target sub-regions: East of England; London; South East England; and South West England Development Agencies. In contrast, the target sub-regions are now covered (or part-covered) by six LEPs: TVB; Bucks Thames Valley; GCGP; Oxfordshire; Swindon and Wiltshire; and West of England.

| RDAs (England) | LEPs (M4C, Oxon & Cambs) | Key Differences |
|---|---|---|
| Advantage West Midlands | Black Country<br>Coventry and Warwickshire<br>Greater Birmingham and Solihull<br>Worcestershire<br>Stoke and Staffordshire<br>The Marches Enterprise Partnership | |
| East Midlands Development Agency | Derby, Derbyshire, Nottingham and Nottinghamshire<br>Lincolnshire<br>Leicester and Leicestershire<br>Northamptonshire<br>Humber | |
| Northwest Development Agency | Cheshire and Warrington<br>Greater Manchester<br>Lancashire<br>Liverpool City Region<br>Cumbria | |
| One NorthEast | North Eastern Local Enterprise Partnership<br>Tees Valley | ○ **Competitive element removed from the front end of the inward investment process**<br>○ **Economic geography is significantly different**<br>○ **Inward investment viewed with different priorities**<br>○ **LEPs have 'started to bring people together'**<br>○ **LEPs have created a more efficient and team-based inward investment process**<br>○ **Local groups 'forced' to collaborate**<br>○ **Much reduced resources and smaller staff (average of <10 versus 120)**<br>○ **Wider definition of 'investment'** |
| East of England Development Agency | New Anglia<br>**Greater Cambridge & Greater Peterborough** | |
| **London Development Agency** | Pan London | |
| **South East England Development Agency** | **Buckinghamshire Thames Valley**<br>Coast to Capital<br>Hertfordshire<br>**Oxfordshire**<br>South East<br>South East Midlands<br>**Thames Valley Berkshire** | |
| **South West of England Regional Development Agency** | Cornwall and the Isles of Scilly<br>Dorset<br>Enterprise M3<br>Gloucestershire<br>**Swindon and Wiltshire**<br>**West of England**<br>Heart of the SW<br>Solent | |
| Yorkshire Forward | York and North Yorkshire<br>Leeds City Region<br>Sheffield City Region | |

**Table 5.9: Summary of RDAs, LEPs and key differences[123]**

## 5.4 The Specialist Commercial Property Landscape of Oxon, Cambs & M4C

The conceptual framework for this research proposes that the 'structural environment', external to the firm, works in conjunction with the 'contingent environment' to drive foreign TMT firm settlement and siting decisions. This section uses data collected through this research to examine one of the contingent influences from the macro perspective of commercial property in the target sub-regions. Since these issues are common to all target sub-regions, analysis adds to the 'context' in accordance with critical realist expectations. The following contextual issues are examined: UK corporate real estate; how UK property is classified; and the unique space requirements of TMT, before presenting secondary findings on the core contingent influence, science park penetration in the target sub-regions. Finally, the section presents key primary findings on how TMT firm space requirements have evolved and how the need has been impacted. Analysis of CRE and other property-related documents revealed one key finding of relevance to this research, namely, how the UK classifies property (s.3.5.1) because two classes (B1 and perhaps A2) and uses ('financial and professional services' and 'business') relate generally to specialist properties such as science parks.

### 5.4.1 The Technology Commercial Property Stock of Oxfordshire, Cambridgeshire & M4 Corridor

Analysis of UKSPA data, Oxfordshire, Thames Valley, CRE and other strategic documents (Table 5.2) revealed three key findings. First, the UK generally and SE England specifically, are well-endowed with specialist technology properties; second, with more specific relevance to this research, the apparent overall equality between technology property stocks in the sub-regions and third, the disparity between science park penetration in the sub-regions.

The south of England, generally, and Oxfordshire, Cambridgeshire and the M4 Corridor, specifically, are well-endowed with specialist 'key hubs' designed to accommodate technology firms. These specialist properties include all manner of Science Parks (Technology Parks, Research Parks and Innovation Centres), Business Parks (defined as "an area where

[123] Adapted from Bentley et al 2010, p.8)[123]

company offices and light industrial premises are built"[124]) and other specialist workspaces. As noted (ss. 6.4.1, 7.4.1), these areas are well set up to accommodate technology, especially smaller firms.

In the M4 Corridor, Oxfordshire, Cambridgeshire, commercial property stocks boast a wide and growing selection of specialist properties, including twenty seven and twenty-eight Business Parks respectively, eight innovation centres and related facilities. Oxfordshire and Cambridgeshire boast a diverse and flexible stock that is concentrated and capable of accommodating different sizes and functional foci of technology-based firms. Unlike Oxfordshire and Cambridgeshire, with their rich and concentrated endowment of seventeen science parks, the M4C has just three science parks, according to the latest UKSPA Directory, but is amply endowed with Business Parks. For a full list of Science and Business Parks in Oxfordshire and Cambridgeshire and the M4 Corridor, see Appendices 5.2 and 5.3.

#### 5.4.1.1 Science Park Penetration in Oxfordshire, Cambridgeshire & M4 Corridor

Analysis of science park and related documents confirmed the disparity between science park penetration in Oxfordshire, Cambridgeshire and the M4 Corridor. The fact that these world-renowned destinations of technology have been penetrated by science parks at such different levels is of immediate importance to this research. The science parks from the three sub-regions are plotted below (Figure 5.4), listed (Table 5.10) and then profiled (ss. 6.4.2, 7.4.2).

| **M4C Science Parks** | **Address** | **Lat (N)** | **Long (W)** |
|---|---|---|---|
| **Bristol & Bath Science Park** | Dirac Crescent<br>Bristol BS16 7FR | **51.50** | **-2.48** |
| **Brunel University Science Park** | Kingston Lane<br>Uxbridge, Middx UB8 3PH | **51.53** | **-0.11** |
| **University of Reading Science & Innovation Park** | Whiteknights<br>Reading, Berks RG6 6AH | **51.46** | **-0.97** |
| **Oxon & Cambs Science Parks** | **Address** | **Lat (N)** | **Long (W)** |
| **Begbroke Science Park** | Begbroke Hill, Woodstock Road<br>Begbroke OX5 1PF | **51.82** | **-1.31** |
| **Cambridge Research Park** | Ely Road, Waterbeach<br>Cambridge CB25 9TF | **52.30** | **0.17** |
| **Cambridge Science Park** | Milton Road<br>Cambridge CB4 0FZ | **52.23** | **0.14** |
| **Chesterford Research Park** | Little Chesterford, Saffron Walden CB10 | **52.06** | **0.24** |

[124] http://www.oxforddictionaries.com/definition/english/business-park Accessed13.05.15

| | | | |
|---|---|---|---|
| | 1XL | | |
| **Culham Innovation Centre** | D5 Culham Science Centre<br>Abingdon, Oxfordshire OX14 3DB | **51.66** | **-1.23** |
| **Granta Park** | McClintock Building<br>Great Abington, Cambridge CB21 6GP | **52.12** | **0.22** |
| **Harwell Innovation Centre** | Curie Ave<br>Didcot OX11 0QG | **51.58** | **-1.31** |
| **Harwell Oxford** | Harwell Oxford<br>Didcot OX11 0RL | **51.60** | **-1.29** |
| **Milton Park Innovation Centre** | 99 Milton Park<br>Abingdon OX14 4RY | **51.62** | **-1.29** |
| **Oxford Science Park** | Magdalen Centre<br>Robert Robinson Avenue<br>Oxford OX4 4GA | **51.72** | **-1.22** |
| **Melbourn Science Park** | Cambridge Rd<br>Royston, Hertfordshire SG8 6EE | **52.09** | **0.02** |
| **Peterhouse Technology Park** | 73 - 110 Fulbourn Road<br>Cambridge CB1 9PT | **52.18** | **0.18** |
| **St. John's Innovation Centre** | Platinum Building, St John's Innovation Park, Cowley Road, Cambridge CB4 0WS | **52.24** | **0.15** |
| **Vision Park Cambridge** | 2 Chivers Way<br>Histon, Cambridgeshire CB24 | **52.24** | **-0.06** |

**Table 5.10: M4C, Oxfordshire & Cambridgeshire Science Parks**

The geographical positions enable the science parks to be plotted as shown below:

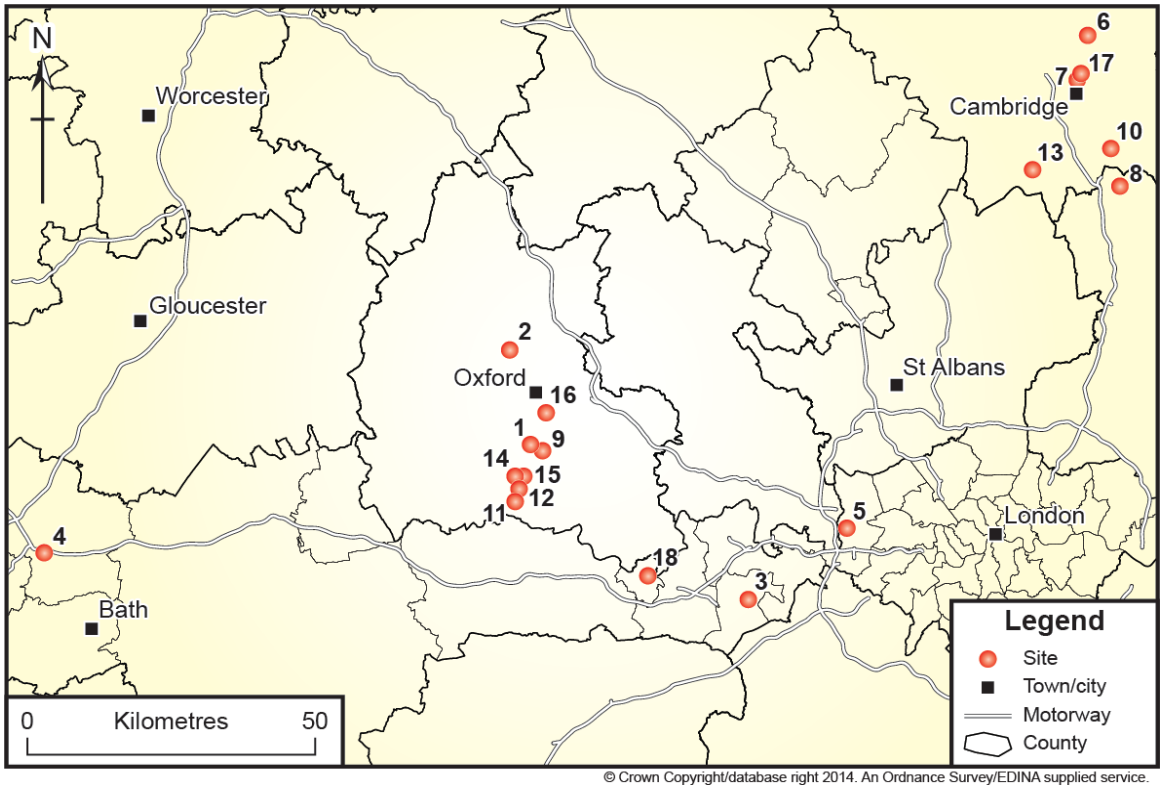


**Figure 5.4: Distribution of Science Parks & TMT firms in M4C, Oxfordshire & Cambridgeshire**

In total, there are seventeen science parks in Oxfordshire and Cambridgeshire [125], but whilst the properties are evenly distributed across the two counties, two of the three science parks in the M4 Corridor are located in the Thames Valley and one near Bristol/Bath, with none in the middle. One possible explanation for this is that regions are most likely to host successful science parks if they have the following five attributes (and all of which are in evidence in Oxfordshire, Cambridgeshire and M4 Corridor): an existing base of R&D and high-tech activity; one or several research universities; medical schools and engineering institutes; good air service; a well-developed network of infrastructure and business services; and insightful and effective political, academic, and business leaders (as confirmed by Luger & Goldstein 1991). All seven participant properties in can boast of the first four attributes and possibly the fifth, though the fifth is less objective.

These findings validate the presence of the key contingent influence in the conceptual framework, and are enhanced by two derivative realisations: there are sufficient science parks in the study to justify the research agenda and second, the science parks in the study are geared up to host foreign TMT firms because they possess all of the key attributes.

### 5.4.2 Enterprise Zones & the Unique Space Requirements of TMT Firms

One additional observation that can be made to the discussion is the unique space requirements of TMT firms (s.3.5.3) from which a reasonable inference can be made with respect to science parks. First, enterprise zones emerged in 2012, for example Alconbury. From a LEP perspective, the zones are being seen as a 'key inward investment opportunity' into which certain types of business can be fed over the next 20 years or so[126].

Second, enterprise zones will be attractive to TMT firms and direct competition for science parks because they boast many of the same facilities, with added incentives. On the other hand, TMT firms have smaller teams, a critical need advanced technological infrastructure, the need to be creative and a realisation that aspects of well-being are embedded in work. As the global employment market evolves, the need for office space is impacted in several ways':

(i) Space (reduction in demand);

(ii) Orientation (need for increased flexibility and attention to work life balance);

(iii) Sustainability (space which 'conforms to standards'); and

[125] Not including the two Bedfordshire parks
[126] GCGPLEP Focused Interview

(iv) Data centers (greater demand), Ibid, p.5.

Thus, two sets of factors (unique space requirements and how the need for space is impacted) suggest that TMTF are in search of a certain type of property and work environment which are essential to their operations. The enhanced requirements make property more costly per unit for TMTF but they require less space per person so the costs may even out in the end. Finally, with respect to science parks, it can be inferred reasonably that TMTF are ideal tenants given their unique requirements, all of which science parks claim to provide, whether or not Enterprise Zones provide competition (s.1.2).

## 5.5 The Process of Foreign TMT Firm Location, Settlement & Site Selection – Expert Perspective

As noted, the Critical Realist conceptual framework provides for a 'structural environment', external to the firm, which is strongly implicated in TMTF location, settlement and site selection, making 'process' the first issue to deal with each of the first three key structures: (i) Parent TMTF Internationalisation; (ii) Subsidiary TMTF Settlement; and (iii) Subsidiary TMTF Site-selection. This section uses primary data from focused telephone interviews to interrogate this sub-component and produce context-level findings about key macro locational issues from two sources: (i) primary research from focused qualitative interviews with expert-practitioners in international plant location and site selection[127] and (ii) focused qualitative interviews with public agency personnel (UKTI, LEP and local economic development experts).

Analysis revealed that expert-practitioners focused on the process used by firms in making selection decisions and the extent to which these decisions can be reconciled with the plethora of available options. Expert-practitioners pointed out that a property search occurs late in the process and it tends to consist of a number of structured/sequential steps, involving up to ten or twelve steps. These findings make the first contribution to the key concept of site selection, as shown in the conceptual framework (Figure 4.2) and supplements findings from the firm-perspective (ss. 6.2.2.1, 7.2.2.1).

Interviewees argued that the site-selection process in practice is different from those discussed in the first literature review (s.2.4.2) because the focus is not on the tools or 'micro

[127] Two respondents addressed these issues in respect of TMT firms, given their senior roles at IBM

tactics' of a specific industry or location search but on the commonalities observed from multiple location searches across different industries across the world.

Whilst elements of the step-wise process may change, the overall process remains sound and sheds light on what actually happens in practice. First, the process currently used by IBM was outlined[128]:

> 'first of all, you define what it is that you're looking for as a company' and you 'translate that into location requirements, a sort of a strategic transformation into location requirements, that's what we call the initial project scoping, sometimes referred to as the investment project definition'.

A second step is to 'establish an initial long list of locations', which starts to 'de-select any other part of the world'. In terms of possible locations, this may equate to 20 or 30 options which could be countries, regions or cities, which are then 'quickly reduced to a shortlist (5 maximum)' before 'trying to establish a shorter list of best locations'. It depends on how extensively the companies want to do further research. The objective is to limit the list 'to a number they can handle and can really spend quality time on to research'. From this last list comes the choice of a location, from which 'internal' sites will be looked at.

However, not all participants agreed; JLL[129] counter-argued that 'it's quite a high ask to point to a generic search process' (because) 'if you take it end to end, from point of arriving to point of actual completion and operating from an area'. He added, however, that the property search element comes 'quite late in the game', so what tends to happen is that 'many location decisions are made for sub-optimal reasons' which are 'not things that you can really model' because these are 'quirks of a location decision making process'. It starts with people being aware of and interested in a particular geography, so the executive that's going to be running the function when it emerges in the UK has a particular preference on where they want to be located'. JLL cited the 'old joke about Japanese corporates that were saturated around showcase golf courses because the Chairmen wanted to play golf when they flew in'. However, drawing on his inward investment experience[130], he recalled that there was

> 'a lot more due diligence being done on an international basis, so the first battle is UK Plc versus France or Germany or wherever', which would be followed by 'a lot of scrutiny on particular geographies within the UK and their labour pool'.

[128] Telephone Interview with Global Leader, Plant Location International at IBM, 17.07.13
[129] Telephone Interview with Head of EMEA Research at Jones Lang LaSalle, 23.07.13
[130] Locate in Kent

This confirms earlier responses from other experts and from TMT firms that 'access to talent' is a key driver, which JLL confirmed, is:

> 'quite normal because if you think about it, the operating costs of a corporate are its human capital costs, its people, about 10% of its cost is probably IT and other sorts of operational infrastructure and about 10% of its real estate, so it'd be madness to make a location decision on 10% of your costs'.

Because 'property figures quite late in the search process, JLL thought that the key hoop to get through is people, both decision makers and their personal preferences and the labour pool that they can tap into … then there's always a little bit of discussion at the end of the search around sweetness for the deals, grants, incentives, that sort of thing'. However, this important caveat was added, which put into perspective 'deal sweeteners':

> 'grants and incentives make a good decision better but they never make a bad decision great' and that's generally how I see people playing that; it's usually the last thing to be considered. But the absolute key thing driving (choice) is the labour pool and skills and the costs of those skills'.

Analysis of responses converged on a 'step-wise' approach that translates objectives into practical requirements in a 'sort of a strategic transformation into location requirements', called the initial project scoping, (a.k.a. the investment project definition). Companies then create a long list (20 to 50 locations) which then goes through a 'filtering process' involving a gradual 'de-selection' of locations "in order to identify the best suited location for a particular type of activity"[131]. 'A long list is basically the locations that meet certain key requirements for the activities' (for example, in terms of serving a competitor market or a particular region of the world; cost requirements, risk requirements they expose themselves to, political risk, natural disaster risks, etc). This list is analysed against a number of key operational questions and criteria, such as skills availability, structure and operating costs levels, facility costs, etc, and then crucially against two dimensions; a qualitative and a financial dimension, and combined into a "cost-quality map basically to identify the cost-quality trade-offs that exist in those there are locations".

Desk-based research follows with the aim of producing a short list of typically 3 to 5 locations on analysis of the cost-quality trade-offs. Those locations are then visited and 'looked at in much more detail', which involves talking to companies there, observing actual operations,

[131] IBM Respondent#2, Telephone Interview, 13.10.13

talking to various service providers (HR/recruitment consultants, utility providers, real estate brokers) and local government authorities to understand the dynamics of the location and the labour market. The importance of the visit cannot be overemphasised because "you can't analyse the dynamic aspect of a location from a desk". On the basis of the visit, the short list can be analysed in more detail using a simple SWOT analysis to identify "which location(s) make(s) most sense and to identify a preferred location and a back-up location". During the visit, a much more detailed site search in the preferred location takes place to look at the real estate in much more detail and identify specific office space. Finally, a choice is made "once (the firm is) happy that the more key operational requirements (skills availability, quality of infrastructure, ability, etc) are met". The process, compiled from the contributions of site selection experts, is summarised below:

1. **PROJECT SCOPING:** initial project scoping
2. **LONG LIST**: create a long list of locations
3. **FILTERING PROCESS:** a 'filtering process' involves a gradual 'de-selection' of locations, during which the long list is analysed against a key operational criteria
4. **COST-QUALITY MAP**: analysis against a qualitative and a financial dimension
5. **DESK-BASED RESEARCH:** desk-based research follows
6. **SHORT LIST**: to produce a short list of typically 3 to 5 locations
7. **VISIT/TOUR OF LOCATIONS**: locations are visited
8. **SWOT ANALYSIS**: the short list can be SWOT analysed in more detail
9. **SELECTION OF A FINAL PAIR**: to identify a preferred and a back-up location
10. **FINAL CHOICE:** a location, region and site are selected

These siting-related findings address the three concepts in the 'structural environment' of the conceptual framework (s.4.2.3.3), which are the generative mechanisms that become the basis for decisions in the contingent environment, namely, when a TMT firm makes the decision either to site on or off a science park. These findings address research objective 1 and subsidiary research question 1, and help to validate the importance placed on site selection, a core structural factor, with a related sub-component, 'process'.

## 5.6 Chapter Summary

This first of three findings chapters presented contextual-level findings, from primary and secondary data that address overarching issues common to Oxfordshire, Cambridgeshire and the M4 Corridor from two main sources, analysis of secondary strategic practitioner,

Government and other publication data and analysis of focused interviews with expert-practitioners in plant location, CRE, site selection and UK inward investment.

As noted in section 5.1, a full contextual overview is necessary because critical realism expects spatial and temporal 'relevant circumstances' to contribute to any attempt to explain causal analysis. The analysis revealed that Europe and the UK remain top FDI destinations and services sectors generally, and ICT sectors specifically, are a strong and growing sector in the UK, which makes a great contribution to the economy in terms of GVA. The UKTI inward investment strategy has been implemented successfully and is working well and the change to LEPs has been well received despite criticisms in the literature and a few ongoing 'teething problems'. The changes in inward investment and the atomisation of economic development have been widely accepted as good. The target sub-regions are well endowed with specialist technology commercial property stocks and together, boast a wide and growing selection of specialist properties, including more than twenty science parks and more than fifty Business Parks between them. The stock is more diverse, flexible and concentrated in Oxfordshire and Cambridgeshire, with the capability of accommodating different sizes and functional foci of technology-based firms. These findings validate the choice of M4 Corridor, Oxfordshire and Cambridgeshire as targets for the empirical study and confirm that they are appropriate geo-spatial lenses through which to view the site selection decisions and processes of foreign TMTF landing in the UK.

However, crucially, science parks did not feature in any of the stakeholder interviews. When prompted, JLL thought the lack of prominence might relate to firm size but then remembered that many clients are not large firms (or are not large when they locate to the UK as subsidiaries). Finally, the unique space requirements of TMTF and how the need for office space is impacted suggest that TMTF are in search of a certain type of property and work environment which are essential to their operations. With respect to science parks, it can be inferred reasonably that TMTF are ideal prospective tenants given their advanced technological requirements, reduced requirement for space and need for a work environment that engages with the concept of work-life balance, all of which science parks claim to provide. These findings also help to validate the importance placed on UK science parks as a key contingent influence of the conceptual framework, and by implication its capabilities to influence the site selection behaviour of foreign TMTF landing in the UK.

## END of Chapter Five

# Chapter Six

## Research Findings II

## Site Selection in the M4 Corridor (Firm-Level Evidence)

## 6.1 The Case of Silicon Corridor (M4C)

This chapter presents findings from analysis of the inward migration and site selection of foreign TMT firms in the M4 Corridor and the role played by science and technology parks. Analysis is based on four sources of primary and secondary data: (i) structured, semi-structured and open questions to foreign TMTF that settled in the M4C in 2011; (ii) focused telephone interviews with expert-practitioners in TMT, inward investment, plant location, site selection, CRE, science parks and LEPs; (iii) structured, semi-structured and open questions to M4C science parks; and (iv) relevant company, Government and local strategy and policy documents, including *inter alia* company publications, science park publications, LEP Strategic Plans (Berkshire) and UKTI Strategy 2014 (Tables 6.1, 6.2).

As in Chapter 7, the exploration is conducted from the perspective of firms and expert-practitioners to provide an objective evaluation of science park intervention. The story of the M4 Corridor ('M4C') as a magnet for technological value add is well told, although the M4C is also less well documented than Oxon and Cambs and less well defined geographically because the motorway traverses three major counties West of London, through Berkshire, Wiltshire and South Gloucestershire, before it crosses the River Severn into South Wales and traverses two more counties. However, this study focuses on the segment which runs from West London to the Second Severn Crossing, north of Bristol, a distance of ~175 km:

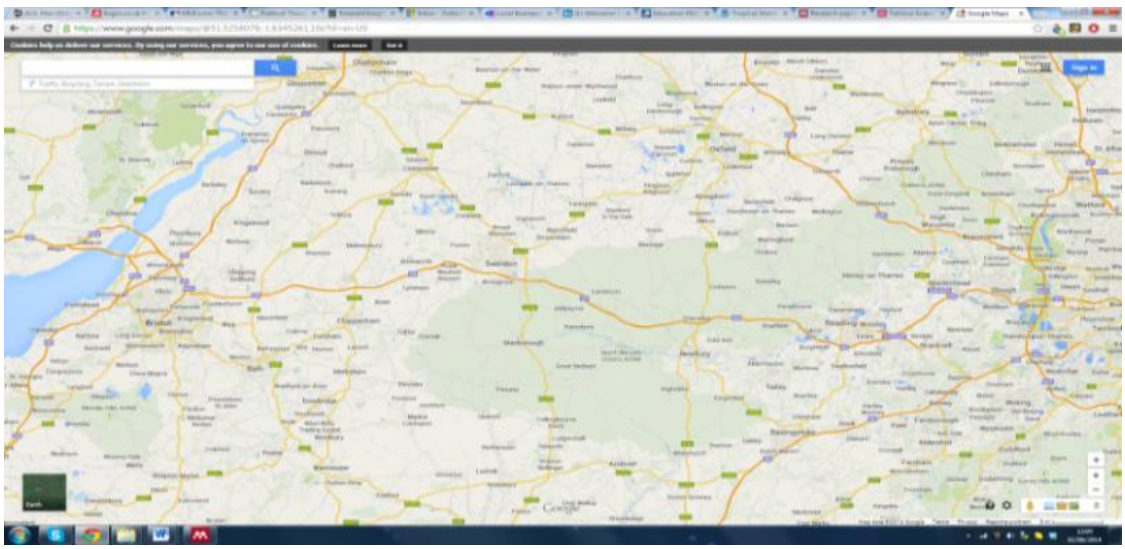

**Figure 6.1: Google Map showing M4, London to Bristol**

The M4 Corridor is known for the very large technological firms it has attracted in certain parts. Deloitte (2011) shows that thirty TMT firms settled in the M4C, ten of which returned

questionnaires in the first stage of research. In the second stage of research, eleven focused qualitative interviews were held with expert-practitioners in the Thames Valley, Swindon and Bristol and Bath. In the third stage, qualitative questionnaires were completed by the three registered M4C science parks. In a fourth and final stage to fill gaps from the initial analysis, focused qualitative interviews were held with expert-practitioners in the three M4C LEPs. Holistically, this provides a unique and insightful qualitative dataset on the experiences of TMT firms in the M4C. TMT firm participants are shown in Table 4.9 and M4C research participants who contributed to the case research, along with documentary sources, which are listed below in the order of interviews and date order of publication, most recent first.

| DATE OF INTERVIEW/CITY | JOB TITLE/ORGANISATION | EXPERTISE/AREA OF CONTRIBUTION |
|---|---|---|
| **Science Park Experts** | | |
| 30.07.13<br>**Guilford, Surrey, England** | Chairman UKSPA<br>Managing Director<br>**Surrey Research Park** | **Science Parks (UK/international)** |
| 09.08.13<br>**Norwich, England** | Director Science Parks<br>**Goodman's International**<br>Colworth Science Park & Harwell Innovation Centre | **Science Parks (UK)** |
| 30.09.13<br>**Norwich, England** | Chief Executive Officer, UKSPA<br>**Chesterford Research Park** | **Science Parks (UK)** |
| 27.02.14<br>**Pitea, Norrbrotten, Sweden** | Director<br>**FEPRO** | **Science Parks (international)** |
| **M4C Regional Inward Investment** | | |
| 19.08.13<br>**Reading, England** | Head of Inward Investment & Reinvestment<br>**Thames Valley Chamber of Commerce** | **Inward Investment (M4C)**<br>www.thamesvalley.co.uk |
| 19.08.13<br>**Reading, England** | Partnership Manager South East,<br>Investment Services Team<br>**UKTI/TVCC** | **Inward Investment (M4C)**<br>www.uktradeinvest.gov.uk<br>www.thamesvalley.co.uk |
| 02.09.13<br>**Reading, England** | Partnership Manager South East,<br>Investment Services Team<br>**UKTI** | **Inward Investment (UK)**<br>www.uktradeinvest.gov.uk |
| **Local Economic Development (M4C)** | | |
| 09.10.14<br>**Bristol, England** | Head of Product Development<br>**Invest in Bristol & Bath** | **Local Economic Development (M4C)**<br>www.bristolandbath.co.uk |
| 06.11.14<br>**Swindon, England** | Economic Projects Manager<br>**Forward Swindon** | **Local Economic Development (M4C)**<br>www.forwardswindon.co.uk |
| 07.11.14<br>**Reading, England** | Chief Executive<br>**Thames Valley Berkshire LEP Ltd** | **Local Economic Development (M4C)**<br>http://thamesvalleyberkshire.co.uk |

**Table 6.1: M4C TMT Firm Participants (Focused Telephone Interviews)**
**N.B.** M4C Science Park participants are listed in Table 6.15

| DOCUMENT | SOURCE | YEAR OF PUBLICATION |
|---|---|---|
| **M4C, LEP and other documents** | | |
| Local Enterprise Partnerships' EU Structural and Investment Fund Strategies<br>Report to South East England Councils:<br>Executive Summary March 2014 | South East England Councils | 2014 |
| European Structural and Investment Fund Strategy 2014 – 2020 | Swindon and Wiltshire LEP | 2014 |
| Aligning Local Innovation with Government Ambition,<br>Strategic Economic Plan March 2014 | Swindon and Wiltshire LEP | 2014 |
| Bristol City Region City Deal | West of England LEP | 2014 |
| Economic Development Strategic Plan for Growth (Slough), 2014 - 2018 | Slough Borough Council | 2014 |

| | | |
|---|---|---|
| Thames Valley Berkshire: Delivering national growth locally Strategic Economic Plan, 2015/16 – 2020/21 (Consultation draft, December 2013) | TVBLEP | 2013 |
| Thames Valley LEP Strategy submission document | TVBLEP | 2013 |
| Thames Valley Berkshire Local Enterprise Partnership – Outline Proposal | TVBLEP | 2010 |
| Economic Development Strategy (Wokingham) 2010 - 2013 | Wokingham Borough Council | 2010 |
| Functional Economic Market Areas and Economic Linkages, Report | SQW Consulting | 2010 |
| The Heathrow Phenomenon, Economic Impact Analysis, Final Report | Deloitte | 2007 |
| Attracting new investment into the Thames Valley Region | TV Economic Partnership | 2006 |

**Table 6.2: Sources of Documentation (M4C)**

This chapter follows a mixed case reporting structure, adapted from Yin's (2009, p.176) 'linear-analytic' structure for exploratory case research, 'the standard approach for composing research reports', with elements of Creswell's (2009, p.193) recommended structure for case reports (s.4.5.1). Next, the M4C economic geography is discussed, including a brief look at the history of the technology-intensive sub-region; and the technology agglomeration pattern with an analysis of the geographical concentration of the ICT industry. The chapter then progresses from the 'structural' environment for TMTF location decisions to the 'contingent' environment, before summarising M4C firm-level findings.

### 6.1.1 The Economic Geography of the M4 Corridor


This section presents and analyses the relevant issues relating to the economic geography of the M4 Corridor, by which it is meant:

> "The locational, organizational and behavioral principles and processes associated with the spatial allocation of scarce (human, man-made and natural) resources (which are also distributed spatially) and the spatial patterns and (direct and indirect, social, environmental and economic) consequences resulting from such allocations"[132].

The section builds on section 3.4.2.1 ('Doing Business in the M4C') and includes a brief history of the sub-region; analysis of its technology agglomeration pattern; evidence of

[132] http://faculty.washington.edu/krumme/207/concepts/ebg.html Accessed 09.10.14

geographical concentration; and regional attractiveness, including the M4C's site-specific advantages and a look at the UK enterprise stock.

