SUSTAINABLE ENTREPRENEURSHIP
REGIONAL AND COUNTRY STUDIES

United Kingdom

SUSTAINABLE ENTREPRENEURSHIP PROJECT

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Sustainable Entrepreneurship: Regional and Country Studies (United Kingdom)

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Sustainable Entrepreneurship: Regional and Country Studies
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PART II
UNITED KINGDOM

Preface

In 1985 Ronen and Shenkar reviewed the then-published literature on country clustering[1], including works by Haire, Ghiselli and Porter[2]; Sirota and Greenwood[3]; Ronen and Kraut[4]; Hofstede (1976)[5]; Griffeth, Hom, Denisi and Kirchner[6]; Hofstede[7]; Redding[8] and Badawy[9]. Ronen and Shenkar integrated and synthesized the available data to propose their own map of country clusters based on patterns of employee work attitudes derived after reviewing responses of thousands of employees in dozens of countries around the world to questions about their general attitudes towards work (e.g., the importance of various work goals, their satisfaction of needs through work, organizational factors and managerial issues and the nature of roles and interpersonal relationships in the workplace including how well managers related to subordinates).

Using a statistical procedure known as "smallest space analysis", Ronen and Shenkar identified and diagrammed eight country clusters: Arab, Near Eastern, Nordic, Germanic,

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[1] S. Ronen and O. Shenkar, "Clustering countries on attitudinal dimensions: A review and synthesis", Academy of Management Review, 10 (1985), 435-454. For further discussion of the various research studies reviewed by Ronen and Shenkar, see "Globalization: A Library of Resources for Sustainable Entrepreneurs" prepared and distributed by the Sustainable Entrepreneurship Project (www.seproject.org).

[2] M. Haire, E. Ghiselli and L. Porter, Managerial thinking: An international study (New York: Wiley, 1966).

[3] D. Sirota and J. Greenwood, "Understand your overseas work force", Harvard Business Review, 49(1)(1971), 53-60.

[4] A. Kraut and S. Ronen, "Similarities among countries based on employee work values and attitudes", Columbia Journal of World Business, 12(2) (1977), 89-96.

[5] G. Hofstede, "Nationality and espoused values of managers", Journal of Applied Psychology, 61 (1976), 148-155.

[6] R. Griffeth, P. Hom, A. Denisi and W. Kirchner, A multivariate, multinational comparison of managerial attitudes. Paper presented at the annual meeting of the Academy of Management, Detroit (August 1980).

[7] G. Hofstede, Culture's consequences: International differences in work related values (Beverly Hills: Sage, 1980). Hofstede's IBM survey is referenced frequently in this Guide and Ronen and Shenkar noted that several survey instruments used by Hofstede included various items relating to work goals (i.e., Hofstede's famous initial four dimensions of power distance, uncertainty avoidance, individualism and masculinity), need deficiency, fulfillment and job satisfaction. Hofstede also sought the opinions of respondents regarding their choice among four types of managers as to actual and preferred types of characteristics for their manager. Information regarding the variables used in the study and survey procedures that were followed is derived from S. Ronen and O. Shenkar, "Clustering Countries on Attitudinal Dimensions: A Review and Synthesis", The Academy of Management Review, 10(3) (July 1985), 435-454 (Table 1 – "Variables Used in the Studies Reviewed").

[8] G. Redding, "Some perceptions of psychological needs among managers in South-East Asia", in Y. Poortinga (Ed.), Basic problems in cross-cultural psychology (Amsterdam: Swets and Zeitlinger B.V.: 1976), 338-343.

[9] M. Badawy, Managerial attitudes and need orientations of Mid-Eastern executives: An empirical cross-cultural analysis. Paper presented at the annual meeting of the Academy of Management, Atlanta (August 1979).

Far Eastern, Latin American, Latin European and Anglo.[10] They also categorized four countries that they felt could not be easily fit into one of the clusters as "independents": Brazil, India, Israel and Japan. In general, countries tended to cluster together based on similarities in level of development and technological progress, geographic proximity, language and religious values and beliefs. Those countries that were classified as independents each had a unique language, religion, and history. The composition of the membership of each cluster is represented in the following table[11]:

Arab	Near Eastern	Nordic	Germanic	Far Eastern	Latin American	Latin European	Anglo
Abu-Dhabi	Greece	Denmark	Austria	Hong Kong	Argentina	Belgium	Australia
Bahrain	Iran	Finland	Germany	Indonesia	Chile	France	Canada
Kuwait	Turkey	Norway	Switzerland	Malaysia	Columbia	Italy	Ireland
Oman	Yugoslavia	Sweden		Philippines	Mexico	Portugal	New Zealand
Saudi Arabia				Singapore	Peru	Spain	South Africa
United Arab Emirates				Taiwan	Venezuela		United Kingdom
				Thailand			United States
				Vietnam			
Independents							
Brazil		India		Israel		Japan	

Ronen and Shenkar found that there country clusters generally corresponded to how countries might be grouped based on their measurements on the four original dimensions in Hofstede's cultural dimension model[12]:

	Power Distance	Individualism	Uncertainty Avoidance	Masculinity
Nordic	Low	Medium-High	Low-Medium	Low
Germanic	Low	Medium-High	Medium	High
Anglo	Low-Medium	High	Low-Medium	High
Latin European	High	High	High	Varies
Latin American	High	Low	High	Varies
Far East	High	Low	Low-Medium	Medium
Near East	High	Low	High	Medium

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[10] S. Ronen and O. Shenkar, "Clustering countries on attitudinal dimensions: A review and synthesis", Academy of Management Review, 10 (1985), 435-454. Ronen and Shenkar actually presented the clusters in a "pie chart" format that grouped countries together in terms of their similarity on work-related variables and the table in the text follows this grouping of countries. For example, Latin American and Latin European countries were closely related as were Nordic and Germanic countries.

[11] Id. For discussion of "smallest space analysis," see L. Guttman, "A general non-metric technique for finding the smallest coordinate space for a configuration of points", Psychometrika, 33 (1968), 461-469.

[12] Derived from S. Ronen, Comparative and multinational management (New York: John Wiley & Sons, 1986), 262-265; and S. Ronen and O. Shenkar, "Clustering countries on attitudinal dimensions: A review and synthesis", Academy of Management Review, 10 (1985), 435-454.

An Anglo cluster was included in all of the cluster studies reviewed by Ronen and Shenkar and for purposes of their synthesis they quickly concluded that it made sense to group most of the countries that could be characterized as associated with the former British empire network including the United Kingdom, of course, and Australia, Canada, Ireland, New Zealand, South Africa and the US.[13] Inclusion of these seven countries was consistent with the Anglo cluster created by Hofstede in 1980 that included countries that shared various characteristics on his cultural dimension model: low to medium power distance; low to medium uncertainty avoidance; and high individualism and masculinity. While using former British rule as the criteria for inclusion in the Anglo cluster would dictate adding India and Israel, both of which were placed in that cluster by some of the researchers (i.e., Sirota and Greenwood; and Ronen and Kraut), Ronen and Shenkar excluded them based on the diversity that those countries showed on other dimensions. Other countries placed in the Anglo cluster in some studies—Austria, Sweden and Switzerland (i.e., Sirota and Greenwood; and Hofstede (1976))—were rejected by Ronen and Shenkar after further reanalysis of the original data.

1	2	3	4	5	6	7	8	9
UK	UK	UK	UK		UK		UK	UK
US	US	US	US					US
	Australia	Australia						Australia
	Canada	Canada					Canada	Canada
	India	India						
	New Zealand	New Zealand						New Zealand
	South Africa	South Africa			South Africa			South Africa
	Austria							
	Switzerland							
			Sweden					
					Ireland			Ireland
					Israel			

Cluster Studies: (1) Haire, Ghiselli and Porter; (2) Sirota and Greenwood; (3) Ronen and Kraut (1977) (SSA of Sirota and Greenwood); (4) Hofstede (1976); (5) Redding; (6) Ronen and Kraut; (7) Badawy; (8) Griffeth, Hom, Denisi and Kirchner; and (9) Hofstede (1980).

Researchers working on the Global Leadership and Organizational Behavior Effectiveness project, commonly referred to as "GLOBE" project[14], concluded that the respondents to their surveys could be classified into 62 "societal cultures". In order to facilitate meaningful interpretation of the results the researchers determined that the societal cultures they were investigating could be meaningfully placed into one of ten "societal clusters," sometimes simply referred to as clusters. The clusters were designed, defined and created before the research was conducted, not as a result of the findings reached once the data was collected and analyzed, and were based on a variety of factors

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[13] S. Ronen and O. Shenkar, "Clustering countries on attitudinal dimensions: A review and synthesis", Academy of Management Review, 10 (1985), 435-454.

[14] For detailed discussion of the GLOBE project, see "Globalization: A Library of Resources for Sustainable Entrepreneurs" prepared and distributed by the Sustainable Entrepreneurship Project (www.seproject.org).

including the results of previous empirical studies; other factors such as common language, geography and religion; and historical accounts.[15] Societal cultures in the Anglo cluster include Australia, Canada (English-speaking), England, Ireland, New Zealand, South Africa (white sample) and the US.[16] Societies in the Anglo cluster were high in performance orientation and low in in-group collectivism meaning that they tended to competitive and result-oriented and less attached to families, organizations and other groups than other societies.[17]

The degree of similarity or dissimilarity between the Anglo cluster and the other nine societal clusters with respect to the cultural dimensions measured during the GLOBE study was as follows[18]:

Correlation	Societal Clusters
Strong Similarity	Nordic Europe; Germanic Europe
Mild Similarity	Latin America; Latin Europe
Neutral	Southern Asia; Sub-Saharan Africa
Mild Dissimilarity	Confucian Asia; Eastern Europe
Strong Dissimilarity	Middle East (Arab)

Based on the information in the table above a manager from a society in the Anglo cluster would expect to find familiar cultural values, although not precisely the same as in his or her own society, in the Nordic Europe and Germanic Europe clusters but would need to be especially careful and mindful of significant cultural differences in the Middle East (Arab) cluster.

