

SCIENTIFIC ADVISORY BOARDS AS SOCIAL RESOURCES- EXPLORING THEIR ROLE, USE, AND IMPACT IN THE MARKET DEVELOPMENT ACTIVITIES OF NEW VENTURES

Working paper

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Abstract:

This work in progress paper formulates a research agenda for exploring new ventures' scientific advisory boards as a valuable source of social capital. While the human capital of such boards and the value of their relationships within the broader scientific community have been investigated in a small number of recent publications, their potential influence in a firm's market sensing, market creation and market development has not been the subject of inquiry. We present a case vignette from a previous research study that serves as an illustration of the potential wealth of such a line of inquiry before formulating an agenda for future research endeavours in this area.

This work in progress aims to explore what roles Scientific Advisory Boards (SABs) play during the stages of development of new ventures in the Life Sciences. Many ventures nested in the Life Sciences construct and use SABs in the early stages of their development, and early evidence has indicated that these boards may be a central resource for start-ups in this area (Chok, 2009; Keating and McLoughlin, 2009). Yet, issues surrounding the role, use and impact of SABs have remained little explored in the literature. While a limited number of references to SABs have been made (for example Powell and Brantley, 1992; Issacson, Mitchell and Starr, 1994; Stuart, Hoang and Hybels 1999; and Casper and Karamanos, 2003, Chok 2009), few dealt centrally with this particular resource. Of those studies that have been conducted, most have considered SABs in relation to the human capital (knowledge, reputation) they offer; yet, there are indications that seen as social capital resources, SABs can also fulfil an important role in helping a new venture tap into existing or even create new markets (Keating 2008). This paper aims to explore the use of SABs as a market exploration and development device during a number of stages of development of a new venture. Two key questions structure this inquiry: What roles does a SAB play in the development of a new venture, in particular with regard to market creation and customer acquisition? And how do these roles change during different stages of a development of a new venture? These questions will be informed by two theoretical frameworks: the resource-based view of the firm and research on social capital in industrial networks. Both frameworks are particularly relevant from an IMP perspective: while network relationships have always been central to the IMP group's concerns, oftentimes this concern has not translated to the individual level of analysis (Araujo et al. 1998). Remarkably, given the wealth of research conducted in the IMP spirit over the past decades, Ford and Håkansson (2006, p. 6) note that "we are still a long way from having a clear understanding of the process of interaction itself in an economic setting", a comment which seems even more pertinent at an individual level of analysis than at the firm level.

This paper will be structured as follows. After a brief description of the new venture development process and resources required during this process, a review of the role and function of SABs shall be provided. Next, to illustrate the importance of systematic research into these issues, evidence from an extant study carried out by one of the authors will outline preliminary findings surrounding the use and impact of an SAB on a number of stages of development of a new venture. On the basis of this study, a research agenda will be formulated, and concluding remarks will indicate further directions of research in this area.

Resource Requirements and Activities during the New Venture Development Process

The creation and development of new ventures consists of acquiring, developing and allocating resources to novel use (Shane and Stuart, 2002). New ventures will carry out certain activities in attempting to develop their firm including such activities as opportunity recognition and evaluation, business plan development, initial organization, resource and product development and market entry. To develop the firm, firms require resources; these are acquired and developed through firm activities. Early activities can include recognising and developing a business opportunity (Shane and Venkataraman, 2000, Singh, Hybels, Hills and Lumpkin, 1999; Singh, Hybels and Hills 2000), incorporation of a firm and business planning (Delmar and Shane 2003, 2004), while other activities that can take place at various stages of the development of the firm includes attempts to access finance of varying types (Aldrich 1999), develop varying types of resources and capabilities (Brush, Green and Hart, 2001, Lichtenstein and Brush, 2001), and create commercial relationships and alliances (Baum and Silverman, 2004).