#### 6.1.1.1 A Brief History of the M4 Corridor technology-intensive sub-region

A corridor can be defined as "a complex area of 'braided' infrastructure (which) reports upon the spatial dynamics of transportation, economic development, urbanisation and institutional functions of that area" (Chapman *et al*. 2003). The M4 Corridor is one of the most documented technology-intensive regions in the world. World technology-intensive regions have assumed the label of 'silicon', wherever they exist (s.2.4.5), and the M4C includes Silicon Corridor (M4) and Silicon Gorge. The M4 motorway has a decidedly longer history than its main economic outcome, the M4 Corridor, having existed for 53 years, whereas the latter is estimated to have begun ~mid-1980's before accelerating in the early 1990's. The English section of the M4 Motorway was started in 1961 and construction between West London and the River Severn, including the suspension bridge was completed between 1965 and 1971. The Welsh section of the motorway was completed in 1993 and a second crossing of the river (Second Severn Crossing) completed in 1996, at which time the motorway was re-routed from the suspension bridge to the new bridge, so traffic could save time by taking a more direct route. The total distance of the M4 is 191.9 miles (~309 km)[133].

The M4C, particularly the eastern segment (Thames Valley), appears to have started attracting technology in the early 1990s, when it "evolved from a favoured European 'bridgehead' for multinational corporates to a globally recognised hub of dynamic economic activity"[134]. The level of activity falls off as the motorway proceeds westward from Newbury to Swindon, approaching the western end of the motorway, activity picks up again where technology and research firms have located in the triangle of Bristol, Bath and Swindon (Figure 3), in the area known as Silicon Gorge, named after the Avon Gorge, a geological co-formation of the River Avon. This is because economic development activity had started at least a decade earlier when investment gradually spread westwards from London and then later spread to the western English extreme of the motorway when Almondsbury (~10 km north of Bristol), saw a considerable growth of technology industries in the mid-late 1990s:

> "Government was Conservative-led and Thames Valley was fast-becoming home to many of the world's largest IT corporations, and the largest community of scientists and

[133] For this study, the M4 Corridor focuses on London to Bristol/Bath only (the dataset showed no firms in Wales).
134 http://www.businessmag.co.uk/thamesvalleypropertyawards/thames-valley/ Accessed 16.09.14

technologists in Europe. US-parented computer firms such as Microsoft led the way and established Thames Valley bases, and other major software and IT businesses soon followed" (Business Magazine 2010).

This growth continued through the remainder of the '90's and 'Noughties', and to the 2008 recession. According to Business Magazine (2010), however, the recession has not materially affected the trend though it has tested the resilience of the region which has shown the ability to bounce back, adapt and meet the various social and market challenges. In the process, the M4C has established firmly its businesses, enriched its technology entrepreneurs and brought job security and a fresh vibrancy and sophistication to the region.

### 6.1.2 Technology Agglomeration Pattern of the M4 Corridor

The M4 motorway runs from Chiswick, West London (through Heathrow Airport) to central South Wales. The M4 'Corridor' is the notional area that runs adjacent to and roughly in parallel with the motorway, bounded by several tech 'cities', mainly to its north: Slough, Maidenhead, Bracknell, Reading, Newbury and Swindon, with Bath and Bristol south, as it crosses into South Wales.



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**Figure 6.2: Map showing full length of the M4**

However, as noted, the technology concentration is non-uniform, with some activity north of Heathrow that drops off passing the M25 and builds again as it approaches Slough, before clustering in the 'quadrilateral' of Slough and Maidenhead to the east and Reading and Wokingham/Bracknell to the west.

135http://histru.bournemouth.ac.uk/Oral_History/Talking_About_Technology/computing/computing_m4_corridor.htm Accessed 18.09.14

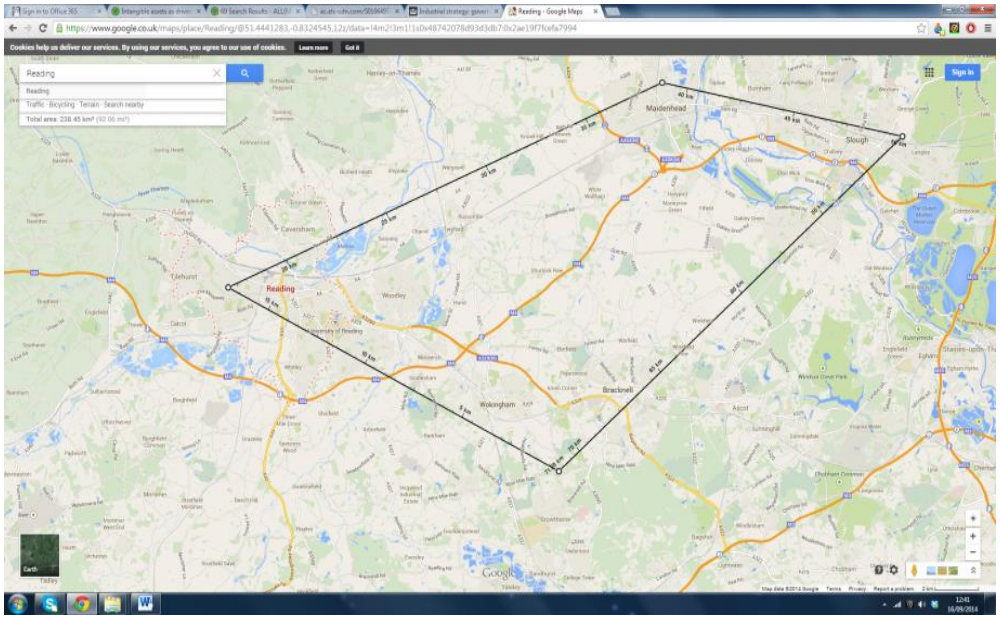


**Figure 6.3: Google Map showing M4C 'eastern cluster'**

After Theale, the M4 meanders westward past copses and coppices, as the corridor tapers off and concentration diminishes until virtually disappearing west of Newbury, before it builds again, culminating in the triangle between Swindon, Bath and Bristol.

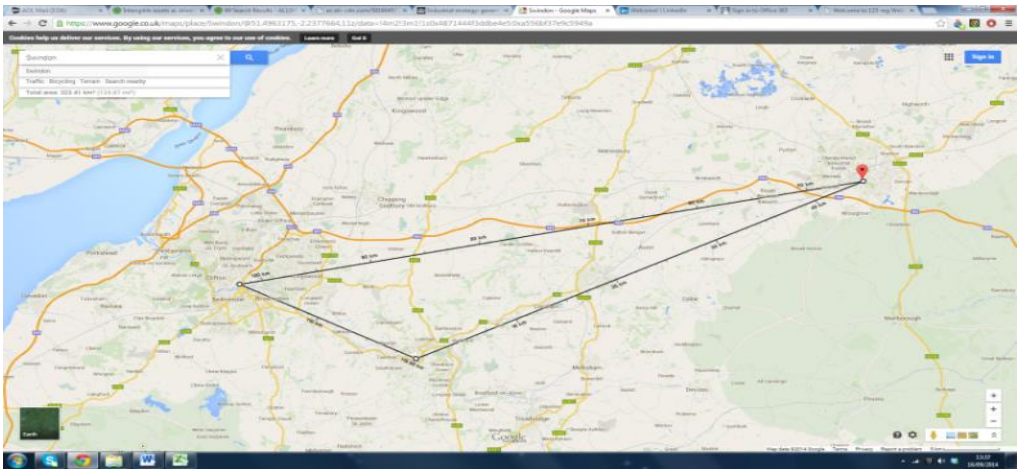

**Figure 6.4: Google Map showing M4C 'western cluster'**

Table 6.3 shows average distances, orientations (north and south) from the M4 and geographical positions (latitudes and longitudes) of twelve of the major cities and townships, starting from the eastern end, with all cities and towns on the 51st parallel.

| City/Town | Distance from M4 (km) | Orientation to M4/Lat (N), Long (W) |
|---|---|---|
| Slough | 0.91 | **N/51.51**, -0.60 |
| Maidenhead | 2.6 | **N/51.52**, -0.72 |
| Bracknell | 5.2 | **S/51.42**, -0.75 |
| Wokingham | 2.55 | **S/51.41**, -0.84 |
| Winnersh | 0.42 | **N/51.43**, -0.88 |
| Reading | 4.67 | **N/51.46**, -0.99 |
| Theale | 0.44 | **S/51.44**, -1.08 |
| Newbury | 5.81 | **S/51.40**, -1.33 |
| Swindon | 2.47 | **N/51.56**, -1.78 |
| Bath | 13.21 | **S/51.38**, -2.36 |
| Bristol | 7.68 | **S/51.46**, -2.59 |
| Almondsbury | 0.99 | **S/51.55**, -2.57 |
| **Average Distance** | **3.91 km (~2.4 m)** | |

**Table 6.3: Positioning of cities and towns along the M4**

Large multinational TMT firms with a base in the eastern M4C include *inter alia* Alcatel-Lucent, Cisco Systems, Citrix Systems, Dell Computers, Ericsson, Huawei, Hutchison, Microsoft, Lucent, Lexmark, Nvidia, Oracle, Panasonic, SAP and Symantec, with firms like Vodafone taking up residence father west, near Newbury and Broadcom recently opened a second site in Silicon Gorge. The M4 agglomeration pattern, therefore, is not uniform and resembles a 'dolphin', with a long, slim 'snout' (Chiswick to Slough), relatively large 'head' (Figure 2) and body 'fanning' out to a wide 'tail' (Figure 3). Whatever the pattern's shape, it is clear that a cluster exists (Bresnahan *et al*. 2001; Hoen 2001; Isaksen 1996).

#### 6.1.2.1 Geographical Concentration as Location Quotient in M4C

One way to confirm geographical concentration or industry specialisation is by use of location quotient, "calculated as the quotient between the local share of employee jobs in a specific industry and the local share of national employee jobs" (ONS 2010). For concentration,

> "a value greater than **1** means that region **r** has a higher share of employee jobs in industry **i** than its share of national employee jobs' and for specialisation, 'a value of **1** means that an industry's share of employee jobs in region **r** is the same as its share of national employee jobs in Great Britain' (Ibid 2010).

The M4 Corridor cuts across twelve unitary authorities (*c.f.* Oxon/Cambs 'county councils'), whose location quotients are shown below for technology-concentrated authorities. The numbers confirm a very high geographical concentration and ICT industry specialisation for five areas, with the three highest in Wokingham (3.96), Slough (3.86) and Bracknell Forest (3.40), meaning these areas have three to four times the national level in shares of ICT jobs

and ICT industry's share of jobs in the local region. However, location quotients in the M4C 'tail off' the farther west one travels from London but rise again upon reaching Bristol/Bath, though to levels less than one-third of those in Thames Valley.

| **Area** | **ICT Location Quotient** |
|---|---|
| **Wokingham** | **3.96** |
| **Slough** | **3.86** |
| **Bracknell Forest** | **3.40** |
| **Reading** | **3.16** |
| **West Berkshire** | **3.05** |
| Windsor & Maidenhead | 2.36 |
| South Gloucestershire | 1.50 |
| Bath and North East Somerset | 1.25 |
| Bristol | 1.08 |
| Wiltshire | 1.01 |
| North Somerset | 0.71 |
| Swindon | 0.30 |
| **Average ICT concentration** | 25.64/12 = **2.14** |
| *c.f. Hart District* | ***4.00*** |

**Table 6.4: ICT Location Quotients in M4C** (ONS, 2010)

The deep high-tech enterprise stock (Figure 6.5) is evidence that the M4 Corridor is a top and proven attractor of TMT, and possibly, as Prime Minister Cameron suggests, "Britain's Silicon Valley" (Yiannopoulos, 2012). Table 6.4 shows the Location Quotients for ICT industries in the M4 Corridor and confirm activity is highly concentrated on five towns. The average ICT concentration of the first five towns is an impressive 3.49, however, if the five townships are removed, the average ICT concentration falls to an ordinary 1.17, which is not significantly different from the country as a whole. This finding contradicts a key attribute that contributes to the M4C's attractiveness (s.6.2.3), as well as the popular view in the public domain, whilst suggesting strongly that ICT concentration is in the 'dolphin's head' of the M4C (s.6.2.2).

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**Figure 6.5: TMTFs in Silicon Southwest**

### 6.1.3 The Regional Attractiveness of the M4 Corridor

Clearly, parts of the M4 Corridor have proven very attractive for multinational technology firms, starting with North America firms in the 1990s and now with over 2,000 firms by 2010, the region has attracted the attention of national and international policy makers. From at least three sources, the original Thames Valley LEP submission document, Kramer *et al*. (2011) and The Business Magazine, the key attributes of the region are identified, this section building from section 3.4.2.

In the original LEP application, it was argued that the M4 Corridor's attractiveness put it in a class with London, Paris and Frankfurt in Europe and Beijing and Delhi globally. Specifically, 'it was the most attractive location outside London, having secured over 30% of all investment in that region between 1997 and 2007, to make it the leading location in the South East' (2010, p.2). The sub-region had mobilised all forms of capital; human, financial, social, physical, market, intellectual and innovation. Whether or not the Thames Valley is in a global class is debatable, but what is clear is that the sub-region possesses a number of superior attributes when compared to 'the rest of Britain's 128 sub-regions' in terms of economic activity, consistent economic performance, ICT concentration, jobs and growth.

[136] Taken from: http://www.swinnovation.co.uk/sponsors/ Accessed 10.05.14

Analysis of other documents (for example Kramer *et al*. 2011, p.451) suggests that a key functional specialism developed in the M4C has been the ability to create a business environment which brings together local and regional, public and private initiatives to sustain innovation, and the concurrent ability to do so within the contexts of industry and academia, by developing strong links with the Universities of Reading, Oxford, West London, Bath and Bristol. This means that the M4C has implemented effectively a well-functioning 'triple helix'.

The most oft-repeated (Business Magazine[137], TVBLEP) bases for M4C attractiveness are proximity/access to London, proximity/access to Heathrow Airport, a well-educated, highly skilled and creative local workforce and the advanced level of the ICT sector. As the M4 meanders westward from London, additional attributes emerge such as 'quality of lifestyle', 'beautiful rural countryside', 'good schools' and 'high standard and interesting retail and leisure options' which have helped the area to thrive, develop 'significant clustered industries, supply chains and professional services support based around the regenerated townships listed in Table 6.4 (Adapted from Ibid 2009). In the 'Avon triangle' (Swindon – Bath – Bristol), additional attributes come to light; including evidence of public-private partnerships in the form of local 'growth coalitions' and the 'effectiveness of Government policies'. Whether 'commuting zones' or 'Travel to Work Areas' (TTWAs) are used as the basis for functional economic geography, it is clear that Bath and Bristol are virtually co-located, though ~18 km apart. As noted by SQW (2010, p.7), "any particular place may exist in many 'layers' of functional space" and Bath is a good example:

> "simultaneously both in a hub in relation to much of north and east Somerset but also strongly part of the Bristol market catchments; and has commuting and commercial relationships with London".

To understand fully Bath's economy, "there is a need to recognise this broad geography of flows and the position of Bath within it". This coupling effectively makes for two cities around which firms can base themselves and tap into the "cluster of HEIs in Bristol and in a band running roughly southwest and northeast of Bristol' that make up the local knowledge economy" (2010, p.53).

Findings from secondary analysis suggest that the attractiveness of the M4 Corridor is built on at least six attributes, or an additional two to the four mentioned above. The 'fundamental building blocks' of proximity/access to Heathrow Airport and London and a highly skilled

137 http://www.businessmag.co.uk/thamesvalleypropertyawards/thames-valley/ Accessed 16.09.14

workforce and advanced sector development work best when Government, Academia and Industry help the business environment to function seamlessly. The M4C possesses clear attractions such as those listed above, although it may compare less well in some parts with comparator sub-regions on staff costs; office space availability/costs, and freedom from congestion. However, it is not clear to what extent the attractiveness is uniform throughout the corridor. For firms moving into the M4C, the presence of Heathrow Airport ('a fundamental requirement that businesses want') features prominently in all responses, as do:

> "things like high skills and employment levels, the sort of general vibrancy that exists around (here) is one of the attraction for lots of businesses and within that context, a lot of sites have to make sure they're providing purely a range of facilities that's on offer, so, you know, (we) can't provide a 20-hectare greenfield site as readily as some other parts of the UK" (TVCC #2).

The area, like most in the UK, is expensive but despite this, much of the M4 advantage seems to be linked to the 'general vibrancy that exists around this part of the world', an 'attraction for lots of businesses' and within that context, "some very good, high quality, high standard accommodation all the way down to your 'rough and ready' types of accommodation" because "sites have to make sure they're providing a range of types of facilities that's on offer". In addition to external travel, 'internal travel' also ranks highly, it is relatively easy to get around, and access to train travel (local) and London are all very good. The final advantage derives from a skills base relevant to the needs of a company, so:

> "If you're a Chinese company, you can find people here that speak Mandarin and Cantonese; if you're a German company …. you only need to walk around this part of the world and you hear languages coming out of the woodwork".

TVCC #2 further noted that "the feeling was that those sorts of packages that make a location attractive are in the M4 Corridor, as well as the specific issues that make a particular site or a specific location attractive". However, given that the majority of M4C advantages or attributes can be tied directly to London, it may be argued that the source of the M4C's attractiveness can be reduced to proximity and easy access to London.

## 6.2 The Structural Environment of TMT Firm Location, Settlement and Site selection (M4C)

The Critical Realist conceptual framework outlined in Figure 4.2 (s.4.2.3.3) postulates that a 'structural environment', external to the firm, is strongly implicated in TMT firm settlement and siting decisions. The framework identifies three key structures: (i) Parent TMT Firm Internationalisation; (ii) Subsidiary TMT Firm Settlement; and (iii) Subsidiary TMT Firm Site-selection. This section uses primary data to interrogate the significance of each of these structures in relation to foreign TMTF location, settlement and site selection in the M4C; the first two structures are dealt with in section 6.2.1 and the third, in 6.2.2.

### 6.2.1 Parent Firm Internationalisation & Settlement in the UK

Findings on three key aspects of parent firms' decisions to locate to the UK and settle in the M4C sub-region are presented. First, internationalisation findings are analysed, including mode of entry and multinational experience, followed by reasons for deciding to locate and settle, and finally, actual geographic locations. As a prelude to the first, Table 6.5 presents parent company data to confirm overseas headquarters. The list is presented in the order the parent TMTF participants returned completed questionnaires.

The average parent TMT firm is American, thirteen years old, involved in ICT (software), with large staffs, deep multinationality and a high annual turnover with very healthy profits[138] (Table 6.6). This suggests that the firms in this research are large enough to possess the necessary asset power and deep multinationality which provides enough multinational experience to make internationalisation decisions involving location (choice of country) and settlement (choice of sub-national region) with the minimum of fuss in order to engage in international expansion for any or all of the reasons noted in section 2.4.4.

[138] The full details and attributes of the firms are presented in Appendix 6.1

| No | Parent Firm Name | Overseas (Home) Address |
|---|---|---|
| 1 |  | 1 CommVault Way<br>Tinton Falls, NJ 07724<br>**USA** |
| 2 |  | 35 South Market St, Suite #100<br>San Jose, CA 95113<br>**USA**[139] |
| 3 |  | 2801 Network Boulevard Suite 300<br>Frisco, TX 75034<br>**USA** |
| 4 |  | 90 Matawan Road<br>Parkway 120, Fifth Floor<br>Matawan, NJ 07747<br>**USA** |
| 5 |  | Nové sady 996/25<br>602 00 Brno<br>**Czech Republic** |
| 6 |  | 580 Cottonwood Drive<br>Milpitas, CA 95035<br>**USA** |
| 7 |  | Sangoma Technologies<br>100 Renfrew Drive, Suite 100<br>Markham ON L3R 9R6<br>**Canada** |
| 8 |  | Schiecentrale, Schiehavenkade 58-60,<br>3024 EZ Rotterdam,<br>**The Netherlands** |
| 9 |  | Portes de la Défense<br>15-55, Boulevard Charles de Gaulle<br>92700 Colombes,<br>**France** |
| 10 |  | 20 Enterprise, Suite 100<br>Aliso Viejo, CA 92656<br>**USA** |

**Table 6.5: M4C Parent TMT Firms Home Addresses**

| | HQ/Age | Ownership/ Entry Mode | TMT Sector/ Segment | Staff (parent) | Stage of Lifecycle | No of Global Offices | Annual Turnover (2012)/ EBITDA |
|---|---|---|---|---|---|---|---|
| **Averages** | USA<br>13 yrs | Private/ WoS | ICT - Software | 487 | Success-growth/ take-off | 20 | £91.92m (2012)/20–30% |

**Table 6.6: M4C Parent TMT Firm Averages**

Consequently, parent TMT firms exercised a single entry mode to the UK, wholly-owned subsidiaries, supplemented by a second, acquisitions, in two instances. The two firms that also made acquisitions (Sangoma, Broadcom) did so within two years of landing.

[139] EC relocated to San Jose from Sunnyvale shortly after the data was collected.

As discussed in Chapter 2, the two modes give firms total ownership and control; there are several possible explanations for this overwhelming choice of entry. The most reasonable are the need for total control and the possession of 'asset power' and multinational experience (s.2.4.4). Asset power is a function of firm size which allows firms to choose any entry mode, with a sole venture being the preferred choice, particularly in markets with a high market potential, like the UK. The firms also possess deep multinational experience, with an average of twenty offices around the world and the UK not being the first expansion option. These findings also help to validate the importance placed on parent firm internationalisation strategy as a key structural component of the conceptual framework, and by implication of TMT firm location behaviour.

Second, the firms in the sample gave eight clear reasons for locating in the UK and settling in the M4C. The reasons for choosing the UK as a destination country and the M4 Corridor as the preferred sub-region were the same in all cases (with the ranking slightly different for settlement). Reasons were equally driven by access or proximity and in rank order, were: access to talent/skilled workers; access to customers, proximity to customers, proximity to transport (air, rail and roads); markets accessibility; markets proximity; access to technologies; and proximity to suppliers. According to the CFO, Sequan's decision to expand to the UK and settle west of London were taken for "'access talent, proximity to markets and customers, and proximity to transport". The Selfservice Company sought a location that gave "freedom, proximity and direct access to markets and customers, particularly with regards to London" (UK MD). Kentico needed access to customers, markets and talent/skilled staff and iCIMS gave two main reasons, "access to customers and access to talent/skilled staff" for its choices (VP-Marketing). Electric Cloud explained that location, settlement and site selection choices were driven by access to customers and markets, followed by access to talent/skilled staff (Sales Director). Likewise, Promise's choices were driven by access and proximity to customers, markets and talent/skilled staff (EMEA MD); and Sangoma gave 'access to customers, markets and talent/skilled staff' as the three most important reasons for its choices (CFO). CommVault gave six important reasons for expanding to the UK and settling in the M4 Corridor, 'access to customers and markets'; 'access to talent/skilled staff and proximity to customers, markets and transport (air, roads and rail)', (V-P, Worldwide Sales Operations). Finally, GENBAND chose the UK and decided to settle in the M4 Corridor for the same three top reasons: 'access to talent/skilled staff; proximity to customers and proximity to markets' (EVP & Chief Strategy Officer); and Telogis chose the UK and M4 Corridor for

'access and proximity to customers and access and proximity to markets' (CSO). These reasons are summarised below in Table 6.7.

| Rank | Choice of COUNTRY | Choice of REGION |
|---|---|---|
| **1** | Access to talent/skilled staff | Access to customers |
| **2** | Access to customers | Access to markets |
| **3** | Access to markets | Access to talent/skilled staff |
| **4** | Proximity to markets | Proximity to customers |
| **5** | Proximity to customers | Proximity to markets |

**Table 6.7: Top 5 Reasons for Parent TMT Firm Location & Settlement Choices (M4C)**

Finally, the above findings suggest that the reasons given are virtually the same for international expansion and to settle in a particular sub-region. In this research, firms leverage asset power and deep multinational experience to facilitate internationalisation decisions and imply that these firms could expand and settle anywhere in order to engage new markets. These findings also produce another key implication; firms with a developed product and clientele are mainly concerned with access and proximity to markets and customers in order to sell products and service existing customers. The implication of these findings for the conceptual framework deployed here is that there is a strong overlap between two of the structural drivers: parent firm internationalisation strategy and subsidiary firm settlement strategy. Indeed, findings call into question whether these drivers can be thought of as distinct and suggest they need to be reconceptualised in a different way.

### 6.2.2 Subsidiary TMT Firm Site selection in the M4C

This sub-section deals with the final structural component of the conceptual framework by interrogating evidence of subsidiary TMT firm site selection in the M4C from three sources, expert-practitioners involved in the process; structured, semi-structured and open questions to TMTF that initially sited there in 2011 (Appendices 4.5a, 4.5b) and company data (mainly company websites and LinkedIn feeds but also, Annual Reports and Hooper's).

#### 6.2.2.1 The Process of Subsidiary Firm Site selection – Expert perspective

Expert-practitioners are approached by 'around thirty technology companies per year' wishing to 'land' in the M4C, and selection is carried out with the help of the Chamber of Commerce, the 'local delivery partner for Berkshire and Buckinghamshire', which deals with the majority of enquiries through the Foreign & Commonwealth Overseas Office or the London-based UKTI teams'. The sub-national approach is part of a national strategy, governed by UKTI, which requires all FDI opportunities to be entered onto the 'Single National Pipeline', with responsibility for qualifying the opportunity (*i.e.* completing the FDI

scorecard) lying with the individual who first sources it. The opportunity is qualified and passed to the relevant Sector Lead within the Initial Support Team (IST), who convenes a virtual team to deliver the project. If the client is undecided on where to 'land', project delivery and proposition development will rest with the IST. However, if the client has decided they wish to land in a specific area, then the opportunity relates to a 'Devolved Administration', London or a 'single local area', so project delivery and proposition development will rest with the relevant partner. Once the team has been convened, project handling will generally go through the following phases, some of which may iterate.

**1. Project start-up**

(i) *Identify and convene virtual team
(ii) *Confirm client requirements
(iii) *Agree project scope and deliverables
(iv) *Plan project delivery

**2. Developing the proposition**

(i) *Gather relevant data and conduct consultation
(ii) *Develop first version of proposition
(iii) *Issue proposition and offer ongoing support to client

**3. Organising a visit**

(i) *Plan suitable itinerary
(ii) *Finalise plans and confirm budget
(iii) *Conduct visit, involving relevant stakeholders
(iv) *Write visit report

**4. Refining the proposition**

(i) *Follow up with client and gather feedback
(ii) *Develop more detailed (final) version of proposition
(iii) *Issue proposition and offer ongoing support to client

**5. Closing the project**

(i) *Gain feedback from client (including for losses)
(ii) *Identify individual from ID team to handover relationship
(iii) *Update Pipeline Tool)

**Figure 6.6: Process of site selection (Expert perspective)** - Source: TVCC #2/UKTI 2013

The recommended sub-regional approach is bespoke and needs-driven and relies on a network of specialist professional services providers, delivered as part of the national sector-based UK first principle which has six strategic strands:

1. "Working with local partners and the Devolved Administrations to present consolidated propositions which focus on the strength of the UK as an investment location";
2. Offering clients a coherent and coordinated 'offer' of investment choices;
3. Helping clients to access the right people at the right time;
4. Creating compelling propositions that play on the UK's strengths;

5. Harness, pool and augment previously dispersed capability to enable existing organisations to become even more successful at attracting and retaining world-class investments; and
6. Working with our local partners to identify expansion opportunities for clients and ensuring a joined up approach with our UKTI trade colleagues" (UKTI).

Firms get "a support mechanism from the top-down, which effectively involves a high level of support from the UK investment services team" (TVCC #2). According to TVCC, firms can enter the local network via a 'number of market channels' and the channel they work through is "a mix of UKTI and private sector firms and property advisers". The channel, whether chosen by the Chamber or firm, "determines how firms go about conducting their property search". The process starts with an enquiry from:

> 'JLL, for example, 'right at the tail-end of when a company is looking at three sites – Manchester, Oxford, Reading' when they need specific information such as 'information about the local talent pool and who is already here' (in terms of competition).

Participants also described another way, 'where a company is doing business in the UK for the first time and needs the broader messages of how doing business here is different to Europe'**.** The Chamber meets potential clients (usually at Heathrow) and introduces them immediately to the network of providers around a table at the Reading office[140]:

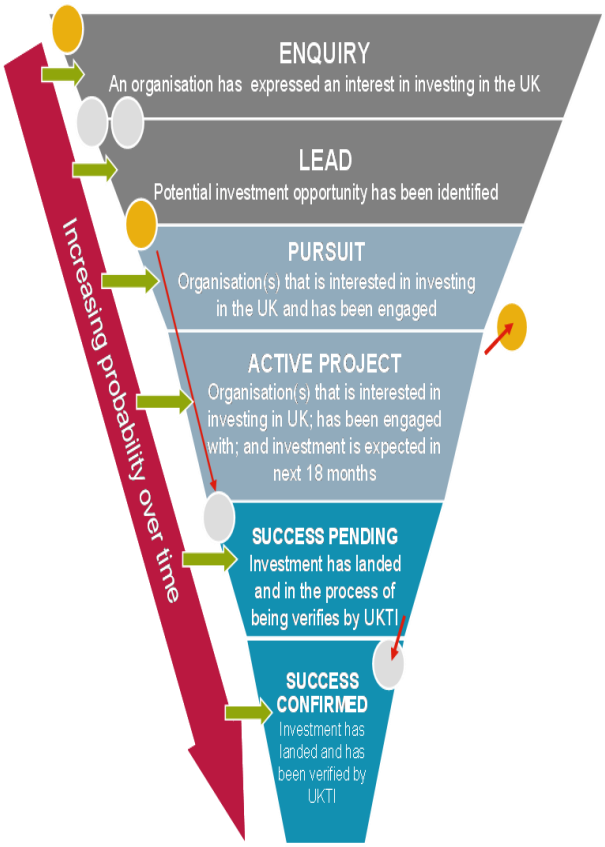
> "We've got probably about 300 professional services companies who are members of the chambers of commerce here and all of them have got a portfolio of foreign-owned companies that are on their books".

The Chamber then 'takes the process (only) so far' and to the point where a company needs specific professional advice that would involve a local property company to undertake the negotiation with the landlord. The process as described is clearly bespoke, involving multiple providers and sufficiently flexible to incorporate elements of the private sector, in particular, professional services providers. At various times in the process, firm site selection engages with support from public and private providers, which shows that private provision is part and parcel of the local economic development network, the objective being to provide a 'seamless' service invisible to companies:

[140] Reading covers Bracknell, West Berkshire and Wokingham but the Chamber also has a Heathrow Office and Membership Support offices in Buckinghamshire, South Oxfordshire, Slough and Swindon.

"we try to make sure we are dealing with what the company needs before we start to get to a policy level of trying to explain the whole complexity of a public administration and a number of local authorities across one county or that we represent here at the chamber" (TVCC #1).

The process consists of six stages as below:




- The project lifecycle consists of six stages
- These map to the investment pipeline
- Projects can enter the pipeline at any stage
- EMU verify and allocate every new project (regardless of its lifecycle stage), before it is allocated to the appropriate IST member

**Figure 6.7: UKTI FDI Project Lifecycle (UKTI 2014)**

This bespoke system is a central part of the UKTI value proposition involving the Chamber, private providers and local authorities and is considered to be unique in the M4C because "when you go to other countries in Europe, for example that just doesn't happen from that top level right down to the local level". The approach is simple and pragmatic and can be contrasted with the textbook approaches outlined in section 3.5.2. The theme of public and private support is continued in sub-section 6.3.2.

#### 6.2.2.2 Subsidiary TMTF Site selection (M4C) – To 'science park' or not to 'science park'

Findings on three key aspects of subsidiary firms' decisions to site in the M4C sub-region are presented and analysed in this section. First, Table 6.8 (below) shows addresses and actual

geographic positions of foreign TMT firms siting upon initially 'landing' in the M4 Corridor in 2011[141] (participant firms are highlighted), which confirm a definite clustering. Second, reasons for site selection choices are presented and analysed. Finally, the implications of those choices are analysed.

As noted, TMTF show a very strong 'clustering' in the eastern Thames Valley, as verified by geographical positions and 74% alignment (all participant firms in the sample) with the 51.4th parallel. Interestingly, this parallel is also home to seven of the twelve cities and townships along the M4, three of which boast ICT location quotients above 3 (Table 6.3). This quantified physical positioning confirms the qualitative finding in section 6.1.2 and produces a derivative finding; a need for proximity to London (customers, markets) and Heathrow Airport (proximity to air transport and access to distant markets); though these were mentioned expressly in only three responses (additional implications of access are in s.6.3.1).