The following chart depicts the relative importance and intensity of endorsement of the six culturally endorsed leadership dimensions to the societies included in the Anglo cluster:

Level of Importance/Endorsement	Leadership Dimension
High	Charismatic/Value-Based Leadership
High	Participative Leadership
High	Humane Oriented Leadership
Moderate	Team Oriented Leadership
Moderate	Autonomous Leadership
Low	Self Protective Leadership

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[15] For extensive discussion of the design of the societal cultures and the reasons for placement of societies within those clusters see Chapter 10 of R. House, P. Hanges, M. Javidan, P. Dorfman and V. Gupta (Eds), Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies (Thousand Oaks CA: Sage, 2004), 536. See also V. Gupta, P. Hanges and P. Dorfman, "Culture clusters: Methodology and findings," Journal of World Business, 37(1) (2002), 11-15.

[16] For further information on this cluster, see N. Ashkansasy, E. Trevor-Roberts and L. Earnshaw, "The Anglo cluster: Legacy of the British empire," Journal of World Business, 37(1) (2002), 28-39.

[17] P. Northouse, Leadership: Theory and Practice (4th Ed) (Thousand Oaks, CA: Sage, 2006), 310.

[18] Chapter 10 of R. House, P. Hanges, M. Javidan, P. Dorfman and V. Gupta (Eds), Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies (Thousand Oaks CA: Sage, 2004).

Leaders in societies in the Anglo cluster are most likely to be perceived as effective when they strive to inspire and motivate and expect high performance outcomes from others on the basis of firmly held core values, when they involve subordinates in making and implementing decisions and when they are patient, supportive and considerate and demonstrate compassion, generosity and concern for the well-being of others. Societies in the Anglo cluster strongly disapprove of leaders who are self-protective and engage in behaviors such as being status- and class-conscious, ritualistic, procedural, normative, secretive, evasive, indirect, self-centered, and asocial. The leadership profile of the Anglo cluster is strongly similar to the profiles for the Nordic Europe and Sub-Saharan Africa clusters and strongly different than the profiles for the Middle East and Eastern Europe clusters.

The preferences and dislikes of the various leadership styles among the societies in the Anglo cluster, including the United Kingdom, will lead to challenges in deploying the leadership styles preferred within this cluster in other clusters. For example, charismatic/value-based leadership is strongly endorsed in the Nordic Europe, Latin America and Latin Europe clusters but disliked in the Middle East cluster. Participative leadership will work well in the Nordic Europe cluster but is not endorsed in a number of clusters including Southern Asia, Eastern Europe, Middle East and Confucian Asia. Humane-oriented leadership will be welcome in the Sub-Saharan Africa cluster but not in the Nordic Europe or Latin Europe clusters. Finally, while the Germanic Europe and Nordic Europe clusters have the same low assessment of self protective leadership as the societies in the Anglo cluster that leadership style is endorsed in a number of other clusters including Southern Asia, Eastern Europe, Latin America, Middle East and Confucian Asia and thus cannot be ignored by leaders from the Anglo cluster working in those other parts of the world. In general, the main difficulties for leaders from the societies in the Anglo cluster in transferring their preferred leadership skills to other societal clusters will be based on differences regarding perceptions of the value and effectiveness of several of the leadership styles notably the self protective, participative, human oriented and charismatic/value-based styles.

References and Resources

Additional information on studies and commentaries relating to various aspects of leadership and management styles and practices in the United Kingdom can be found in the Sustainable Entrepreneur's Libraries of Resources prepared and distributed by the Sustainable Entrepreneurship Project (www.seproject.org) covering Leadership, Management, Organizational Design, Organizational Culture, Strategic Planning, Governance, Corporate Social Responsibility, Finance, Human Resources, Product Development, Technology Management, Globalization and Managing Growth and Change.

§1:1   Introduction

Like Silicon Valley, Silicon Fen, the well-known technology cluster that has sprung up in an approximately 20-mile radius around Cambridge about 50 miles north of London and, like Silicon Valley, has its own famous motorway, the "M11". The drive north from London brings one to an area of gentle hills and pastoral farmland and into a region once filled with marshes and wetlands and that has historically been referred to as "the fens."

While the popular name "Silicon Fen" is derived from these geographic features, locals have generally referred to the development of technology-based activities in the area simply as the "Cambridge Phenomenon." Although the region has long been touted as having the potential to match and overtake California's Silicon Valley and other dynamic technology clusters around the world, Silicon Fen is probably no more than the third largest concentration of high technology activity in the United Kingdom itself after taking into account developments along the "M4 Corridor" to the west of London and "Silicon Glen" in Scotland, and competition can also be found in the Motorsport Valley centered on Oxfordshire.[19] Nonetheless, the emergence of a "Cambridge" brand of innovation as well as the intriguing involvement of public and private sector influences made the Silicon Fen an interesting and relevant candidate for comparison and contrast with the Silicon Valley.

It is not surprising that Cambridge would appear on any list of important regional technology clusters. It is readily acknowledged that the area, particularly the University of Cambridge, sometimes referred to herein simply as the "University," has provided the world with a significant amount of the fundamental knowledge for several of the key advanced technologies that are being pursued by companies from around the globe today, including Newton's laws of physics, Watson and Crick's work in mapping DNA and the discovery of the electron by Thompson. The University has also produced more Nobel laureates than any other institution of higher learning in the world. However, while the entire Cambridge community has always been an impressive contributor to the theory of science, the zest for identifying and pursuing commercial applications of scientific breakthroughs has generally been lacking in the area from the very beginning, even as Britain itself forged to the head of the dynamic Industrial Revolution on the shoulders of the building blocks created in University laboratories.

The University was formed in 1209 by a group of scholars that migrated from Oxford University for reasons that are still somewhat unclear and the next four centuries were marked by the fits and starts associated with the establishment of various colleges and the political and religious turmoil that gripped the entire nation. At the time that Newton published his *Principia Mathematica*, which established the fundamental principles of modern physics, in 1687, some effort was being made to develop the fens; however, the University community itself continued to adopt a decidedly anti-business attitude. Most of the talented students attracted to Cambridge came to sample the social aspects of matriculation and little respect was given to dissemination of practical knowledge. Academics openly resisted attempts to modernize the curriculum in the sciences and studies were discouraged from engaging in the type of scientific experimentation that so often leads to discovery of real world applications.

Matters changed somewhat in the mid-19th century as the Parliament became anxious to modernize Cambridge and Oxford to keep pace with initiatives in other countries to develop their university systems as incubators for research and development activities. In 1873 the Cavendish Laboratory was launched as Cambridge's first intercollegiate scientific research center focusing on the study of experimental physics and the results

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[19] D. Dearlove, "The Cluster Effect: Can Europe Clone Silicon Valley?", Strategy+Business (July 1, 2001).

were nothing short of spectacular. In the years that followed, Cavendish was the birthplace for Thompson's work on the electron and Clerk-Maxwell's development of a theory of electromagnetism. These projects alone served as major building blocks for the modern industries of electronics and information technology ("IT"). The Cavendish Laboratory, and the University's newly formed engineering and medical departments, also provided the region with its first set of commercial spin-outs, a group of local companies that specialized in the development and manufacture of scientific instruments.

At the beginning of the 20th century the launch and success of the Cavendish Laboratory, and the long-established traditions of the University for discovery and innovation in the sciences, put Cambridge well ahead of the academic institutions that would eventually provide substantial support for what became known as the Silicon Valley—Stanford University and the public institution across the bay in Berkeley. Moreover, in addition to the spin-out activity already taking place in Cambridge, the country as a whole was the focal point for industrial activity that would not reach California for several decades. Obviously, however, the situation for both regions progressed along different, and somewhat unforeseen, paths in the years to come and the key to understanding what has become the Silicon Fen is appreciating the political, social and economic forces that combined to direct the development of high technology business in Cambridge.

The sheer volume of spin-outs that had emerged in the Cambridge area from event like the Cavendish launch was promising and one of those firms, Cambridge Scientific Instruments ("CSI"), became the region's first prominent technology company. However, the reality was that most of the companies that ventured into the commercial arena eventually fell away and often disappeared. One of the major problems was that the primary objective of most of these firms was to service the requirements of University departments and other research institutions, rather than attempt to create and enter new industrial markets. As a result, they lacked the experience and resources to identify and exploit market-based opportunities and often ignored commercial projects in favor of their University clients. In those cases where an effort was made to develop products for industrial customers, the end result was often too complex and costly to be of interest to more than a handful of end users.

Many of the markets and industries in which Cambridge-based high technology companies participated ultimately became the subject of substantial government intervention, as well as technological and structural changes that eventually overwhelmed most of the local firms. The 1960's was a period of consolidation for many industries in Britain and even relatively large and established high technology companies, such as CSI, were vulnerable to takeovers by larger firms. As a result, even companies that had installed management teams that were more focused on market opportunities, particularly in the international area, were forced to contend with often unwanted bids from outsiders. In the case of CSI, the Government actually invested a substantial amount of public money to insure that its preferred bidder won the race to acquire CSI. The result was disastrous for the once-promising business as managers departed in frustration and the Government was forced to spend substantial sums of money to keep the venture afloat. Other national governmental policies such as awarding contracts to defense contractors

better known to the British establishment rather than upstarts from Silicon Fen slowed the progress of emerging companies in the region, a situation that contrasted significantly to the close ties between the US defense community and startups operating in both Silicon Valley and Route 128 in America.[20]

Although commercial success was spotty, Cambridge nonetheless enjoyed a continuous level of high technology activities in the IT sector, not surprising in light of the traditional strengths of the University in physics and engineering. In 1949, Maurice Wilkes invented the first stored program digital computer. The IT sector in Cambridge began to develop in earnest in the early 1970's and growth was facilitated by various initiatives relating to space, funding and overall regional management, as well as the liberal policies of the University with respect to ownership and use of intellectual property rights developed in its departments and laboratories. In 1970, for example, Trinity College launched the first industrial science park in the United Kingdom. In contrast to comparable initiatives in Silicon Valley, however, the Trinity College Science Park was not vigorously promoted and occupancy rates throughout the first decade were modest at best. Nonetheless, the initiative was important if for no other reason that it marked a significant departure from the historical resistance to the formation and support of science-based businesses in Cambridge.[21] The scarcity of venture capital in the United Kingdom extended to the IT sector as well and local firms were provided with support through special loan programs for high technology companies made available through Barclays Bank in Cambridge. The Cambridge Computer Group was formed in 1979 as a way for companies to collaborate and the now famous "Cambridge Phenomenon" was born out of the initial meetings of this group.