A number of perspectives exist within the literature on new venture development with regard to resources and capabilities. Typologies of resources have ranged from general categories such as human, financial, physical, to more specifically organizational typologies including skills and know how, technological, and reputational resources (Brush, Greene, Hart and Edelman, 1997, also see Lichtenstein and Brush, 2001). Similar to other perspectives on resources, the precise types of resources necessary for start-ups to develop can be difficult to define and delimit. Heirman, Clarysse and Van Den Haute (2003), for instance, in their study of the starting resources of technology firms in Flanders, Belgium only considered physical (including technological), financial and human resources, while Brush, Greene and Hart (2001) considered financial, physical, human, technological, organizational, and social resources in the resource base construction by entrepreneurs. In a similar vein, Helfat and Liebermann (2002) outline a range of core and complementary resources and capabilities that may impact a firm's development. Thus, although different perspectives exist with regard to the types of resources and capabilities of importance for new ventures, there is convergence on certain types of resources that a firm will try and access and use to develop their firm. Specifically these resources include both tangible and intangible resources and move across physical, technological, financial, social and human resources¹. Crucially for the purpose of this paper, it has been noted that the types of resources required by a particular firm may vary over the development of the firm (Lichtenstein and Brush, 2001). It is therefore necessary to briefly turn and explore the stages of development of new ventures.

¹ It is worth noting, that although dealt with as separate assets, the authors' recognize that the resources a firm have are interlinked and are dependent on a combination and use of other forms of assets.

The stages of development of new ventures

New ventures may carry out a number of varied activities and although many firm activities are carried out simultaneously or in close proximity to one another, certain activities are more salient than others at different times. A number of models have tried to segment the various stages of organizing or the stages of development of a new venture or small business as well as understand the types of resources and activities that are important at the varying stages (for example Churchill and Lewis, 1983; Carter, Gartner and Reynolds, 1996; Hanks, Watson, Jansen, and Chandler, 1993; Brush, Greene, Hart, and Edelman, 1997). Such models can inform the types of activities that a firm may need to undertake and problems that they may face at varying stages. It is worth noting though that such taxonomies can suffer from the problems of prescribing generalised activities for particular stages, which may be of limited use given the heterogeneous nature of firm activity generally. Furthermore, problems exist in determining at what stage a new venture is and what characteristics define a particular stage. Notwithstanding these caveats, research has emerged that can help understand the salient activities and resources that a nascent firm may use in its development through time.

In a study of high tech University spin-outs that were created to commercialize Intellectual Property (IP), Vohora, Wright and Lockett (2004) explored five phases of development of spin-out firms and the resources and activities and critical junctures that brought the firms through various phases. These phases included a research phase, an opportunity framing phase, and pre-organization, re-orientation, and sustainable returns phases. Each phase is used to describe particular types of activities undertaken and illustrates how a new venture has to pass through a number of junctures (opportunity recognition, entrepreneurial commitment, credibility, and sustainability) to move onto the next phase. Of interest here is that their research was focused on high-tech spin-outs, which parallels the focus of the present investigation in developmental phases of new ventures in the Life Sciences. Their focus on particular junctures through a variety of outcomes to define phases of development may also be of value to present purposes. However, it must be noted that the typology

and critical junctures of Vohora, Wright and Lockett (2004) are specifically focused on University spin-outs that were created to exploit a piece of IP and the transferability of their taxonomy to a broader context remains to be demonstrated.

Lichtenstein and Brush (2001) aimed to explore resource salience at particular points in time in a new venture resource bundle and show gaps and inconsistencies that existed in a number of general taxonomies used to describe the general stages of development of a new venture and the resources required at each of those stages. While the idea of mapping empirically resource bundle development onto the stages or phases of development is to be applauded, Lichtenstein and Brush's particular focus

on relationships and intangible resources may have been influenced by the types of firms they studied (each were close to seven years old with products to sell).

Further, a recent frame developed by Keating and McLoughlin (2009) and derived from a longitudinal study identified three distinct phases of development that a new venture in the life sciences passed through. The first phase consisted of discovering, developing, communicating, and convincing on a perceived opportunity, phase two consisted of developing to deliver on a market opportunity, while the final phase covers delivering on a market opportunity. Similar to Vohora, Wright and Lockett's (2004) findings, each phase consisted of achieving a particular outcome before the venture could pass through to the next phase of development. However, a limitation exists in this work in that these phases were identified through a single case study, and that their categorization of the phases was quite broad.

