Architectural Knowledge Transfer and Competitive Advantage

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Abstract

The purpose of this paper is to examine several spin-off biopharmaceutical companies within Ireland. It seeks to examine the possible emergence of a knowledge community or learning network between the spin-off companies and if the nature and origins of the companies and their founders influences the transfer of inter-organisational architectural knowledge. It also seeks to investigate whether the emergence of an alumni network consisting of employees from each of the companies, has had an effect on the transfer of knowledge between the spin-offs. Literature examined for this paper focuses mainly on knowledge communities, component and architectural knowledge. This study will contribute to the theoretical debate and the understanding of how knowledge is transfer across firms and what affects this knowledge transfer. It will also contribute to the understanding of the dynamics and effects of inter-organisational networks.

Keywords: Elan, Spin-offs, architectural knowledge, component knowledge, alumni networks.

Elan Corporation plc is a neuroscience based biotechnology company head-quartered in Dublin, Ireland that is focused on discovering, developing, manufacturing and marketing advanced therapies in neurology, autoimmune diseases and severe pain. It was founded in 1969 as a pharmaceutical company and diversified into the lucrative biotechnology arena; Elan was a story of phenomenal Irish success. In 2000 it operated globally, was the largest company on the Irish Stock Exchange and was a leader in drug delivery technology and pharmaceutical research. At its peak on June 20, 2001 Elan was worth more than Allied Irish Bank and Bank of Ireland combined and with a share price of €74 it was clear that Elan was well placed to achieve a leadership position in the biotech industry.

What happened to Elan has little to do with uneasy market conditions in 2002 and much more to do with their accountancy practices which, while complying with the rules, wer just that little bit too clever. The company were particularly skilful at capitalising on accountancy rules to boost earnings while keeping liabilities under control. It was only in the 2001 audited accounts that Elan disclosed that they had sold royalty rights on six of their top products. Instead of disclosing these sales as exceptional non-recurring transactions, Elan included them in normal revenues. This resulted in conveniently disguising a decrease in revenue growth elsewhere in the business. Elan treated money invested into one of its joint ventures as an asset on its own balance sheet, when the same money was taken back by Elan they renamed it as licence and R&D revenue and added it into profits. They estimate that circular accounting was inflated by forty percent between 1997 and 2001. As a consequence of this investors were seriously misled. Until the middle of 2002 the company appeared to be insulated for a liquidity crisis with $1.6 billion in cash.

In the wake of the December 2001 Enron collapse and triggered by the fears among investors, caused by rumours of dubious accounting practices after failing to meet an initial deadline to file the company's 2002 annual report to the U.S. Securities and Exchange Commission (SEC), Elan's share price collapsed by fifty-two percent in just one day and alone accounted for a sixteen percent fall in the Irish ISEQ market index. By October 9, 2002 Elan's share price had fallen by over 98% to just €1.23 valuing the company at just €430 million. It was the most spectacular decline in Irish corporate history. The amount of $18.4 billion was wiped off Elan's value after the SEC commenced a probe into the business dealings of former managers who set up partnerships to keep research coats off the corporate balance sheet.

By February 2004, Elan had developed, implemented, and completed a recovery/restructuring plan and staged a remarkable recovery that resulted in divestiture proceeds of more than $2 billion. By November 2004 the share price had once again risen up to €23. By February 2005, Elan had settled the SEC investigation and this helped eradicate some of the uncertainty about Elan's future.

Ironically, Elan's challenges been positively healthy for Ireland and have generated broader growth and development in the Irish biopharmaceuticals industry. The incapacitation of the company provided an opportunity for the emergence of more than a dozen new companies headed by former Elan personnel. It was in this environment that former employees like Dr. John Devane, former Executive Vice-President of Elan's R&D, Dr. Mary Martin, former Managing Director of Elan's drug delivery strategic business unit, Mary Burke, formerly responsible for clinical pharmacology at Elan and Seamus Mulligan, former Executive Vice-President of Business and Corporate Development at Elan, set up spin off companies like AGI Theraputics, Bioclin Research Laboratories, Athpharma, Merrion Pharmaceuticals, Azur Pharma, Amarin, Pharmaplaz, PK Pharma Innovations Ltd. and InfoSight Corporation. Former Elan employees have also launched venture capital companies like Frontier and dedicated legal practices for life sciences in two large well known law firms; Matheson Ormsby Prentice and BCM Hanby Wallace.