Another problem that ultimately placed the region at a competitive disadvantage, particularly in relation to competitors from Silicon Valley, was the failure of the University and its spin off firms to appreciate the importance of securing patents and building a formal portfolio of intellectual property assets. The most stunning examples are in the life sciences area, particularly biotechnology. It is, of course, well known that the Cavendish Laboratory was the home of the ground breaking work of Watson and Crick on modeling DNA and it was at Cambridge's Laboratory of Molecular Biology ("LMB") that Milstein and Kohler developed techniques for producing monoclonal antibodies. However, in spite of these innovative activities, the rising stars in this area came not from Cambridge, but from spin off companies from the life sciences departments of the campuses of the University of California in San Francisco and San

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[20] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 79 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[21] Koepp reported that local government authorities had continuously adopted regulations that made it difficult, if not impossible, for Cambridge companies to grow at the pace otherwise required by the technologies with which they were working. For example, local town planning regulations referred to as the Holford Principles, named after the chair of planning committee formed by the University and local officials, included active measures that made it particularly difficult for so-called "go-ahead scientific industries" to thrive. See R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 80 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

Diego. For example, Genentech was launched in 1976 just outside of San Francisco to exploit opportunities based on recombinant DNA technology and Hybritech was formed in San Diego two years later to pursue commercialization of the monoclonal antibody technology that was originally developed in Cambridge several years before. These ventures, and others, were vigorously funded and supported by venture capital firms in the Silicon Valley.

The Government realized that opportunities had been lost, perhaps irretrievably, by the failure to protect and exploit intellectual property assets that had been created with public funds. Responding to substantial criticism and casting of blame, the Science Division of the National Enterprise Board took the lead in establishing Celltech, a new company styled after Genentech that was to be the platform for exploiting life science technologies developed at the LMB and at other academic research centers around the country. While Cambridge innovations were one of the large motivating factors for creating Celltech, the company itself was located on the M4 corridor in the heart of what became known as the "Golden Triangle" of technological, finance and management resources available in Cambridge, London and Oxford. Recognizing that the country did not have the venture capital resources necessary to finance such an undertaking, the Government willing took a substantial equity stake in the company upon formation, which was ultimately divested several years later. This represented a significant, and positive, change in the type and quality of public intervention as the Government provided capital otherwise unavailable in the private market while allowing the firm to be managed as a private enterprise.

Celltech emerged as a solid financial performer, entering the FTSE 100 in 2000; however, even more importantly, it has provided substantial support and cohesion for the development of the flourishing biotechnology sector in Cambridge and throughout the United Kingdom. In particular, Celltech has been able to transfer Cambridge-created technology for other partners and, in turn, provide funding and management assistance for new life science businesses in the Cambridge area. While Celltech was formed in 1980, the first biotechnology start-up firm with headquarters in Cambridge, Cantab Pharmaceuticals, was not founded until 1989. The founder had actually spent time at Celltech learning about management and operation of a successful biotechnology company and senior managers of Celltech served as advisor to Cantab and also became investors. Cantab itself became a model for subsequent biotechnology start ups in and around Cambridge and ultimately biotechnology companies came to represent the fasting growing high technology sector in the area during the 1990's. By the end of the decade, almost 25% of the high technology employees in the Silicon Fen region were working life sciences businesses.

In spite of the problems discussed above, the growth and development in Cambridge-based technology activities was certainly was "phenomenal" based on historical standards and expectations for the region, albeit far from matching the scope and breadth of what was occurring in Silicon Valley at the same time. The Cambridge Computer Group ("CCG"), through its original report in 1985 and the update issued in 2000, provided the best and most widely-accepted picture of the "Cambridge Phenomenon." The original report found that about 100 high technology firms had been launched in the Cambridge

area during the 1970's and that by 1984 that number had grown significant to about 260 companies. These companies employed about 14,000 workers, which represented 17% of the overall employment in the Cambridge travel-to-work area. At the time, the report enthusiastically compared these developments to growth along the San Francisco Peninsula in the 1960's, during which time about 250 high technology businesses were born in that area.

Fifteen years later the update to CCG's original report confirmed that the growth of the early 1980's had been sustained and that by 1998 there were 1,350 high-tech firms employing some 32,500 people in the area. About 86% of the technology companies in Silicon Fen at that time were local, or "homegrown", and the clear preference was for building and maintaining small- to medium-sized companies with very few firms—less than 3%--having more than 200 employees. Most of the persons employed in Silicon Fen worked for companies that were less than 20 years old and Koepp commented that "[u]nlike the staid, large-corporation-dominated technology districts of other parts of the British Isles and the continent, the Cambridge Phenomenon is remarkable for its indigenous, continually replenishing base of entrepreneurial high-tech firms".[22] Among the key business sectors were IT, mobile telecommunications, biotechnology, instrumentation and technology consultancies. The 2000 update to the Cambridge Phenomenon also noted that specialist research teams of industry leaders, such as Microsoft, had set up operations in the area; the University had further enhanced its position as the nation's leading university for both teaching and research and was actively seeking to engage with front-ranking science based companies; and more financial and professional services firms had established significant offices in Cambridge, creating networking opportunities and substantial local employment in their own right, and an active, locally based, investor community was emerging.[23] At that time the CCG had been joined by other organizations created to facilitate networking in the region, such as the Cambridge Network, and the original Trinity College Science Park had been joined by several new science and R&D parks and incubator facilities, each of which provided business support and accommodations for new technology-based businesses.

Commentators, as well as local proponents of Silicon Fen, have argued that Cambridge entrepreneurs and investors have rejected the often problematic business models that have been pursued in Silicon Valley in favor of companies that are based on proven technologies, patentable inventions and "sophisticated science".[24] A "Map of British Innovation" created and published in 2010 based on a study conducted by Quid, a Silicon Valley-based data analysis and consulting firm, identified a number of industries and markets where UK entrepreneurs appear to be making an impact on a global basis including pharmaceuticals, payment and financial technology, alternative energy and energy conservation technologies (i.e., tidal, wind, solar and Smart Grid), medical

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[22] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 79 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[23] The Cambridge Phenomenon is actually a free-standing company formed in 2009 to provide ongoing support for entrepreneurship and innovation in the region and further information is available at the company's website: http://www.cambridgephenomenon.com/.

[24] "Silicon Fen Strains to Grow", The Economist (April 12, 2001).

devices, data analytics, online music software and social gaming, emerging mobile hardware and network IT technologies, biotech, lighting and batteries.[25]

Walton cataloged several popular reasons why technology companies based in the UK and Europe have seemed to be unable to develop into the global behemoths—Microsoft, Intel, Apple, Oracle and Google—that have come out of the US including a lack of appropriate funding and tax arrangements; the absence of a large homogeneous home market; an inability to bring products rapidly to market; and a lack of entrepreneurial culture and spirit.[26] He then went on to cite several specific impediments to growth of companies launched in Silicon Fen such as a tendency among Cambridge entrepreneurs to exit their businesses through sales to foreign acquirers rather than floating shares on the public market, a scenario which usually causes jobs and intellectual property to drift away from the area; the tendency among UK and European venture capitalists to invest smaller sums in their portfolio companies than their US counterparts; the infrequency of strategic investments by large UK companies in promising Silicon Fen startups; the failure of UK and European stock exchanges to attract the interest of Silicon Fen companies looking for additional capital; and the absence among Silicon Fen entrepreneurs of the same level of ambition and attitude toward risk that is consistently found among technology pioneers in the US.

Writing after the 2000 update to the Cambridge Phenomenon, Koepp noted the real challenges that local planning policies had created for revolutionary expansion of commercial research activities in the region and praised the efforts of several key local business leaders who nonetheless battled forward with their own initiatives to support growth, development and innovation including advisory programs for entrepreneurs and their small businesses, special financial services programs focusing on investment management and corporate finance, formation of angel investor groups to "recycle capital" into new ventures.[27]

The financial difficulties in the UK and elsewhere during the second part of the 2000s were accompanied by the closure or dramatic downsizing of the UK corporate research laboratories of a number of large multinational companies—GEC Marconi, ICI, BT, Philips and IBM—that had previously served as valuable catalysts in commercializing new technologies developed within the UK's world-class universities.[28] By 2013 it was estimated that around 1,500 science- and technology-based companies employing more than 53,000 people were operating in Silicon Fen, including a few such as ARM—a developer of processor chips for smartphones and other mobile devices—that had become market leaders in the UK and globally, international surveys had recognized Cambridge as being among an elite group of "university-based innovation ecosystems"

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[25] R. Tyler, "Technology Entrepreneurs are Driving UK Towards Recovery", The Telegraph (February 6, 2011).

[26] N. Walton, Silicon Fen or Silicon Wen (October 23, 2008).

[27] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 82-84 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[28] R. Tyler, Technology Entrepreneurs are Driving UK Towards Recovery, The Telegraph (February 6, 2011).

(third in the world behind only MIT and Stanford in the US), the region was achieving growing recognition as a global innovation center for bioscience and IT, and major multinational companies had selected Cambridge for significant R&D initiatives bring large amounts of capital and employment opportunities to the area.[29] However, the recent success and recognition has reignited debate over allocation of resources to improve the infrastructure in and around Cambridge to accommodate growth.[30]

UK entrepreneurs also have other options for launching and growing their emerging companies including the much publicized Tech City in London, which has been recognized and heavily supported by the UK government and has become home to hundreds of startups as well as offices of large technology multinationals such as Cisco and Google. Tech City initiative has been pitched as providing entrepreneurs and investors with a unique mix of urban diversity; concentration of of media, film, TV and creative industries; and proximity of government, and the initiative has been supported by the availability of tax benefits, liberalized immigration for entrepreneurs and the creation of a new High Growth Segment on the London Stock Exchange to enhance liquidity for UK-based emerging companies. One major challenge, however, has been a so-called "digital skills gap" due to the large unmet need of firms in the UK digital sector for people educated at the graduate level or above: applications for IT-related degree programs have dropped dramatically at the same time that a large percentage of UK digital employers are complaining about their inability to recruit team members with the right technical and practical skills.[31] In addition, companies that have set up in Tech City have complained about high rents, difficulties in finding skilled workers in the immediate area and a lack of access to capital. Nonetheless, the Greater London area remains extremely attractive because it has the highest proportion of skilled workers in the UK and the strongest local economy in the country and there have been calls for technology companies to look elsewhere in London, such as the Mayfair District, to set up their operations.[32]

Ireland's foray into the technology arena has historically focused on attracting technology-focused multinationals to establish their European operations in Ireland and as these efforts have succeeded the local area has seen a gradual expansion of its own home-grown startup activities, often with the assistance of venture capital-type

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[29] J. Naughton, "They Call it Silicon Fen: So What is the Special Draw of Cambridge?", The Observer (November 30, 2013). Naughton noted that Microsoft and Toshiba had bother set up major European R&D facilities in Cambridge and that AstraZeneca had announced plans to locate its global R&D and corporate headquarters in Cambridge, a move expected to create 2,000 jobs for researchers and support staff. The assessment and rankings of university-based innovation systems was reported on in R. Graham, Technology Innovation Ecosystem Benchmarking Study (2013).