Finally, Partanen et al. (2008) describe the growth of science- and technology-based SMEs through a four-phase framework comprising of innovation assessment, offering development, commercialization and achieving rapid growth. Relevant to the present purpose, they emphasise that marketing and reputation networks become particularly relevant in the second and third phase of their model, while the former stages are characterised by a need for financing and knowledge networks and the latter require multifunctional networks. While their multiple case study includes one bio-pharma start-up, the discussion of the phase model lacks some important details that could direct further research attempting to identify the specific phases ventures may find themselves in.

Taking the strengths and limitations of the studies discussed above into consideration, this paper will build upon Keating and McLoughlin's developmental stages (2009) but with the aim to further refine and develop the phases of development for life science firms and with a particular focus on social resources represented by SABs, which will be discussed in the next section.

Scientific Advisory Boards

As mentioned, SABs are a thinly researched phenomenon in the management literature (Keating, 2008; Chok, 2009). A Scientific Advisory Board (SAB) consists of a number of scientists named on a formal board that may act in a number of ways on behalf of a new venture. SABs may consist of academic and commercial scientists who are not permanent employees of the organization and who act in a consultancy capacity for the venture (Cetindamar & Laage-Hellman, 2003). The obligations of SAB members will vary from venture to venture but at a minimum they are expected to provide advice on scientific matters and attend board meetings (Stuart & Ding, 2006) Members of a SAB may be rewarded for membership in a number of ways from cash payments for attending meetings or

providing consultancy through to being given equity or stock options (Stephan and Everhardt, 1998). It is worth noting that not all Life Science/biotech new ventures have a SAB or use SABs in their business development (Stephan and Everhardt, 1998; Chok, 2009), which raises the question of why some nascent enterprises choose to establish such a board and some don't.

The role and function of a SAB is generally thought to be centred on the provision of scientific advice and direction to new ventures, however this may not be their only function (Centindamar and Laage-Hellman, 2003; Keating 2008; Chok, 2009). Crucially for the current investigation, their role may stretch beyond the mere advisory aspect in a number of ways. First, most new ventures are resource poor, although this does depend on organizational endowments (Shane and Stuart, 2002). Thus, these ventures will often look outside of their firm to gain required resources from other resource holders (Katila and Shane, 2005). SABs can play a vital role in this process. Hillman and Dalziel (2003) introduced the term 'board capital' in their paper on the role of management boards in small and medium-sized firms. Board capital consists of the human and social or relational capital that each advisory board member brings to the company (Wincent, Anokhin, & Ortqvist, 2010). Human capital, in this context, can be defined as "the full range of knowledge, skills and abilities that produce a given set of outcomes" (ibid. P. 266). What is of particular interest in the first instance is the idea of reputation being bound to the human capital of members of an SAB. New ventures struggle from the liability of newness (Stinchcombe, 1965); to overcome this and gain required resources from resource holders it is necessary that they must be perceived to be a legitimate potential relational partner. Having (a) SAB member(s) of prominence and high repute attached to a new venture can act as a form of organizational endorsement (Stuart, Hoang and Hybels, 1999) and therefore help fulfil a legitimating function. Thus, a SAB can act as a signalling mechanism and provide symbolic reputation to the quality of the new venture. Furthermore, as mentioned by Stephan and Everhardt (1998), by having high status members on a new venture's SAB, they can also act as recruitment vehicles for potential employees. Finally, fulfilling the most obvious function, a SAB with eminent scientists can provide advice through their knowledge of a particular scientific area and also act to capture knowledge (Chok, 2009) that may be used in the future or block others from having access to particular forms of expertise. In a similar vein, commercial scientists on SABs may provide advice on commercial scientific decisions.