The average subsidiary is summarised in Table 6.9). This suggests that subsidiaries are small enough, on the one hand, to be 'ideal' size tenants for science parks, but on the other, large enough and sufficiently well-resoured to choose 'external' sites if they so wish. Firms were asked eight semi-structured and open questions about science parks: when; how they became aware; amount of a priori SP knowledge[142]; whether SP considered; reasons for external siting; main advantages/disadvantages of site; awareness of SP claims; and whether would relocate to SP in next 12-24 months. Decisions involving site choices and reasons for those decisions by the ten respondent firms are analysed next and top 5 reasons summarised, followed by all choices at the end in Table 6.10.

| | HQ/Age | Ownership/ Status | TMT Segment | Staff (subsidiary) | Stage of Lifecycle | Annual Turnover (2012)/ EBITDA | Site Preference (Offsite or Onsite) |
|---|---|---|---|---|---|---|---|
| **Averages** | USA | Private/ WoS | ICT - Software | 5 - 20 | Success-growth/ take-off | £3.5 - £5m (2012)/10–20% | Offsite ('external') |

**Table 6.8: M4C Subsidiary TMT Firm Averages**

Sequans rented an external private commercial site after 'a search of possible UK sites' (Winnersh Triangle), mainly to gain proximity to transport networks and access, specifically:

[141] Initially 'landed' as some firms (*e.g.* ECE) have since relocated.
[142] Participants were asked to choose between: 'none', 'very little', 'some/moderate amount'; 'quite a lot'; and 'very much' information

> 'Access to talented employees (specifically, in the field of computer engineering), proximity to markets and customers, and proximity to air/roads/travel to and from London'.

Prior to entering the UK, Sequans had done its own research of potential sites, which included Science Parks, and found 'quite a lot' of information but decided against siting in one. According to the CFO, the decision was taken because the advantages of siting 'externally' outweighed those of being in the science park. From the perspective of science parks, however, Sequans represents a worst-case scenario because the subsidiary had much information *a priori* upon entry but still decided against siting in a science park.

CXC (parent of SSC) decided on letting a private commercial site, which enabled 'closeness to markets and customers' and 'close(ness) to roads/travel to London'; they did not consider a SP because of 'inflexible leases' and 'not enough space', after its own research. Prior to entering the UK, the company's own research produced 'quite a lot' of information about Science Parks, but decided against moving into one. According to the UK MD, the site gives them the freedom, proximity and direct access to markets and customers, particularly with regards to London. These first two examples point towards the fundamental nature of the third structural component of the conceptual framework, Subsidiary TMT Firm Site Selection Strategy, as being proximity to markets. This assessment is further supported by the example of Kentico, where the most important reasons for renting a private commercial site were proximity and access to customers and markets. By taking the particular off-site premises, however, Kentico acceded to a very important third reason; the site was chosen because of the 'location of (its) UK Sales Director' (Wokingham). Kentico's decision may seem to be based on a quirky reason but as noted in section 5.5, it is not uncommon for firms to choose sites based on preferences of management executives. Kentico had no information about SPs prior to landing so could not have considered one, a decision that is understandable, given the company only found out about SPs later by 'word-of-mouth'. Kentico has been able to balance its experiences of negative externalities ('frustrations of traffic congestion') with the positive externalities enjoyed, such as: 'close to town facilities like post office, copy centres, variety of food options'. Kentico is not aware of any SP 'claims' and will not be considering a move into one because on balance, they are 'happy with the existing tenancy which covers three people' who are here for marketing and sales.

iCIMS chose a private site in Central Reading for three important reasons: 'ease of access, location of customers and cost', according to the CEO/Founder. The main overriding reasons behind the siting choice, however, were because the 'technology is developed and housed in

US' and the 'plan is for UK to be used for Sales and Customer Service' only. iCIMS had little information *a priori* about science parks and became aware of them after locating to the UK. Therefore, SPs were not considered as a viable property choice, and the decision to site in one was never considered. This finding confirms the literature on proximity and access to customers and is the third mention of a function-driven choice (sales and customer service), whilst introducing the issue of 'costs'. Electric Cloud Europe chose a private commercial/Business Park primarily because the site was close to customers, markets and transport, with access to talent/skilled staff (sales) being a third most important reason. ECE became aware of science parks before expanding to the UK, and received 'very much' information from its parent firm, but did not consider SPs a viable property choice. Though aware of the claim that 'similar sector firms' inhabit SPs, ECE is not likely to reconsider because its entire focus is on growing sales from their UK office. The examples of iCIMS and Electric Cloud confirm the nature of the third structural component whilst broadening the dimensions of this structural factor and highlighting the fact that science parks are not regarded as providing privileged access to particular labour markets.

The nature of this central third structural component is further reinforced by the choices of CommVault and Promise Technology, two very well-resourced firms. CommVault sub-let a private commercial property in an office block in Reading[143] which provided the access (customers, markets, talent/skilled staff, facilities/equipment, technologies) and proximity (markets, customers, and all transport networks; air, rail and roads) they sought. The VP Worldwide Sales said the property was chosen because it is "centrally located in the heart of high tech with easy access to London and the rest of UK". CommVault was aware of science parks prior to locating to the UK, but had very little information, so SPs were not considered as a viable property choice and because the private property offered 'greater flexibility of leases'. Promise Technology (PT) also rented a private commercial site primarily 'from a marketing point of view, a virtual office location via Regus' for the following reasons; 'easier public transportation access' and 'better fit of facilities in the environment'. According to the MD EMEA), Promise became aware of science parks prior to expanding to the UK, and knew 'quite a lot' about them, courtesy of its parent firm in California. However, SPs were not considered as a viable property choice because they 'did not fit the main purpose of the office – sales and marketing function'; and 'did not add any additional value'. Additional disadvantages included 'harder to reach with public transportation'; 'facilities offered are not

[143] RD reckoned they're in a 'Business Park' but there is none registered at the address

the facilities we need'; and their 'focus (is) on R&D and not Sales and Marketing'. Promise is aware of the SP 'claim' that:

> "You are part of the ecosystem environment with companies who are also active in R&D activities, an inspiring environment with possibilities to work close together with the other companies who are also located at the science parks".

However, despite the knowledge and awareness, Promise did not consider a move to SPs (nor is likely to do so in the near future). This finding again confirms the literature on proximity and access to customers, markets and transportation with the unique added consideration of a 'better fit of facilities in the environment'. Promise's choice was driven explicitly by the function of the UK office (sales and marketing), so from the perspective of science parks, there was no value add with respect to this purpose. Indeed there were several disadvantages to siting in one so despite much a priori information, science parks were not considered. This finding again highlights the fact that science parks are not regarded as providing privileged accommodation with regard to proximate markets and broadens the dimensions of this structural factor by introducing the important consideration of office function.

The nature of the central third structural component is reinforced finally by the choices of three quite different TMT firms. Sangoma also rented a private commercial site in Central Bracknell primarily because the "new location was very close to the old location, making travel (and relocation) easy". This rather mundane reason was supplemented with two overriding strategic reasons; a decision taken at head office that meant giving them "more access to qualified staff" and purpose of the office (the subsidiary's presence had "transitioned to a virtual office with only three employees in the UK" to support customers. Sangoma had little a priori information about SPs but could see little value add from being in a science park due to the above. This finding extends the literature on function of office given that the choice of office was driven by the office function (in this case, a small 'virtual office') and access to talent.

Like Sangoma, GENBAND also rented a private commercial property (Maidenhead), selecting the most important reasons as 'maintaining product development' and 'servicing existing customers'. These were supplemented with two additional primary reasons, proximity to the air network (Heathrow), and proximity to customers. According to the EVP & Chief Strategy Officer, EMEA, GENBAND knew 'very much' about science parks 'prior to locating to the UK', based on 'information from the parent firm', however, SPs were not considered because the property choice "provided better and easier access to customers, domestic and European", the clear implication being that GENBAND (UK) provides a sales/marketing and customer

service function. This finding confirms the extension of the dimensions of the site selection structural factor to office function and the related considerations of a developed product and clientele from a mature company. This finding extends the literature on office function for the purpose of access to customers, specifically for the specific reason of customer service. This finding also highlights the growing realisation in this research that science parks do not provide a unique siting choice for firms in search of proximate talent, customers or markets.

Finally, like Sangoma and GENBAND, Telogis ('Anonymous') rented a private commercial site in a Bracknell Business Park for four most important reasons: 'access and proximity to customers and markets'. Telogis knew 'quite a lot' about science parks 'prior to locating to the UK', based on 'information from the parent firm', however, Telogis opted for a Business Park because they "needed a site that would allow access to markets in the UK and Europe", and there are no plans to relocate in the near future. This finding confirms the literature on access and proximity to customers, markets and transportation given the specific stated purpose of having access to the rest of the UK and Europe, which implies the choice is based in proximity to transport networks and function of office (sales and marketing). The five most important reasons for site selection choices are summarised below.

| Rank | Reasons for choosing property arrangement |
|---|---|
| **1** | Proximity to transport, customers and markets* |
| **2** | Function/purpose of office (marketing/sales, product development, etc) |
| **3** | Access to talent, customer(s)/market(s)* |
| **4** | Management preference |
| **5** | Costs, Better fit of facilities, etc |

**Table 6.9: Top 5 Reasons for Subsidiary Firm Site selection Choices (M4C)**

* 'Transport' ranked highest amongst proximity choices, followed by customers and markets; talent ranked highest amongst access choices, followed by customers and markets, equally.

The above findings converge on a near consensus for choosing a particular site or premises, driven by three main sets of reasons; proximity, office function and access. These findings extend the proximity- and access-related reasons for location and settlement into site selection but are supplemented with function of office which clearly came through as an important site selection driver. A synthesis of these findings means that, ceteris parabus, TMT firms are most concerned about selecting sites that facilitate engagement with existing customers and markets for the purposes of servicing existing clients, growing sales and/or maintaining product development. These sites should also enable mobility to access prospective customers and markets, whether in the UK, Europe or farther afield because of the 'proximity' options, of which 'transport networks' ranked highest.

By choosing function of office, firms imply that the site selection choice can be driven by the stage of development of the product, that is, the product lifecycle[144]. Analysis of M4C TMT firms confirmed that 'developed products' (for example, iCIMS, Kentico and Genband) sought marketing and sales opportunities, whereas 'developing/early stage products' (Sequans) sought access to talent and technologies. This unexpected finding suggests that technological products tend not to follow the traditional product life cycle 'S' curve and instead, either morph into a new product or slowly fade away because products are under constant review, suggesting the TMT product sales lifecycle may be constantly renewed, as well.

Analysis also revealed that access to talent can be more closely examined by looking again at the link between site selection and product development stage. For developed products, 'front office talent' (sales and marketing) was sought by firms, whereas, 'back office talent' (software engineering) was sought for developing products, the implications of which are obvious. These M4C findings confirm that the nature of Subsidiary TMT Firm Site Selection is constituted of five main considerations (Table 6.10.)

Finally, with relation to siting on or off science parks, analysis revealed that M4C subsidiary firms possessed varying amounts of information a priori about science parks. As noted above, firms were asked to choose between five levels of information ('none, very little, some, quite a lot and very much') and since none of the firms subsequently sited in a science park, the results are illuminating but in some cases, ominous for science parks for two reasons. In no case was science parks chosen as a source of information (c.f. 'own research' and 'parent firm') and despite having knowledge of science parks a priori at the time of siting in the sub-region in some cases, science parks were still overlooked in favour of alternative sites. These findings confirm that science parks are not regarded as the sole or most important providers of access or proximity to customers, markets and transport networks, and suggest that where the planned function of the office cannot be served by siting on a science park, they will not be considered. Because as shown above, prior knowledge did not translate into decisions to site on science parks (categorisations are shown in Table 6.10 which captures the links between knowledge level and initial siting).

[144] This prompted an ad hoc question to participants about products, the results of which are revealed in s.6.4. The responses revealed an absence of products in the latter two stages of development ('market maturity' and 'market decline') and interestingly, a sense of 'continual development'.

| SP Siting | | | | |
|---|---|---|---|---|
| | OFF | **Category B**<br>**Kentico** | **Category D**<br>**iCIMS; CommVault; Sangoma** | **Category F**<br>**Sequans; SSC; ECC; GENBAND; Telogis** |
| | ON | **Category A**<br>**None** | **Category C**<br>**None** | **Category E**<br>**None** |
| | | **None or Little** | **Some information** | **Much information** |
| | | **Low ←--------- Level of a priori SP knowledge ---------→ High** | | |

**Table 6.10: Categorisation of M4C Subsidiary TMT Firms (SP knowledge)**

This categorisation addresses the research objective to develop a typology of foreign TMT firms based on a priori knowledge of science parks and initial siting decision in the UK. The findings on subsidiary TMTF site selection address the major research question, first three research objectives and first three subsidiary research questions (s.1.3). Findings also address the core components of the structural environment of the conceptual framework and one component of the contingent environment (Figure 4.2). Site selection findings in relation to science parks are summarised below in Table 6.11.

| TMT Subsidiary Firm | Stage of Product[145] Strategic Pathway[146] | Categorisation based on a priori SP Knowledge | Purpose of site | Site selection choice | |
|---|---|---|---|---|---|
| | | | | On/Off-site SP | Why/Why not SP |
| **Sequans** | Developing/ 'Market Attacker' | **Category F** | Marketing & Sales, Research & Development | Off-site | advantages of external site 'outweighed those of being in the SP, for three reasons, '*proximity to markets and customers*', '*proximity to air/roads/travel to and from London*' and '*access to talented employees (*specifically, *in the field of computer engineering)*' |
| **SSC** | Developed/ 'Market Attacker' | **Category F** | Marketing & Sales | Off-site | freedom, proximity and direct access to markets and customers in London |
| **Kentico** | Developed/ 'Market Attacker' | **Category B** | Marketing & Sales | Off-site | '*close to town facilities (services like post office, copy centres, variety of food options)*' |
| **iCIMS** | 'Developed (*"our platform was first developed in 2000. It's is currently on version 14.2 (14th year, 2nd release in year). Onboard was added 6 years* | **Category D** | Sales & Customer Service | Off-site | the '*plan is for UK to be used for Sales and Customer Service*' |

[145] Stages of product development correlate with stages of product life cycle
[146] Based on Hacklin et al's., (2013) framework

| | | | | | |
|---|---|---|---|---|---|
| | *ago. Connect 2 years ago. All go through 3 releases a year"*/ Market Attacker' | | | | |
| **Electric Cloud** | Developed/ 'Market Attacker' | **Category F** | Sales | Off-site | Proximity to all transport networks |
| **CommVault** | Developed [147] 'Ecosystem Aggregator' | **Category D** | Marketing & Sales | Off-site | Offered '*greater flexibility of leases'* |
| **Promise** | *"We are continuous developing new and exciting storage solutions. It is a continuous process. We are not bringing solutions to the market without a good market survey up front so all the solutions we are developing are core solutions"*/ 'Business Remodeler' | | Marketing & Sales | Off-site | "*did not fit the main purpose of the office – sales and marketing function'*; and '*did not add any additional value*". |
| **Sangoma** | Developed/ 'Market Attacker' | **Category D** | Marketing & Sales | Off-site | the subsidiary's presence had *"transitioned to a virtual office with only three employees in the UK"* |
| **Genband** | Developed/ 'Ecosystem Aggregator' | **Category F** | Marketing & Sales, Customer Service Product Development | Off-site | *"provided better and easier access to customers, domestic and European"* |
| Telogis | Developed/ 'Market Attacker' | **Category F** | Marketing & Sales | Off-site | "*needed a site that would allow access to markets in the UK and Europe*" |

**Table 6.11: Summary of Subsidiary TMTF site selection choices/main reasons (M4C)**

As noted above, the constitution of the nature of these two structures, one of which has been forged by the same choices by TMTF for internationalisation and settlement, and the other by site selection, has been defined. The findings confirm that TMT sectors expanded to the UK as wholly-owned subsidiaries and sought to settle on access and proximity to customers, markets, talent/skilled staff, transport networks, and subsequently sited, based on proximity and the specific purpose of office function. In addition, Critical Realism encourages the conclusion that such choices caused the site selection outcomes and because CR postulates that the domain of

[147] Meaning that the product is believed to be under constant development and/or there was no response to the question about PLC.

the real contains the hidden 'structures' and 'causal mechanisms' that produce the empirical events (in this case, internationalisation and settlement causing site selection).

## 6.3 The Contingent Environment of TMT Firm Settlement and Site-selection in the M4 Corridor

The conceptual framework (Figure 4.2) also postulates that a second set of contingent relations exist, which have been caused by parent TMTF internationalisation and settlement and subsidiary TMTF site selection:

> "Contingently related conditions are never inert, but are themselves the product of causal processes and have their own causal powers and liabilities" (Sayer, 1992, p.140 as cited in Easton 2011, p.121).

The framework identifies four sets of key contingent relations: (i) Accessibility (to customers, markets, labour and suppliers); (ii) Public Agency Support (from UKTI, LEPs, etc); (iii) Private Professional Services providers (which become involved with incoming firms via the current focus on localism and LEPs); and (iv) the M4 Corridor Science Park Stock (which includes science and business parks and other sites). This section presents analysis of the significance of each of these relations on location, settlement and site selection of TMT companies in the M4 corridor: the sets of relations are presented in sections 6.3.1 - 6.3.4.

### 6.3.1 Accessibility to Customers, Markets, Suppliers & Talent

In analysing the necessary relations of TMT firm internationalisation, settlement and site selection of foreign TMT firms (ss.6.2.1, 6.2.2), it emerged that accessibility, generally, and access to talent, specifically, emerged as primary drivers of these three linked decisions (s.4.2.3.1; Table 6.13). Accordingly, this sub-section will build on those issues by focusing on the comparison of the contingent influences relating to access to talent/skilled staff versus other accessibility, namely customers, markets and suppliers, and the clear distinction from 'proximity'.

| Rank | Choice of COUNTRY | Choice of REGION | Choice of SITE |
|---|---|---|---|
| 1 | Access to talent/skilled staff | Access to customers | Proximity to transport, customers and markets |
| 2 | Access to customers | Access to markets | Function of office |
| 3 | Access to markets | Access to talent/skilled staff | Access to talent, customers/markets |
| 4 | Proximity to markets | Proximity to customers | Management preference |
| 5 | Proximity to customers | Proximity to markets | Costs, better fit, etc |

**Table 6.12: Top 5 Reasons for TMT Location, Settlement & Site selection (M4C)**

Findings show that parent TMTF were concerned mainly, though not exclusively, with accessibility (to talent, customers and markets) in internationalisation and settlement decisions. However, in site selection decisions, subsidiary TMTF focused on proximity and office function in preference to access to talent. What emerges is a clear distinction between accessibility, whether for any of the reasons stated above, and proximity, whether to transport, customers or markets. This finding confirms the importance of four accessibility relations – talent, customers, markets and transport networks - and broadens the dimensions of this contingent factor to include proximity as a distinct set of relations, in addition to accessibility. This clear distinction suggests proximity is a separate but related component to accessibility (an unexpected finding that could not have been explored beyond this point in this research). Finally, access to suppliers received no mention, though one response implied technology suppliers in siting for maintaining product development (Genband).

### 6.3.2 Public Agency Support & Private (Professional) Advice

This sub-section builds on the briefing of UK regional economic development policy (s.2.4.6.2) and initial contextual findings (s.5.3.3) by summarising findings from analysis of the main policy instrument in use and its key ramifications for this research, as they relate to the M4C. Four sets of findings are presented, first on the geographical coverage of LEPs in M4C; second, on the effect of the economic development policy change on the site selection negotiation process of inbound firms; third, on the emergence of a 'public-private partnership' in terms of delivering support and fourth, on the advent of competition as a result of the impact of LEPs on the way M4C stakeholders operate with regard to inward investment. Six expert-practitioners were consulted.

| | |
|---|---|
| Head of Inward Investment,<br>Thames Valley Chamber of Commerce<br>https://www.thamesvalleychamber.co.uk/contact/ | UKTI Investment Services Adviser[148]<br>https://www.gov.uk/government/organisations/uk-trade-investment |
| Head of Product Development,<br>Invest in Bristol & Bath/West of England LEP<br>http://www.bristolandbath.co.uk/ | UKTI Head of Local Engagement<br>https://www.gov.uk/government/organisations/uk-trade-investment |
| **CEO**<br>Thames Valley Berkshire LEP<br>http://thamesvalleyberkshire.co.uk/ | **Economic Projects Manager**<br>http://www.forwardswindon.co.uk/ |

**Table 6.13: M4C Expert Participants**

Of England's thirty-nine LEPs (Figure 2.1), three are in the M4C: West of England[149] (consisting of four unitary authorities, Bath & Northeast Somerset; Bristol, North Somerset and South Gloucestershire); Swindon and Wiltshire[150] (two unitary authorities, Swindon Borough Council and Wiltshire Council); and Thames Valley and Berkshire[151] (five unitary authorities, Windsor and Maidenhead, Slough and Wokingham, Bracknell Forest, Reading and West Berkshire) as listed in Table 5.9. LEPs are more than the local authorities, however, so they are also encouraged to include business leaders, the community and further and higher education sectors (Thames Valley Berkshire LEP Growth Deal 2014, p.1). The Growth Deal is one of the responses to the criticisms to reposition LEPs to provide funding through and in response to the Strategic Economic Plans, 2013 and 2014 (with 2017 to come). In the new Local Growth funding arrangement, Thames Valley and Berkshire has received £137m, West of England, £86m and Swindon and Wiltshire, £275m.

On the issue of the effect of the economic development policy change on the site selection negotiation process of inbound firms, focused interviews revealed differing opinions, which highlighted differences between the impact(s) and the policy instrument (particularly, the extent to which it has 'embedded'). The prevailing view was that the five principal drivers of location had 'remained the same' for the past twelve years and though the drivers may change in terms of priority, they have stayed the same. The drivers are market opportunity ('obviously Heathrow is an important consideration'); access to talent ('who's already here and that's important for the

[148] GR provided two interviews, as UKTI and also TVCC
[149] http://www.westofenglandlep.co.uk/ Accessed 27.10.14
[150] http://www.swlep.biz/ Accessed 27.10.14
[151] http://thamesvalleyberkshire.co.uk/ Accessed 27.10.14

M4 Corridor, particularly in terms of the global brands that exist here'); lifestyle; and the environment in which people will live and work:

> "these are often left out and which is why, as a champion for what we're trying to do in the business community, we'll encourage all property agents to include this as well, and that is that M4C is a tried and tested international business location in terms of the advice you receive from professionals and from government organisations that promote us" (TVCC #1).

This emergence of a public-private partnership in delivering support means that the inbound firm gets a complete coverage of support, customised to their needs and with no gaps in service (s.5.3.2). The network of partners now includes professional services providers such as legal services and accountants, trusted advisers and technology providers/supply chain, all of which become involved before the property 'milestone'. Obviously, 'property professionals in particular have a key role to play' because

> 'property tends to be the point at which an enquiry is raised and people start to get excited about what is going to happen and where site selection happens but actually the process starts well before a property adviser has been contacted' (TVCC #1).

In the process of landing in the M4C, 'their perception needs to be that whether it's a public or partner organisation, they're receiving the advice that they need to receive'. With specific regard to the inception of LEPs:

> "The rollout of the LEP has continued to focus the mind … upon whether regions outside of London are receiving a level of attention and are actually prepared to receive a level of attention that they need to rebalance the economy".

The inclusion of 'drivers of location' as central to the site selection negotiations and the emergence of public-private partnerships are two examples of contingent causal powers and point towards the importance of public agencies and private providers in site selection. In terms of the way M4C stakeholders operate with regard to inward investment, several clear beliefs were expressed, namely that the Thames Valley is unique because of its proximity to London: "it continues to benefit from the success of London, so if you're marketing London and there are companies based out here, they will consider this their London office"; the LEP network has raised the question of 'sharing the spoils of the UK Plc', by highlighting 'what more needs to be done by the individual local areas to provide something different to London'; and the 'local' competitiveness element, "situations more times than not where a company is considering

setting up in East London or Shoreditch, so that's helped us to focus our minds on what we're about, as well":

> "for the resources that are allocated to it, this part of the world has and continues to succeed above and beyond the obvious input in terms of the finance that's given to other parts of the UK and awful lot more people and an awful lot of money spent on inward investment are not getting the sort of returns that we're getting in this part of the world" (TVCC #2).

The competitiveness has exposed the "varying capacities and capabilities within LEPs in terms of what they do with this thing called inward investment". Clearly, while Berkshire is well positioned given proximity to London, this is not the case in Swindon, which has an 'uphill battle' as it tries to carve a niche in sectors that are much more advanced in other areas, for example, automotive engineering components in the West Midlands[152]. This means that LEPs have to be "sharper and smarter about how (they) do what (they) do", and be clear about what priority inward investment takes because not all LEPs see it equally. In some cases, the increased competitiveness has caused LEPs to widen their interpretation of inward investment to include both 'existing inward investment, as well as brand new FDI'. This has led to local economic development 'cannibalism' in which smaller, less well-resourced LEPs go after firms that are already located in the UK. From a critical realist perspective, however, the outcomes of local competitiveness and 'cannibalism' are two clear examples of a 'causal liability' which result as the process of negotiation and support of incoming firms are played out.

The final point of analysis turned on the extent to which LEPs have made a difference in the way stakeholders operate in the M4 Corridor generally. This builds on section 5.3.3 and resumes with the point that the M4C represents a 'fairly unique situation' in that the mandate for inward investment has remained relatively unchanged. The mandate for inward investment in Berkshire and across the M4 Corridor pre-LEP contained the Chamber of Commerce which meant that the relationship was largely through the old RDA, and already established. The Chamber remains the local delivery partner for the LEP, so it takes responsibility for inquiry management, marketing and some element of investor development as well. This work may not reflect the broader changes nationally because it has remained relatively unchanged, although there has been much more of a county-focus effort. From an inbound investors' point of view, the perception appears to still be one of 'we need access to Heathrow', and the area we're looking at is one hour left or one hour right of Heathrow.

[152] Focused telephone interview with Economic Projects Manager, FS, 06.11.14

The business community wants to see four things; Heathrow remaining in place, the talent pool developed, and a good place to live and work. So, the inward investment agenda will continue as long as these reasons exist:

> "the LEPs that exist around the networks in Berkshire are driven very strongly by the connections that the Thames Valley Chamber of Commerce have developed and continue to develop in terms of making that delivery on the ground, making it effectively and as smooth as possible" (TVCC #2).

This set of contingent relations has blurred the line between public and private provision and also is a concession to free market ideals; 'why not let the market do what it's already doing'. However, for some LEPs in the M4C (for example, Buckinghamshire Thames Valley), 'inward investment is not a priority' because they realise bodies such as the Chamber are already doing it. This has two ramifications from a UKTI perspective, first how do they embrace that sort of stakeholder activity as inward investment activity and how does it get captured and measured in the LEP network. Given the debate prompted by the change in economic development policy, the blurring of lines, de-prioritisation of inward investment and the difficulty of measuring these are examples of contingent liabilities by opponents of localism.

### 6.3.3 M4 Corridor Technology Property Stock

This sub-section builds on sub-section 3.4.2 and the initial contextual findings on specialist commercial property (s.5.4) by summarising findings from analysis of semi-structured, structured and open questions to M4C Science Park principals and science park documents (Appendix 4.7). The key set of contingent relations that are analysed in this section relate to the M4C technology property stock which includes the main sites for inbound TMT firms.

Like the comparator regions, the M4C is well-endowed with specialist properties designed to accommodate high tech firms. Unlike both Oxfordshire and Cambridgeshire, however, the specialist property mix in the M4C is different because it has a low penetration of science parks, although it contains as many business parks, thus the technological property stock comprising of science parks, business parks and a range of miscellaneous specialist sites. According to the latest UKSPA Directory[153], three (3) science parks are registered in M4C; Brunel, Reading and Bristol & Bath, with an additional four science parks in relatively close proximity (s.5.4.1).

153 http://www.ukspa.attitudedev.co.uk/members/our-members Accessed 20.09.14

The M4C technological property stock also includes a host of smart Business Parks and office blocks like Aquis House and Atlantic House in Reading. Below is a map of all TMT firms, Business and Science Parks in the M4 Corridor, plotted according to actual co-ordinates.

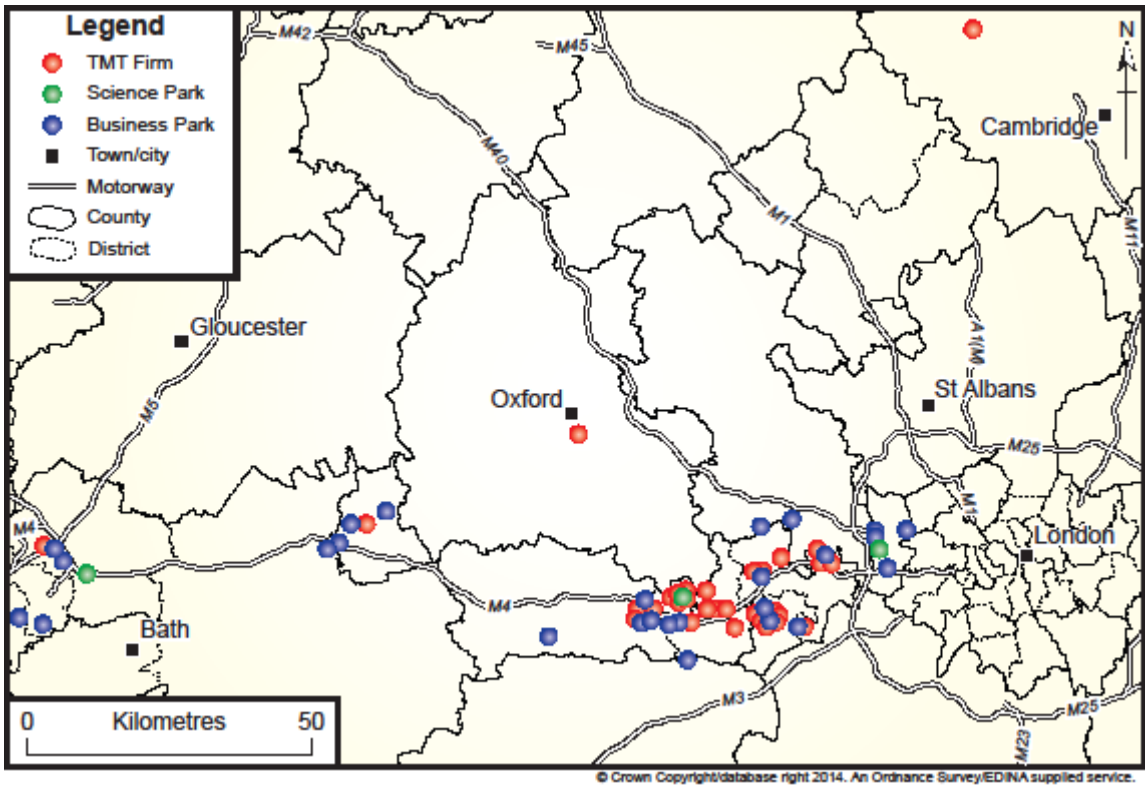



**Figure 6.8: TMT Firms, Science Parks and Business Parks (M4C)**

### 6.3.3.1 Science and Business Park Penetration in the M4 Corridor

Brunel, Reading and Bristol & Bath Science Parks are all classifiable as 'science parks', according to the definitions (s.3.6.2); two of three are fully owned and the third part-owned by universities. Despite, the three Science Parks spanning the length of the M4 Motorway, none of the thirty one foreign TMT firms in the full sample sited in any of the three parks. This could be due to the fact that two of the three parks are less than 5 years old and were in the early stages of development in 2011 ('first or second generation'), but as pointed out, there are several SPs within easy distance of the Thames Valley. By contrast with science parks, twenty-seven Business Parks are registered in the M4C, five of which are owned by Goodman UK, a subsidiary of the Australian multinational, Goodman International, which claims to be one of the leading business and science park investors in the UK[154].