[30] D. Baker, "A Meeting of Minds in Cambridge: Key Figures from Silicon Fen's Tech Economy", Wired (May 17, 2013); and L. Armitstead, "Cambridge: Home of Britain's Biotech Boom Offers Relief to UK Economic Ills", The Telegraph (April 2, 2013).

[31] O. Solon, "Europe's Hottest Startup Capitals: London", Wired (October 1, 2013).

[32] C. Rhodes, "Forget Tech City!: Mayfair is Where Tech Start-ups Should Be", London Loves Business (June 24, 2013). In fact, 40% of the firms on the Fast 50 list of UK high growth companies compiled by Deloitte for 2013 were London-based, including five of the Top 10. A. Saunders, "Launchpad: London Top of Tech Tree Says Deloitte", Management Today (November 13, 2013).

investments from the larger foreign firms.[33] Cities such as Dublin have provided support by encouraging and financing the development of technology parks. Silicon Glen in Scotland also tried to jumpstart its technology sector by offering tax breaks and other incentives to foreign technology companies; however, while the region was successful in attracting foreign companies focusing on semiconductors and computers it was not able to make much progress in creating homegrown technology businesses.

§1:2 Entrepreneurship

Notice has often been taken of the striking differences between the technology-based companies launched in Silicon Valley and Silicon Fen and, in particular, commentators have pointed out that Silicon Fen has lagged far behind Silicon Valley with respect to creation of large companies or serving as the birthplace of entire new industries. In most cases, Cambridge entrepreneurs chose, and often successfully followed, niche strategies that are bound on special purpose technologies that are generally not suitable for mass markets and achieving high levels of sales revenues and, in fact, local surveys taken during the late 1990s indicated a distinct preference for maintaining a manageable size of the enterprises and that no more than 3% of the local firms at that time had more than 200 employees.[34] Pfeifer et al. found that about two-thirds of the technology-based companies in Cambridge had been founded by "locals" (i.e., from the University, another local research establishment or former employees of a larger local company that provided support to the founders in spinning off a new business) and that a majority of the companies remained locally headquartered businesses with small staffs as they matured.[35] Ejler et al. argued that many technology companies in Cambridge realized that growth is often counterproductive for continuous innovation and opted for a strategy of pursuing interesting new projects by "spinning out" the necessary people and assets into new business units or companies that could be organized in a project-based form that was more hospitable to the low levels of formalization and decentralized decision making thought to be best for knowledge-intensive firms.[36]

While governmental restrictions on commercial and residential developments in Cambridge, as well as infrastructure issues such as poor transportation planning, have certainly contributed to the comparatively modest growth of Silicon Fen technology companies, another possible explanation for the direction the Cambridge Phenomenon has taken is the personality characteristics of the local entrepreneurs themselves. It has been suggested that the founders of new businesses in Silicon Fen do so not to create a global monolith, no matter how badly the politician may want that, but instead will be content to nurture small-scale enterprises that cater to the needs of an identifiable and manageable market niche that does not draw the attention of large competitors. In fact,

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[33] D. Dearlove, "The Cluster Effect: Can Europe Clone Silicon Valley?", Strategy+Business (July 1, 2001).

[34] S. Wicksteed, The Cambridge Phenomenon Revisited (2000), 9.

[35] A. Pfeifer, I. Alalawi, L. Heim, O. Pound, D. Pressman and S. Tsang, The Golden Triangle: A Comparative Perspective—Silicon Fen (UK) and Campinas (Brazil). Silicon Fen has a long history of startup launching as spinoffs from larger companies with the parent firm providing assistance in forming the new business and providing consulting services and access to shared and subsidized central services such as IT and personnel administration. "Forward Thinking", Personnel Today (April 11, 2000).

[36] N. Ejler, F. Poulfelt and F. Czerniawska, Managing the Knowledge-Intensive Firm (2011), 49.

Cambridge entrepreneurs have often been criticized based on the perception that they are only interested in creating "lifestyle companies" that allow them to pursue their fascination in a particular technology while avoiding strategies and activities that might result in the firm growing to a size that is beyond their immediate control.[37] On the other hand, however, a significant portion of the new companies in Cambridge are spin-offs of other firms and the founders of these new companies have been praised for their "strong pedigrees" in research and management based on the experience they have accumulated during their previous ventures.[38] It has also been suggested that the relatively cautious approach to growth among Cambridge firms contributed to impressive survival rates in comparison to Silicon Valley and other UK innovation centers: in one study of 53 companies launched through the St. John's Innovation Center in Cambridge over a ten-year period, only five of them ceased trading and, of those, failure of the business was not the reason for shutting down for two of them.[39]

Another factor relevant to new business launches in Silicon Fen is the belief that the region may lack the competitive dynamism and networking that appears to thrive in Silicon Valley. It has been observed, with some truth, the scientists and engineers in the UK are somewhat reluctant to tread into new areas that have already been staked out by colleagues. As a result, it is common to find that no more than a handful of researchers may be pursuing a particular lead or project at any one point in time. In contrast, when a promising idea or technology is identified in Silicon Valley, several firms, often a dozen or more, may receive support from venture capitalists to engage in what become a rapid race to be the first to bring a product to market or develop a sustaining intellectual property portfolio around the new technology. Those that do not succeed will either pass out of business or perhaps be acquired by the winner or a larger company interested in a shortcut to entering an emerging technology market. Intense competition in Silicon Valley also co-exists with elaborate networks of collaborative arrangements between firms, a strategy that is particularly important to small companies that focus on R&D yet must look to others to complete other functions such as manufacturing and distribution. In contrast, surveys show that links with local businesses are generally perceived as being unimportant by venture capitalists, universities and other research institutions in the UK.

As for networking, Huber's study of 105 research and development workers, technology officers and managing director working at 46 different hardware and software companies in Silicon Fen revealed that informal social networking of the type that flourishes in Silicon Valley was generally thought to be unnecessary by his respondents and that most

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[37] See "Silicon Fen Strains to Grow", The Economist (April 12, 2001) ("Too many local start-ups, say the men who have made it, lack the ambition to become big. At around 15 employees, they stop growing. Robin Saxby, the chief executive of ARM, says that Cambridge lacks Silicon Valley's aggressive money-making urges: 'Lots of the people here are still more interested in lifestyle than making money.').

[38] A. Pfeifer, I. Alalawi, L. Heim, O. Pound, D. Pressman and S. Tsang, The Golden Triangle: A Comparative Perspective—Silicon Fen (UK) and Campinas (Brazil) (quoting an interview with Chris Kirby, an investment banker with Cowen International Ltd.).

[39] Id. The St John's Innovation Centre, which was launched by the University's St John's College in 1987, has provided incubation services to hundreds of early stage companies and, as the study results indicate, has enjoyed very strong survival rates for those companies.

of them felt that they did not have the time required for networking to be effective.[40] Many of the respondents reported that they believed that their fields were too specialized to benefit from sharing and collecting ideas outside of their workplaces and those who were involved in activities that had a global focus were likely to go beyond their local community to interact with others around the world on knowledge-based issues using Internet communications tools. In other words, online sharing was more important than face-to-face interaction within Silicon Fen and Huber's findings cast doubts on the theory that clustering of firms working in related industries will generate positive "spillover" effects through sharing of news, ideas and best practices.

Koepp makes the interesting argument that Silicon Fen entrepreneurs may be unwittingly influenced by the rewards and honors systems that has prevailed in Britain for centuries and that this may have an impact on how they manage their companies.[41] According to Koepp, entrepreneurs, including those who come directly out of the University, may consciously or unconsciously be striving to achieve titles and positions in Britain's eternal social hierarchy and that this quest may become more important than the inventions created, products developed or revenues generated during the course of launching and building a firm. Koepp conceded that the technology-based companies in Silicon Fen are likely more meritocratic than British corporations outside of the region, but cautioned that the larger social fabric of the nation must always be taken into account.

§1:3 Leadership

A more recent survey of leadership styles commonly seen among CEOs in the UK confirmed that the hierarchical culture that has historically persisted among UK companies continues to play an important, and arguably harmful, role in that it leads to reliance on "command and control" and "toughness" as major values in UK leadership models.[42] One of the alarming byproducts of this type of leadership style is widespread lack of engagement between company leaders and their subordinates and growing disenchantment, particularly among younger workers, at the lack of opportunities offered employees to be included in decision making and creative processes. In addition, UK business leaders continue to have a comparatively high focus on short-term results and some of them argue that while they appreciate the concerns regarding disengagement it is difficult to implement changes in challenging economic times when merely surviving has been the key operational objective for their businesses. Some business leaders also worry that abandoning the traditional hierarchical relationships between management and employees may be perceived as sign of weakness. All in all, the survey, which was conducted by the Ashbridge Business School, uncovered three barriers to engagement and dialogue between UK CEOs and their subordinates: shortcomings in leadership capabilities that hindered engagement, such as poor self-awareness on the part of leaders;

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[40] University of Cambridge Research, Unsociable Networks (August 18, 2011) (citing F. Huber, "Do Clusters Really Matter for Innovation Practices in Information Technology?: Questioning the Significance of Technological Knowledge Spillovers", Journal of Economic Geography, 12(1) (2012), 107).