"In the knowledge intensive organisation, intelligence and intellectual labour replaces physical labour as the fundamental source of value and profit" (Florida, 1995) and according to Morgan (1997) "much more needs to be done to promote inter-organisational flows of information and knowledge". Tallman et al (2004), state that "economic geographers have come to see knowledge exchange (through technology spillovers, informal exchange, movement of people

and so forth) as critical to defining performance in regional clusters". In the biotechnology industry there is a particular emphasises placed on companies to develop and keep abreast of important industry knowledge, skills, development and innovation. An effective method of achieving this is by ensuring that the company has access to learning and knowledge networks. Powell, Koput and Smith-Doerr (1996) in their paper on networks of learning in the biotechnology industry feel that companies need to learn to locate themselves in network positions that will allow them to access and transfer knowledge and keep pace with scientific and technological developments. They argue that "biotech firms grow by being connected to benefit-rich networks". According to Gans, Hsu and Stern (2000) "…in biotechnology, some form of cooperation is the norm".

Among the Elan spin offs there is the possibility of the emergence of a knowledge community or knowledge network. Henry and Pinch (2000) define a knowledge community as "a group of people… often in separate organisations but are united by a common set of norms, values and understandings who help define the knowledge and production trajectories of the economic sector to which they belong". According to Henry and Pinch (2000) knowledge is spread among companies within a particular industry and region by a number of different ways including "the rapid and continual transfer of staff (bodies) between the companies within the industry". This staff turnover is also known as churning, Henry and Pinch (2000) explain that churning is a process of "circulating and producing embodied knowledge within the knowledge community and regional production centre". While this process of churning does not necessarily change the structure of the industry, it does raise the knowledge base of the industry as a whole with in a region. The destruction of Elan and the emergence of several spin-off companies produced a 'churning' of staff in the form of several employees departing from Elan to establish their own biopharmaceutical companies. This churning did not necessarily destroy Elan or dramatically change the structure of the biotechnology industry in Ireland but it did produce a reorganisation of the industry, the dissemination of ideas, skills and knowledge associated with the biopharmaceutical industry in Ireland and raised the knowledge base of the industry as a whole within the region of Ireland. What has emerged are several individual companies within the biotech industry creating an informal inter-organisational network, connected by a group of ex-employees with the same values and knowledge because of their history at Elan, which facilitates the transfer of industry knowledge among the participant companies.. But what is the nature of this knowledge transfer and what implications does it have for the spin-offs?

The concept of component and architectural knowledge was first developed by Henderson and Clarke (1990). Matusik and Hill (1998) developed the differences and distinguish between them. Pinch et al (2003) define component knowledge as "those specific knowledge resources, skills, and technologies that relate to indefinable parts of an organisations system, rather than to the whole". They argue that component knowledge is generally tied to technology and operating processes and skills of a particular industrial field, for example in the biotechnology field it would relate to scientific or medical skills. Component knowledge is relatively transferable, despite legal barriers and protection it tends to leak out of firms relatively quickly. They state that component knowledge is generally codifiable or explicit in nature, (for example, instruction manuals), in that it can be spread relatively easily throughout different geographical locations through various mediums.

Henderson and Clark (1990) define architectural knowledge as "knowledge about the ways in which the components are integrated and linked together into a coherent whole." In literature numerous terms have been used to describe a firms ability to adapt and develop architectural knowledge, such as routines (Nelson and Winter, 1982), core competencies (Prahalad and Hamel, 1990), organisational resources (Barney, 1991), and dynamic capabilities (Teece et al., 1997). The main aspect of architectural knowledge that distinguishes it from component knowledge lies in its non-transferability to other firms; it tends to be specific to and develops over time in particular organisations. As no two organisations have identical histories, no two organisations can have identical architectural knowledge.

Architectural knowledge also tends to be tacit in nature. Pinch et al (2003) define tacit knowledge as "often related to specific ways of doing things that emerge in particular places. It is therefore argued that tacit knowledge is often context dependent, being facilitated by a

common language, culture and value system". Matusik and Hill (1998) suggest that tacit knowledge is learned through experience. According to Maskell and Malmberg (1999) this concept of tacit knowledge can perhaps be used to explain competitive advantages and success that geographical clusters enjoy. Processes that can be transferred through tacit knowledge are engrained in local contexts and can therefore be difficult to transfer to other areas. Face to face interaction among companies aids the exchange of tacit knowledge through learning by doing (Pinch et al, 2003).

Pinch et al (2003) in their study of industrial agglomerations using knowledge concepts state that "these concepts of component and architectural knowledge provide new perspectives into the bases for competitive advantage in firms". Zahra and George (2002) argue that architectural knowledge is often an excellent tool used to establish an organisations level of ability to attain, integrate and implement new industry knowledge into the organisation. They termed this process the absorptive or learning capacity of a firm. Pinch et al (2003) argue that "firm level architectural knowledge primarily consists of stocks of knowledge and is a good source of competitive advantage for an individual firm". However, while certain aspects of architectural knowledge may augment an organisations ability to use it as a tool to aide absorptive capacity, there are some elements of it that may inhibit and prevent this process (Henderson and Clark, 1990). It is important to understand the relationship that exists between component and architectural knowledge; "component knowledge is embedded within and influenced by architectural knowledge" (Matusik and Hill, 1998). Architectural knowledge influences and controls how component knowledge is analysed and implement into the organisation.