[154] http://www.thamesvalley.co.uk/sponsors/goodman/ Accessed 21.09.14

Whereas none of the TMT firms sited in any of the M4C Science Parks, at least seven firms sited in four Business Parks[155]. The implication of the introduction of Business Parks at a major level broadens the dimensions of this contingent factor and highlights yet again that science parks are not regarded as providing the only or main sites that gives TMT firms proximity and access to talent, customers and markets. Also, the strong connection or overlap between the two, Business and Science Parks, means that findings call into question whether these two possible sites can be thought of as the same and suggest that they perhaps need to be reconceptualised in a new way. Summary data of M4C Science Parks is presented in Appendix 4.2.

### 6.3.4 Science Park Intervention in the M4 Corridor

The conceptual framework (s.4.3.2.3) also postulates that science parks are strongly implicated in the site selection of foreign TMT firms in the UK and as such, are a core component of the contingent environment. This section presents analysis of semi-structured, structured and open questions to Science Park principals in the M4C and science park documents, which yielded a number of key findings on SP intervention (s.1.4) from which emerged several themes: ownership structure; age/stage of lifecycle; key claims and USP; tenant focus; and stated versus actual development strategy. Of these, the latter four – age/stage; claims/USP; tenant focus; and development strategy - may be interpreted as 'causal powers' under certain conditions such as recruitment, so are analysed as such. Findings are presented according to these themes and Table 6.17 closes the section with a summary of the analysis, which addresses key aspects of the research agenda, namely Science Parks, research questions and objectives. First, an 'average' profile of the science park participant is presented.

| | Owner/ Age | Top 3 Claims | Tenant Focus | Geographical Focus | Stated Development Strategy | Actual Development Strategy |
|---|---|---|---|---|---|---|
| **Averages** | Sole HEI/12.6 years | 1. Opportunity<br>2. Work/Life Balance<br>3. Flexible contracts | ICT - Software | Local<br>Regional<br>International | Hybrid | Incubator |

**Table 6.14: M4C Science Park Averages**

[155] This research did not extend empirically to Business Parks but their popularity has enabled them to be separated from Science Parks as shown in the revised conceptual framework.

**Ownership Structure**

In this research, SP ownership is classified by the number, type and profit orientation of owners (s.3.6.3). As noted previously, the three M4C Science Parks are owned fully (BUSP and RSIP) or partly by universities (BBSP is owned mainly by Quinlain Estates and Development Plc and Aviva Investors and a host of minor shareholders which includes the Homes and Communities Agency (HCA) and the Universities of Bristol, Bath and West of England). Brunel and Reading are sole HEI owners, whereas Bristol & Bath is a consortium Plc owner. Crucially, Reading University recognises the long-term nature of science park development for which it has set out a 20 – 25 year development plan. The main implications of these two types of ownership are control (sole owners enjoy a greater degree of control than consortia when it comes to decision making and resource allocation) and success (sole owners tend to be more successful than consortia, s.3.6.3).

**Age & Stage of Lifecycle**

Two of the three M4C Science Parks (BUSP, RSIP) were constructed (initial phases) in the past five years, with the third (BUSP) having been built by 1986. This means that the average age of the properties is 12.6 years, the two most recent are 'early stage' science parks, and Brunel, the oldest, is an 'established' science park. The main differences in the two stages are that science park development strategies have time considerations and the early stage parks have yet to realise strategies or for whom it is not yet possible to evaluate the effects of a given strategy (see below), whatever it is, because the necessary minimum period of time has not yet elapsed in one case (RSIP) and is just being met in the other (BBSP, 5 years). Brunel University Science Park is the lone established park and one for which it is possible to evaluate the effects of a given strategy. This finding helps to validate the importance placed on science parts as a key contingent component of the conceptual framework, and by implication, whether SPs can be held responsible for the behaviour of TMT firm site selection before enough time has elapsed.

**Key Claims & USP**

The M4C science parks collectively made at least twelve claims in their responses: "the opportunity to stay at the forefront of technological development"; the opportunity to "work alongside one of the UK's best technology universities" (BUSP); exceptional due to location; "the highest concentration of PhD graduates in the UK" and "unrivalled quality of life", making

it "a vibrant, dynamic place for forward-thinking businesses …. the blueprint for the sustainable commercial spaces of the future"[156]; a "hub for the region's many science and technology businesses, connecting entrepreneurs, fledgling businesses and established brands with vital investors, academia and design" which fills a gap in 'the cities of Bristol and Bath, which form one of the six Science City regions in England (BBSP[157]); fills a gap where there is "no dedicated science park currently operating in the Thames Valley or London" (Sir David Bell, VC, University of Reading), a 'natural choice' for a range of tenants including 'UK and international companies seeking a Thames Valley location', 'London-based companies looking for space to expand' and 'emergent Thames Valley SMEs'[158] (RSIP). These claims can be summarised in terms of opportunity, work/life balance, location and timely addition to the property market, and reduced to five key claims:

(i) opportunity to be at the cutting edge of technological development;
(ii) opportunity to be affiliated with top technology universities;
(iii) ideal location;
(iv) unrivalled quality of life; and
(v) much-needed physical workspace in the M4C specialist commercial property stock.

These combined claims paint the M4C science park environment as one that is an ideal-type for technology firms, whatever the size or geographic orientation, and imbue SPs with a causal power when it comes to attracting TMT firms. The claims also confirm some of the claims reported in section 3.6.5 (but also from the perspective of SPs).

**Size & Physical Workspace Capacity**

The M4C science parks currently possess nine buildings and ~195,000 square feet of space between them, with a further >800,000 in agreed planning consent. Reading's first building of its first phase offers "a range of serviced laboratory and office space for hire (100 to 2,200 sq ft), available on flexible inclusive licence packages from 6 months plus" and the second building, the Enterprise Centre, comprises of 45,000 sq ft, for a total current capacity of ~107,000 sq ft and 50 firms (95% capacity)[159]. Reading University's governing body approved £50m to create the site infrastructure and complete the first three buildings (£25

156 http://www.bbsp.co.uk/ Accessed 20.09.14
157 Adapted from: http://www.ukspa.attitudedev.co.uk/members/bbsp#sthash.vjlR2nNV.dpuf Accessed 20.09.14
158 http://www.reading.ac.uk/news-and-events/releases/PR517786.aspx Accessed 20.09.14
159 http://www.ukspa.attitudedev.co.uk/members/ursp#sthash.h4Stb5hN.HifXmBCp.dpuf 20.09.14

million), which will create additional space in three multi-tenanted office and laboratory buildings:

> "Phase II of the Science Park is a new development immediately adjacent to the M4 motorway to the South of Reading. Outline planning consent has been granted for an initial 200,000 sq ft. of development on a 45 acre green field site" and a 'total planned area of 800,000 sq ft'[160].

Bristol & Bath is the largest M4C science park, with capacity for 500 firms in 50,000 sq. ft. of workspace (85% capacity) on 59 acres of land; the first phase comprises of three buildings including the Innovation Centre (25,000 sq. ft. of flexible space, aimed at early-stage companies) and Grow On Centre (a further 25,000 sq. ft. of space for more mature businesses, including Marine Current Turbines, a Siemens company, TDK-Lambda and Rolls Royce)[161]. Planning for the second phase of the Park is underway and is expected to include further grow on space and industry-led collaboration centres for emerging technologies". BBSP includes the Forum

> "with its striking 11,000 square foot glass atrium, is open to the public and provides a social heart for the Park, with space to meet, eat, collaborate and network".

The smallest of the three, Brunel Science Park has capacity for 26 firms in three buildings (100% capacity) in just 37,000 sq. ft. on 1 acre of land; it describes itself as a 'conceptual' science park because "wherever opportunities have arisen, it has looked after and encouraged companies in other parts of the campuses", rather than a physical science park, which is limited by the number of buildings on site. Collectively, the M4C science parks boast a reasonable amount of space (~200,000 sq. ft.) to back up claims of 'filling gaps' in the M4C technology property stock (and certainly over the timing of this research). There is planned consent to increase significantly the Reading site, which will bring the total M4C science park workspace to ~1,000,000 sq. ft. by the end of 2016.

**SP Tenant Focus & Recruitment**

Science park recruitment activities can focus on three attributes of prospective tenants, size, sector and geographic origin. The overwhelming sectoral focus of M4C science parks is information technology and telecommunications, followed by biotech, engineering and

[160] http://www.ukspa.attitudedev.co.uk/members/ursp#sthash.h4Stb5hN.dpuf Accessed 20.09.14
161 http://www.ukspa.attitudedev.co.uk/members/bbsp#sthash.vjlR2nNV.dpuf 20.09.14

pharmaceuticals; size focus is a mix of small, local and large, international firms and geographic origin, again, is a mix of local start-ups and established large international companies, as evidenced by Brunel USP, which boasts a wide range of services and claims to have attracted

> "a range of tenants including new start-ups, and small, specialist companies, as well as new spin outs from established, international companies" [162].

Brunel Science Park claims to host both large and small firms; international companies seeking the proximity of the University for research in engineering and pharmaceuticals, and in addition, Brunel claims to have had a hand in the subsequent development of "a number of our early start ups (which) have since grown into large, successful operations". Due to full occupancy and "the University going through major changes which are impacting on (BUSP) lettable space", tenant recruitment is suspended:

> "at present we do not market/ advertise or promote the science park as we are at this time 100% occupied; any enquiries we do have come either from the University, our website, or through UKSPA".

BUSP's 100% occupancy rate consists of twenty-six small to medium firms, all of whom originate locally, from four sectors:

- Biotechnology/Pharmaceutical/Medical Equipment (40%)
- Greentech (20%)
- Semiconductors, Components, Electronics (20%)
- Software (20%)

Reading Science Park aims to be a 'natural choice' for 'UK and international companies seeking a Thames Valley location', 'London-based companies looking for space to expand' and 'emergent Thames Valley SMEs' but the extent of its recruitment activities are 'word of mouth' and 'some promotion of facility to known companies seeking space' via an agent and no specific targeting of foreign firms. Commensurate with this approach, RSIP is approaching 95% occupancy and hosts forty-eight firms, nearly all from the locale, in four sectors:

- Telecommunications and Networking (60%)
- Biotechnology/Pharmaceutical/Medical Equipment (25%)
- Other (including consultancy, professional services) (10%)
- Greentech (5%)

[162] Ibid

Finally, Bristol & Bath Science Park, the largest of the three parks, claims to be a "hub for the region's many science and technology businesses, connecting entrepreneurs, fledgling businesses and established brands with vital investors, academia and design".
BBSP's recruitment activities include 'active networking, locally and nationally' and 'continuous PR' with specific targeting of foreign firms via 'UKTI and UKSPA'. This has paid off for BBSP, which reports 85% occupancy and a current tenant base of 425 firms, 80% of which originates from SW England (20% international, 'non-European') in five sectors:

- Semiconductors, Components, Electronics (30%)
- Software (30%)
- Telecommunications and Networking (30%)
- Biotechnology/Pharmaceutical/Medical Equipment (<10%)
- Internet (<10%)

Analysis of M4C science parks preferences for tenant focus, that is a prospective tenant's size, sector and geographic origin, shows that M4C science parks are prepared both conceptually and practically for all types of technology firms, which suggests that recruitment activities should not be fettered in any way, though a wide and seemingly unfocused remit could frustrate development strategy, which is discussed next.

**Stated versus Actual Development Strategy**

Science park development strategy turns on focused recruitment activities driven by a clear tenant focus in relation to the prospective tenant attributes discussed above. From the above analysis, a clear sectoral focus for M4C science parks has emerged, but there is a less clear size and geographic focus based on what the science parks say and what they actually appear to do. Stated M4C science park development strategies are all 'hybrid', meaning they combine size and geographic origin. For example, Reading Science Park aims to be a 'natural choice' for 'UK and international companies seeking a Thames Valley location', 'London-based companies looking for space to expand' and 'emergent Thames Valley SMEs', which amounts to an implied 'hybrid' strategy because it contemplates both the attraction and incubation strategies. When asked to explain his understanding of the term development strategy, the Director said development strategy "is exactly what it says, the strategy to develop the proposition":

> "we have a very clear development strategy set out in our business plan which describes the aspiration and the way we might achieve that ranging from the physical development of the park through to target markets and approaches to

> reaching them as well as development of hard and soft services and other network and value generating propositions that enable the development strategy. In short, we think in a very commercially orientated way and yes, we have a development strategy".

Whilst his definition touches on some aspects of the concept ('aspiration', 'target markets'), clearly it misses the mark as to its ontological essence. However, this stated strategy (compiled from Reading documents, website and responses to questions) contrasts with the actual strategy, which is gleaned from responses to questions on sectoral make-up and geographical origin of tenants. Of Reading's firms, 91% are small, independent, 'single site' firms, nearly all from the local area, which suggest an 'incubator strategy'.

Brunel Science Park reports a very diverse constitution of tenants, in terms of size, technological and geographical provenance of firms. 'New start-ups' mingle with 'small, specialist companies' and corporate ventures in the form of 'new spin outs from established, international companies', as well as 'early start ups (which) have since grown into large companies'. In addition, BUSP claims to have attracted many large international firms, which suggests a 'hybrid development strategy'. When pressed to explain her understanding of the term, the Operations Manager replied:

> "we understand this to mean how we are to develop the Science Park for the future and what plans we can implement to achieve this. We do currently have a business plan in place, but again it is uncertain due to of our current situation with the University and dependent on direction from them"[163].

Her definition touches on the most basic aspect of the concept ('future', 'implementation plans'), but appears to confuse it with a 'business plan'. BUSP's stated strategy is at odds with its actual strategy on issues of sectoral make-up and geographical origin of tenants. BUSP hosts twenty-six firms, all of which originate from the local area and all of which are small firms in the 'start-up/incubator stage, suggesting a clear 'incubator' strategy. The two are different from the Innovation Centre of Bristol & Bath Science Park which provides "space for early-stage companies" and its Grow On Centre which provides "space for more mature businesses", again implying a 'hybrid' strategy because it contains elements of the two main development strategies. BBSPs Director's response to what he thought the term 'development strategy' meant was limited both in content and its attempt to capture the essence of the concept:

[163] Email of 17.10.14

> "Strategy for building the relevant site", underpinned by a "Gateway policy (which) we agreed to apply (and) which specified that tenants had to be engaged in R&D, Science and Technology related businesses".

BBSP's stated strategy accords with its actual strategy on issues of sectoral make-up and geographical origin of tenants because as noted, BBSP hosts 48 firms, >80% of which originate from SW England (<20% international, 'non-European') and which are mostly small, 'high growth' firms, suggesting a 'hybrid' strategy.

As explained in sub-section 2.7.4, the scope of science park development strategy extends to three distinct strategic options and one derivative strategy:

(i) Incubator strategy "to focus on creating as favourable conditions as possible for commercialisation of research-based ideas in the form of spin-out companies from universities and other HEI's;

(ii) Attraction strategy "to attract established and larger corporations to locate knowledge-intensive divisions or units in a park and close to the expertise and the recruitment base which a university represents";

(iii) Hybrid strategy, in which both the attraction and incubator-growth activities are undertaken with equal effectiveness; and

(iv) Retention strategy, "a variation to the incubation strategy, in which science parks incubate, grow and then retain firms in the locality/region, an incubation-growth-retention strategy (Seymour 2009, building on Ylinenpää 2001).

Analysis of M4C science park development strategy confirms uncertainty and unclarity around the concept, both in terms of definition and in practice. Whilst 'actual' strategies were evident from the constitution of tenant bases, these did not always accord with the 'stated' strategies of principals or the recruitment activities of the science parks. This discord suggests a strategic misalignment and at least a probability of sub-optimal performance in the case of properties that are either not fully occupied or occupied by tenants who do not fit the profile of the science park. The first two examples confirm the fundamental nature of the key contingent relations generated by Science Parks, which are at the centre of this research.

If their remit is confused, this could part explain the absence of foreign TMT firms on M4C science parks. Finally, given the time implications of development strategies if implemented correctly, it means that long-term aspirations could be frustrated as well.

### 6.3.5 Summary of Science Park Findings (M4C)

Science parks are at the centre of both the research agenda and conceptual framework because they are strongly implicated in the site selection of foreign TMT firms in the UK. This section examined findings relating to SP intervention (ownership structure; age/stage of lifecycle; key claims/USP; tenant focus; and stated versus actual development strategy), of which, the latter four were analysed as 'causal powers'. It was found that for the key contingent factor, Science Parks, these may become 'causal liabilities' because of improper implementation.

Findings reveal three overriding concerns about science parks: first, they are not implicated in the decisions of TMTF with no mentions in the information gathering stage; second, in cases where science parks were considered, there is no evidence that firms selected science parks, that is, they selected alternative sites, even when they had 'very much' information a priori; and third, science parks exhibited lack of awareness and familiarity with development strategy and consequently, strategic misalignment between stated and actual strategy.

The proactive targeting of a particular profile of firm, in this case, technology-based and foreign, cannot be completed where the stated and actual strategies for doing so, differ. All three science parks claim a hybrid (or combined) development strategy but two actually practise an incubator strategy. It is also evident that there is a total lack of appreciation for 'development strategy' as the concept was intended when published. The detachment of practice from 'theory' suggests that the development strategies of M4C science parks are strategic choices by accident (or emergent) and not intention or design, so given the nature of strategy and strategic choices, they cannot be 'strategic' in nature. Science Park intervention findings are summarised below.

| M4C Science Park | Ownership structure/Owner/ Year established | SP categorisation & USP | Tenant & Geographical Focus | Development Strategy | |
|---|---|---|---|---|---|
| | | | | Stated | Actual |
| **Brunel University (BUSP)**  | Sole HEI: Brunel University/1986 | 2G Science Park | 'a range of tenants: new start-ups, small, specialist companies, new spin outs from established, international companies' | Hybrid | **INCUBATOR** |
| **University of Reading (RSIP)**  | Sole HEI: University of Reading/2010 | 1G/2G Science & Innovation Park | 'UK and international companies seeking a TV location', 'London-based companies looking for space to expand' and 'emergent TV SMEs' | Hybrid | **INCUBATOR** |
| **Bristol & Bath (BBSP)** Bristol & Bath Science Park | Consortium Plc + HEI: Quintain Estates and Development plc and Aviva Investors; Freeholder: Homes and Communities Agency Key shareholders: Universities of Bath, Bristol and West of England/2011 | 2G Science Park | 425 firms, 80% of which originates from SW England (20% international, 'non-European') in five TMT sectors | Hybrid | **HYBRID** |

**Table 6.15: Summary of M4C Science Park Intervention**

## 6.4 Summary of M4 Corridor Firm-Level Findings

This chapter presented the first of two detailed Case Reports on firm-level findings from the M4C, following a mixed case reporting structure, adapted from Yin (2009) and Creswell (2009). This section closes the M4C case report with a summary of key findings as they relate to the conceptual framework and research agenda, followed by a brief closing commentary. Analysis of the locational, settlement and site selection choices of M4C participant TMT firms and the management actions of M4C science parks revealed numerous findings, several of which call into question whether the constitution of the conceptual framework and imply that the framework needs to be reconceptualised. Thus, findings are summarised next, guided by the reconceptualised framework (two structures, three contingent components), starting with M4C contextual findings.

### 6.4.1 M4C Contextual Findings

Analysis revealed six contextual findings relating to the target sub-region on: economic geography, technology agglomeration pattern and the profiling of M4C TMT Firms, some of

which confirm the literature and others that extend it. Findings reveal that the economic geography of the M4C is dominated by twelve tech cities that straddle the motorway (five north and seven south) at an average distance of ~2.4 miles from the M4 (Table 6.3). The sub-region has seen a steady growth in economic development activity since the 1980's when investment gradually spread westwards from London and is now dominated by technology, with many large notable global TMT firms. TMT firms show a very strong 'clustering' in the Thames Valley, as verified by the geographical positions (Table 6.4) and ~100% alignment with the 51.4th parallel of latitude and -0.6 arc of longitude. The M4C technology agglomeration pattern is non-uniform and heavily skewed towards the Thames Valley, in particular around three townships, resembling a 'dolphin', with a long 'snout' (Chiswick to Slough), relatively large 'head' (Slough/Reading to Wokingham/Bracknell) and body 'fanning' out to a wide 'tail' (Swindon to Bristol/Bath), with three of the highest UK ICT location quotients in Wokingham, Slough and Bracknell Forest, all scoring well above 3 (Table 6.3).

The M4C boasts a long list of attributes that make it a very attractive sub-region in which to set up business operations and live, including but not limited to accessibility from an excellent transport hub in the form of Heathrow Airport; a sound university base; a highly skilled and competent workforce and a deep enterprise stock of large, foreign TMT firms. These offset the negative externalities of costly house prices and traffic congestion. Site-specific considerations include access to the infrastructure, access to labour, the quality of real estate, cost of real estate, utilities, telecommunications, etc. The most oft-repeated site-specific advantage was the availability of talent (or the ability to attract that talent).

The profiling of M4C TMT Firms confirms the literature that the sub-region sets out to attract established ICT firms, which may have small operations but are owned by very large parent firms; two with employee numbers of 1,400 and 1,800 and annual turnovers of US$200m and US$600m, respectively[164]. These findings confirm that the M4C is an appropriate geo-spatial lens through which to view the site selection decisions and processes of foreign TMT firms landing in the UK. Findings relating the structural and contingent environments are summarised next in sections 6.4.2 and 6.4.3.

[164] KS (£5m, 104 empls); iCIMS (£5m, 260 empls); Promise Technology (£100m, 500 empls)

### 6.4.2 The Structural Environment of TMT Firms in the M4C

**Parent TMT Firm Internationalisation (Location & Settlement)**

As noted, the Critical Realist conceptual framework (Figure 4.2, s.4.2.3.3) that drives this research postulates that an external 'structural environment' is strongly implicated in TMT firm location, settlement and siting decisions. This section presents four findings relating to the first two of these structures for foreign TMT companies settling in the M4C (s.6.2).

First, findings help to validate the importance placed on parent firm internationalisation strategy as a key structural component of the conceptual framework, and by implication of the location behaviour by foreign TMT firms to the UK (s.6.2.1). Second, the implication of these findings for the conceptual framework is that there appears to be a strong overlap between two of the structural drivers identified, namely parent firm internationalisation strategy and subsidiary firm settlement strategy. There was an unmistakeable linkage between the top 'most important' reasons for selecting a country and for selecting a sub-national region, which was unanticipated. The top most important reasons for making a national (country) choice were the same as making a sub-national settlement choice (M4C): access to talent/skilled staff; access to customers; and access to markets (same choices but in a slightly different order for settlement choices; access to customers, markets, then access to talent/skilled staff).

This finding was unanticipated because all participants selected the same reasons for location and settlement with the divergence occurring at the subsequent point of site selection. Indeed, these findings call into question whether the two drivers, internationalisation and settlement strategy, should be thought of as distinct/separate and suggest they perhaps need to be disaggregated. Third, firms showed a complete preference for wholly-owned subsidiaries as the entry mode for foreign TMT firms coming to the UK, which confirmed the literature (s.2.4.4). Finally, the methodological choice of Critical Realism encourages the conclusion that such choices in conjunction with contingent influences caused the site selection outcomes because CR postulates that the domain of the real contains the hidden 'structures' and 'causal mechanisms' that produce the empirical events (in this case, internationalisation and settlement causing site selection). The findings include one confirmed and one unanticipated finding, on parent TMT firm internationalisation.

**Subsidiary TMT Firm Site Selection**

In respect of the third structural component, analysis revealed five findings, which focused on the manifestation and constitution/nature of the component. First, findings helped to validate the importance placed on subsidiary firm site selection strategy as a key structural component of the conceptual framework, and by implication, the process and involvement of stakeholders such as public agencies. Second, the first two TMT firm examples point towards the fundamental nature of site selection strategy as being proximity (to all transport networks, customers and markets); function of office and access to talent, customers, markets. For example, Kentico's most important reasons for renting a private commercial site were proximity and access to customers and markets (s.6.2.2.2). The nature of this central third structural component was further reinforced by CommVault and Promise Technology, two very well-resourced firms. These choices diverge from location and settlement and are noteworthy because they introduce proximity and office function, the latter of which adds to the literature. A related finding was that ceteris parabus, stage of development of product ('market development'/'market growth') and/or stage of company implicates the function or purpose of the site, thereby influencing, if not determining site selection choice.

Third, findings confirm the extension of the dimensions of this structural factor to office function and the related considerations of a developed product and clientele from a mature company. More established TMTFs such as Genband and CommVault were more interested in choosing sites that followed the purpose for being in the region. This finding extends the literature on office function for the purpose of access to customers, specifically for the specific reason of servicing existing customers or pursuing prospective customers. This finding also highlights the realisation that science parks do not provide a unique siting choice for firms in search of proximate customers, markets or talent because all firms in the M4c chose 'offsite' properties. Fourth, findings confirm the existence of site-level considerations. Site-specific advantages (SSA) are very practical considerations that either appear at the start of the site search process when there are very specific requirements that could stop a project before it starts or more usually, at the end of the process, after all other advantages, locational and regional, have been contemplated. Site-level considerations, therefore, tend to be very pragmatic things, practical things that have to work in a site and become the focus of the analysis at the very end of site selection process, which is absent from the literature. Site–specific advantages derive from regional attractiveness attributes and accrue to all sites in the Thames Valley and some farther west; including high skills level, high employment

levels, proximity to Heathrow, a sort of 'general vibrancy' about the area, and a good selection of properties that provide a range of facilities. Unique site advantages include contemporary offices with full facilities and the pull of similar firms, thus confirming the established Marshallian externalities such as demand, skilled labour, specialised inputs and inter-firm collaboration/spillovers. This finding addresses research objective four and subsidiary question four. Finally, the property search element of site selection obviously comes late in the process and prioritises around the main reason for being somewhere. For example, if the firm is involved in technology R&D, then Bristol because of a need to be proximate to the University or city centre; but if the firm is involved in technology sales and marketing or customer service, then perhaps a Business Park or office block in Reading would suffice. This is similar to Oxfordshire and Cambridgeshire in which search priorities focused on 'labour catchment' and 'linkages to universities'.

### 6.4.3 The Contingent Environment of TMT Firms in the M4C

The realist conceptual framework also postulates that a set of contingent relations exist, which 'feed off' structural relations, having been caused by the latter. These "contingently related conditions are never inert, but are themselves the product of causal processes and have their own causal powers and liabilities" (Sayer, 1992, p.140 as cited in Easton 2011, p.121, s.6.3). Findings are presented according to each of the contingent relations, starting with science parks and science park intervention (including an examination of development strategy). Analysis of the contingent environment of site selection of M4C participant TMT firms revealed several key findings across the three contingent influences, science parks, public agencies and accessibility.

**Science Parks, Business Parks & Development Strategy**

Science parks are strongly implicated in the site selection of foreign TMT firms in the UK and as such, are at the conceptual heart of this research and a core component of the contingent environment (s.6.3.4). Analysis revealed multiple findings in respect of the science park contingent influence, which initially was comprised of an aggregated view of all technology properties and the key sub-component, development strategy. Findings, first of all, validated the presence of the key contingent influence in the M4C. However this finding was countered by two derivative realisations; that science parks are not regarded as the sole or most important providers of access or proximity (to talent, customers, markets or transport

networks), and if the planned function of the office cannot be served by siting on a science park, they will not be considered. Because as shown above, prior knowledge did not translate into decisions to site on science parks (categorisations are explained in Table 6.11, which captures the links between level of knowledge and initial siting). Interestingly, analysis of responses also revealed three main reasons for not siting in science parks: not consistent with the function of the office; lack of market proximity and lack of customer proximity. These findings confirm that science parks are not regarded by TMT firms as providing privileged proximity and access.

The M4C stock of Science Parks number three, relatively young (first and second generation) university-owned parks, and twenty-seven Business Parks. The very low density of science parks, however, has not translated into a high rejection rate by foreign TMTFs. In fact, the opposite seems to have happened, with the M4 Corridor compensating for the low level of SPs with a comprehensive stock of Business Parks and attracted TMTFs in the study at a ratio of 3:1 compared with Oxfordshire and Cambridgeshire. The implication of introducing Business Parks at such a disproportionate level broadens the dimensions of this contingent factor and highlights the fact that again, science parks are not regarded as providing TMT firms privileged proximity and access to talent, customers and markets. The strong connection or overlap between the two types of properties means that findings call into question whether these two possible sites should be thought of as ontologically identical or similar and suggest that they perhaps need to be reconceptualised as distinct. This finding highlights the fact that science parks are not regarded as providing privileged accommodation with regard to proximate markets and broadens the dimensions of this contingent influence by introducing the important consideration of office function. The fact that the three M4C science parks are 'new' raises the concern of whether SPs could be held responsible for the behaviour of TMT firm site selection before enough time has elapsed as is required by certain development strategies (s.3.6.3).

All three M4C science parks deploy a hybrid development strategy, though analysis of the literature and responses to questions indicated two 'incubator' and one 'hybrid' strategy. Findings showed consistently a consensus of unfamiliarity and unawareness across science park principals and expert-practitioners over the concept of 'development strategy' or with its simple intended practical application. Therefore, divergence between 'theory' and practice suggest the science parks' strategic choices are accidental (or emergent) and not designed, so given the nature of strategy and strategic choices, they cannot really be 'strategic' in nature. If

science parks could not give clear reasons for recruitment activities, firms certainly were clear about why they would not choose to site on one.

Finally, analysis of responses enabled a categorisation of TMT firms based on a priori knowledge of science parks and the decision initially to site. In relation to siting on/off science parks, analysis revealed that M4C subsidiary firms possessed varying amounts ('none to very much') of information a priori about science parks. Crucially, in no case were science parks cited as a source of information (c.f. 'own research' and 'parent firm'); science parks did not feature in the interview responses of professional services experts; and despite having very much knowledge of science parks a priori at the time of siting in some cases, science parks were still overlooked in favour of alternative sites. This knowledge did not translate into decisions to site on an SP (categorisations are explained in Table 6.11). These Science Park findings address the major research question, research objectives 1 and 3, and subsidiary research questions 1 and 3 (s.1.3). These findings add to the literature and are potentially damning to science parks, which, either are strategically misaligned and therefore not optimally resourced to make appropriate interventions involving foreign TMT firms or are not a part of the dialogues that could lead to firms siting on one.

**Public Agency Support & Private (Professional) Advice**

Analysis of focused interviews revealed that firms entering the UK enjoy a full range of support in selecting sites for operations and a multi-stage process exists which involves public and private agencies, and often, a complex network of stakeholders. In line with the latter, LEPs are focused on getting used to the new way of working whilst leveraging past relationships (Thames Valley, Swindon and Bristol & Bath). From the firm perspective, the process of searching for and selecting appropriate sites for foreign TMT firms can be a long and complex process involving multiple stakeholders, public and private. For M4C property searches, public bodies include the UKTI, Thames Valley Berkshire Chamber of Commerce, Thames Valley Berkshire LEP, Forward Swindon and Invest in Bristol & Bath. Private professional services providers include many of the major property players, for example, Jones Lang Lasalle, DTZ, Colliers, and local estate agents. Analysis of the intermediary contingent influence generated five findings, which address research objective 1 and subsidiary research question 4 (s.1.3).

First, this set of contingent relations has blurred the line between public and private provision partly because of the way LEPs work (s.5.3.3) which involves promoting 'public-

private' arrangements once a prospective firm enters the local 'radar' and meetings are convened. The integration of public and private interests is also a concession to free market ideals; 'why not let the market do what it's already doing'. Second, the implication of these findings for the conceptual framework is that there is a strong overlap between two of the contingent relations, public agency support and private professional services providers, thus suggesting that the two could be aggregated and reconceptualised as a single entity for the purposes of this research.

Third, the new competitive way of working by LEPs means that they interpret differently their remits, for example, in relation to inward investment. This has led to local economic development 'cannibalism' in which smaller, less well-resourced LEPs ignore FDI and go after firms that are already located in the UK sometimes from neighbouring authorities (for example, Swindon). Fourth, the economic development policy shift from regionalism to localism is still causing concerns, primarily with the practical challenges of implementing LEPs due to overlapping jurisdictions, increased complexity of working patterns, variable budgets and the rise in competitiveness at the local level.

Analysis of focused interviews revealed differing opinions, which highlighted differences between perceptions of the policy instrument, LEP and its impact (particularly, the extent to which it has 'embedded'); with opinions ranging from 'business as usual' to good work being done to more work needing to be done. Finally, from a critical realist perspective, the blurring of lines, de-prioritisation of inward investment, rise in local competitiveness and 'cannibalism' are clear examples of 'causal liabilities' which result as the process of negotiation and support of incoming firms are played out.