[41] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 82 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[42] V. Zainzinger, "British Style of Leadership is Harmful to Business", Real Business (June 20, 2013)

leadership pride that leads to disengaging leadership behaviors; and, as mentioned above, the culture and system in which UK business operates that is antithetical to engagement (i.e., organizational hierarchy and the focus on short-term results).[43]

§1:4 Management

Relatively little research has been done on management styles and practices among emerging companies in the UK, a situation which has sometimes led to the unfounded assumption that Silicon Fen companies are managed in ways that are quite similar to technology companies in Silicon Valley; however, Koepp argued that "[t]he practices guiding Cambridge's commercial enterprises ... differ radically from the management styles found in [Silicon] Valley ... [and] ... Cambridge entrepreneurs in general are not intent on creating the next Silicon Valley ... [and] ... are content with reinforcing the Cambridge Phenomenon, avoiding comparisons with its American counterpart even though it shares its key dynamics and staying power".[44]

Insights into how managers of UK emerging companies think may be available from broader research. For example, in the early 1960s Burns and Stalker reported that they had identified two very different management styles in UK: organic and mechanistic.[45] Humes observed that UK companies had traditionally shown little interest in formal business training for their managers and opted for "gentlemen amateurs" with either no degree or a liberal arts degree as their foundation for taking on a management role.[46] As a result, the characteristics of UK management culture included a stress on common sense, adaptability and resourceful pragmatism along with class and club-consciousness. However, beginning in the early 1990s accounting began to emerge as a preferred specialist background in the UK and there was also a definite movement toward management training in universities and colleges. Bass and Eldridge found that profit-making was important in the decisions of successful UK managers.[47]

In their exhaustive study of patterns of management and productivity among companies in seventeen countries, Bloom and Van Reenen found that UK managers fell into the middle of pack with respect to "overall management".[48] When considering management practices and styles among UK emerging companies it is useful to understand the broader context of management practices throughout the country regardless of type and size of firm. In an earlier study of management practices in hundreds of manufacturing companies in France, Germany, the UK and US, Bloom and Van Reenen, working with other colleagues, found that UK productivity lagged behind the US and that 10% - 15%

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[43] A. Armstrong, Ashridge Business School: Engagement through CEO Eyes (May 2013), 8.

[44] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 80 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[45] T. Burns and G. Stalker, The Management of Innovation (1961).

[46] S. Humes, Managing the Multinational: Confronting the Global-Local Dilemma (1993), 118-121.

[47] B. Bass and L. Eldridge, "Accelerated Managers' Objectives in Twelve Countries", Industrial Relations, 12 (1973), 158-171.

[48] N. Bloom and J. Van Reenen, "Why Do Management Practices Differ across Firms and Countries", Journal of Economic Perspectives, 24(1) (Winter 2010), 203.

of the gap could be attributed to differences in management practices between the two countries and that UK firms included in the survey had the widest variation in management practices among the four countries including the highest proportion of "poorly managed" companies.[49] The researchers noted that the relatively poor performance of UK management in relation to the other three surveyed countries was somewhat puzzling given that the UK had moderately high levels of competition and low levels of regulations, two factors that the researchers argued were important drivers of good management practices.

Bloom, Van Reenen and their colleagues did a follow up study in the Autumn/Winter of 2009 and 2010 with many of the same UK companies that they had previously surveyed to identify any intervening changes in management practices and found that management practices appeared reasonably persistent over time (i.e., the well-managed firms in 2006 tended to also be the well-managed firms in 2009) and that management quality appeared to have improved among the firms as a group, particularly with respect to adoption and implementation of "lean operations".[50] The researchers observed that the improvement in management practices was greatest in situation where the company faced increased product market competition or had upgraded its skills and that companies also performed better when managerial turnover had occurred, a finding that the researchers suggested might indicate that companies were making managerial changes to bring in people capable of implementing better management practices. The researchers also touched on constraints to improving management practices in the UK and cited, in order, an inadequate supply of managerial human capital, inadequate worker skills and informational barriers (i.e., "not knowing what changes to make").

§1:5   Organizational design

In his cross-country study and comparative analysis of managerial "control practices" in France, Britain and Germany, Horovitz found that such practices in Britain were characterized by the following features[51]:

- Financial controls were emphasized and the controls used were "sophisticated".
- At the top managerial levels the controls were not detailed and instead focused on handling exceptions and "early warning systems".
- Controls were used mainly as guiding instrument rather than as policing or surveillance tools.
- Product/market units were generally granted a good deal of autonomy and freedom from intervention by central staff.

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[49] N. Bloom, Management Practices: The Impact on Company Performance, CentrePiece (Summer 2005) (summarizing N. Bloom, S. Dorgan, J. Dowdy, T. Rippin and J. Van Reenen, Management Practices across Firms and Nations (2005)).

[50] N. Bloom, R. Lemos, M. Qi, R. Sadun and J. Van Reenen, Constraints on Developing UK Management Practices (2011).

[51] J. Horovitz, "Management Control in France, Great Britain and Germany" in T. Weinshall, Societal culture and management (New York: Walter de Gruyter, 1993), 445-454, 446.

In addition, Horowitz observed that most of the British firms practicing some form of long-term planning and had established a separate and specialized department at the corporate level tasked with collecting and analyzing the strategic plans prepared at the subsidiary level.[52] Horowitz described the planning process in Britain as being "bottom-up", involving a substantial number of people and conducted in accordance with planning procedures laid out in a standard planning manual that specified the contents of each of the plans prepared and submitted by the subsidiaries. Plans were expected to be comprehensive and address not only strategic issues for the particularly subsidiary but also detailed aspects of subsidiary operations.

Horovitz noted that most of the British companies in his sample were "holding companies" and suggested that this organizational pattern influenced the strategies used in Britain with respect to control patterns. The central office staffs of the British enterprises tended to be small while multiple subsidiaries were vested with substantial authority for the strategic and operational decisions associated with their businesses (i.e., a strong degree of "decentralization"). The subsidiaries, each of which were headed by their own managing director, had responsibility for selection of products, brands and markets and associated operational and logistical plans (i.e., administration, accounting and personnel matters). Horovitz explained that "the central office staff and directors shape[d] policy decisions at the group level, act[ed] as bank for the subsidiaries, and monitor[ed] the performance of the subsidiaries".[53] Top executives at both the group and subsidiary level convened monthly to review performance and discuss policy; however, in general the British organizational scheme was described as one that "allows for flexibility, autonomy of operations, and entrepreneurship at the operational level, while orientation and loose control are supplied by group executives and a small staff".[54]

Child and Kieser were particularly interested in comparing and contrasting the values and preferred management practices of British and German managers and found that British managers were less concerned about perceived "authority" and tended to be less "directive" than their counterparts in Germany and more willing to delegate decisions to lower levels of the organizational hierarchy, which was consistent with their finding that British firms were less centralized than German firms.[55] They cited the work of other researchers as support for their findings. For example, Haire et al. found that British managers perceived the terms "direct" and "persuade" as having relatively little difference as to meaning, thus implying that British managers understood that it would be necessary for them to couple their instructions with a less than fully authoritarian approach.[56] The need to seek cooperation with others was also revealed in another

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[52] Id. at 449.

[53] Id. at 448.

[54] Id.

[55] J. Child and A. Kieser, "Organizational and managerial roles in British and West German Companies: An examination of the culture-free thesis" in T. Weinshall, Societal culture and management (New York: Walter de Gruyter, 1993), 455-477. See also D. Granick, The European Executive (New York: Doubleday, 1962) (noting that British managers appeared to enjoy and prefer a relatively high degree of decentralization).

[56] M. Haire, E. Ghiselli and L. Porter, Managerial Thinking: An International Study (New York: Wiley, 1966).

survey involving British middle managers that found that they believed that achievement and challenge were important and that they placed a high value on "benevolence towards and receiving recognition from others".[57] All in all, when compared to their managerial counterparts in Germany, British managers have scored lower on measures of respect for authority, fear of displeasing superiors and desire for explicit and stable relationships.[58]

Hofstede described an unpublished work of Stevens describing the results of his survey of graduate business students from three different European countries—France, Germany and Great Britain—that included questions regarding their ideas about how to deal with issues in a case study that involved a conflict between the product development and sales departments at a hypothetical firm.[59] Stevens found that the British felt that the conflict was a product of poor interpersonal communication that required more training for the parties involved and based on this feedback, as well as different responses from the students from the two other countries, proposed a preferred "implicit model" of organizational structure for British companies based on the low power distance and low uncertainty avoidance in the societal level culture of that country that Stevens referred to as a "village market" that was neither formalized nor centralized and which depended on continuous attention to maintaining open interpersonal communications between different departments and their members. Studies performed by Schneider and Barsoux appeared to confirm the Hofstede/Stevens conceptual model and they suggested that the "village market" structure was based on low formalization and hierarchy and had specific characteristics that included decentralized; generalist; people as "free agents"; entrepreneurial; flexibility; more delegation; coordination through informal, personal communication; and output control.[60] Taken together, these studies argued for the proposition that people from the UK are less concerned about risk and power distance and thus are comfortable interacting in organizations that are less hierarchical and formal and which follow the "village market" model.

Mintzberg developed a typology of "preferred configurations of organizations" that corresponded with the Hofstede/Stevens model and could also be fit into a matrix created using the uncertainty avoidance and power distance dimensions.[61] One of his structural types, referred to as the "adhocracy", corresponded to the "village market" model and was suitable for low power distance/low uncertainty avoidance societies such as Britain and for firms seeking to engage in innovative activities. The key part of the organization for this structural type was the administrative support staff providing indirect, but necessary services such as clerical and maintenance; and the preferred coordination

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[57] G. Hofstede, Nationality and Espoused Values: Working Paper 74-78 (Brussels: European Institute for Advanced Studies in Management, 1974). The same survey provided evidence that German managers attached relatively greater value to having authority to direct other people.

[58] J. Child and A. Kieser, "Organizational and managerial roles in British and West German Companies: An examination of the culture-free thesis" in T. Weinshall, Societal culture and management (New York: Walter de Gruyter, 1993), 455-477, 458.

[59] G. Hofstede, Motivation, Leadership and Organization: Do American Theories Apply Abroad," Organization Dynamics, 9 (1980), 42, 60. Hofstede was referring to the work of O. Stevens at INSTEAD.

[60] S. Schneider and J.-L. Barsoux, Managing Across Cultures (2nd Ed.) (2002).

[61] The framework was initially presented and described in the early 1980s. See H. Mintzberg, Structures in Fives: Designing Effective Organizations (1983).

mechanism was mutual adjustment, which relied on communication among people in various parts of the organizational structure. A final example of "implicit models of organization" that closely followed the principles of Stevens, Hofstede and Mintzberg and used all of the dimensions of societal culture included in the Hofstede framework was offered by the ITIM Culture and Management Consultancy, which suggested that British companies would rely on a "contest", or "winner takes all", model consistent with a competitive societal culture characterized by low power distance, high individualism and masculinity and a relatively low score on uncertainty avoidance.[62]

§1:6   Organizational culture

Trompenaars believed that "[o]rganizational culture is shaped not only by technologies and markets, but by the culture preferences of leaders and employees" and noted that local branches of international companies, while adopting the same logo and reporting procedures, are often "fundamentally different in the logic of their structure and the meanings they bring to shared activity" as a result of the influence of local culture.[63] Working with his colleague, they built their own "database of corporate culture" based on responses received from 42 countries to questionnaires that "deal[t] with general concepts of egalitarianism versus hierarchy, degrees of formality, different forms of conflict resolution, learning and so on" and asked respondents to "choose between four possible descriptions of their company" that corresponded to the four types of organizational cultures in the model suggested by Trompenaars.[64] According to Trompenaars, the results indicated that the highest scores for guided missile cultures were found in the US and the UK.