Literature on the area of component and architectural knowledge argues a concept called cluster level architectural knowledge; this develops from the interactions, interdependencies and common interests of cluster members. It is based on issues such as reciprocity, trust, exchange, cooperation and component knowledge exchange (Pinch et al, 2003). This architectural knowledge is not knowledge that has originated in one particular firm and spread out among the other member organisations of the cluster, instead it is "a shared system for organising component knowledge that is common to a set of proximate firms" (Pinch et al, 2003). They suggested that firms in a cluster may develop "an inter-firm, cluster specific, stock of architectural knowledge" over time and this helps identify and distinguish particular clusters from the rest of the industry. Common cluster level architectural knowledge can increase the absorptive capacity of the whole cluster. This happens as each of the individual firms in the cluster seeks similar component knowledge, and incorporates and implements that knowledge into the individual companies and the marketplace in a similar cluster level fashion, using similar architectural knowledge. This spread of cluster level component knowledge among cluster members offers them a short lived competitive advantage before the component knowledge disperses out to other non-cluster companies in the industry. However while component knowledge may spread easier to other non cluster companies, due to the unique, company/cluster specific nature of architectural knowledge this makes it much more difficult to spread and may continue to give the cluster and its member companies a longer sustained competitive advantage (Pinch et al, 2003). Tallman et al (2004) conceptualised that if a firm and a region is maintain long term competitive advantage, the constituent firms must develop and closely guard their stocks of knowledge and develop mechanisms that will reduce the dispersion of such knowledge. Brown and Duguid (2001) offer an effective analogy a describing component and architectural knowledge- component knowledge is the cargo or baggage that is transported around on a set of rails which represent cluster level architectural knowledge. If you are not on the railway line you will not get any of the cargo.

Component knowledge is absorbed and spread among companies quicker in a cluster due to its less complex nature and the literature states that the more similar the architectural knowledge the more easier it is for companies to absorb industry component knowledge as architectural knowledge provides the routines for adaptation and application of component knowledge. As they develop as a cluster they develop cluster-specific architectural knowledge which is critical for easing the exchange of component knowledge. Tallman et al (2004) propose that "Firm specific architectural knowledge will persist even within regional clusters and will result in observable differences in the stocks and applications of component

knowledge across firms in a cluster". However, there is a possibility that as the spin-offs all emerged from Elan that all their organisational and managerial processes that are characterised as capabilities or core competencies (which usually distinguish one company from another in an industrial sector) are similar and are therefore of an architectural type (Tallman et al, 2004). If these companies have similar histories, management styles, organisational practices, capabilities and competencies there is a possibility that they have developed a particular unique and effective 'cluster level' architectural knowledge, characterised by highly similar architectural knowledge in each of the spin-offs, that gives them a competitive advantage over and above that of the ordinary cluster which has developed its own cluster level architectural knowledge. The literature states that if companies have similar architectural knowledge originating from similar path dependencies and activities, then this improves the overall absorptive capacity of a firm for component knowledge that has been developed in the other companies (Tallman et al, 2004). If the spin-off companies are similar and have similar architectural knowledge and have developed a certain level of cluster level architectural knowledge for more effective absorption of component knowledge how does affect the success levels and competitive advantage of the cluster and the individual companies within the cluster? Is this an advantage or a disadvantage? How does this trait of the spin-off distinguish them from other clusters?

On the other hand, unique architectural knowledge offers a company a competitive advantage by helping them keep component knowledge private for longer and differentiates a company in a cluster, so if all the spin off companies have similar architectural knowledge which allows for quicker and easier spread of component knowledge how does do the spin-offs maintain a competitive advantage in the industry? How does this whole process affect the competitive advantages of the spin-offs? What affect does it have on strategic and management decisions?

What has also emerged with these spin-off companies is a network of informal relationships or 'alumni network' between the former employees. These alumni networks are powerful networking tools as they provide a gold mine of referral resources, new business opportunities and marketplace intelligence, knowledge and skills. They provide many advantages to organisations and their members. However, while companies like KPMG, Bain or McKinsey who have long established a formal alumni website or formal alumni meetings, the Elan Alumni have no such formal arrangement or network, "Although there is no formal network structure, every Elan orphan appears to know exactly what their former colleagues are doing." (The Sunday Times 2005), yet there still exists an informal network of relationships, "We meet in a chaotic manner, at christenings, weddings and funerals, but we would be very, very close… a lot of us grew up in Elan and we share the value system and the work ethic." (Mary Martin, The Sunday Times 2005). What affect has the alumni network had on knowledge transfer among the spin-offs? Is it possible that the development of a specific cluster level architectural knowledge has been aided and supported by this informal alumni network?

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