**Accessibility to Customers, Markets, Suppliers & Talent**

Findings underscored the importance of this contingent influence on TMT site selection, clarified the main outcomes of accessibility and called into question its tight relationship with proximity. As noted in section 6.3.1, accessibility emerged as a primary driver of the three sets of decisions regarding internationalisation, settlement and site selection of foreign TMT firms. Accordingly, analysis produced three key findings; first, accessibility generally was the most highly mentioned; second, access to talent, specifically, was mentioned more than any other access (customers and markets) and except for one case, suppliers were not mentioned at all.

Third, accessibility was related to location and settlement but site selection concerned 'proximity', which suggested a clear distinction from accessibility (Table 6.13). The popularity of access to talent as the preferred option for choosing a country or a region by foreign TMT firms entering the UK confirmed the vast literature on 'labour' (s.2.4.2).

Findings broadened the dimensions of this contingent influence by confirming that 'access' includes wider considerations than talent and prioritised the other outcomes, namely, the importance of four accessibility relations – talent, customers, markets and transport networks - and broadens the dimensions of this contingent factor to include proximity as a distinct set of relations, in addition to accessibility (s.7.3.1). This clear distinction suggests that proximity is a separate but related component to accessibility (an unexpected finding that could not have been explored beyond this point in this research).The differences in responses[165] suggest that the contingent influences of 'access' and 'proximity' should be disaggregated, as reflected in the new conceptual framework (Chapter 8). In addition to the abovementioned impact on the conceptual framework, these findings address the major research question, research objective 1 and subsidiary research question 2.

### 6.4.4 Closing Commentary on TMT Firm Settlement & Site-selection (M4C)

This chapter presented the second set of findings and first of two detailed Case Reports (the M4 Corridor) following a combined structure, as set out by Yin (2009) and Creswell (2009), as described in section 6.1. This summary of all findings closes the chapter, focused on the research agenda and key components of the conceptual framework, back-ended with contextual findings (M4C) and closing commentary. Findings address the major research question, research objectives, subsidiary research questions and conceptual framework.

Document Analysis and questionnaires focused on key questions involving inward migration and site selection of foreign TMT firms in the sub-region and the extent to which this was eventually influenced by Science Parks. By examining the site selection process from the perspectives of firms, expert-practitioners, stakeholders, relationships, commercial property and primary policy instrument(s), it was found that experts characterise the site selection process in one way, whereas TMT firms tend to 'DIY' and practise it in a different way.

[165] Both in terms of priority given to it when presented as a choice with accessibility and number of mentions.

Secondary findings confirm that the M4C has a very low penetration of 'young' (possibly first or second generation) science parks but that the lack of science parks does not damage the region's attractiveness for foreign TMTF; that the three M4C science parks have filled a gap in the commercial property landscape, which is heavily populated with business parks; and finally, that the process of site selection by foreign TMTF tends to by-pass science parks where they do exist. M4C Science Parks play a marginal role only in the siting decisions of foreign TMTF. Alternative explanations could be the newness of science parks (2010 and 2011) or the low number but an additional five science parks are within easy reach of the M4C. Exploratory findings also included clear reasons why TMTFs did not situate in SPs, and may be indifferent when it comes to property choice so long as firms end up with proximity and access to transport, talent, customers and markets. Foreign TMTF seek properties to provide best proximity and access, and they by-pass Science Parks, whilst Science Parks broadcast claims of an 'ideal-type' environment for TMTF (ss.3.6.5, 6.3.4). There can be alternative explanations for these phenomena in Silicon Corridor, other than the low density of Science Parks, but it is not clear that the presence of more Science Parks would have resulted in more 'on-site' TMT firms for the reasons noted above.

## END of Chapter Six

# Chapter Seven

## Research Findings III

## Site Selection in Oxfordshire & Cambridgeshire (Firm-Level Evidence)

## 7.1 The Case of Oxfordshire and Cambridgeshire (Silicon Spires & Silicon Fen)

This chapter presents exploratory findings from analysis of the inward migration and site selection of foreign TMT firms in Oxfordshire and Cambridgeshire and the role played by science parks in the three sub-regions. The chapter represents the second of two detailed case reports and the final of three Research Findings Chapters, which also follows a mixed case reporting structure (s.4.5.1.1).

Analysis is presented from four sources of primary and secondary data: (i) structured, semi-structured and open questions to the foreign TMT firms that initially settled in the target sub-regions in 2011; (ii) focused telephone interviews with expert-practitioners in the fields of TMT, inward investment, plant location, site selection, corporate real estate, science parks and LEPs; (iii) structured, semi-structured and open questions to four science parks; and (iv) relevant company, Government and local strategy and policy documents, including *inter alia* company publications, science park publications, LEP Strategic Plans (Oxfordshire and Cambridgeshire) and UKTI Strategy 2014. Finally, the chapter summarises the key issues of Oxfordshire and Cambridgeshire. Again, exploration is conducted from the perspective of firms and expert-practitioners to differentiate the study and provide a more objective evaluation of science park intervention. Where they arise, relationships between theory or secondary research, and practice are highlighted.

The stories of Oxfordshire and Cambridgeshire as creators of technological value and magnets for 'foreign' technology are well-documented (s.3.4.1). Despite the obvious similarities between the two technology-intensive regions, however, there are also distinct differences. Oxfordshire and Cambridgeshire are well defined geographically, two counties separated by two other counties, and home to world-renowned centres of higher education and knowledge production. Known world-wide for driving technological innovations, the two counties have been amenable to, and thus, heavily influenced by policy decisions, which have had a determining effect on their development (s.3.4.1.1). Of the thirty-six fast-growth TMT firms that make up the research sample, only seven settled in Oxfordshire and Cambridgeshire. For Oxfordshire and Cambridgeshire, the literature is broad and deep, offering decades of research and publications. Analysis of the UK sub-regions argues that while Science and Technology Parks may seem a natural choice for technology, the argument(s) for the fit needs to be more nuanced. By approaching the issues from the firm perspective and the farthest 'nominal recruitment distance' of tenant firms, this research

seeks improved understanding and explanation of the location, settlement and site selection patterns of foreign TMT firms in the UK.

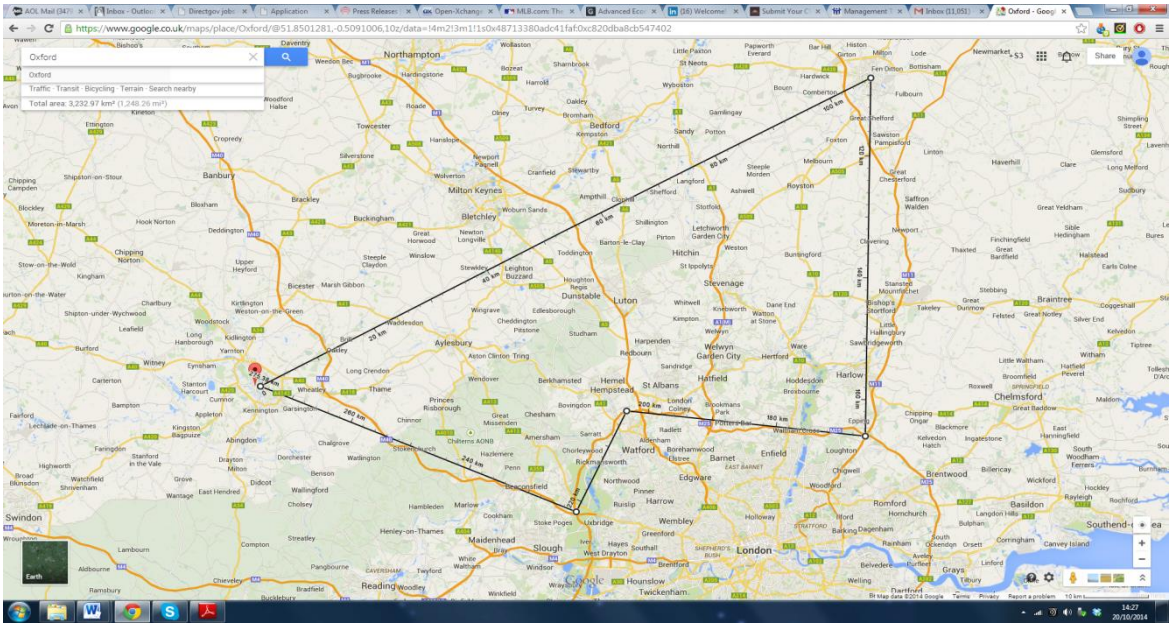



**Figure 7.1: Google Map outlining main parts of Oxfordshire & Cambridgeshire**

The chapter is structured as follows: Section 7.1.2 discusses the economic geography of Oxfordshire and Cambridgeshire, front-ended by a brief history of the technology-intensive sub-regions. Section 7.1.3 presents evidence of agglomeration patterns with a discussion of Oxfordshire's and Cambridgeshire's ICT location quotients, and regional attractiveness. Section 7.2 presents findings on the 'structural environment of TMT Firm settlement and site selection (including inter alia, parent firm internationalisation, settlement and subsidiary site selection).

The chapter then progresses to a 'spatial' perspective in which it specifically discusses where TMT firms chose to settle and why; section 7.3 presents findings on the contingent environment of TMT Firm settlement and site selection (including inter alia, specialist commercial property, science park penetration and development strategies of Oxfordshire and Cambridgeshire science parks); and finally, section 7.4 summarises findings and closes the chapter. Tables 7.1 to 7.3 list documents in date order of publication and research participation.

| DOCUMENT | SOURCE | YEAR OF PUBLICATION |
|---|---|---|
| **Oxfordshire and Cambridgeshire, LEP and other documents** | | |
| Oxfordshire LEP<br>Strategic Economic Plan, Mar 2014 | Oxfordshire LEP | 2014 |
| Greater Cambridge & Greater Peterborough LEP<br>Strategic Economic Plan | GCGP LEP | 2014 |
| 'Business skill needs in the Greater Cambridgeshire Greater Peterborough area", Final Report | GCGPLEP | 2014 |
| The Oxfordshire Innovation Engine<br>Realising the Growth Potential | SQW | 2013 |
| MIT Skoltech Initiative "Technology Innovation Ecosystem Benchmarking Study" | MIT | 2012 |
| Cambridge Technopole Report<br>An overview of the UK's leading high--technology business cluster | www.cambridgetechnopole.org.uk<br>St John's Innovation Centre | 2013 |
| Active Businesses in Oxfordshire by Size | Oxford City Council | 2011 |
| Cambridge Cluster at 50<br>Final Report to EEDA and Partners | SQW | 2011 |
| ISIS Technology Transfer & Innovation Management | | 2011 |
| Oxford to Cambridge Arc Ltd<br>End of Project Review, June 2008 | Former Executive Director | 2008 |
| Arcs and Triangles:<br>Accelerating the Development of the Innovation Economy | Former Executive Director | 2007 |
| The Cambridge Advantage | Centre for Entrepreneurial Learning<br>University of Cambridge | Undated |

**Table 7.1: Sources of Secondary Data (Oxfordshire and Cambridgeshire)**

| DATE OF INTERVIEW/CITY | JOB TITLE/ORGANISATION | EXPERTISE/AREA OF CONTRIBUTION |
|---|---|---|
| **Local Economic Development (Oxfordshire & Cambridgeshire)** | | |
| 08.11.13<br>**Cambridge, England** | Former Executive Director | **Local Economic Development (Oxon)** |
| 22.10.14<br>**Cambridge, England** | Economic Projects Manager<br>**Greater Cambridgeshire & Greater Peterborough LEP** | **Local Economic Development (Cambs)**<br>www.gcgp.co.uk |
| 12.11.14<br>**Reading, England** | Chief Executive<br>**Oxford LEP** | **Local Economic Development (Oxon)**<br>http://olep.co.uk |
| **Oxfordshire & Cambridgeshire Inward Investment** | | |
| 16.08.13<br>**Oxford, England** | Head of Product Development<br>**Invest in Oxfordshire** | **Inward Investment (Oxon)**<br>www.investinoxfordshire.co.uk |
| **Science Park Experts** | | |
| 09.08.13<br>**Norwich, England** | Director Science Parks<br>**Goodman's International** (Colworth Science Park & Harwell Innovation Centre) | **Science Parks (UK)** |
| 30.09.13<br>**Norwich, England** | Chief Executive Officer, UKSPA<br>**Chesterford Research Park** | **Science Parks (UK)** |

**Table 7.2: Oxfordshire and Cambridgeshire Research Participants**

| No | Company | Address | Lat/Long |
|---|---|---|---|
| 1 | **RELEX UK Ltd** | **St John's Innovation Centre**, Cowley Road, CB4 0WS | 51.46, -0.97 |
| 2 | **NetLogic Microsystems Ltd** | Unit 406, **Cambridge Science Park**, Milton Road, CB4 0WW | 51.44, -1.07 |

**Table 7.3: Oxfordshire and Cambridgeshire TMT Firm Participants**

N.B. Science Park participants are listed in Table 7.14.

### 7.1.2 The Economic Geography of Oxfordshire & Cambridgeshire

Oxfordshire and Cambridgeshire are two county councils located to the northwest and northeast of London, respectively. This section focuses on the economic geography of the sub-regions as defined in section 6.1.1 and continues the discussion of the attractiveness of these sub-regions as places for foreign TMT firms to do business in Silicon Spires, Science Vale and Silicon Fen.

#### 7.1.2.1 A Recent History of Oxfordshire and Cambridgeshire as technology-intensive sub-regions

As noted, Oxfordshire and Cambridgeshire are well documented in the literature for being a well-resourced 'innovation ecosystem' (for example, Lawton Smith & Waters 2011; SQW 2013 & 2006; Mohr and Garnsey 2010; Segal *et al.* 2003; and Koepp 2003). Oxford has 'Science Vale' which claims to have 'thirteen per cent of research and development in SE England and four per cent of that in all of England', whilst Cambridge has 'Silicon Fen', with one of the highest concentrations of science parks anywhere (Barrell 2006). Also as noted, both are supported by world-renowned universities, have established networks of science parks, professional services providers and entrepreneurial ventures, have shown 'an increase in average firm size and profitability over 20 years' with some firms growing to be 'world beaters', so they continue to be the main focus of the UK Government's innovation initiatives (Mohr and Garnsey 2010, p.2). As a combined unit[166], Oxfordshire and Cambridgeshire tend to be bioscience and life sciences driven with a focus on start-ups and early stage ventures, *c.f.* the M4C which tends to focus on 'foreign direct investment (FDI)' in the form of established technology and telecoms providers.

Separated by three counties, Buckinghamshire, Bedfordshire and Hertfordshire, with no direct transportation connection between them, the cities of Oxford and Cambridge are about 109 km apart 'as the crow flies'. The two counties boast one of the most concentrated technology regions and thus are a main focus of the global industry. Intercity road and rail links are scarce and surface travel challenging, but the areas are served by six airports, including four international airports (Stansted, Luton, Heathrow and Birmingham) and two general aviation airports (Cranfield Airport and Cambridge Airport).

[166] Though not so in the literature, which seems to be about one or the other but rarely about both (e.g. SQW reports).

The counties have bustling knowledge economies and eight universities within easy reach of each other, including Oxford, Cambridge, Oxford Brookes, Open University, Buckingham, Bedfordshire, Hertfordshire and Anglia Ruskin Universities. On superficial examination, this conurbation of business/industry, academia and government looks formidable but all indications are that the two counties operate separately with little evidence of real collaboration.

#### 7.1.2.2 Oxfordshire: the Science Vale & Silicon Spires

As discussed in section 3.4.1, Oxon is home to Silicon Spires and the Science Vale Enterprise Zone, the latter of which consists of ~1,000 acres of property and comprises of the Harwell Oxford Campus and Milton Park located to the south of Oxford, roughly half-way to London. SQW (2013, p.13) argues 'high technology development would not have taken place without this infrastructure' and 'it remains the underpinning factor' in the region which boasts a clear technological focus, based on four 'distinctive but overlapping technologies' (Figure 3.4).

With respect to inward-bound foreign technology, the 'profile of the sub-region has been raised internationally and the quality of life enhanced through cultural and other contributions', two key aspects that position Oxfordshire well as an attractive business and lifestyle choice. Several non-governmental organisations (NGOs) have been established to support this initiative; Oxford Enterprise Zone and the Oxfordshire Local Enterprise Partnership work to promote the region to business, along with Invest in Oxfordshire, 'a free professional and confidential service for handling enquiries', which acts as 'the initial point of contact for potential investors wishing to locate in Oxfordshire' (2013, p. 4). In addition, there is a general encouragement for universities to collaborate with industry, domestic and foreign, the latter of which contributed more than '£22m in research sponsorship' in 2010/11. The combination of endowment of institutions, teaching and research; clear technological focus; enhanced quality of life; diverse technology enterprise stock; government-industry collaboration and growing academic-industry collaboration provide a strong foundation for the region to continue to attract firms and people. However, against the backdrop of this well-established infrastructure, Oxfordshire is faced with a serious dilemma regarding its future as a growing technology region. Two immediate problems are physical space (for commercial offices and residences) and transportation links, both of which are addressed in the Oxford's 'City Deal' submission for a 'Knowledge Economy Spine' (linking Oxford, Bicester and Science Vale) but neither of which will be implemented in the short term. Although the plan is a 'significant step forward, it does not place sufficient

emphasis on the crucial economic role of Oxford' (Ibid, p. 72). The most damaging criticism is that 'Oxfordshire has lacked the strong leadership and consistent messaging that have benefited some competitor locations, not least Cambridge' (Ibid, p.6).

#### 7.1.2.3 Cambridgeshire & Silicon Fen

Silicon Fen is situated 'within a 20 mile radius around' the north of the city and became famous as a centre of innovation, networking and new venture financing. Silicon Fen 'stretches from Bury St. Edmunds, through Cambridge to the outskirts of Bedford'[167]. Cambridge has grown to be 'the most successful university-anchored, high-technology district in Europe' (Kenney 2003, p.179) and third best in the world in a recent report (MIT, 2013). Like Oxfordshire, Cambridgeshire also boasts a clear technological focus, based on three 'converging revolutions' (Figure 3.5). However, despite the overarching ethos into which people buy, the sub-region may not be as effectively positioned when it comes to inward-bound foreign TMT firms due to issues of:

- "Commercialisation of science and diffusion of knowledge;
- Inefficiencies and deficits in funding early stage businesses;
- Rising traffic congestion;
- Inadequate transportation links to other regions;
- Limited air transport connections to international destinations;
- Insufficient housing – quality and price issues; and
- £2 billion infrastructure deficit (Tym Report 2001)" (Adapted from Barrell, 2006).

Herriot (former Managing Director of St John's Innovation Centre[168]), emphasised the predicament facing Cambridge, which he reckoned could be addressed by collaborating more effectively and developing "a technology roadmap that looks five or ten years down the line" because without it, the risk of being 'isolated clusters of the very best University research and a small number of R&D firms but:

> "not the downstream production, service and support jobs that make a vibrant economy. We'll create all the new ideas but others will get too much of the benefit" (2011[169]).

[167] Adapted from http://www.siliconfen.com/sfstory.php Accessed 01.03.14
[168] Quoting Michael Best "Choosing to Lead: The Race for National R&L Leadership and New Economy Jobs" (2004)
[169] As cited in Cambridge Cluster Lecture, Mannheim Handout, Slide 26, 2011

### 7.1.3 Technology Agglomeration Patterns in Oxfordshire and Cambridgeshire

The specialist technological focus in Oxfordshire and Cambridgeshire is confirmed by the ONS (2010) Location Quotients database, which shows that for a County Council covering four areas: Oxford, South Oxon; Vale of White Horse and West Oxon, Oxfordshire's ICT location quotients confirm a concentration and specialisation of ICT firms and share of national employment in those industries but comparatively, with an average of only 1.30, less than a third of the top M4 Corridor performers (Table 6.4), but may be consistent with Oxon's focus (Figure 3.4).

| Area | ICT Location Quotient |
|---|---|
| Oxford | **1.39** |
| South Oxfordshire | **1.10** |
| Vale of White Horse | **1.68** |
| West Oxfordshire | **1.05** |
| **Average ICT concentration** | **5.22/4 = 1.305** |

**Table 7.4: ICT Location Quotients for Oxfordshire (ONS 2010)**

With respect to inward-bound foreign TMTF, however, the 'profile of the sub-region has been raised internationally and the quality of life enhanced through cultural and other contributions', two key aspects that position Oxfordshire well as an attractive business and lifestyle choice. In addition, there is a general encouragement for universities to collaborate with industry, domestic and foreign, the latter of which contributed more than '£22m in research sponsorship' in 2010/11. The combination of endowment of institutions, teaching and research; clear technological focus; enhanced quality of life; diverse technology enterprise stock; government-industry collaboration and growing academic-industry collaboration provide a strong foundation for the region to continue to attract firms and people. Cambridgeshire County Council covers: Cambridge, East Cambs; Fenland, Huntingdonshire and South Cambs, for which ICT location quotients are shown below. The quotients suggest a minimal concentration of ICT (average 0.92) which is lower than Oxon's but understandable, given the three-pronged focus (Figure 3.5).

| Area | ICT Location Quotient |
|---|---|
| Cambridge | **1.62** |
| East Cambridgeshire | **0.51** |
| Fenland | **0.25** |
| Huntingdonshire | **0.66** |
| South Cambridgeshire | **1.67** |
| **Average ICT concentration** | **4.71/5 = 0.942** |

**Table 7.5: ICT Location Quotients for Cambridgeshire (Source: ONS 2010)**

Analysis of documents (for example, MIT 2013; Lawton Smith & Waters 2011; SQW 2010; Barrell 2006) confirms that Cambridgeshire boasts a unique value proposition, but the sub-region faces issues when it comes to inward-bound foreign technology, including many of the negative externalities that afflict technology-intensive regions, including but not limited to the issues listed in section 7.1.2.3. Herriot[170] had warned of "the risks of turning into Cambridge, England" with "isolated clusters of the very best University research and a number of small R&D firms but not the downstream production, service and support jobs that make a vibrant economy" (2011).

### 7.1.4 The Regional Attractiveness of Oxfordshire and Cambridgeshire

Oxfordshire and Cambridgeshire have proven very attractive destinations for multinational technology, dating back to the early 1980s and before: "their importance in the UK's knowledge-economy as a whole and in particular sectors such as bioscience has been recognized by central government" and multinationals alike (for example, DTI 1999, 2001; H.M. Treasury, 2003 as cited in Lawton Smith & Waters 2011, p.966). The two sub-regions have attracted high profile firms like Microsoft which set up a research campus and invested heavily in R&D. This section draws on analysis of key strategic documents: (i) the Oxfordshire LEP Strategic Economic Plan (2014); (ii) The Oxfordshire Innovation Engine (SQW 2013); (iii) the Greater Cambridge & Greater Peterborough' LEP Strategic Economic Plan (2014) and (iv) the MIT Skoltech Initiative "Technology Innovation Ecosystem Benchmarking Study" (2013), supplemented with analysis of focused telephone interviews of three local economic development officials in Oxfordshire and Cambridgeshire[171].

Analysis of the above confirmed three core reasons, inter alia, for which Oxon and Cambs are known and respected worldwide, but also highlighted several shortcomings that must be addressed if the regions are to build on well-established reputations and retain regional attractiveness. First, both sub-regions are asset rich and boast clear and well-publicised technological foci (2014, p.5 and s.3.4.1.1). Second, both sub-regions are world class knowledge economies underpinned with worldwide reputations as knowledge production centres on the backs of "universities which have created/supported the world's most successful technology innovation ecosystems" (MIT 2012, p.9).

[170] Former Managing Director of St John's Innovation Centre quoting Michael Best "Choosing to Lead: The Race for National R&L Leadership and New Economy Jobs" (2004)
[171] Chief Executive OLEP, 12.11.14; Skills and Business Growth Lead GCGPLEP, 22.10.14; and Inward Investment Specialist, Invest in Oxon, 16.08.13

Third, the twin areas boast thick 'scientific labour markets' (high tech manufacturing ranking highly in top ten sectors) with high (78.3%) employment and low (1.1%) unemployment (2014, p.8), which serve the ~1,500 technology-based firms that reside there. Document analysis also confirmed several core issues that Oxfordshire and Cambridgeshire must address if the sub-regions are to retain regional attractiveness; in particular, issues of space, transport and talent (the flip side of thick labour markets) appeared frequently:

- There is a distinct "shortage of suitable premises for firms in Oxford city centre, which has seen only two minor developments in the last twenty years" (Ibid, p.11); this shortage is mirrored in Cambridgeshire.

- Whilst the A34 provides a 'strategic link' between the south and north (OLEP 2014, p.vi), it is not sufficient to meet the current or future road needs especially when rail links within and across the two sub-regions are so sparse.

- Third, whilst the sub-regions enjoy thick labour markets, this market may have accumulated over many years because as noted by the EIU (2012, p.9), "Boston and Oxford are both synonymous with higher education, but relatively few graduates stay there after graduating". So, whilst talented individuals bring 'kudos' and much excitement to areas, they are also typically highly mobile and only 'sticky places' will keep them because 'stickiness connotes both ability to attract as well as to keep" (Markusen 1996, p.294).

In addition, the University of Cambridge was noted as a primary, and on-going, example of a university whose successful cultural change was challenged by "800 years of history" and "active hostility to setting up technology transfer activities" (2012, p.15) and despite proximity to London, Oxon's high tech firms "identify a chronic shortage of early stage investment capital and increasing exasperation with the structure and timescales of conventional venture capital investments" (SQW 2013, p.9).

Whereas documents focused on issues of space, roads, 'footloose' talent, ingrained culture and the lack of financial resources for early stage technology entrepreneurs, the focus of local economic development officials was 'making do' with less resources; investing in transport infrastructure; focusing on segments within sectors to build on strengths; and taking a wider interpretation of FDI. Oxfordshire received 'the second smallest (funding) allocation in the country', but qualified for a further £20 million of EU funding under the European Structural Investment Fund and additional funding in excess of another £20 million in for transport investment through City Deal and Growth Deal (CEO) to go along with private investment:

> "We have secured working with private sector partners in rail, Chiltern Railways, First Great Western and Network Rail, close on £½ billion of investment into the rail network, resulting from a clear economic rationale for growth and a clear understanding that that growth would therefore happen … invested in with confidence in those areas".

This has enabled rail extensions from Bicester through to Oxford via a new parkway station at Water Eaton Park (~£140 million as one single investment through Chiltern Railways) and an 'East West' Rail, along with access to Heathrow, improvements to Didcot Station and Bicester stations, and also the City of Oxford, thus addressing a key concern of transport and contributing to the attractiveness of the sub-region.

Oxfordshire is also looking to strengthen its sectoral focus by placing a greater emphasis on key sectors they are already strong in, where they have a 'real world lead not just world class technology and R&D', such as "high performance engineering, high performance motorsport technology etc, life sciences, space and satellite related development" in order to identify new market opportunities "particularly our foreign owned businesses as well in terms of FDI market". But new opportunities will mean taking a wider interpretation of FDI, not limiting focus on foreign investment and growing the existing business stock; "so we're not going to rely on FDI, we're going to use that as a strengthening of Oxfordshire's proposition rather than predicating our growth on FDI". The constraint of space is repeated in Cambridgeshire, where Cambridge City does not favour growth (GCGPLEP), as is the aspiration to focus more on local strengths, such as the Welding Institute (at Granta Park). In addition, GCGPLEP is keen to develop a clustering strategy (s.7.2.2).

In summary, Oxfordshire and Cambridgeshire are both well-known and respected worldwide as world class knowledge economies and are underpinned by worldwide reputations as knowledge production centres based on world class universities, which have served the sub-regions well and kept them at the forefront of the world's most attractive regions for technology. Several shortcomings do exist that must be addressed if the regions are to build on well-established reputations and retain regional attractiveness but as long as the regions stay highly focused and provide cutting edge R&D, they will remain attractive to the world's most ambitious firms, given they both are recognised as having created and maintained two of the world's most successful technology innovation ecosystems. On balance, Oxfordshire and Cambridgeshire are appropriate geo-spatial lenses through which to view the siting decisions of foreign TMTF landing in the UK.

## 7.2 The Structural Environment of TMT Firm Location, Settlement and Site Selection

As noted in section 6.1.2, this research is underpinned by a conceptual framework (Figure 4.2) which postulates that a 'structural environment' is strongly implicated in TMT firm settlement and siting decisions, and is comprised of three key structures: (i) Parent TMT Firm Internationalisation; (ii) Subsidiary TMT Firm Settlement; and (iii) Subsidiary TMT Firm Site-selection. This section presents analysis of each of these structures in relation to the location, settlement and site selection of TMT companies settling in Oxfordshire and Cambridgeshire.

### 7.2.1 Parent Firm Internationalisation & Settlement in Oxfordshire and Cambridgeshire

This section presents findings on the two parent firms of foreign TMT firms that located to the UK and settled in Oxfordshire and Cambridgeshire in 2011. First, internationalisation and settlement findings are analysed, including mode of entry to the UK, reasons for deciding to locate and settle, multinational experience, and actual geographic locations. Table 7.6 presents parent company data to confirm overseas headquarters; for the full list of Oxfordshire and Cambridgeshire parent TMT firms, including details of parent company, size, number of employees, year incorporated, and product portfolio, Appendix 5.1).

| No | Parent Firm Name | Overseas (Home) Address |
|---|---|---|
| 1 | RELEX<br>**Retail Logistics Excellence - RELEX Oy** | **RELEX Finland**<br>Postintaival 7<br>00230 Helsinki<br>FINLAND |
| 2 | NETLOGIC MICROSYSTEMS<br>**NetLogic Microsystems, Inc (Broadcom)** | **Broadcom Corporation**<br>5300 California Avenue<br>Irvine, California 92617 |

**Table 7.6: Oxfordshire and Cambridgeshire Parent TMT Firm Home Addresses**

The parent TMT firms in Oxfordshire and Cambridgeshire are Finnish and American, eight years old on average, involved in ICT (software and hardware), with small and large staffs, and one with deep multinationality experience and the other with much less multinational experience.

Whereas NetLogic has a high annual turnover of $8.43b (2014), Relex has a low turnover of '£3.5m - £5m'.[172] (Table 7.7). NetLogic is large, with the necessary asset power and deep multinationality which provide enough experience to enable easy internationalisation decisions involving choice of country and sub-national region in order to engage in international expansion. RELEX, on the other hand, is much smaller, less well-resourced and is less than five years into its internationalisation experience.

| | HQ/Age | Ownership/ Entry Mode | TMT Sector/ Segment | Staff (parent) | Stage of Lifecycle | No of Global Offices | Annual Turnover (2012)/ EBITDA |
|---|---|---|---|---|---|---|---|
| **RELEX** | Finland/ 6 yrs | Private/WoS | ICT – Software | '50 – 74' | Success-growth/ take-off | 4 | £3.5 – £5m (2011) |
| **NetLogic (Broadcom)** | USA/ 10 yrs | Public/WoS | ICT – Hardware | 700+ | Developed/ Ecosystem Aggregator | 40 | $8.43b (2014) |

**Table 7.7: Oxfordshire and Cambridgeshire Parent TMT Firm Summary data[173]**

Both parent TMT firms entered the UK as wholly-owned subsidiaries which, as discussed in Chapter 2, enables total ownership and control, and for which can there are several possible explanations, the most reasonable being the need for total control, the possession of 'asset power' and multinational experience (s.2.4.4). These findings help to validate the importance placed on parent firm internationalisation strategy as a key structural component of the conceptual framework, and by implication, of foreign TMT firm behaviour in regard to locating to the UK. Both firms gave clear reasons for locating to the UK and settling in Oxfordshire and Cambridgeshire as their preferred places for business operations. Relex's most important reasons for making a national (UK), sub-national settlement choice were 'access to customers', 'proximity to customers' and 'access to markets'. NetLogic chose very similar reasons for national location (UK) and sub-national settlement: 'access to customers, markets and technologies'. These two examples suggest that fundamental aspects of the third structural component of the conceptual framework, Subsidiary Firm Site Selection Strategy, are access and proximity to customers and markets, and access to technologies:

| Rank | Choice of Country | Choice of sub-national Region |
|---|---|---|
| **1** | Access to customers | Access to customers |
| **2** | Proximity to customers | Access to markets |
| **3** | Access to markets | Access to technologies |
| **4** | Proximity to markets | Proximity to markets |
| **5** | Competitors have done it | Ease in starting and operating a business |

**Table 7.8: Top 5 Reasons for Parent TMT Firm Location & Settlement Choices**

[172] The full details and attributes of the firms are presented in Appendix 7.1
[173] In the M4C Case, this data is treated as averages based on 10 participants but here, as two entries.