The guided missile type of organizational culture was "project-oriented" and associated with high scores for egalitarianism and task-orientation.[65] Trompenaars commented that this type of organizational culture, so named because of its fit with the way things appeared to be done by National Aeronautics and Space Administration, was "rather like the Eiffel Tower in flight . . . [b]ut while the rationale of the Eiffel Tower culture is means, the guided missile has a rationale of ends". Guided missile cultures are oriented toward tasks, which are typically undertaken by teams or project groups led by generalists who serve as coordinators[66]; however, the jobs of team members, who are predominantly specialist experts in their fields, are not fixed in advance and it is expected that everyone will do "whatever it takes" in order to complete a task. In this type of

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[62] For further discussion, see H. Wursten, Culture and Change Management, ITIM Culture and Management Consultancy.

[63] F. Trompenaars and C. Hampden-Turner, Riding the Waves of Culture: Understanding Cultural Diversity in Global Business (2nd Ed) (1998), 161.

[64] Id. at 182.

[65] The descriptions and quotes in this paragraph are taken from F. Trompenaars and C. Hampden-Turner, Riding the Waves of Culture: Understanding Cultural Diversity in Global Business (2nd Ed) (1998), 177-179.

[66] Trompenaars and Hampden-Turner analogized the guided missile culture to a matrix organization in which specialist members of project teams had dual reporting responsibilities—functional and project-based—and commented that in this way the "guided missile culture is superimposed upon the Eiffel Tower organization to give it permanence and stability".

culture there is often uncertainty about what will be needed to achieve the desired ends and it is expected that time will need to be spent in investigating and discovering solutions. Finding new and effectives means to hit the target set at the beginning is valued but changing the target in the middle in response to new information is quite problematic. Loyalties to professions and projects are much stronger than loyalties to the organization in the guided missile culture, which is also quite individualistic, and turnover is high as specialists move in and out of the organization frequently as projects begin and end. Temporary residence in the organization means that intimacy is avoided in relationships. Trompenaars observed that "[m]anagement by objectives is the language spoken, and people are paid by performance".

Among the seven driving values consistently reinforced as part of the organizational culture of ARM are delivery of results that benefit the company, teamwork and selflessness, constructive pro-activity, partner and customer focus, responsiveness, innovation and personal development.[67] The aspirational model of many Silicon Fen companies can be illustrated through the entertaining manual of organizational culture created and distributed by Red Gate, an award-winning Cambridge software company opened in 1999.[68] The company's Book of Red Gate was first prepared to help new employees absorb some of the firm's organizational culture; however, over time it was distributed outside of the company and fell into the hands of customers and potential applicants for new positions at the company. The book includes multiple tenants of the company's organizational culture including mutual respect and responsibility between the company and its employees; employees should attempt to do the best work of their lives; motivation is not about "carrots and sticks", a reminder that the company seeks to avoid constant oversight and threats of punishment and provide people with the freedom to excel; "don't be an asshole"; the company's best work is done in teams; employees should focus on getting the right stuff done; visible mistakes are tolerated as a sign that the company is a healthy organization; no politics—everyone should be transparent in their dealings with others; do the right things for our customers; profits are only a way of keeping score, not the game itself; the company will succeed if it builds wonderful, useful products; decisions will be based on the available evidence; and contribution will be counted and recognized. Read together, these principles point to an organizational culture that is egalitarian, pragmatic, team-oriented and customer-focused and the book itself is laid out in a whimsical and humorous manner.

§1:7 Strategic planning

In a cross-cultural comparative study of control practices that included British, German and French firms, Horovitz observed that most of the British firms that were included had been practicing some form of long-term planning for extensive periods—six years or more—and that many of those firms had established a separate and specialized department at the corporate level tasked with collecting and analyzing the strategic plans

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[67] Silicon Fen and the 7 Driving Value of ARM, Target Jobs UK.

[68] The discussion in this paragraph is based on The Book of Red Gate (2012), which is available for viewing online at the company's website.

prepared by each of the individual subsidiaries.[69] Horowitz described the planning process in Britain as being "bottom-up", meaning that it generally began with each managing director of the various subsidiaries preparing and submitting a five year plan to the corporate planning department around six months before the beginning of each new planning year. Each of the plans were discussed at the corporate level and comments and suggestions for revision are made to the subsidiaries so that their plans could be modified and submitted once again for inclusion into an "aggregate plan" for the entire group. Horowitz noted that the entire process involved a substantial number of people and extended over four to five months and was generally conducted in accordance with planning procedures laid out in a standard planning manual that specified the contents of each of the plans prepared and submitted by the subsidiaries. Plans were expected to be comprehensive and address not only strategic issues for the particularly subsidiary but also detailed aspects of subsidiary operations.

Strategic planning among Silicon Fen emerging companies is certainly influenced by expectations and aspirations regarding the ultimate size and scope of their businesses and it has been widely reported that Cambridge entrepreneurs generally have lower expectations for company growth and that the proof lies in the fact that Silicon Fen is dominated by small-scale firms that are quite happy with their size and lack ambition to become the next Cisco or Intel.[70]

Koepp reported that one study had found that only one-third of the fledgling biotechnology companies operating in Silicon Fen considered linkages with local customers and suppliers to be critical or very important to their success and that most of the surveyed companies actually felt that such linkages were unimportant or of very little significance.[71] Koepp contrasted this to the highly-publicized technology networking that had become a hallmark of Silicon Valley and speculated that it might be British social norms that drove the apparent reluctance of Silicon Fen entrepreneurs to aggressively talk up their business plans and ideas outside of their immediate trusted circles and their preference for "do[ing] things as independently as possible".

§1:8 Governance

The corporate governance model typically associated with the Anglo-American countries (i.e., the US, UK, Canada, Australia and New Zealand) is often referred to as "market-based" since it features an active external market for corporate control and is designed to

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[69] J. Horovitz, "Management Control in France, Great Britain and Germany", in T. Weinshall, Societal Culture and Management (1993), 445, 449. Horowitz noted that most of the British companies in his sample were "holding companies" with small central office staffs and large numbers of subsidiaries, each of which were headed by their own managing director and had responsibility for selection of their products, brands and markets and preparation of the associated operational and logistical plans (i.e., administration, accounting and personnel matters).

[70] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 82 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[71] Id. at 81 (First Quarter 2003) (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

support a fluid capital market that allows participants to quickly and efficiently access the cash needed to pursue market opportunities as soon as they are identified.[72] Proponents of this model usually point to the way in which it has facilitated progress by companies in the US and UK in the development and expansion of innovative products and "new economy" industries such as electronics, software, media, and financial services. However, there has obviously been a down side to this approach given the damage that has occurred for companies and investors due to the inherent volatility of the model and the short-term orientation of executives operating in these markets due to the widespread reliance on performance (short-term)-based compensation arrangements.[73]

According to Toonsi, the Anglo-American model is based on the fundamental principal that the firm is "instrumental" and to be used as a means for collecting and deploying resources in a way that facilitates the creation of value for the owners (shareholders in the corporate context). As such, it follows that the owners (shareholders) are the main stakeholders with respect to exerting influence on managerial decision making; however, ownership concentration is low among the Anglo-American countries. In the fact, it can rightly be said that the main feature of the Anglo-American model is the separate of control of the enterprise from an ownership group that has traditionally consisted of a large number of widely dispersed individual shareholders and, more recently, institutional investors (i.e., mutual funds, pension funds and insurance companies). The Anglo-American model relies on a one-tier board system with one level of directors and no distinctions between executives ("inside" directors) and non-executives ("outside" or "independent" directors), although recent changes in the legal and regulatory framework for corporate governance in the Anglo-American countries, particularly in the US, have led to more formalized and distinguishable duties and responsibilities for non-executive members of the boards of public companies. Stock and bond markets are extremely important in the Anglo-American countries and great emphasis is placed on their efficiency and performance.

Shareholders in the Anglo-American model are heavily dependent on the actions of professional managers who have been vested with control over corporations and their assets, a situation that has led to referring to corporate governance in the Anglo-American countries as the "principal-agent" model. Clearly such a model has the potential for efficiency in light of the increasing size of firms required to attain competitive economies

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[72] The Anglo-American model has been given a number of different names including the outsider, common law, market-oriented, shareholder-centered, or liberal model. R. Aguilera and G. Jackson, "The Cross-National Diversity of Corporate Governance: Dimensions and Determinants", Academy of Management Review, 28(3) (2003), 447. While associating the outsider model with the Anglo-American countries is appropriate, Nestor and Thompson reminded that in some of the smaller English-speaking countries (i.e., Australia, Canada and New Zealand) there is a discernibly higher percentage of ownership concentration than in the US and the UK, particularly family-owned firms; however, they concede that the corporate governance systems in those countries clearly have characteristics similar to those in the US and the UK: strong recognition of shareholder rights, institutional ownership of wealth, the tradition of strong legal regulation of securities markets and heavy insistence on transparency in accounting. See S. Nestor and J. Thompson, "Corporate Governance Patterns in OECD Economies: Is Convergence Underway?", in S. Nestor and T. Yasui (Eds.), Corporate Governance in Asia: A Comparative Perspective (2000), 19, 30.

[73] Portions of the description in this section is adapted from F. Toonsi, "Cultures of Control: International Corporate Governance", QFinance.

of scale; however, there is always the fundamental issue of how shareholders can ensure that their "agents" are acting in ways that further the interests of the shareholders and other stakeholders as opposed to simply taking advantage of their insider status and creating benefits for themselves. Not surprisingly, the Anglo-American countries have focused a good deal of attention on developing legal and regulatory frameworks that can provide protections for the shareholders.