Finally, except for the sequence of reasons changing, the above findings suggest that the top four reasons given by the firms are virtually the same for choosing to expand internationally to the UK and then to settle in Oxfordshire and Cambridgeshire. The examples of Relex and NetLogic broaden the dimensions of this structural factor by introducing additional reasons for location and settlement, which may or may not be unique to the sub-regions.

### 7.2.2 Subsidiary TMT Firm Site selection in the Oxfordshire and Cambridgeshire

This sub-section addresses the final and most important structural component of the conceptual framework by interrogating evidence of subsidiary TMT firm site selection in Oxfordshire and Cambridgeshire from three sources, expert-practitioners involved in the process; structured, semi-structured and open questions to TMT firms that initially sited there in 2011 (Appendices 4.4, 4.5) and company data (websites, LinkedIn feeds, Annual Reports and Hooper's).

#### 7.2.2.1 The Process and Practice of Subsidiary Site Selection (Oxfordshire and Cambridgeshire) – Expert perspective

This sub-section presents primary evidence from the perspectives of active local economic development expert-practitioners on the Oxfordshire and Cambridgeshire site selection process, namely, Invest in Oxfordshire, the OLEP and GCGPLEP. Qualitative analysis of focused telephone interviews with Oxfordshire and Cambridgeshire experts (Table 7.2) confirmed the process of searching for and finding an appropriate property for incoming TMT firms can be long and arduous, possibly involving multiple stakeholders, public and private, at various stages. For property searches in Oxfordshire and Cambridgeshire, the process is especially complex and difficult because of the unique property-related challenges inherent in doing business in the sub-regions (s.7.1.4).

The first three or four stages of site selection as described in section 6.2.2.1 and illustrated in Figures 6.7 and 6.8, are practised in common across the country as guided by the UKTI's UK First Policy. This system has a bespoke back end, which gives locales the flexibility to tweak the final stages according to local practices. The overall process, however, is a central part of the UKTI value proposition which seeks to involve public and private providers and local authorities (the theme of public private support is continued in s.7.3.5).

Analysis of focused interviews revealed three key considerations; the source of leads (which determines how they are managed); commercial confidentiality (sometimes supplemented with 'reverse due diligence'); and fitting inbound opportunities to Oxfordshire and Cambridgeshire's high tech focus. In each case, there is a steady source of 'private enquiries' that may not come via the UKTI funnel, so are not captured nationally. In the case of Invest in Oxfordshire (IiO), leads on incoming firms can come via a range of 'different ways and means', not all of which are ideal:

> 'some directly through our website or various other ways and means but some also come through people that are working on their behalf'.

Incoming firms might also use a search campaign to do 'due diligence about 'us' (the organisation) knowing who they are and that's often the most difficult way of doing it', or IiO may get involved 'third-hand' and may not know whom they are dealing with due to commercial confidentiality, which is not ideal. In terms of 'the mechanism that firms use', it probably involves a 'quick and fairly wide search first that results in Oxon being in the top 10', often:

> because of its name and the way that it's synonymous with good levels of academic attainment, strong research connections, it's known in the U.S. market, the Chinese market, and that gives us a head start'[174].

Firms entering this way do so effectively 'in the blind', leaving the local development team to react to the process. Once the short list has been confirmed, however, the conversation becomes very specific at this point, around 'numbers of people' and 'the skill levels they need, etc'. From the particular perspective of Oxfordshire and Cambridgeshire inward investment:

> 'we're very much trying to focus on the high-tech end of the marketplace, so we're not in mass volume manufacturing, which is dependent on high numbers of relatively low-skilled staff, it just isn't going to be something that (a) we're interested in and (b) whether we're going to be able to service that requirement, quite frankly, and it's going to be better for them to go further north'.

The CEO reported a similar process for OLEP, which involves handling and prioritising leads based on the source and whether it is 'investment', 'growth' or 'business' related: leads "could come nationally, in which case it could be referred in through the UKTI pipeline; could be direct of which we get quite a lot, which will come in either to the LEP or direct to the Invest in Oxfordshire team and those are triaged if you like, as an investment enquiry, local growth

[174] Respondent C, Telephone Interview, 16.08.13

enquiry or business support enquiry)". GCGPLEP confirmed this approach in which they get enquiries that come from UKTI, 'directly through the local authorities, directly through website traffic or directly through enquiries to the developer' but lament that are faced with several problems in closing out the process, including the 'stumbling block' of the high level of commercial confidentiality, which creates work without certainty that the firm will settle[175]. Also problematic for GCGLEP is the lack of a formal central local database of information, so "at the moment people are doing it on their personal knowledge of what's in certain areas, so that's not a situation that we're particularly happy with". Third, Cambridgeshire, like Oxfordshire, does not favour growth so there is a growing pressure on space:

> "Cambridge sort of doesn't really want to grow, … it sort of grows despite itself and getting that phenomenon outside of cities, so encouraging businesses to come in and say take space at places like Granta Park which is not full, or Babraham Research Centre or whatever it may be, is quite a difficult ask" (Project Manager).

It works at specialised sites like Babraham but many incoming businesses may want incubator space or commercial space and "the bottom line is there isn't enough space in Cambridge, so that's making it increasingly difficult". To deal with this problem, the LEP has developed a 'detailed sectoral breakdown' which will be the basis for a clustering strategy, targeting sectors in which Cambs is strong, with the Enterprise Zone at Alconbury at its centre. The examples of OLEP and GCGPLEP broaden the dimensions of this structural factor and highlight that the site selection process may be different for each sub-region (*c.f.* M4C, s.6.2.2.1), once enquiry handling is turned over to local economic development personnel.

The process of site selection in Oxfordshire and Cambridgeshire culminates in a pre-determined sequence involving UKTI, which has high-level, initial responsibility for creating a short list of sites; at the local levels, agencies engage inward investors directly, only towards the end of the process. At the local level, opportunities for distribution are 'triaged' and forwarded to the appropriate local authority. The process for a firm then culminates around its most significant issues, including operating costs, access to labour catchment and cost of labour, because 'that's the thing that floated people's boats', the final choice involving quite a lot of subjective choices of 'the decision makers, their personal preferences and the labour pool'. These findings help to validate the importance placed on subsidiary firm site selection strategy as a key structural component of the conceptual framework, and by implication, the process and involvement of stakeholders including public agencies, which are discussed in section 7.3.

[175] Project Manager, GCGPLEP - Telephone Interview, 22.10.14

### 7.2.2.2 Subsidiary TMTF Site selection (Oxfordshire & Cambridgeshire) – To 'science park' or not to 'science park'

Findings on key aspects of the two subsidiary firms' decisions to site in Oxfordshire and Cambridgeshire are presented and analysed in this section. First, Table 7.9 shows addresses and actual geographic positions of foreign TMT firms siting upon initially 'landing' in Oxfordshire and Cambridgeshire in 2011 (participant firms are highlighted). As noted previously, seven TMT firms initially 'landed' in Oxfordshire and Cambridgeshire[176] and two participated. Both firms selected science parks and reasons for site selection choices are presented and analysed from questions regarding the decision.

| No | Company Name | Website | O& C Contact Address (2011) |
|---|---|---|---|
| 1 | Alphatec Spine Inc | www.alphatecspine.com | Robert Robinson Avenue, **Oxford Science Park**, Oxford OX4 4GP |
| 2 | IneoQuest Technologies | www.ineoquest.com | The Magdalen Centre, **Oxford Science Park**, Oxford OX4 4GA |
| 3 | **NetLogic Microsystems, Inc (Broadcom)** | www.broadcom.com | Unit 406, **Cambridge Science Park**, Milton Road, Cambridge CB4 0WW |
| 4 | NetMotion Wireless, Ltd | www.netmotionwireless.com | 4 Mandelbrote Drive, Oxford OX4 4XG (very near to OSP) |
| 5 | **Retail Logistics Excellence - RELEX Oy** | www.relex.fi | **St John Innovation Centre**, Cowley Road, Cambridge CB4 0WS |
| 6 | Tangoe Inc | www.tangoe.com | 10 **Milton Park**, Abingdon, Oxfordshire OX14 4RR |
| 7 | Thoratec Europe Limited | www.thoratec.com | Burnett House Lakeview Court, **Ermine Business Park**, Huntingdon, Cambridgeshire PE29 6UA |

**Table 7.9: Oxfordshire and Cambridgeshire Subsidiary TMT Firms Addresses**

Detailed qualitative analysis focused on responses to questions about awareness of science parks, prior knowledge/information of science parks, advantages of science parks and the site-specific advantages (SSA) offered for TMT firms, inter alia in order to assess the attraction of science parks.

Relex UK Ltd is owned by Relex Oy, a privately held Finnish supply chain management (SCM) solutions provider, headquartered in Helsinki, Finland. According to the UK MD, when the company expanded to the UK, Relex considered possibilities for 'flexible lounge-type offices' and "this was the best (he) found", a science park which offered 'shared services'; 'facilities and equipment' and 'small business support'. Relex Ltd had become aware of science parks before moving to UK, and received 'very much' information from its parent firm, Relex Oy, but

[176] Initially 'landed' as some firms (*e.g.* RELEX) have since relocated.

initially joined St. John Innovation Centre as a result of its own property search. In the initial stages of the process, the firm was aided by UKTI but once in the UK, the firm decided shortly after settling to initiate another property search to 'get closer to customers' that landed it in a private shared office in Central London. The subsequent RELEX finding also confirms the literature on access to customers, but is the first mention of facilities or support. Relex validates the fundamental presence of the third structural component of the conceptual framework, Subsidiary Firm Site Selection Strategy, and broadens the dimensions to include three long-standing claims of science parks (ss.3.6.5 and 6.3.4). In addition, it contemplates directly the major research question by clearly showing that the source of information did not come from any other sources but its own. However, upon landing, the company realised it needed to be closer to customers and the market, so moved almost immediately to Central London (thus highlighting again the 'office function' reason). From the perspective of science parks, however, RELEX represents a good, though not ideal scenario, because the company had much information *a priori* but all from its own research, so the decision to site in a science park was not influenced in any way by the science park.

NetLogic Microsystems Ltd also initially sited in and remains in Cambridge Science Park. NetLogic Ltd is owned by NetLogic Microsystems Inc. (NASDAQ: NETL, 'NetLogic'), an American provider of high-performance intelligent semiconductor solutions for Internet networks, headquartered in California[177]. NetLogic's decision to site in a science park was driven primarily by the need for proximity to 'technology suppliers', and access to talent and customers. In NetLogic's case, the property search process was initiated via a services provider before being turned over to the company at the point of a short list of potential sites. NetLogic became aware of science parks before moving to the UK and received 'very much' information from its parent firm, before initially siting and remaining in CSP. After Broadcom acquired NetLogic Inc in 2012, Broadcom expanded to Bristol, again siting near a technology supply chain. NetLogic confirms the literature on access to customers, markets and talent/skilled staff and goes a step farther in confirming proximity to technologies, one of the claims of science parks, whilst arguably taking the decision based on office function. From the perspective of science parks, NetLogic represents a very good scenario, the firm having gathered much information a priori about science parks, then initially siting in one and remaining there to this day[178]. These two final TMTF examples further validate the fundamental presence of Subsidiary Firm Site Selection Strategy as a key structural

[177] NetLogic was acquired in Feb-2012 by Broadcom (NASDAQ: BRCM) for US$3.7b[177].
[178] N.B. NetLogic is the sole participant TMT firm to meet these criteria.

component of the conceptual framework, while reinforcing the realisation that science parks are a valid site for landing TMT firms and office function is an overriding reason for choosing a site. These findings also address key aspects of the research agenda, namely the main and two subsidiary research questions and objectives.

Finally, with relation to siting on or off science parks, analysis revealed that the two Oxfordshire and Cambridgeshire subsidiary firms possessed very much information *a priori* about science parks. In no cases was science parks chosen as a source of information (*c.f.* 'own research' and 'parent firm') but both firms ended up siting in science parks. In contrast to M4C firms, these findings confirm that science parks are still a viable siting option for inbound TMT firms. The below table captures the links between *a priori* knowledge and initial siting (categorisations are explained in s.6.2.2.2).

| SP Siting | | | | |
|---|---|---|---|---|
| | OFF | **Category B** None | **Category D** None | **Category F** None |
| | ON | **Category A** None | **Category C** None | **Category E** Relex Ltd NetLogic |
| | | None or Little | Some information | Much information |
| | | Low ←--------- Level of a priori SP knowledge ---------→ High | | |

**Table 7.10: Categorisation of Oxfordshire and Cambridgeshire Subsidiary TMTFs (SP knowledge)**

This categorisation lends further credence to the typology of foreign TMT firms based on *a priori* knowledge of science parks and initial siting decision. The findings on subsidiary TMT firm site selection also address the major research question (albeit negatively given that SPs played no part in the firms decisions); first three research objectives; and first three subsidiary research questions (s.1.3). Site selection findings are summarised in Table 6.12 below.

| TMT Parent Firm | Stage of Product[179] Strategic Pathway[180] | Categorisation based on a priori SP Knowledge | Year founded/Age [181]/ Stage of Firm | Stage of Product[182] | Purpose of site | Site choice | |
|---|---|---|---|---|---|---|---|
| | | | | | | On-site SP | Why SP |
| **RELEX Ltd** | Developing/ 'Market Attacker' | **Category E** | 2004/7/success-growth | Undetermined | Marketing & Sales Customers | ON-site: 'shared services'; 'facilities and equipment' and 'business support (on-site initially) | SJIC gave the company a 'soft landing' and put them amidst like-minded firms |
| **NetLogic** | Developed/ 'Market Attacker' | **Category E** | 1991/20/take-off | Undetermined | Product development Research & Development | ON-site: proximity to 'technology suppliers', access to talent and customers (on-site) | CSP enabled access to technology and R&D |

**Table 7.11: Summary of Subsidiary TMTF site selection choices/rationale**

The constitution of the nature of the first two structures of the conceptual framework has been forged by similar, though not exactly the same choices by TMT firms for internationalisation and settlement. Also, both firms chose science parks. The findings confirm that the two TMT firms entered the UK as wholly-owned subsidiaries and settled in Oxfordshire and Cambridgeshire for access to customers, markets and talent/skilled staff, and for the overriding reason of office function. As noted in section 6.2.2.2, the methodological application of Critical Realism suggests that the first two sets of structural factors, in conjunction with contingent influences caused the site selection outcomes because CR postulates that the domain of the real contains the hidden 'structures' and 'causal mechanisms' (in this case, internationalisation and settlement) that produce the empirical events (in this case, site selection). Information on the two Oxfordshire and Cambridgeshire TMT firms is summarised in Table 7.7.

## 7.3 The Contingent Environment of TMT Firm Settlement and Site Selection

As explained in section 6.3, this research argues that the contingent environment of TMT firm site selection includes four components, Accessibility; Public Agency Support (National, Regional and Local); Private Professional Services Providers; and UK Science Parks; each of which has related

[179] Stages of product development correlate with stages of product life cycle
[180] Based on Hacklin et al's., (2013) framework
[181] Date taken to 2011, not current (2014)
[182] Stages of product development correlate with stages of product life cycle

subcomponents. This section uses data collected to interrogate the significance of each of these components in relation to the site selection of TMT companies in Oxfordshire and Cambridgeshire.

### 7.3.1 Accessibility to Customers, Markets, Suppliers & Talent

In analysing the necessary relations of TMT firm internationalisation, settlement and site selection in Oxfordshire and Cambridgeshire, access and proximity to customers, markets and technologies, emerged as primary drivers of these three linked decisions. The reasons contrast slightly with those given by M4C firms but highlight the difference between accessibility and proximity. As such, these findings broaden the dimensions of this component by confirming that 'access' can include wider considerations than talent and by calling into question whether the contingent influences of 'access' and 'proximity' should be conflated, thus suggesting they are distinct.

| Rank | Choice of Country | Choice of sub-national Region | Choice of SITE (SP) |
|---|---|---|---|
| **1** | Access to customers | Access to customers | Access to shared services |
| **2** | Proximity to customers | Access to markets | Access to facilities and equipment |
| **3** | Access to markets | Access to technologies | Access to talent and customers |
| **4** | Proximity to markets | Proximity to markets | Proximity to technology suppliers |
| **5** | Competitors did it | Ease in starting/operating a business | Access to small business support |

**Table 7.12: Top 5 Reasons for TMT Firm Location, Settlement & Site selection**

### 7.3.2 Public Agency Support & Private (Professional) Advice

This sub-section builds on initial contextual findings (s.5.3.3) by summarising findings from analysis of the UKs main economic development policy instrument and its key ramifications for this research, as they relate to Oxfordshire and Cambridgeshire. Four sets of findings are presented, first on the geographical coverage and constitution of LEPs in Oxon and Cambs (and resulting complexity); second, on the effect of the economic development policy change on the site selection negotiation process of inbound firms; third, on the process of delivering support and fourth, on the way LEP stakeholders manage inward investment. Four expert-practitioners were consulted:

| | |
|---|---|
| Investment Services Adviser<br>Invest in Oxfordshire<br>http://www.oxfordshirelep.org.uk/cms/content/invest-oxfordshire | **CEO**<br>http://www.oxfordshirelep.org.uk/cms/content |
| Skills and Business Growth Lead<br>**Greater Cambridgeshire and Greater Peterborough LEP**<br>http://www.gcgp.co.uk/yourlep | Former Executive Director<br>**Oxford to Cambridge Arc** |

**Table 7.13: Oxfordshire and Cambridgeshire LEP Experts**

Qualitative analysis of interviews revealed a convergence of opinion on the issues of increased complexity due to the number of bodies forced to work together ('duty to cooperate'), the resulting impact on the site-selection negotiation process and key differences from RDAs, and how the support process has been impacted. The challenges faced by LEPs was a recurring theme but it was also clear that there is a concerted attempt by LEPs 'to get on with it', in spite of the challenges, including a consensus on the reduced or lack of resources, financial and personnel, especially when compared with RDAs (the most significant differences being autonomy, fewer resources, a limited geography but with increased responsiveness and having to 'work in partnership').

Two LEPs cover Oxfordshire and Cambridgeshire, GCGPLEP[183] (comprised of three unitary authorities, Cambridgeshire, Peterborough unitary authority and Rutland) with shared authorities in King's Lynn and West Norfolk; St Edmundsbury and Forest Heath and Uttlesford and North Hertfordshire, making for "a big area (that's) very politically quite difficult to manage". Oxfordshire LEP[184] (OLEP) comprises of "six local authorities in total, one upper tier and five lower tier authorities and in terms of the board and the functionality. However, LEPs like OLEP are encouraged to incorporate universities, the private sector and other groups as well, including FE, HE, groups of businesses like the CBI, IoD, FSB and Chamber of Commerce:

> "so we have that broader sort of relationship with business as well as public sector and obviously because of the split of local authority control, our upper tier authority deals with all the transport, education, health and social care, adult services etc and our lower tier authorities are our planning authorities….."[185]

Because of the increased complexity in way of working, charges have been levied at LEPs; they are finding it difficult to create local solutions which draw in extra investment, the strategy to rebalance the economy is not working, and LEPs will not be able to match RDAs in terms of resources and clout due to inappropriate boundaries and scales. LEPs have found ways to manage the complexity, whilst addressing the criticism, for example in OLEP, which has opened up its board and

> "set up a joint committee of local authorities to enable them to bring together their powers in a collective decision making process; we have a joint statutory committee established, which brings all the local authorities together including the upper and lower tier, so all six authority areas" (CEO).

[183] http://www.gcgp.co.uk/ Accessed 07.01.15
[184] http://www.oxfordshirelep.org.uk/cms/ Accessed 07.01.15
[185] CEO, OLEP, Telephone Interview 12.11.14

So challenges exist, but there are mechanisms to address them. By bringing all of the leaders together (six authorities and six of the private sector LEP board members) the best decision to deliver the strategic objectives could be made, even if it takes longer. According to the CEO, it means that "we can take offline those conversations which could be far more difficult in a strategic context and get in to the detail through the growth board where you wouldn't want to have that level of discussion at a LEP board meeting". Whether this is how the various groups deal with the 'duty to cooperate' is not clear because how will stronger locations be incentivised to continue to cooperate with weaker locations? In Cambridgeshire, a similar process has been established to ensure all stakeholder views are represented and decision making is not 'centralised' in any way:

> "for instance the Growth Deal; we've got a senior economic development group, which is made up of heads of service, directorates, those types of people from the key districts and from the top tier authorities; then we have a CEOs group, which is all the CEOs of all the authorities, and then we have a local authority leaders group, which is all councillors, so we have three tiers of working".

As noted by the OLEP CEO, there is a "genuine local authority and business representation from the locality in terms of functional economic area sitting together as a board, whereas the RDAs had very significant geographic remit, which didn't always reflect their individual economic circumstances". The impact of this authority is that the geographic spread of RDAs and their much more significant regional spread meant that it was far more difficult for functional economic areas within the RDA's remit to be able to influence the way that investment priorities should be positioned. LEPs also are 'certainly more responsive to local need and can, through pragmatism, actually work much more collaboratively across common economic geographies as well'. This is critical in an area like Oxfordshire, which overlaps the Thames Valley and where 'there are seven LEPs that form that geographic area', with no single board governing it all, yet they 'work within context of a mutually agreed agenda, "not driven by a regional agenda that doesn't reflect local need"[186]. These findings confirm the importance of 'public agency support' in considerations of local economic activity, the level at which landing firms and science parks operate. They also broaden the dimensions of the component, because of the differences from the RDAs and the differences between the modus operandi of Oxfordshire and Cambridgeshire LEPs which are completely different from M4C. Another recurring consideration was the 'clear resourcing issue'; whereas RDA's 'probably on average had 120 staff each, were central government funded, and had significant budgets', so they were able to direct, in contrast with

[186] CEO, OLEP, Telephone Interview 12.11.14

LEPs which are faced with competitive bidding processes based on local economic plans, which some think creates 'a greater feel to the issues locally' and improved capability to work in partnership, despite having fewer resources to support delivery. As noted in section 6.4, one response to the early criticisms of LEPs was to reposition LEPs to provide funding through the Local Growth Deal and in response to the Strategic Economic Plans. In the first round of the City Deal, Oxfordshire received £55.5m and in the first round under the LGF, £108.56m (CEO). Meanwhile, the total allocation for the GCGPLEP area is £72m (2014 – 2020), which combines European and other funding[187].

Finally, how inward investment in the form of incoming firms has been impacted can be judged from how the various intermediaries manage inquiries. Information on incoming firms comes to LEPs in various ways from various sources, including the UKTI, 'the reactive stuff', according to Cooper (GCGPLEP), which is initially anonymous. Enquiries also may 'come directly through the local authorities or directly through website traffic or directly through enquiries to the developer as well as here'. Many firms wish to preserve commercial confidentiality so 'it stays very confidential until there's a point where the name is needed to be known'.

There is also the establishment of 'growth hubs', where LEPS have "secured regional growth from the investment to support what were referred to as growth hubs and the ambition was always that that would be a single portal for business enquiry and business investments". For example, OLEP has brought together all of its business growth, inward investment activity, skills activity and 'innovation work like for universities on R&D programmes', creating a very comprehensive and highly sector-focused business support and investment portfolio. The lead would come in one of three ways, nationally, in which case it could be referred in through the UKTI pipeline; through sector specialists, or could come through national enquiry into government etc:

> "through our growth hub we play in all the national offer activities in terms of national offer and support, whether that's Growth Accelerator, whether it's UKTI's offers. The initiatives through Britain is Great, etc, all the national UK first offers, but we also align it with our own local activity" (CEO, OLEP).

The intense focus on highly specialised sectors means that the inward investment team has 'a very strong global market presence' in 'performance automotive technology, and data and satellite communications' and have to look at market opportunities globally. The team works

[187] http://www.gcgp.co.uk/how-can-we-help/esif/ Accessed 09.05.15

closely with 'an aftercare supply chain support function' again across business support and remit, so we sit them side by side. This new way of managing the inward investment process has impacted several operational levels of LEPs. The process of public (UKTI) notification is focused on enquiries that may or may not come to fruition and which are a source of frustration from time to time. The process can be characterised as one of 'controlled complexity', where all leads are initially centrally controlled, then despatched and triaged before directing them to local authorities. In addition, LEPs have to make do with all sources, private as well, to create and maintain a pipeline of opportunities.

In summary, the Oxfordshire and Cambridgeshire LEPs offer sharp contrasts in the way they work; Oxon has much more resources, is highly focused sectorally, generally better organised and a more manageable scope. GCGPLEP has a very diverse geographic focus, is seeking to become sectorally focused and the inward investment process is a work in progress. This set of contingent relations has firmly established the importance of LEPs generally in the national inward investment scheme and the co-existence of public and private provision of firm location services, and specifically as a contingent influence on the site selection of incoming firms.

### 7.3.3 Oxfordshire and Cambridgeshire Technology Property Stock

As noted, there are approximately twenty science parks in Oxfordshire and Cambridgeshire, and nearly as many business parks. As also noted, this research postulates that the contingent environment of TMT firm site selection includes four components, the most central of which is UK Science Parks. This section draws data from focused telephone interviews of experts, qualitative questions of science park and science park documents to present five sets of findings on the technology property landscape of Oxfordshire and Cambridgeshire, levels of SP penetration, SP development strategies, SP intervention and site-specific advantages (SSA). First, the Oxfordshire and Cambridgeshire specialist commercial property is analysed, followed by the core subcomponent of science parks.

Analysis of several recent publications on CRE and Oxfordshire and Cambridgeshire property (including SQW 2013, 2011; Varcoe & O'Mara 2011) confirmed that Oxfordshire is 'well-endowed with specialist property for new and small high tech firms, but less for larger firms' (p.66). Included in its stock are 'eight innovation centres, providing more than 15,000 square meters of flexible space and six science parks', offering more than 500,000 square meters of floor space, with another 380,000 square meters available for development (Ibid). The commercial property stock in Cambridgeshire also has a wide and growing selection of specialist

properties, including eleven science parks, business parks and related business facilities. Like Oxon, Cambs is home to a diverse and flexible stock that is capable of accommodating technology-based firms, regardless of size or stage of development, including a handsome complement of Science, Research and Business Parks, Innovation Centres and other specialist spaces. Like the M4C, Oxon and Cambs technological property stock comprises a mix of specialist sites, however unlike the M4C, the technological property stock has a different constitution.

#### 7.3.3.1 Science and Business Park Penetration in Oxfordshire and Cambridgeshire

Instead of three science parks, Oxfordshire and Cambridgeshire are home to more than twenty fully functioning science, research and technology parks and no less than twenty-eight Business Parks in the total combined area (including the counties in between) of which thirteen are in Oxfordshire or Cambridgeshire. Of the twenty-eight Oxfordshire and Cambridgeshire Business Parks, nine are situated in Oxon, three in Cambs, two in Bucks, six in Herts and six in Essex. Summary Business Park profiles are presented, followed by profiles of the science parks.

| | | |
|---|---|---|
| **Cambourne Business Park Ltd**<br>The Marketing Office, Cambourne Business Park, Cambourne Rd<br>Cambridge CB23 6DW<br>52.22N, -0.08W | **Clarendon Business Centres** -<br>Belsyre Court<br>57 Woodstock Road<br>Oxford OX2 6HJ<br>51.76N, -1.26W | **Coldhams Business Park**<br>Cambridge CB1 3LH<br>52.20N, 0.17W |
| **Harwell Oxford**<br>The Library<br>Eighth Street<br>Didcot, Oxfordshire OX11 0RL<br>51.58N, -1.31W | **Halley Court Jordan Hill Business Park**<br>Banbury Rd<br>Oxford OX2 8EJ<br>51.79N, -1.27W | **Howland Road Business Park**<br>Howland Rd<br>Thame OX9 3GQ<br>51.74N, -0.96W |
| **Howbery Park**<br>Wallingford OX10 8BD<br>51.61N, -1.11W | **Jordan Hill Business Park**<br>Linacre House<br>Banbury Rd<br>Oxford OX2 8DP<br>51.79N, -1.27W | **Oxford Business Park**<br>Unit C1 Bldg 7600, The Quorum<br>Garsington Road<br>Cowley, Oxfordshire OX4 2JZ<br>51.74N, -1.21W |
| **Papworth Business Park**<br>Stirling Way<br>Papworth Everard<br>Cambridge CB23 3GY<br>52.24N, -0.11W | **Monument Park****<br>Warpsgrove Ln<br>Chalgrove<br>Oxford OX44 7PW<br>51.67N, -1.06W | **Wheatley Business Park**<br>Old London Rd<br>Wheatley, Oxford OX33 1YW<br>51.75N, -1.13W |
| **Witney Business & Innovation Centre**<br>Windrush Park Road<br>Witney, Oxfordshire OX29 7DX<br>51.79N, -1.52W | ** Has look and feel of an industrial park | |

**Table 7.14: Oxfordshire and Cambridgeshire Business Parks**

The implication of this finding for the conceptual framework is that there appears to be a strong case for disaggregating the current overlap between science and business parks due to the preponderance of the latter and from other technology properties as well. Indeed, findings call into question whether these contingent influences can be thought of as similar, and suggest that they perhaps need to be reconceptualised in a different way.

Oxfordshire and Cambridgeshire also are home to a wide complement of science parks, general and specialist, including those research participants summarily profiled below. Figure 6.9 shows the distribution of science and business parks in and around Oxon and Cambs and Appendix 4.1 shows the Oxfordshire and Cambridgeshire Science Parks. Findings confirm the presence of the key contingent influence, Science Parks, in the sub-regions.

| Oxon & Cambs Science Park/Contact | Address/Location Coordinates | Type of Science Park/ URL |
|---|---|---|
| **Begbroke Science Park (BSP)**<br>**Director**<br>Begbroke Science Park – University of Oxford – Where Science and Industry Meet[188] | Begbroke Hill, Woodstock Road<br>Begbroke OX5 1PF<br>51.82N, -1.31W | **Science Park**<br>www.begbroke.ox.ac.uk/ |
| **Granta Park (GP)**<br>**Director**<br>Granta Park Cambridge | McClintock Building<br>Great Abington, Cambs CB21 6GP<br>52.12N, 0.22W | **Science Park**<br>www.grantapark.co.uk |
| **Oxford Science Park (OSP)**<br>**Business Development Manager**<br>The Oxford Science Park | Magdalen Centre<br>Robert Robinson Avenue<br>Oxford OX4 4GA<br>51.72N, -1.22W | **Science Park**<br>http://www.oxfordsp.com/ |
| **St. John's Innovation Centre (SJIC)**<br>**Managing Director**<br>  [189] | St John's Innovation Centre<br>Cowley Road, Milton<br>Cambridge CB4 0WS<br>52.24N, 0.15W | **Innovation Centre**<br>http://www.stjohns.co.uk/ |

**Table 7.15: Participant Oxfordshire and Cambridgeshire Science Parks**

[188] http://www.begbroke.ox.ac.uk/home/about-us/image-gallery/ Accessed 06.12.14
[189] http://stjohns.co.uk/training/growth-accelerator-workshops/ Accessed 06.12.14

### 7.3.4 Science Park Intervention in Oxfordshire and Cambridgeshire

As noted several times previously, Science Parks are the core component of the contingent environment and are at the centre of the conceptual framework for this research because they play a key role in the accommodation of technology generally and specifically are strongly implicated in the site selection of foreign TMT firms in the UK. This section presents analysis of questions to Oxfordshire and Cambridgeshire Science Park principals, science park expert-practitioners, websites and various documents (Table 7.1). Analyses yielded a number of key findings on SP intervention (s.1.4) from which emerged several themes: ownership structure; age/stage of lifecycle; key claims and USP; tenant focus; and stated versus actual development strategy. Of these, the latter four, age/stage; claims/USP; tenant focus; and development strategy - may be interpreted as 'causal powers' under certain conditions such as recruitment. Findings are presented according to these themes and Table 7.17 closes the section with a summary of the analysis in relation to the research agenda. First, an 'average' profile of Oxfordshire and Cambridgeshire science park participants is presented.

| | Owner/ Age | Top 3 Claims | Tenant Focus | Geographical Focus | Stated Development Strategy | Actual Development Strategy |
|---|---|---|---|---|---|---|
| **Averages** | Sole HEI/JV 17.25 years | 1. Opportunity to link with HEIs<br>2. Tap into local innovation ecosystem<br>3. Association with world-leading R&D<br>4. Ideal innovation location | Advanced and specialist science, technology, engineering<br>Biomedicine<br>ICT –Telecoms<br>Nanotech<br>Pharma | Local (incl HEI)<br>Regional<br>International | Hybrid | **Incubator** |

**Table 7.16: Oxfordshire and Cambridgeshire Science Park Averages**

#### Ownership Structure

Oxfordshire and Cambridgeshire Science Parks exhibit a range of ownership models, including sole ownership by HEIs and joint ventures between HEIs and large multinationals. Begbroke Science Park (2000/11 yrs) claims to be a unique Oxfordshire science park given its ownership model (solely owned by Magdalen College, Oxford) but this is not unique, neither in Oxfordshire and Cambridgeshire or generally, either in UK or worldwide. St. John's Innovation Centre (1987/24 yrs) is also owned wholly by one shareholder, St. John's College, Cambridge.

However, it is the ownership model of Oxford Science Park (1991/20 yrs) that reflects an increasingly common ownership in the form of a joint venture between Magdalen College and the Prudential Financial Services Company, with a third company, M&G Real Estate, to manage Prudential's 'onsite' interests. Similarly, Granta Park (1997/14 yrs) was initially launched as a joint venture between MEPC[190] and The Welding Institute (TWI)[191]. There are several main implications of these two ownership models. Sole owners enjoy a greater degree of control (in terms of decision making and resource allocation) and success (sole owners enjoy more success in terms of becoming poles of local economic activity) than other forms of ownership (s.3.6.3).

**Age & Stage of Lifecycle**

All four respondent Science Parks were constructed or launched in (BSP) or prior to 2000 (SJIC, OSP and GC), which means that the average age of the properties is 17.25 years, and all are mature, 'established' science parks. The main implication of this lifecycle stage is that development strategies have had time to embed and the potential could be evaluated because the necessary minimum period of time has elapsed. This finding helps to validate the importance placed on science parts as a key contingent component of the conceptual framework, and by implication, whether SP behaviour can be effectively evaluated for links with TMT firm site selection, given that enough time has elapsed.

**Key Claims & USP**

Oxfordshire and Cambridgeshire science parks collectively make a number of broad claims in questionnaire responses and on websites. St. John's Innovation Centre claims to be "the first innovation centre of its kind in Europe', 'a supportive environment for tenant businesses and provide an environment in which technology transfer and innovation are promoted to assist small and medium-sized businesses' and the provision of "a dynamic and supportive incubation environment to accelerate the growth of ambitious innovative firms in the Cambridge region" (SJIC)[192]. Begbroke SP claims to "encourage links between start-up science based companies, their more established counterparts, the University and wider academic community" (BSP)[193]; "a thriving centre of excellence for science, technology and business occupiers" (OSP) and a destination for 'specialist skills', 'high-quality research' and

[190] http://www.mepc.com/home.aspx Accessed 07.12.14
[191] http://www.twi-global.com/ (The Welding Institute) 07.12.14
[192] http://www.stjohns.co.uk/strategy.html Accessed 06.12.14
[193] http://www.stjohns.co.uk/strategy.html Accessed 06.12.14

'commercialisation activity' in 'a world-leading science base' in one of the country's most innovative and entrepreneurial regions'. GP also places work/life balance in its key claims: "to help attain a good work-life balance, the Estate Team organises a sports and social programme and a range of amenities" (Granta Park[194]). These claims can be summarised and reduced to five key claims in terms of value-added business support; opportunity to link directly with a(n) HEI and the local innovation network; association with world-leading scientific and technological excellence; an unparalleled location for innovation and the promotion of work/life balance.

These combined claims paint the Oxfordshire and Cambridgeshire science park environment as one that is an ideal-type for TMTF, particularly those involved in advanced specialist science, engineering and technology R&D, whatever the size or geographic orientation. Added to these is the implied lure of world-beating universities in each of the sub-regions. These findings imbue SPs with a causal power when it comes to attracting TMT firms. The claims also confirm some reported in section 3.6.5.

**Size & Physical Workspace Capacity**

Oxfordshire and Cambridgeshire science parks currently possess nineteen buildings and ~780,000 sq. ft. of space, with a further >100,000 in agreed planning consent (*c.f.* M4C space capacity, s.6.3.4). Oxfordshire and Cambridgeshire space is distributed as follows. BSP offers 'around 32,000 sq. ft. of lettable space'[195] in six fully serviced buildings (Christian, IAT, Bungalow, Old Forge and Units 5 & 6) and a 'further 65,000 sq. ft. of University research space and ~97,000 sq. ft. with outline planning'. The space is marketed as "serviced, partially serviced and un-serviced offices plus wet or dry laboratories"[196]. Granta offers more than 85,000 sq. ft. of large rentable space in two buildings (Futures and Somerville); in addition to smaller, more flexible lets in two additional buildings (Riverside and McClintock). OSP boasts "more than 530,000 sq. ft. of office and laboratory space" across seven buildings, with a new building planned[197]. Finally, SJIC's offer includes ~65,000 sq. ft. in two buildings: the Innovation Centre, the "main building (with) 92 units ranging from 90 to 4,500 sq. ft. in floor area, with most units in the 200 – 1,000 sq. ft. range"; and the Jeffreys Building, which "has 8

[194] http://www.grantapark.co.uk/main.cfm?sid=gpark&pid=history Accessed 06.12.14
[195] Converted at: http://www.asknumbers.com/square-meter-to-square-feet.aspx Accessed 09.05.15
[196] http://www.begbroke.ox.ac.uk/home/space-and-facilities/available-property/ Accessed 09.05.15
[197] http://www.oxfordsp.com/commercial-property-offices-let-rent-oxford-science-park-oxfordshire.asp Accessed 09.05.15

units ranging from 2,960 sq. ft. to 12,960 sq. ft."[198]. In total, the SP workspace capacity on offer is approaching a million sq. ft. across the participant properties[199]. As above, the availability of physical space for a demanding sector imbues SPs with a causal power when it comes to attracting TMT firms because they have the capacity to accommodate them.

**SP Tenant Focus & Recruitment**

As noted in section 6.3.4, science park recruitment activities can focus on three attributes of prospective tenants; size, sector and geographic origin. The overwhelming sectoral focus of Oxfordshire and Cambridgeshire science parks is advanced and specialist science and engineering, ICT, telecommunications, biotech, nanotech and pharmaceuticals. Oxfordshire and Cambridgeshire properties tend to focus on small, medium and large firms, mainly domestic and from the locale or region. There are some international established large international companies. St. John's Innovation Centre focuses exclusively on local technology-based and enabled small and medium-sized businesses, particularly startups and new business ventures. Because the SP works on short-term flexible occupancy, the tenant mix is constantly changing

> "but the majority of businesses based at SJIC are involved in Biomedicine; Energy; the Environment; Computer/Telecoms; Industrial Technologies; R&D; Design of new products and services; Consultancy (technical) and Testing and analysis"[200]

Begbroke currently hosts 'around 30 (small, medium and large) companies and 20 research groups', which ideally come from the Oxon region and from one or more of the following five segments of established technology-based firms:

(i) Big Data and Energy Efficient Computing;
(ii) Life Sciences, Genomics and Synthetic Biology;
(iii) Advanced Materials and Nanotechnology; and
(iv) Energy Generation, Capture and Storage; and
(v) Automotive Research and Development[201].

Granta is exclusively focused on attracting large, established life sciences/pharmaceutical firms, including 'Big Pharma'. The Granta Park website shows it is home to MedImmune, the 'worldwide biologics research and development arm of Astra Zeneca' and Pfizer, amongst a

[198] http://stjohns.co.uk/accomodation/unit-availability/ Accessed 09.05.15
[199] At the time of data collection, two parks (BSP and OSP) were reporting less than full occupancy.
[200] http://stjohns.co.uk/accomodation/services-for-tenants/ Accessed 09.05.15
[201] http://www.begbroke.ox.ac.uk/home/whos-here/ Accessed 06.12.14

number of others, thus suggesting it has successfully attracted very large companies. Finally, OSP's sectoral focus includes life sciences, ICT, Telecoms and environmental sciences and OSP sees itself as a distinctive contemporary location for companies of all sizes, with no apparent limit on geographical origin. The current OSP tenant list contains more than 60 firms, including Sharp Research Laboratories (one of its first tenants), an IBM subsidiary, Nominet and engineering services giant, Amey[202]. Analysis of Oxfordshire and Cambridgeshire science parks preferences for tenants show that science parks there are prepared conceptually and practically for all sizes and origins of prospective firms involved in advanced science, engineering, pharmaceuticals and technology, which suggests that recruitment activities should not be fettered in any way, though a wide and seemingly unfocused remit could frustrate development strategy.

**Stated versus Actual Development Strategy**

The implementation of science park development strategy turns on focused recruitment activities driven by a clear tenant focus in relation to three prospective tenant attributes as discussed above, size, sector and geographical origin. Analysis revealed four key findings about Oxfordshire and Cambridgeshire science parks; first, participant properties are all classifiable as science parks, according to the definition(s) (s.2.7.2) and all are fully or jointly-owned by universities. Second, participants are all established parks, which mean that the results of any intended strategies can be assessed given the time relationship (s.3.6.3). Third, despite being an average age of 17.25 years, science parks are modern, well-positioned, connected and highly specialised, which makes the properties potentially very attractive to specialist technology firms. Finally, analysis revealed alignment of stated and actual strategy in one case, but confusion and uncertainty amongst other science park principals over the ontology of 'science park development strategy' in the other three cases. The above analysis lays the basis for a clear tenant profile of science parks, analysed by examining what the science parks say (from questionnaires and websites) and what they actually do (evidence of actual tenant bases). The raison d'etre of St. John's Innovation Centre has been explicit from the start of operations; to provide a supportive environment for tenants and an environment in which technology transfer and innovation are promoted to assist local small and medium-sized businesses. This focus was reinforced by SJIC's Mission Statement and its current Managing Director, when he answered 'yes' to the first question on whether the current tenant base is deliberate and then explained his park's strategy:

[202] http://www.oxfordsp.com/companies-list.asp Accessed 06.12.14

> 'To position SJIC as the location of choice for post-start-up, high-growth firms exploiting innovation commercially; to provide value-adding support services such as advice, training and networking centred on fund-raising and intellectual property issues; and 'to leverage the Cambridge brand'.

In answer to the all-important question on development strategy, the Director said it is:

> 'a considered, evidence-based plan focused on expanding or deepening business activities through targeting new services or locations or raising the level of professionalism and customer engagement; staying focused on core competences and total shareholder return'[203].

Begbroke focuses on five segments of established technology-based firms and currently hosts more than 50 commercial and research organisations. The segments suggests 'large firms', as evidenced by the quite impressive tenant list. Begbroke's Academic Director confirmed he had a deliberate strategy for the property which is: "to nurture the very high risk early stage companies such as University (or private) start-ups", which is an incubator strategy according to the definition, but which was partly qualified farther by saying:

> 'It means putting in place an infrastructure to help companies grow. So in our case we try to help between Technology Readiness Levels (TRL) 1 to around 5. We also help companies identify "grow-on" space for the TRL 5-9 activity[204].

However, it is difficult to reconcile the stated BSP strategy with its published technological focus and the current tenant list. Whilst statements suggest an Incubator Strategy, the tenant list suggests a Hybrid Strategy. These first two examples point towards the fundamental relation of this spinoff of the key contingent component of the conceptual framework, Science Park Development Strategy, to the effective management of science parks. One property (SJIC) shows perfect alignment, whereas the other (BSP) shows misalignment. This analysis is further reinforced by the Granta example, which showed neither familiarity with the development strategy concept nor an ability to characterise its strategy accurately. When asked about his development strategy, the Director answered affirmatively to the opening question on whether his current tenant base is deliberate, but then summarily explained development strategy as "construction opportunities" before distancing himself: 'it wasn't our strategy but the prior owners (MEPC); can't really speak to their strategy'[205].

[203] Questionnaire returned by MD St John's Innovation Centre, 24.07.13
[204] Questionnaire returned by Director, Begbroke Science Park, 28.07.13
[205] Questionnaire returned by Director, Granta Park, 25.07.13

The OSP tenant list contains 60 firms, including very large firms such as Sharp Research Laboratories and Amey, which suggest a definite strategic focus on attracting established TMTF. The Business Development Director was certain that his strategy is deliberate and designed: 'to encourage a portfolio of high tech companies, to grow on the Park' but did not respond to the specific follow-on question on development strategy[206]. Here, the stated aim seems to be at odds with the stated strategy, which itself seems to be at odds with the evidence of the tenant list. On paper, OSP has an incubator strategy but in practice, an attraction strategy. Oxfordshire and Cambridgeshire development strategies, stated and actual, are summarised below in Table 7.17.

### 7.3.5 Summary of Science Park Findings (Oxfordshire and Cambridgeshire)

This section examined findings relating to SP intervention, involving ownership structure; age/stage of lifecycle; key claims/USP; tenant focus; and stated versus actual development strategy), the latter four of which were analysed as 'causal powers'. Four key findings were revealed: first, in both cases where science parks were considered, firms selected science parks (Table 7.11); second, although science parks were not implicated in the decision making processes of TMT firms, with no mentions at the information gathering stage, the two Oxfordshire and Cambridgeshire firms still sited in one (Table 7.10); but third, the siting was done in spite of science parks, which exhibited a lack of awareness and familiarity with development strategy and consequently, strategic misalignment between stated and actual strategy (s.7.3.4). Fourth, the confluence of issues initially adjudged to be potential 'causal powers' could become 'causal liabilities' if strategic misalignment persists, resulting in sub-optimal performance of science parks due to frustration of aspirations in the long term and given the time implications of development strategies.

From the science park perspective, participant explanations were largely at odds with tenant evidence. Excepting SJIC, which showed a full alignment between the park's current tenant activities and stated strategy, the remaining respondents all missed the mark on the meaning of development strategy and/or the interpretation of tenant bases. Because participants were asked a specific question on the deliberateness of their development strategy and given two opportunities to answer the question (Appendix 4.7), it must be concluded that there was unfamiliarity with the concept and a lack of awareness as to how it should apply in practice. This finding has implications for the major research question, research objective two and

[206] Questionnaire returned by Business Development Director**,** Oxford Science Park, 29.07.13

subsidiary research question two. The following table summarises Oxfordshire and Cambridgeshire Science Park intervention, focused on four key considerations.

| Oxon & Cambs Science Park | Ownership structure/Owner / Year established | SP categorisation & USP | Tenant & Geographical focus | Development Strategy | |
|---|---|---|---|---|---|
| | | | | Stated | Actual |
| **Begbroke Science Park (BSP)** | Sole HEI: Oxford University/2000 | 3G Science Park | 30 (small, medium and large) companies and 20 research groups', which ideally come from the Oxon | Incubator | **HYBRID** |
| **Granta Park (GP)** | JV (HEI+Plc): Oxford University & TWI/1997 | 2G Research Park | large, international, established life sciences/pharma ceutical firms, including 'Big Pharma' | Hybrid | **ATTRACTION** |
| **Oxford Science Park (OSP)** | JV (HEI+Plc): Oxford University & Prudential/1991 | 3G Science Park | more than 60 life sciences, ICT, Telecoms and environmental sciences, UK and international | Incubator | **ATTRACTION/HYB RID** |
| **St. John's Innovation Centre (SJIC)** | Sole HEI: St. John's College, Cambridge University/1987 | 3G Innovation Centre | local technology-based and enabled small and medium-sized businesses, particularly startups and new business ventures | Incubator | **INCUBATOR** |

**Table 7.17: Summary of Oxfordshire and Cambridgeshire Science Park Intervention**

## 7.4 Summary of Oxfordshire and Cambridgeshire Firm-Level Findings

This chapter presented the second detailed Case Report on firm-level findings from Oxfordshire and Cambridgeshire, following a mixed case reporting structure. This section closes the case with a summary of key findings and relationships to the conceptual framework and research agenda, followed by a brief closing commentary.

### 7.4.1 Oxfordshire and Cambridgeshire Contextual Findings

Two general findings from the qualitative analysis of focused telephone interviews and documents published on the two counties concern the physical geography and sectoral focus of the sub-regions. First, the geography and infrastructure of Oxfordshire and

Cambridgeshire do not lend themselves to easy collaboration across the two cities (in fact, most publications address issues relating to their specific part of the region without mention of the other), also see section 7.4.4. Second, the profiling of Oxfordshire and Cambridgeshire firms part confirms the literature that the area sets out to attract new business ventures and start-ups but contradicts it on origin (not from the local geographic area, as the two example firms had originated in Finland and California) and sector (not from the life sciences/biotech sectors, as both were ICT, s.7.2.2.2).

It is clear, though, that both Oxfordshire and Cambridgeshire are well-known and respected worldwide as world class knowledge economies, underpinned by worldwide reputations as knowledge production centres based on world class universities, which have served the sub-regions well and kept them at the forefront of the world's most attractive destinations for technology. Several shortcomings do exist, however, and must be addressed if the regions are to build on well-established reputations and retain sub-regional attractiveness but as long as they stay highly focused, provide cutting edge R&D, they will remain attractive to the world's most ambitious firms, given they both are recognised as having created two of the world's most successful technology innovation ecosystems (s.7.1.4). On balance, however, findings confirm that Oxfordshire and Cambridgeshire are appropriate geo-spatial lenses through which to view the site selection decisions and processes of foreign TMTF landing in the UK.

### 7.4.2 The Structural Environment of Oxfordshire and Cambridgeshire TMT Firms

Analysis of the locational, settlement and site selection choices of participant TMT firms and the management actions of participant science parks revealed numerous findings, several of which call into question the initial conceptual framework, in particular, whether certain structures or components can be thought of as separate and distinct or need to be combined, and which suggests that the framework needs to be reconceptualised. Thus, findings are summarised next, guided by the reconceptualised framework, which is now reduced to five components, two structural factors and three contingent influences.

**Parent TMT Firm Internationalisation (Location & Settlement)**

In respect of the first two structural components, analysis revealed three findings, which focused on the nature and constitution of the component. First, this research validates the

importance placed on parent firm internationalisation strategy as a key structural component of the conceptual framework, and by implication, of foreign TMT firm behaviour in regard to locating to the UK. Second, it suggests that parent TMT firm internationalisation and settlement strategies could be conflated because reasons given for choices were the same, access and proximity to customers, markets and technologies (Table 7.8). Third, the two example firms, Relex and NetLogic broaden the dimensions of this newly combined structural factor by introducing additional reasons for location and settlement, which this research accepts may or may not be unique to the sub-regions for which the choices are made.

**Subsidiary TMT Firm Site Selection**

Analysis revealed six findings in respect of the second structural component; these findings focus on the influences on and process of the component, and its nature. First, findings help to validate the importance placed on subsidiary firm site selection strategy as a key structural component of the conceptual framework, and by implication, the process and involvement of stakeholders such as public agencies.

Second, the two public agency examples, OLEP and GCGPLEP, broaden the dimensions of this structural factor by highlighting differences in the way each deals with incoming firms, thereby suggesting that the site selection process may be different for each sub-region once enquiry handling is turned over to local economic development personnel (s.7.2.2.1; *c.f.* M4C, s.6.2.2.1). Third, one TMTF example, Relex Ltd, also broaden the dimensions of this structural component to include three long-standing claims of science parks (ss. 3.6.5, 6.3.4). In addition, it contemplates directly the major research question by clearly showing that the source of information did not come from any other sources but its own. Fourth, both TMTF examples further validate the fundamental presence of Subsidiary Firm Site Selection Strategy as a key structural component by siting on science parks, thereby reinforcing the realisation that science parks are a valid site for landing TMT firms and office function is an overriding reason for choosing a site. In both cases, firms had received 'very much' a priori information on science parks, thus lending credence to the typology of foreign TMTF based on a priori SP knowledge and initial siting decision. Fifth, the two TMTF examples suggest that fundamental aspects of subsidiary firm site selection are access and proximity to customers and markets, and access to technologies.

Finally, as noted in section 6.2.2.2, the methodological application of Critical Realism suggests that the first two structural factors, in conjunction with contingent influences caused the site

selection outcomes because CR postulates that the domain of the real contains the hidden 'structures' and 'causal mechanisms' (internationalisation and settlement) that produce the 'observable' empirical events (site selection).

### 7.4.3 The Contingent Environment of Oxfordshire and Cambridgeshire TMT Firms

Analysis of the contingent environment of site selection of Oxfordshire and Cambridgeshire participant TMT firms reveal several key findings across the three contingent influences of the newly reconceptualised framework.

**Science Parks, Business Parks & Development Strategy**

Analysis reveals seven findings in respect of the second structural component, which initially was comprised of a key sub-component, development strategy, and an aggregated view of all technology properties. Findings, first of all, validate the presence of the key contingent influence, Science Parks, in the target sub-regions (s.7.3.3.1), but simultaneously call into question whether they should be aggregated with other technology properties, particularly, business parks. Due to the preponderance of the latter (Table 7.14), the framework is reconceptualised to show business parks a separate and distinct contingent influence. Second, the technology property landscape of Oxfordshire and Cambridgeshire show significant SP penetration in both sub-regions. Third, as noted above, the two example firms both sited in science parks, which confirms that science parks play a key role in the accommodation of technology generally (s.7.2.2.2) and specifically are strongly implicated in the site selection of foreign TMT firms in the UK (also confirmed by several M4C firms which had considered, though later rejected science parks). The fourth and fifth findings focus on the status of the component, in particular attributes that, together, imbue science parks with 'causal powers' (in this case, to attract TMT firms), which arise under certain conditions such as development strategy implementation. The confirmed availability of physical space (s.7.3.4) for a demanding sector shows that Oxfordshire and Cambridgeshire SPs have the capacity to accommodate firms, thus imbuing them with a causal power when it comes to TMT firms but there is generally limited space. Sixth, given the time element inherent in development strategy, findings confirm that Oxfordshire and Cambridgeshire science parks could be effectively evaluated for links with TMT firm site selection, given that all science parks were 'established' parks (average age 17.25 years) and sufficient time had elapsed.

The final finding also relates to development strategy, with the two TMTF examples pointing toward the fundamental relationship between this sub-component and the effective management of science parks. Whereas one property (SJIC) shows perfect strategic alignment, the others (BSP) show varying degrees of misalignment, unfamiliarity and lack of awareness with the concept and inability to characterise strategy accurately.

**Public Agency Support & Private (Professional) Advice**

Analysis of Public Agency Support generated three findings, which also address research objective 1 and subsidiary research question 4 (s.1.3). First, findings validate the importance of 'public agency support' (in particular, UKTI and LEPs) in considerations of local economic development activity, the level at which both units of analysis of this research, landing TMT firms and UK science parks, operate. Second, findings clarify the underlying structures and processes of the component, revealing that the modus operandi of Oxfordshire and Cambridgeshire LEPs are completely different from those in the M4C (s.7.3.2). Third, this set of contingent relations validates LEPs as a contingent influence on the site selection of incoming firms and firmly establish their importance generally in the national inward investment scheme and the co-existence of public and private partners in the provision of firm location services.

**Accessibility to Customers, Markets, Suppliers & Talent**

Finally, analysis of accessibility generated two main findings, which highlight the focus of the contingent influence and clarify which outcomes underpin accessibility. Findings broaden the dimensions of this influence by confirming that 'access' includes wider considerations than talent (*c.f.* M4C) and second, prioritise the other outcomes, in this case, why firms seek access (customers, markets and technologies, s.7.3.1).

Finally, this chapter presented findings from four sources of primary and secondary data on Oxfordshire and Cambridgeshire. As in Chapter 6, the exploration was conducted from the perspective of firms and expert-practitioners but with specific reference to science parks in Oxfordshire and Cambridgeshire. This research found that on balance, Oxfordshire and Cambridgeshire are appropriate geo-spatial lenses through which to view the site selection decisions and processes of foreign TMT firms landing in the UK in 2011. This is because the sub-regions have the infrastructure (science and business parks), technology focus (s.7.3.4),

motivation and desire to attract technology from all over the world. As noted in section 7.4.1, these should help the sub-regions to remain attractive to the world's most ambitious TMT firms, given they both have created and been able to maintain two of the world's most successful technology innovation ecosystems.

**END of Chapter Seven**

# Chapter Eight

## Conclusions

## 8.1 Introduction to Conclusions

This thesis set out to explore the proposition that an ideal fit exists between knowledge-based, less space-intensive, geographically-unconstrained and growth-oriented foreign TMT firms and the UK science park environment, with its limited but sophisticated work spaces and in-built flexibility in terms of leases and grow-on space. Specifically, the purpose of the qualitative study was to explore the role played by UK science parks in the site selection of 'landed' foreign TMT firms, generally defined as 'science park intervention'. Based on evidence from the UK's three most technology-intensive sub-regions, this research finds that UK science parks play a tangential, almost accidental role at best in the site selection decisions of foreign TMT firms landing in the UK. The tangential nature of this influence manifests in four ways: (i) science parks did not receive a single 'mention' in any of the focused interviews with industry expert-practitioners (other than science park experts); (ii) science parks did not receive a single 'mention' in questions to foreign TMT firms on 'sources of information prior to landing'; (iii) science park principals showed a complete lack of awareness for the one theoretical concept that bridges the divide between them and technology-based firms; and most surprisingly, (iv) despite gathering 'very much' information on science parks *a priori*, ten of twelve foreign TMT firms chose alternative sites and the two onsite firms that chose science parks had received none of it's *a priori* information from a science park.

This closing chapter synthesises and summarises research from the previous three chapters in accordance with the revised conceptual framework and research agenda (objectives and questions, and introductory problem statements). Key findings from the qualitative analyses are summarised and presented in the following sequence: confirmation of previous research/literature; contradiction of previous research/literature; unexpected findings and contributions to new knowledge, where appropriate. Contributions and practical implications of the study are highlighted and limitations and future research directions outlined. Section 8.1.1 reiterates the problem statement and presents the revised research agenda and conceptual framework that underpinned and then emerged from this research. Section 8.2 summarises key research findings relating to the 'structural environment' and section 8.3 summarises key findings relating to the 'contingent environment' of foreign TMT firm site selection. Section 8.4 discusses contributions and implications of the research; section 8.5 discusses research limitations; and section 8.6 provides a reflective commentary to close the thesis.

### 8.1.1 Re-statement of a Revised Research Agenda

This research tested the long held notion that the most intimate of relationships exists between science parks and technology-based firms in a differentiated and unique way; differentiated because previous science park research has been conducted from the perspective of 'captive tenant firms' or firms in the vicinity of the park in additionality studies and usually limited to a comparison of two or three science parks (Appendix 1.1) and unique because it focused on a naturally 'controlled' sample of foreign TMTFs, all of whom entered the UK during the same period. This orientation differentiated the study from previous science park research which had been conducted from quite complimentary perspectives, small 'recruitment distances' and a limited sample of science parks. During the research, findings emerged, causing a re-think of the research agenda (objectives, questions and conceptual framework), updated below from section 1.4:

1. To confirm the key issues in location, settlement and site selection for foreign TMT firms in the UK;
2. To explore the extent to which UK science parks influence the site selection decisions of foreign TMT firms;
3. To develop a comprehensive typology of foreign TMT firms based on a priori knowledge of science parks; and
4. To capture and model the nexus of issues around location, settlement and site selection of foreign TMT firms and UK science parks.

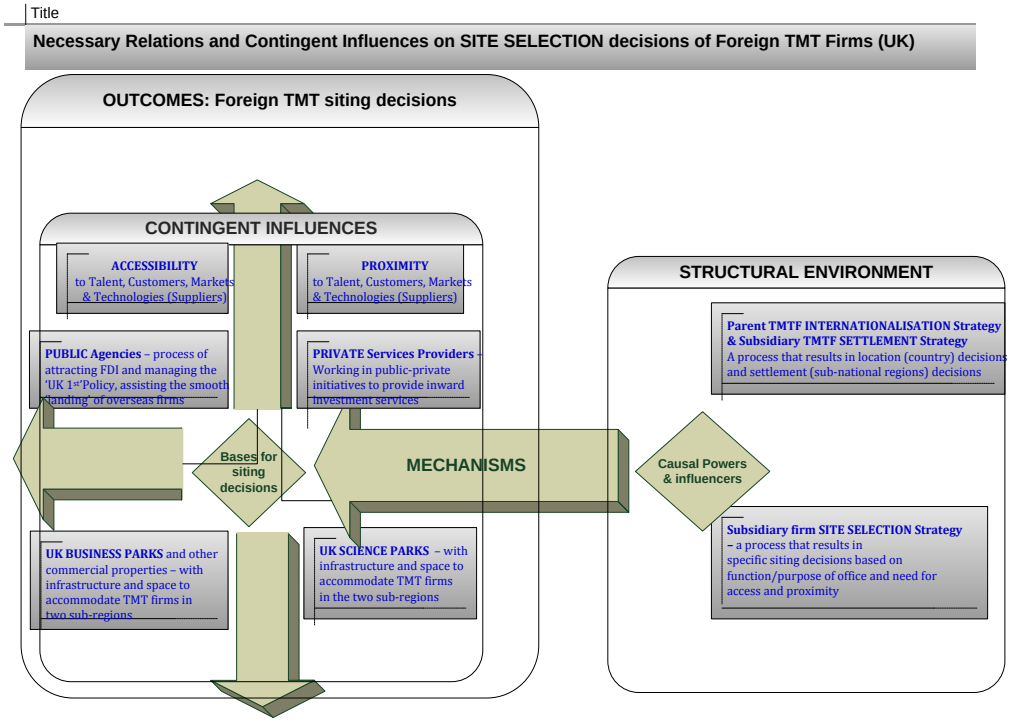
***What is the role played by UK science parks in the site selection of inbound foreign TMT firms?***

The following revised subsidiary research questions attend this major question:

1. What are the key reasons and process for foreign TMT firm site selection in the UK?
2. What is the current level of understanding and application of the concept of development strategy in UK science parks?
3. How can the site selection of foreign TMT firms be classified from the perspective of UK science parks
4. How can the issues from the nexus of foreign TMT firms and UK science parks be effectively captured and modelled?

To meet research objectives and address research questions, the study employed a detailed two-stage secondary research with follow-on methodological review (Chapters 2 through 4 and partly in Chapter 5) and a programme of empirical research to study science parks in

three sub-regions, the M4 Corridor and 'Oxfordshire and Cambridgeshire', from the perspectives of firms and expert-practitioners. New findings encouraged a re-think of concepts and re-conceptualisation of the framework, which has been revised from the re-working and/or emergence of necessary and contingent relations.




## Figure 8.1: Revised Conceptual Framework

## 8.2 Summary of Key Findings relating to the Structural Environment of Foreign TMT Firms (UK)

As noted, the Critical Realist conceptual framework (s.4.2.3.3) postulated that an external 'structural environment' is strongly implicated in TMT firm location, settlement and site selection. The initial framework identified three key structures, now reduced to two: (i) parent TMT firm internationalisation and settlement strategies; and (ii) subsidiary TMT firm site-selection strategy. This section summarises key findings from the qualitative analyses under the above component headings. The structures are dealt with next in section 8.2.1.

### 8.2.1 Foreign TMT Location (UK) and Settlement (Oxfordshire, Cambridgeshire & M4 Corridor)

Qualitative analyses revealed multiple findings relating to location in the UK and settlement in the target regions by foreign TMT firms. Findings are summarised and presented in the following sequence: findings that confirm previous research/literature; findings that contradict previous research/literature; unanticipated findings and finally, contributions to new knowledge.

Multiple findings confirm previous research. Foreign TMT firms locating in the UK in 2011/2 originated disproportionately from the USA, thus supporting Johansson and Vahlne's (1977) arguments on the importance of 'psychically proximate markets' to internationalisation. The average parent TMT firm is American, thirteen years old, privately owned, involved in ICT (software), with large staffs (487), deep multinationality (20 offices) and a high annual turnover (~£92m), with very healthy profits, suggesting that the firms in this research are large, well-resourced with significant asset power and enough multinational experience to facilitate internationalisation decisions involving location, settlement and site selection. Consistent with this profile, subsidiary firms entered the UK as wholly-owned subsidiaries (with two cases subsequently involving acquisitions), thus confirming Birkinshaw's proposition (1996) that the main unit of analysis for MNEs is now the subsidiary and the literature that well-resourced firms choose entry modes that yield total ownership and control (ss.6.2.2.2, 7.2.2.2).