The US and the UK share the same underlying legal system, generally referred to as the "common law", and thus the fundamental structure for governance of corporations in those two countries is quite similar.[74] Day-to-day management of the corporation is the responsibility of the members of an executive team who are charged under corporate law with fiduciary duties to act in the best interests of the shareholders who are the ultimate owners of the corporation. Shareholders are not expected to be involved in the day-to-day management of the business of the corporation; however, they exercise their control through the election of the members of the board of directors who are supposed to set the policies for the corporation and select and oversee the executive team. Boards of corporations with publicly traded securities, so-called "public companies", generally have 10 to 15 members and a majority of "outside", or "independent" directors who are not executives, officers or employees of the corporation, a structural decision designed to reduce the potential for self-dealing at the board level. For a long time, however, the outside directors were typically nominated by the chief executive officer ("CEO") and there were often serious doubts about whether outside directors could, or would, stand up to the CEO. Shareholders in the US and the UK traditionally had little input into corporate affairs other than the election of directors; however, the trend now seems to be toward giving shareholders more input into controversial issues such as executive compensation. Disclosure requirements have also been escalating in an effort to provide shareholders with an expanded view of the relationships between directors and executive officers on the one hand and the corporation on the other.

§1:9   Finance

Many aspects of securities regulation in the UK are overseen by the Financial Services Authority ("FSA"), an independent non-governmental body given statutory powers by the Financial Services and Markets Act 2000 ("FMSA").[75] The FMSA sets out four statutory objectives for the FSA: market confidence—maintaining confidence in the UK financial system; financial stability—contributing to the protection and enhancement of stability of the UK financial system; consumer protection—securing the appropriate degree of protection for consumers; and, finally, the reduction of financial crime, which means the extent to which it is possible for a regulated business to be used for a purpose connected with financial crime. The FSA also attempts to provide political and public

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[74] The discussion in this section is based on F. Allen and D. Gale, Comparative Financial Systems: A Survey, 25-26. The article also appears as F. Allen and D. Gale, "Comparative Financial Systems: A Survey", in A. Boot, S. Bhattacharya and A. Thakor (Eds.), Credit, Intermediation and the Macroeconomy (2004), 699.

[75] Portions of the discussion of the Financial Services Authority in this section are adapted from material found at http://www.fsa.gov.uk/.

accountability; effectively perform its activities with regard to rulemaking, giving advice and guidance and determining our general policy and principles and assist in providing legal accountability.

In discharging its functions under the FMSA the FSA is required to follow what it refers to as "principles of good regulations", which include the following:

- Efficiency and economy: The need to use FSA resources in the most efficient and economical ways.
- Responsibilities and roles of management: This principle is designed to secure an adequate but proportionate level of regulatory intervention by holding senior management responsible for risk management and controls within firms.
- Proportionality: The burdens or restrictions imposed on the industry should be proportionate to the benefits that are expected to result from those burdens or restrictions.
- Innovation: The desirability of facilitating innovation in connection with regulated activities.
- International character: The international character of financial services and markets and the desirability of maintaining the competitive position of the UK.
- Competition: The need to minimize the adverse effects on competition that may arise from FSA activities and the desirability of facilitating competition between the firms regulated by the FCA.
- Public awareness: The desirability of enhancing the understanding and knowledge of members of the public of financial matters (including the UK financial system).

The FSA has powers over unregulated firms and persons regarding market abuse, breaches of money laundering regulations and short selling and also performs significant functions under non-FSMA legislation such as acting as consumer enforcer under the Enterprise Act 2002, acting as an accredited financial investigator for confiscations investigations and restraining order under the Proceeds of Crime Act 2002, acting as a monitor of credit and financial institutions relating to compliance with the Money Laundering Regulations 2007 and acting as the body responsible for registering and authorizing payment and e-money institutions.

With regard to financing for entrepreneurship, even though the UK has traditionally been the most developed venture capital market in Europe, and second only to the US on a global basis, the percentage of venture capital funding available to early-stage high risk companies has long been considered to be grossly inadequate and venture capital firms in the UK have typically been more interested in funding management buyouts and buy-ins involving mature businesses.[76] A report issued at the end of the 1990s by the British

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[76] Koepp classified the activities of British venture capitalists as "merchant venture capital" and cited a study conducted by the Bank of England in the late 1990s that found that only 1% of venture capital funding in the UK could be considered "high-risk investment" and that only a small part of this 1% found its way to early-stage technology firms. R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 81 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

Venture Capital Association estimated that, as a percentage of GDP, the UK only invested one-third of what the US did in technology-based companies. With the exception of London, Cambridge has probably been the most successful region in the UK in developing a concentrated local pool of venture capital funds, including specialty funds focusing on particular technology sectors such as biotechnology, and angel investor sources. However, the size of these funds, and their investment range for a particular deal or portfolio company, pales in comparison to the mega-investors that have been active in Silicon Valley for several decades. Related issues impacting finance for emerging companies in the UK have included difficulties creating and sustaining formal capital markets catering to the needs of emerging companies and the introduction of relatively strict disclosure rules that significantly increased the time and expense associated with floating a new offering of securities.[77]

The availability and influence of venture capital investment in Silicon Fen has been a subject of much debate. In the early 2000s reports indicated that only a very small segment of startup companies in the Cambridge Cluster, perhaps only about 5%, had received financial backing from venture capitalists and many of the companies, particularly those that were spinoffs from larger and older firms, survived on consulting work and, if necessary, selling small amounts of equity to industry colleagues rather than seeking funding from venture capitalists.[78] At that time the consensus was that there was a shortage of local venture capital resources although some small funds were operating and specializing in technology investments. As a result, entrepreneurs looking for funding beyond their own resources needed to tap into local technology consultancies that operated as incubators as well as a fledgling network of angel investors; however, there were also others who argued that venture capital was readily available in nearby London and elsewhere for those companies that were truly interested in accessing the money and managerial and strategic support offered by professional investors. Naughton reported on a club of Cambridge angel investors, numbering 56 as of November 2013 and all of whom with a net worth in excess of £15m and a track record of at least one successful "exit" from a startup, that provides a source of mentoring, critical feedback and seed funding to entrepreneurs well in advance of the stage where venture capitalists would be interested in their firms.[79]

§1:10 Human resources

Given the relatively compact size of Silicon Fen, and the high costs of living in the area, it is not surprising that emerging companies are often confronted with challenges in recruiting necessary personnel, particularly in finding the right people quickly enough to

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[77] Koepp noted that the UK did take steps during the 1980s and 1990s to introduce second-tier markets that would make it easier for smaller companies to list their shares for public trading and obtain liquidity; however, the cost of public capital for UK emerging companies was, in general, much higher than the comparable costs for US technology firms. R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 81 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).

[78] "Silicon Fen Strains to Grow", The Economist (April 12, 2001).

[79] J. Naughton, "They Call it Silicon Fen: So What is the Special Draw of Cambridge?", The Observer (November 30, 2013).

move rapidly forward with exploiting a new opportunity before other firms catch on. Some larger companies have adopted proactive recruiting strategies that allow for going out and hiring scientists, engineers and designers for projects that have yet begun in order to be sure that they had the right human resources in places when anticipated opportunities came to fruition.[80] Efforts of Silicon Fen companies to recruit globally have sometimes been hampered by the country's relatively strict immigration controls and this is another area where Silicon Fen leaders have engaged in lobbying activities to ensure that regional companies can compete for the best talent available in foreign countries.

Silicon Fen was one of the first areas in the UK to experiment with aligning the company's human resources and the overall goals and objectives of the company's business through the use of employee stock ownership plans and Silicon Fen leaders have long been active in promotion reductions to the country's capital gains taxes to increase the value of the benefits available to employees holding stock in their own companies.[81] Koepp suggested that the social stratification that has long been a part of British culture might have an influence on the introduction and administration of the meritocratic incentives and rewards that are typically thought to be important in motivating managers and rank-and-file employees in technology-focused enterprises.[82]

Parsons reported that Silicon Fen has developed a number of "networking groups" that are working to break down the traditional barriers in that region to inter-business networking and that Silicon Fen has also been establishing formal linkages among people in the area that share common technical or commercial interests.[83] According to Parsons these developments have facilitated the emergence of "learning organizations" throughout Silicon Fen, all of which realize that they are a subset of the larger region cluster of technology-focused companies and institutions. Parsons, a senior HR executive at ARM and a member of the leadership teams of The Cambridge Network and other local support groups for entrepreneurship activities, preaches for an organizational model that allows members (i.e., founders, managers and employees) to create friendships within trusting relationships and to work together for a common purpose of achieving great things using their collective creativity and skills. Parsons explained that ARM conducts annual surveys to gain a better understanding of employee engagement and noted that these surveys have continuously identified certain fundamental precepts that ARM incorporates into its organizational priorities: people want to have fun, a challenging and meaningful job and confidence that the firm is taking care of them.

To the extent that societal culture plays a role in determining the most effective HR policies among emerging companies in the UK, it should be noted that the UK, along with the US and other Anglo-American countries, has been characterized as a country

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[80] Forward Thinking, Personnel Today (April 11, 2000).
[81] Forward Thinking, Personnel Today (April 11, 2000).
[82] R. Koepp, Book Excerpt: Clusters of Creativity, The Milken Institute Review (First Quarter 2003), 65, 82 (excerpting from R. Koepp, Clusters of Creativity: Enduring Lessons on Innovation and Entrepreneurship from Silicon Valley and Europe's Silicon Fen (2002)).
[83] Chartered Institute of Personnel and Development, Talent Forward: Talent Clusters (2011).

with a societal culture that includes weak "uncertainty avoidance" and strong "masculinity" and Hofstede has argued that this combination means that managers and employees in the UK will likely place greater importance on the "esteem needs" in Maslow's hierarchy of human needs (i.e., self-esteem, confidence, performance, achievement and respect from others).[84]   Kanungo and Wright found that British managers tended to place greater emphasis on individual achievement as opposed to fringe benefits, security and working conditions.[85]

§1:11 Product development and commercialization

Haake et al. examined differences between UK and German companies operating in the food industry with respect to their organizational processes and structures for new product development.[86]   Among other things, the researchers found that the UK respondents typically set and followed a much shorter planning horizon than their German counterparts—no more than three years in the UK compared to five year planning horizons in Germany. The UK companies also assumed much shorter life cycles for their new products, normally no more than 12 months compared to German projections of life cycles of up to 70 months, and had a much higher percentage of sales attributable to products launched in the previous two years than the German firms included in the survey. The preferred organizational structure for new product development activities among the UK firms was "loose" and "flexible" and their activities were focused much more on commercialization rather than research.

Abubaker and Mitra studied the new product development methods used among 52 small technology-focused companies in Silicon Fen by identifying and assessing their reliance on "knowledge spillovers" and "pecuniary knowledge mechanisms".[87] With regard to the key knowledge spillover mechanisms used by the surveyed companies, the researchers found that they relied most heavily on labor mobility (i.e., acquiring knowledge through the recruitment of new labor) and research institute spillovers (i.e., acquiring and using mostly "free" knowledge from universities and research organizations through

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[84] G. Hofstede, Motivation, Leadership and Organization: Do American Theories Apply Abroad, Organization Dynamics, 9 (1980), 42, 55-56. Under Maslow's famous hierarchy of human needs persons behave in a rational fashion to satisfy five levels of needs running from "basic" to "higher" in the following successive fashion—psychological needs; safety or security needs; social needs; esteem needs; and self-actualization needs. A higher need will not be an active concern for a person until he or she has sufficiently satisfied each of the lower needs. See A. Maslow, "A Theory of Human Motivation", Psychological Review, 50 (1943), 370. See also A. Maslow, Motivation and Personality (1943) and A. Maslow, Maslow on Management (1998).

[85] R. Kanungo and R. Wright, "A Cross-Cultural Comparative Study of Managerial Job Attitudes", Journal of International Business Studies, 13(2) (1983), 115.

[86] S. Haake, C. Moore and N. Oliver, Recipes for Success—Product Development Benchmarks in the UK and German Food Industries (2000).

[87] Y. Abubakar and J. Mitra, Small Firm Innovation in Non-Clustered Regions: Comparing High and Low Agglomeration Regions (2011). According to the authors, "[k]nowledge spillovers . . . are transmitted outside the market system and arise when new ideas and knowledge, crucial for enhancing a firm's innovation potential, flows between firms through personal exchanges in the labour market" and "pecuniary or market related externalities are transferred through inter-firm supply and demand linkages, and therefore arise through trade related sources that have impacts on creation of new knowledge and goods".

conversations with academics and researchers in universities and colleges and early and easy access to public research made available to outsiders without restrictions). As for pecuniary knowledge mechanisms, the Silicon Fen companies were most likely to collaborate with, or use paid services of, universities and research institutes traditionally known to be providers of basic research. The researchers found that in Silicon Fen knowledge spillovers had greater explanatory power than pecuniary knowledge externalities on new product development and also found that both "local knowledge" sources and "national and international knowledge" sources were significant influences on new product development. While the later finding regarding the influence of "local knowledge" was consistent with the arguments in favor of "clustering", the researchers noted that companies in Silicon Fen must nonetheless look beyond their local region for resources since shortages of those resources, such as labor, are likely to occur due to the intense competition that comes with high concentrations of like-minded companies. Silicon Fen companies must also look outside their region for expertise in certain phases of the innovation process including manufacturing of products developed in Cambridge.

Abubaker and Mitra actually combined their study of Silicon Fen companies with a simultaneous assessment of new product development methods used by 48 electronics and software companies in Essex, which was chosen as an example of region lacking a concentration of firms in high technology industries that could be compared to an innovation cluster such as the one that had grown up around Cambridge University.[88] The most popular knowledge spillover mechanism among the Essex-based firms was "imitation", a process that involved reverse engineering products developed by other companies to find new applications. The researchers argued that this approach could be explained, at least in part, by the fact that the companies in Essex had significantly less resources than their counterparts in Silicon Fen to use on internal R&D and imitation required less R&D. When looking at the pecuniary knowledge mechanisms used by the Essex companies the researchers found a tendency to rely on subcontracting relationships as the means for development of innovative products due to a lack of access to universities and large research organizations and the relative cost-effectiveness of subcontracting. As was the case in Silicon Fen, knowledge spillovers had greater explanatory power than pecuniary knowledge externalities on new product development among the companies in the Essex group and "national and international knowledge" sources were significant influences on new product development in Essex; however, in contrast to Silicon Fen, the new product development activities of the Essex companies were not significantly influenced by "local knowledge" sources. Following on the discussion above with respect to Silicon Fen, the researchers noted that shortage of "local knowledge" in Essex was not necessarily a disqualifier in the race to innovate since, based on their analysis, "international knowledge" sources were the most important influence in both "high agglomeration" and "low agglomeration" regions.

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[88] Y. Abubakar and J. Mitra, Small Firm Innovation in Non-Clustered Regions: Comparing High and Low Agglomeration Regions (2011). Abubaker and Mitra were interested in identifying differences between product development activities of small high technology companies in "high agglomeration" and "low agglomeration" regions, with "agglomeration" being determined by the local concentration of firms in high-tech industries as measured in terms of below or above average densities of both firms and their respective workforce in those regions. Abubaker and Mitra selected the Silicon Fen and Essex as "high agglomeration" and "low agglomeration" regions, respectively.

Another aspect of new product development that may be influenced by societal culture is planning, which is obviously relevant when new products are being vetted, selected, developed and commercialized, and researchers have found that planning can lead to different types of successful outcomes and that variable patterns can be observed across cultures. For example, Hagerty and Hoffman found that better planning among Anglo firms translated into higher returns on sales.[89]

§1:12 Technology management

As noted above, Cambridge generally did not follow the lead of its counterparts in the US by imposing restrictions and economic conditions on the exploitation of intellectual property developed by researchers working with funds provided by the University. As a result, faculty members and others involved in University research activities had great latitude in using the resulting technology and associated intellectual property rights in spin off firms without the need to compensate the University through royalties or some form of equity ownership. In fact, it has been estimated that only a small percentage of the emerging companies in Silicon Fen could properly be characterized as direct spinoffs from the University. However, little effort was made to create a formal mechanism for exchange of information and technology between academia and industry and the region lacked the resource bank of experienced managers in the high technology area who could provide guidance and mentoring to those entrepreneurially oriented University staffers who were interested in exploring industrial opportunities. On the other hand, however, the University has played a valuable role in supporting the commercial development of technology as a logical consumer of the technologies and products created by emerging companies in the area and informal partnering between industry and academic has occurred through the frequent use of University graduate students by local companies as part-time labor.

One aspect of technology management is the scope and impact of contacts and relationships between Silicon Fen companies and local units of transnational corporations that have established R&D units in the area. Štrukelj and Dolinšek, who studied the internationalization of R&D in the Cambridge cluster, cited the report in The Cambridge Cluster Report 2004 that the University had "become a leading centre for industrial research laboratories with concomitant investments from major corporations such as AT&T, GlaxoSmithKline, Hitachi, Intel, Microsoft, Olivetti, Oracle, The Wellcome Trust, Toshiba, and others over the past twenty years" and also noted that information published by the Silicon Fen Business Report in 2007 confirmed that at least 19 transnational corporations had set up R&D units in the Cambridge cluster and that several of them had established formal collaboration programs with local research institutions.[90] For example, Hitachi's Cambridge Laboratory worked closely with the University's Microelectronics Research Centre and provided local researchers with access to work

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[89] W. Hagarty and R. Hoffman, The Relationship between Strategic Planning and Performance Among Three Cultures, Proceedings, Academy of Management (1990), 106.

[90] P. Štrukelj and S. Dolinšek, "Internationalization of R&D in Two High-Tech Clusters and Cooperation of R&D Units in those Clusters", Journal of Industrial Engineering and Management, 3(2), 294, 300.

being done at other Hitachi research laboratories in Japan and in other parts of the world.[91] The Intel Research Cambridge Lab was located on the University campus near the University's Computer Laboratory and Department of Engineering, thus creating an easy path for intense collaboration between those University units and Intel researchers under an open and cooperative research model that permits open distribution of the results of any collaborative research.[92] Intel also provided financing for University laboratories, internship opportunities for Cambridge students, access for those students to Intel laboratories and other resources to carry out their own research work and training and mentoring for University researchers. One of the byproducts of Intel's investment of capital, tangible assets and time was that University students and researchers gained a better understanding of Intel and thus were able to tailor their own research programs in ways that would ultimately provide benefits to Intel. Finally, Microsoft's Research Cambridge Laboratory, which was established in 1997, had become one of the largest computer science research laboratories in Europe and offered Microsoft researchers working there an opportunity to engage in "blue sky" pure research with collaborators from the University and elsewhere.[93] Like Intel, Microsoft had a long history of offering internships to University students and working closely with the University's Computer Laboratory, Statistics Laboratory and Department of Engineering.

§1:13 Globalization

In their survey of internationalization among young high-tech companies from Germany and the UK, Burgel et al. found that internationalization was the norm among the surveyed companies from each country, those companies that did internationalize did so fairly quickly after formation and direct exporting or exporting through a distributor were the two most common modes of internationalization for all sampled firms.[94] The researchers found that the UK respondents had higher levels of international sales, measured by looking at the share of non-domestic revenues of the company, than the German firms, and that the geographic reach of the UK companies was much broader than the German companies with the UK firms selling more of their total production to customers in a wider range of foreign markets, particularly in North America and in former British Commonwealth countries. Arguably this strategy was enabled by the decision of the UK companies to sell less customized products, which allowed them to achieve more scalable business models and attract a wide spectrum of customers. However, the UK firms did rely on technology to differentiate between their domestic and export markets and the products that were selected for export tended to be more innovative than those sold domestically. In fact, surveyed UK companies that internationalized tended to use more innovative technologies than their peers who remained domestic-focused. The researchers also found that "commitment to internationalize" or involvement of venture capitalists both appeared to have a strong positive influence on foreign sales of the UK companies. Burgel et al. ultimately

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[91] Id.

[92] Id. at 301-302.

[93] Id. at 302-303.

[94] O. Burgel, G. Murray, A. Fier and G. Licht, The Rapid Internationalisation of High-Tech Young Firms in Germany and the United Kingdom (2000), 10.

concluded that the success of globalization activities among the surveyed UK companies could be attributed to strong entrepreneurial management styles, strong marketing skills and commercial experience.

A study conducted by Lockett et al. regarding how venture capitalists influenced the export behavior and intensity of their portfolio companies included a large number of UK firms and provided evidence that the "value-added resources" available from venture capitalists (e.g., assistance in developing new strategies with respect to international marketing and foreign market entry, acting as a "sounding board" for management ideas and using their networks to identify and recruit management talent with general international business experience and expertise in specific target markets) were important in promoting export behavior in early-stage ventures and that "monitoring resources" (e.g., assistance in establish budgeting and other performance management processes) were effective in supporting internationalization as the firms matured.[95]

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[95] A. Lockett, M. Wright, A. Burrows, L. Scholes and D. Paton, The Export Intensity of Venture Capital Backed Companies, Small Business Economics, 31 (2008), 39.