Firms cited many accessibility and proximity-based reasons for parent TMT firm locational and settlement choices, in rank order: access to talent/skilled staff; customers; markets and proximity to customers, markets and transport networks (air, rail and roads). This was confirmed by the finding that all participants reported as 'very to extremely' good market accessibility from their sites. Views of the importance of access and proximity to customers, markets and talent/skilled staff align with the literature and confirm the long-accepted Marshallian observation that geographically concentrated industry activity tends to create pools of labour and specialised suppliers, which then become attractive for similar firms (ss.6.2.2.2, 6.3.1, 7.2.1 and 7.3.1). Six findings contradict previous research or the literature. The three UK sub-regions have seen a steady growth in economic development activity since the 1980's, but the technology agglomeration pattern in the 'M4 cluster' is distinctly non-uniform. There are 'mini clusters', punctuated with large areas showing ordinary ICT location

quotients (LQs). The economic geography of the M4 Corridor is dominated by twelve 'tech cities' that straddle the motorway at an average distance of ~2.4 km (s.6.1.2). Five 'eastern' cities and townships, and three in particular (Wokingham, Slough and Bracknell Forest), show exceptionally high ICT location quotients but this is not reflected in other parts of the M4C. If the analogy of a dolphin is applied to the M4C technology agglomeration pattern, the above average LQs are all located in the large 'head', with evidence of some activity in the 'tail' that is the Bristol/Bath area. Unlike the M4C, Oxfordshire and Cambridgeshire set out to attract advanced and specialist technology-based firms but findings contradict the literature on parent TMT firm size (firms had an average staff of 940 and annual turnover of ~£350m); sector (ICT), section 8.2.2; and geographic focus (the two firms originated from Finland and the USA). Finally, TMT firms tend to take a 'do-it-yourself' (DIY) approach to site selection, in contrast to approaches presented in the literature (s.3.5.2.1).

Finally, the fact that TMT firms in both sub-regions identified virtually the same reasons for location (country) and settlement (sub-national region) was unexpected; the order or preferences changed but the reasons remained the same. The same five accessibility and proximity reasons given for location were also given for settlement, namely: access to markets; customers; talent/skilled staff (or the ability to attract) and proximity to customers, markets and transport networks (air, rail and roads). This is the first of several findings which call into question the initial conceptual framework, in particular, whether the parent firm internationalisation structure should remain as separate and distinct from the subsidiary firm settlement or better to be combined, as in the revised framework.

### 8.2.2 Subsidiary TMT Site-Selection

The findings from this central focus of the research clarified the process of searching for and selecting a site from which to do business, crucially, whether this was on or off a science park, and the reasons for the decision. The existence of site-specific advantages was also confirmed.

Two findings confirm the literature with regards to subsidiary siting, however the second also part contradicts the literature. First, the profiling of M4C TMT firms confirms earlier research in the literature that the sub-region sets out to attract established ICT firms, many of which have small to medium operations but owned by very large parent firms (two with

employee numbers of 700 and 1,800 and annual turnovers of US$8.43bn and US$600m[207], s.6.2.3.2). The profiling of Oxfordshire and Cambridgeshire TMT subsidiary firms confirms previous research and literature that the sub-regions set out to attract technology-based firms but contradicts the literature on size (average turnover of >£37m, total staff of <77); origin (not from the local geographic area) and sector (both from ICT and not from the life sciences/biotech sectors, s.3.4.1.1).

The research also confirms a long and complex process of searching for an appropriate site, involving multiple stakeholders, public and private. For M4C property searches, the process can include UKTI, Chambers of Commerce, professional services providers and estate agents, and can start by meeting the client at the airport, or train station and then going directly to an 'all parties' meeting. For Oxfordshire and Cambridgeshire property searches, the process is especially complex and difficult because of the unique challenges inherent in doing business in the sub-region. However, two new contributions are that the property search element of the site selection process comes late and prioritises around two key factors: (i) its most significant operating costs, access to 'labour catchment' and cost of labour' with the final choice involving quite a lot of subjective choices of 'both the decision makers, their personal preferences and the labour pool'; and (ii) the function or main reason for having an office in a particular locale, for example, if 'linkages to universities' and R&D are sought, then Oxford but if Sales & Marketing or customer service, then Reading (ss.6.4.2, 7.4.2).

On the issue of site selection and in contrast with the literature, findings reveal that TMT firms tend to deploy a 'do-it-yourself' (DIY) approach, using parent firm or own resources and making subjective choices based on talent availability, the residential choice of a company principal or the de facto purpose/function of the required site, as noted above. Alternatively, firms may engage private professional services providers; either way, they come into contact with public agencies, via a bespoke system (or part) at the back end. This bespoke system is a central part of the UKTI value proposition involving the Chamber, private providers and local authorities. The approach is simple and pragmatic and can be contrasted with the textbook approaches outlined in section 3.5.2.1.

Finally, findings reveal the existence of site-specific advantages and site-specific considerations, the distinction being that the former are the very practical benefits that are taken into account after all other advantages, locational and regional, have been, and the latter are the very practical considerations that either appear at the start of the search process when very specific requirements may be critical to the start or life of the project, or

[207] For example, Broadcom, GENBAND, CommVault and Promise Technology

more generally, at the end of the process, after all other considerations are taken into account, (ss.6.1.3, 7.1.4). Site-specific advantages are the pragmatic things that have to work in a site and include: access to infrastructure; access to labour (catchment and cost); real estate (availability, quality and cost); utilities (reliability and cost); telecommunications (coverage, reliability and cost); etc. Unique site considerations include contemporary offices with facilities and equipment to complete 'soft landing' and the pull of similar firms, the latter confirming the established Marshallian (1920) externalities. Site considerations become the focus of the analysis before negotiations can begin in earnest or (more usually) at the last stage of site selection. These findings address research objectives 1 and 2, the major research question and subsidiary research questions 2 and 3. Findings also help to validate the importance placed on subsidiary firm site selection as a key structural component of the conceptual framework, and by implication, the process and involvement of stakeholders.

## 8.3 Summary of Key Findings relating to the Contingent Environment of Foreign TMT Firms (UK)

As noted (s.8.2), the Critical Realist conceptual framework also hypothesised that the mechanisms of the structural environment generated a 'contingent environment', which has now increased to five sets of contingent relations: (i) Accessibility; (ii) Proximity (an emergent contingent influence, an emergent influence, disaggregated from accessibility); (iii) Public Agencies and Private Professional Services providers (now a combined contingent influence); (iv) Science Parks (now disaggregated from other properties); and (v) Business Parks (an emergent contingent influence). The key findings relating to the new contingent environment are presented next, sequenced according to confirmation, contradiction, unexpected findings and contributions.

### 8.3.1 Business Parks (Oxfordshire, Cambridgeshire & M4 Corridor)

The Oxfordshire, Cambridgeshire and M4C stock of Business Parks currently numbers fifty six or twice as many as science parks. The dominance (presence and number) of these similar properties generate several implications: first, the very high Business Park penetration broadens the dimensions of this contingent factor and second, it highlights the fact that science parks are not regarded as providing TMT firms privileged proximity and access. Of the total sample of firms, six sited in Business Parks and five in Science Parks, thus proving they have at least an equal 'pull' on foreign TMT firms (Appendices 6.2 and 7.2).

### 8.3.2 Science Parks (Oxfordshire, Cambridgeshire & M4C)

The findings on this central contingent influence confirmed the rate of science park penetration in the sub-regions; the ownership of these properties; the reasons for siting (Oxfordshire and Cambridgeshire firms) and not siting (M4C firms) on a science park and impact of age, a correlate of development strategy. Several findings confirm previous science park research.

Analysis of the technological property stock for both sub-regions confirmed a variety of properties (science, technology, research parks) in each but a very different constitution in the target regions, with the Oxfordshire and Cambridgeshire's science park stock outnumbering that of the M4C by almost seven times (20+ to 3). This suggests that Oxfordshire and Cambridgeshire should be better equipped to accommodate technology-based firms; however, this higher density of science parks has not translated into a higher attraction rate for overseas TMT firms[208]; indeed, the opposite has happened with the M4C attracting TMTFs at a ratio of 3:1 (s.7.2.2.2).

Of the seven participant science parks, five (Begbroke, Brunel, Oxford, SJIC, Reading) are owned fully or partly by Universities. Of the remaining two (Granta and Bristol & Bath), one is jointly owned between HEIs and large private enterprises, and the other (BBSP) is a consortium between HEIs and several public and private organisations. Each type of ownership has its advantages but sole owners tend to have greatest flexibility when it comes to decision making and sole-owners are amongst the most successful (for example, Stanford RP, Surrey RP). This finding adds to the literature as previous research has overlooked the question of ownership advantages.

Analysis reveals five reasons for siting in science parks (shared services; facilities and equipment; business support; proximity to technology suppliers; access to talent and customers, Table 7.11) and three main reasons for not considering siting in science parks (not consistent with the function of the office; lack of proximity to markets and customers). This suggests that where the primary function of the UK subsidiary is 'client-facing', for example, sales and marketing or customer service, and something other than R&D, one inference is that the SP did not offer any specific value-add (Tables 6.3.4 and 7.2.2.2).

[208] Of course, there may be alternative explanations for this, for example, not the focus (sector or geographic) of the SPs

These findings validate the fundamental presence of science parks as a key contingent influence of the conceptual framework, while reinforcing the realisation that science parks are a valid site for landing TMT firms. Finally, on the age of science parks, findings confirm that Oxfordshire and Cambridgeshire parks are established (average age >17 years) and probably classifiable as '3rd Generation Science Parks' (s.1.3), whereas M4C science parks are 'young' (average age <5 years). Given the time element inherent in development strategy, age raises the issue of whether science parks can be evaluated effectively for successful implementation of development strategy.

#### 8.3.2.1 UK Science Park Development Strategies (Oxfordshire, Cambridgeshire & M4C)

As noted, science parks are themselves influenced by a key subcomponent, development strategy. Four findings contribute new knowledge about science parks; first, 'development strategy' is not a term with which UK Science Park managers and experts are familiar. There was no evidence of familiarity by experts in either of the three sub-regions or with the simple way in which the concept is intended to be implemented in practice (ss.6.3.4 and 7.3.4).

Analysis shows that science parks in Oxfordshire and Cambridgeshire deploy a mix of strategies, hybrid, attraction and incubator (Table 7.17). However, self-reports focused on incubator strategies (3 of 4) and a hybrid strategy. M4C science parks reported hybrid strategies but analysis showed two incubator and one hybrid strategy (Table 6.17). This means, except for two cases (SJIC, BBSP), practice is detached from development strategy theory, which renders the strategic choices accidental (or emergent), rather than a result of design. Given the nature of strategy and strategic choice, the choices cannot really be 'strategic' in nature (ss.6.3.3 and 7.3.3). Consequently, 'strategic gaps' were discovered in actual development strategies where Oxfordshire and Cambridgeshire and M4C science parks published information on tenant aspirations which did not reconcile with actual tenant lists. The identification of both hybrid strategies and the concept of strategic gaps extend the literature. Given this general confirmation of a lack of familiarity with development strategy**,** it can be concluded that UK Science Parks play at best, a reactive role, and at worst, an 'accidental' role in the attraction of foreign TMT firms. The realisation that development strategy remains an alien concept at all levels of SP practice (Operations/Business Development Managers, Managing Director, Chief Executive, Chairman) is an important but unexpected finding. To not know the particulars (exact definitions) of the concept is one thing

but neither to be totally unaware nor have ever heard is quite another. Second, subsidiary TMT firm settlement choices (for M4C, Oxfordshire and Cambridgeshire) were virtually the same for parent TMT firm location (UK) choices. Finally, foreign TMT firms entering the UK in 2011 settled in the M4C at a ratio of almost 3:1.

Findings validate the importance of development strategy as a key sub-component of the science park contingent influence on TMT site selection. Findings also help to validate the importance placed on public and private support as a key contingent influence on TMT firm site selection, and by implication, the process and involvement of stakeholders, such as public agencies and private professional services providers. These findings address the major research question, research objective 1, and subsidiary research question 1.

### 8.3.3 UK Public Agency Support & Private Professional Services Provision

The newly aggregated component of the contingent environment, UK Public Agency support and Private Professional Services Provision, is made possible by the policy shift generally and the new way of working in LEPs, specifically, which encourages public-private collaboration, best reflected in the UK First inward investment strategy.

Findings confirm that firms entering the UK get a full range of bespoke support in selecting sites for which was described a multi-stage process (ss.6.2.2.1 and 7.2.2.1). Three additional findings contribute to the literature on UK public agency support. The shift in policy from regionalism to localism is still in its infancy (2010 – 2014) so whilst there are clear benefits in the cases of the Thames Valley, Swindon and Oxfordshire, the jury is still out as to how benefits will accrue across the rest of the country, with respondents positive, but not all agreeing that it is a good thing for economic development. The policy shift is cause for some disquiet in locales where there are practical challenges of implementing LEPs due to unclear boundaries or where LEPs are perceived as 'weak' due to less resources or coverage. In addition, findings revealed differing opinions and differences between the impact and the policy instrument, LEP (particularly, the extent to which it has 'embedded'); opinions ranged from 'business as usual' to good work being done to more work needing to be done. On the other hand, findings reveal a near consensus that the UKTI inward investment strategy (2013) is working well and the previous strategy (2008) was also implemented successfully. UK inward investment is now effectively a public-private process, though not much is said or captured about the latter.

Indeed, findings confirm a general confidence that throughout quite a period of change for foreign companies entering the UK (post-2008), client expectations have been met and by a broad and increasing range of providers, both public and private sector. The number and type of stakeholders in UKTI relationships have grown[209] and this change has generally been widely accepted as good for inward investment. Whilst this public-private partnership is good, it is not clear how rewards are shared. Finally, participants revealed a general feeling that the UK should continue to attract TMT firms for many reasons, namely access and proximity to markets, customers, and talent and because of the above new approach to economic development. These findings help farther to validate the importance placed on public and private support as a key contingent influence on TMT firm site selection, and by implication, the process and involvement of stakeholders, such as public agencies and private professional services providers.

### 8.3.4 Accessibility & Proximity

This research confirms that accessibility and proximity[210] to talent, customers, markets, transport and suppliers are critical for firms and factor in their location, settlement and site selection decisions, right up to the point of taking premises and afterward. As noted above in sections 6.4.3 and 7.4.3, the choices made by participant firms created a clear distinction between the two, which suggests that proximity is a separate but related component to accessibility, so they have been reconceptualised accordingly.

Second, findings broaden the dimensions of this contingent influence by confirming that 'access' includes 'goals' other than talent which highlighted the importance of four additional relations – customers, markets, technologies (suppliers) and transport networks. As in several examples above, analysis confirms that TMT firms rated access to talent/labour more highly than any other site-specific considerations. This most oft-repeated of site-specific advantages includes the availability of talent and/or the ability of the locale to attract talent.

Third, the disaggregation of accessibility from proximity, was an unexpected finding, part generated by a distinct set of relations for proximity from firm choices and in rank order – customers, markets and transport (ss.6.2.2.2 and 7.3.1).

Finally, findings confirm that access and proximity to markets take on added importance, especially when the office is charged with a specific function, either 'front office' (prospecting, marketing and sales, customer service) or 'back office' (R&D, technology supply/partnering).

[209] An opportunity was missed to ask how this compared with RDA
[210] These are now disaggregated but dealt with together to avoid duplication.

These findings address research objective 1 and subsidiary research question 1, and help farther to validate the importance placed on public and private support as a key contingent influence on TMT firm site selection, and by implication, the process and involvement of stakeholders, such as public agencies and private professional services providers.

## 8.4 Contributions and Implications of the Research

This section summarises the contributions of the research, followed by a bipolar distinction between theoretical and practical implications of key contributions are then discussed in more detail[211].

### 8.4.1 Contributions to New Knowledge on Science Park Intervention

As noted, this research has produced seven confirmations and six contradictions of the extant academic and practitioner literature, along with three unexpected findings. In addition, this research makes seven contributions to new knowledge, six of which turn on one or both of the study's units of analysis, foreign TMT firms and UK science parks, and one that focuses on a key stakeholder in the site selection process.

First, this research generated a simple and clear typology of foreign TMT firms, based on *a priori* knowledge of science parks. This categorisation suggests a disconnect between science park additionality (particularly, the wide-ranging claims, s.3.6.5) and TMTF siting preferences (ss.6.2.2.2 and 7.2.2.2) because TMT firm *a priori* knowledge of science parks during the site selection process did not routinely end in SP selection (ss.6.2.4 and 6.5.1). Ten of twelve firms chose alternative sites, though not all firms possessed the same level of foreknowledge. Critical Realism allows for alternative explanations but assuming the overriding site selection rationale applies and space was available at the time[212], then ceteris parabus, this is an equally valid explanation because to TMT firms, SPs were not sufficiently differentiated to 'win the premises beauty context'.

Second, this research successfully conceptualised the site selection process for foreign TMT firms by correctly identifying the key structures, influences and relations in a realist conceptual framework that captures the nexus of issues around site selection and UK science

[211] These findings are summarised in Table 8.1 (attached as Appendix 8.2)
[212] Six of seven participant parks reported availability in their responses.

parks. Whilst two structural and two contingent components had to be aggregated and two contingent influences disaggregated, this did not affect the overall rigour and robustness of the framework or its ability to marshal the research journey to findings. Besides, Critical Realism allows for adjustments of this sort as new knowledge comes to light that can refine and sharpen conclusions.

Third, this research has produced new insight into why foreign TMT firms may or may not site on science parks. Firms provided a finite set of reasons for siting on and off science parks: five main reasons were given for siting on science parks (shared services; facilities and equipment; business support[213]; proximity to technology suppliers; access to talent and customers, Table 7.11) and three main reasons for not siting on science parks (not consistent with the function of the office; lack of proximity to markets and lack of proximity to customers, s.8.3.1). Closely related to this 'why on/why off' finding is the property search element of site selection, which comes late and prioritises around two things: (i) its most significant operating costs (access to 'labour catchment' and cost of labour'); and (ii) the function or main reason for having an office in a particular locale. A closer examination of the first reason for selecting a SP, however, shows that the reasons are quite mundane and are in no way, special or distinctive of a property since Business Parks and even serviced offices also provide the same amenities. Conversely, the reasons for not siting on a SP are revealing because not every property provides access and proximity. Therefore, this finding offers new insight into why SPs may not be the 'enclaves of privilege' for TMTF they claim to be.

Fourth, this research has identified a gap in the practice of managing science parks. Five of seven science parks in the study incorrectly characterised their development strategy based on the comparison of self-definitions with tenant constitutions. Oxfordshire and Cambridgeshire science parks (3 of 4) deploy hybrid, attraction and incubator strategies, however, self-reports focused on incubator strategies. M4C science parks reported hybrid strategies but analysis showed two incubator and one hybrid strategy (Table 6.14). So, except for two cases, the practice is detached from theory, and science park strategic choices are accidental (or emergent) and not by design. Given this general confirmation of a lack of familiarity with development strategy**,** it can be concluded that UK Science Parks play at best, a reactive role, and at worst, an 'accidental' role in the attraction of foreign TMT firms. As noted (s.8.3.2.1), to not know the particulars of the concept (exact definition, how the strategies are intended to be deployed) is one thing, but either to be totally unaware or never

[213] These overlap with SP claims

to have heard of it is quite extraordinary (especially given that five of seven participant science parks are owned fully or partly by Universities)!

Fifth, this research provides an explanation for the TMT agglomeration patterns in the three target sub-regions. In Oxfordshire and Cambridgeshire, the pattern shows a very strong 'clustering' around and in science parks. The Oxon 'built environment' may provide a possible alternative explanation for this pattern in a county where commercial planning permission is hard to obtain. The agglomeration pattern in the M4C, on the other hand, is distinctly non-uniform, with two quite well-defined 'mini clusters' (with very high ICT LQs), punctuated with large areas showing ordinary location quotients. The M4 Corridor is dominated by twelve 'tech cities' that straddle the motorway at an average distance of ~2.4 km (s.6.1.2). Five 'eastern' cities and townships, and three in particular, show exceptionally high ICT location quotients but this is not reflected in other parts of the M4C. If the analogy of a dolphin is applied to the M4C technology agglomeration pattern, the above average LQs are all located in the large 'head', with evidence of some activity in the 'tail'.

Sixth, this research has established the existence of site-specific advantages (SSA) and considerations which play a key role in the site selection process. Like countries, regions and firms that are known to possess specific advantages, sites possess SSA, which come into play, either at the start of the selection process (when they can be deal stoppers) or more normally/commonly, at the end of the process (when they can be deal closers). In Oxfordshire and Cambridgeshire, SSA include specific access to technological R&D, much of it advanced, in the universities; and in M4C, access to talent and proximity to transport (particularly, Heathrow Airport) which enables access to customers and markets.

Finally, this research has identified an emerging phenomenon in respect of how LEPs, the current preferred economic development policy instrument, manage inward investment. The new competitive way of working has resulted in subjective interpretation of inward investment remits, the blurring of lines between public and private provision, and de-prioritisation of inward investment, which have resulted in a type of 'local economic cannibalism' in which smaller, less well-resourced LEPs pursue investment which is already sited in the UK, sometimes in neighbouring authorities. This 'localisation' of inward investment is a clear example of 'causal liabilities', which arise as the negotiation process generally and pitch for attracting firms, specifically, are played out.

These contributions help to validate the choice of the two units of analyses and the importance placed on bringing them together in this exploratory study, and validate the constitution of the conceptual framework, particularly, the structural components, which in conjunction with contingent relations cause the outcome of TMTF site selection. These contributions address the full research agenda (objectives and subsidiary research questions) and have implications for theory and practice/policy.

#### 8.4.1.1 Three Theoretical Propositions for Science Park Development

Of the findings summarised above, three in particular have important implications for developing science parks and influencing understanding of how science parks can be managed more effectively. The combination of these findings is driven by the methodological choices in this research, specifically, by Critical Realism, which allows the 'abstraction of findings such that valid analytical generalisations can be made that apply to similar contexts' (s.4.1.2) and Yin's (2009) recommendation that case study findings are generalisable to theoretical propositions and not to populations or universes. In this sense, the case, like the experiment, does not represent a 'sample', and the investigator's goal is to expand and generalise theories through 'analytical generalization' (s.4.5.1.1). The combination of two findings builds on Ylinenpää's (2001) original definitions and is generalisable to three theoretical propositions about science parks.

First, findings reveal a total lack of knowledge regarding development strategies and more importantly, the operational implications of those strategies. Second, TMT firm site selection based on a priori knowledge of science parks suggests strongly that a high level of knowledge does not necessarily result in siting on a(n) SP. The synthesis of these findings is the basis for two theoretical propositions, the first of which states that science parks would be more effectively managed if development was 'shepherded' along one of three trajectories; 'Attraction' (A); 'Build' (B); and/or 'Combination' (C).

Each trajectory has ramifications for strategic and business planning, space planning and routine operations ('proposition one'). Strategic implications concern the time over which the property should reasonably expect returns on its investments, sunk and ongoing, and operational implications concern where and for how long resources will be allocated to underpin strategic plans.

Spatial implications focus on how much space will be required and how space will be provided over what timescale and divided to accommodate and service tenants. Thus, 'proposition two' provides that strategic, operational and spatial considerations must be aligned in order to promote maximum successful development, *c.f.* sub-optimal development occurs when property spaces might be full but little thought has been given to the needs of the property and resource allocation or the time over which certain outcomes could be assessed, for example, its impact on the locale or region in which the SP is based. Finally, 'proposition three' provides that if science parks effectively implement and resource development strategies, the science park will produce in due course, 'propulsive effects' that result in benefits that accrue to the locale and region. These three propositions build on Ylinenpää, with two additional variations to development strategies based on the recognition that strategies can indeed be combined, based on evidence from practice (ss.6.3.4, 7.3.4).

#### 8.4.1.2 Four Levels of Policy Implications

This research identifies four levels of stakeholders in respect of whom policy implications are relevant from the findings and contributions to new knowledge discussed above. Primarily, findings and contributions implicate Science Park 'primary' stakeholders in investment, ownership and management (who conceive, finance, operate and manage science parks), which include HEIs[214] (in particular, those that own or part own SPs). However, there are also implications for economic development policy, at both the national (particularly, policymakers like UKTI) and local (LEPs and Local Authorities) levels and private professional providers of corporate real estate (CRE) and plant location (PL) services. Five policy implications are relevant for:

1. Science Park Owners: Ownership of science parks involves HEIs, private companies, large multinationals and public bodies, the implications of which are that public ownership obliges SP leadership to serve the public in the best possible way, which means judicious use of publicly funded resources, and private ownership obliges SP leadership to serve shareholders best by allocating resources for optimal ROI.
2. Science Park Planners and Developers: Better knowledge of the theory and practice of science park development strategy would lead to more effective planning, development and management, in terms of resources allocation (personnel and funds) and projecting outcomes;
3. Science Park Influencers, UKTI and LEPs: SP development strategies produce three general timelines, the implications of which are that appropriate and realistic planning horizons can be placed on properties, so expectations can be managed better:

[214] HEIs are kept separate due to their prevalence as SP owners.

A. Attraction strategy - a maximum timeline of five to seven years;
B. Build/Incubation strategy - a minimum of ten to fifteen years with the possibility of exceeding twenty years in some cases;
C. Combined/Hybrid strategy - a minimum of five to a maximum of fifteen years or more[215].

4. Science Park Influencers, UKTI and LEPs: 'Proposition three' above provides that if science parks effectively implement and resource development strategies, in due course science parks will produce contextual effects the benefits of which accrue to the locale and region.
5. Science Park experts, CRE and PL: Finally, inbound foreign TMT firms have quite specific needs and very few places in the UK offer the mix of access, proximity and amenities that the sub-regions under study do. From both a national and local perspective, the clear implications are that the settling and site selection processes could be expedited.

When it comes to science park planning, strategic unclarity hinders the ability of the SP effectively to plan and conceive effective planning horizons because each strategy has clear timeline implications. As noted, an Incubator strategy may take a minimum of ten years and often, more than twenty years to 'bear fruit' and produce the contextual effects (proximate agglomeration (for example, from spinouts) a property owner/operator (especially public sector) may expect, for example, St. John's Innovation Centre. On the other hand, an Attraction strategy targeted at global firms may be 'up and running' relatively quickly but the property may have incorrectly estimated the resources needed to fund such a campaign. Tenant firm recruitment is sub-optimal in situations of strategic unclarity because it ignores the types of tenants and the resources needed to market/promote the property effectively. For example, recruiting 'incubatees' is a much less resource-intensive proposition than recruiting firms that start from a large 'nominal recruitment distance', such as global firms headquartered half-way around the world. Potential costs of a 'strategic gap' arise as a result of an absent development strategy, misaligned strategy or ill-conceived strategy has at least two key implications for a science park. The first deals with strategic planning and reasonable expectations of 'returns on strategic effort' and the second concerns effective resource planning and allocation of resources. Given the three distinct timelines that inhere strategies, expectations could be more realistically managed and resources better allocated. These implications affect all stakeholders.

[215] **Note**: Timelines are different from those associated with the evolution of SPs (sec.1.3) because these accord with Ylinenpaa (2001), whereas Allen's (2006) does not.

## 8.5 Five Limitations of Research & Future Research

This exploratory research has been conducted on an established phenomenon, science parks(s), from a(n) unique perspective, 'landed' foreign TMT firms. The critical realist research required a qualitative approach and lent itself to case-based research and the general field of study (economic geography). As a direct consequence of the above methodological choices, five limitations were encountered.

First, to overcome the challenge of finding source data, TMTF data was eventually taken from a particular database; although Deloitte is globally respected for its TMT research and the quality of its data, it is always possible that relying on one database means that some firms are excluded from this study.

Second, methodological choices (CR, qualitative, case-based) imposed overarching demands, which circumvented positivistic concerns such as representativeness, sample size and sampling but in lieu, manifested as qualitative outputs including 'thick description' and the liberal use of quotes to support the narrative, which may appear descriptive in parts. Third, due to the cross-sectional nature, UK-centric focus of the study and the target sub-regions proximity to London, it means that a snapshot only was taken of events, outcomes and processes in a single area ('eastern' south central England), and some issues related to the worldwide phenomenon of science parks, may have been missed or the settlement data distorted because of London.

Fourth, in a high proportion of TMT participants (8 of 12) there was change in personnel and in four firms, changes of address within two years of settling, which mean that while a cross sectional timing was the best choice (see above), it would be difficult to follow up findings, if needed. Finally, given the total lack of awareness of development strategy amongst research participants, it might be argued that the qualitative questions were too 'open', giving participants too much leeway to interpret meaning and inviting them to misconstrue the notion of development strategy almost entirely.

Consequently, research findings would benefit from further testing in several ways. The first extension would be to widen the research in one of three ways; by focusing on UK-wide science parks, then on science parks around the world to test insights more broadly. Next, the study could be widened (beyond Deloitte) to include a more diverse set of TMT firms and get a fuller picture of siting preferences of TMT firms. These extensions to the study would confirm the technology site selection process and test the strength of the relationship between a priori SP knowledge and siting on SPs.

New research might also apply new methodological choices (quantitative), which would require sample sizes to be representative, potentially pacing a different interpretation on the findings. Third, as noted above, qualitative questions could be revised.

Finally, this research has turned on the importance of science park development strategy as a way of correlating a park's tenant recruitment activities with the site selection choices of inward bound foreign TMT firms, generally labelled 'science park intervention', so it was reasonable to consider the implications of strategic gaps and unclarity, and to leverage these oversights to produce three theoretical propositions. Therefore, one key recommendation for future research would be the full testing of theoretical propositions in a longitudinal study lasting not less than five to no more than fifteen years to test each proposition.

## 8.6 Closing Reflective Commentary on the Thesis

This chapter summarised the key findings of the research, discussed contributions and implications of contributions to theory (including theoretical propositions for science park development) and policy/practice with limitations and suggestions for further research.

Science Parks can be an effective economic development instrument that starts at the local level and builds by creating propulsive effects that impact the region and possibly knock-on effects that are felt at a national level. Science parks are an integral part of the UK's national and regional innovation systems and research infrastructure, and as such, are essential to the dialogue and efforts to maintain the UK as a top innovation-driven economy (s.2.4.1). As emphasised by the Right Honourable David Willetts, MP at UKPSA's 30th Anniversary gathering (2014)[216]:

> "I am in no doubt that science parks are an important part of the research infrastructure in the UK and an important part of our ambitions to be the best place in the world to do science".

Willetts celebrated the success of the UK in the Seventh European Framework Programme for Research and Technological Development, in which "UK organisations took 15.5% of the programme's budget, or just under €7 billion", … and 'secured more funding than any other country in the last two calendar years of the programme'.

[216] https://www.gov.uk/government/speeches/speech-by-david-willetts-to-the-uk-science-park-association Accessed 27.03.15

This positions the UK well for the new Framework Programme, Horizon 2020, which is "the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over seven years, 2014 to 2020"[217], and which expands for the first time into innovation support activities. The EU has taken a very positive view of science parks and sees them as "the perfect habitat for businesses and institutions of the global knowledge economy (which) promote economic development and competitiveness of regions and cities"[218].

Therefore, it is imperative that the UK has science parks that are driven by clear strategies and management infrastructures that effectively allocate resources and eventually deliver innovation-driven growth. Whilst there have been attempts to assess linkages between science parks and how they plan *a priori* to accommodate tenant firms, initial efforts have not been met with much enthusiasm and development strategy as a key construct remains uncultivated. By not contemplating the implications of various strategic routes, science parks only achieve sub-optimal success as timelines for achieving objectives are ill-conceived in response to short-termism such as increasing occupancy with no forethought.

In closing, this research has contributed to new knowledge and produced key policy implications that have direct relevance to policymakers at the national and local levels with immediate benefit to science park stakeholders to help determine the course of innovation-driven development in the UK.

## END of Chapter Eight/Thesis

[217] http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020 Accessed 27.03.15
[218] http://www.europarl.europa.eu/summits/lis1_en.htm Accessed 12.03.15