Board members' social capital

Tied to the above, consideration needs to be given to how exactly members of a SAB can act as social resources. Social capital may be defined as "the sum of the actual and potential resources embedded within, available through, and derived from an individual's or a social unit's network of relationships" (Wincent, Anokhin, & Ortqvist, 2010, p. 268). It is often postulated that social capital consists of 3

dimensions, namely structural (relating to the architecture of one's network ties), relational (the quality of relationships an individual has developed) and cognitive (shared norms) (Liao and Welsch 2005). In structural terms, researchers have distinguished between bridging and bonding social capital; while the former relies on the 'strength of weak ties' (Granovetter 1973), the latter rests on an individual's strong ties within a social network (for example Adler and Kwon 2002). Further, researchers have distinguished between human capital, represented by the skills, knowledge and capabilities held by an individual, and social capital, which resides in the relationships between individuals only (Coleman 1988). From an IMP perspective, this notion brings the three constituent parts of the actor bonds, resources and activities (ARA) approach in close relationship: social capital as an individual or organizational resource consists only in the activities (relations) between actors. In concurrence with Partanen et al. (2008), we would add that especially for new ventures that have not yet established a consistent firm network, much of the social embeddedness described by the IMP approach is likely to reside at the individual level in the form of social capital, which then becomes the appropriate unit of analysis.

In relation to entrepreneurial activities, Florin, Lubatkin and Schulze (2003) have noted that both social and human capital can represent inimitable resource bundles for new ventures, and that these resource bundles show close relationships with the venture's financial fortunes. Davidsson and Honig (2003) noted that bridging social capital, in particular, can greatly assist nascent entrepreneurs to access firm resources as well as market contacts.

Chok (2009) describes the connections of members of SABs and regulators and how this can help firms manage relationships with regulatory bodies. They may also provide direct access to additional human resources, for example to scientists that work for a particular member's lab or their own scientific work or to companies and commercial projects that they are linked to. Thus, from a social capital perspective, SAB members could provide a valuable bridging function (Burt, 1992; Aldrich, 1999) to potentially useful resources through, for example, connections to financial or alliance partners (Stuart, Hoang and Hybels, 1999), by having upstream connections to universities for potential recruitment (Stephen and Everhardt, 1998), through connections with the regulator (Chok, 2009) or, indeed, through downstream connections into potential client firms. In this context, it is also worth noting that members of one SAB may also serve on a number of other boards (a phenomenon often called 'board interlock'), therefore providing direct or indirect access (for example to client firms of another venture) to the company.

To summarise this brief overview of the literature, emerging evidence demonstrates that the role and function of a SAB is not necessarily limited to that of providing scientific direction and advice.

Members of a SAB can act as both human and social resources in a number of ways ranging from providing potentially useful connections to others for resource acquisition or developments, direct access to resources, fulfilling a legitimating function in a symbolic manner, or indeed recreation of business networks. While limited extant research has focused on the scientific relationships of SAB members (for instance to other scientists in universities or regulatory bodies), the potential *commercial* relationships of these board members have remained unexplored. This is an area that is worthy of further investigation from an industrial markets perspective as it may give an insight into the social ‘seeds’ of market and business network developments in heretofore unexpected places. It also has potential of bridging the analytical gap between social and economic capital in exploring how the former can be ‘stabilized’ to aid the development and maintenance of the latter (Wagner, Finch and Hynes, 2009).

We propose that members of a SAB’s social capital and reputation can have a differential and sustained impact on a new venture’s resource development, which is different and supplemental to their human capital (knowledge and advice) and which can be highly valuable in the areas of market sensing, market development and customer acquisition. Given the differential resource requirements over the different phases of a venture development, we expect that that the strength, impact, form and relevance of such social capital provision may change during the different stages of the venture’s early life cycle.

In sum the interest of this paper rests on exploring the impact of the use of SABs on new venture development through the different stages of development of a new venture generally, and on market development and customer acquisition based on their social capital specifically. We have discussed briefly the new venture development process, the types of resources that may be required during this process and the different stages that a venture may pass through in the development process. We also outlined some of the roles and functions that a SAB may perform. To further illustrate this idea it is necessary at this point to provide a small case vignette, taken from a past research project by one of the authors that sparked the current interest in SABs. In outlining this case two of the three phases of new venture development in the Life Sciences will be described. This vignette will be used as an empirical illustration of the theoretical points made in this review, and assist in developing a research agenda for developing the current work in progress. However, before outlining this brief illustration it is necessary to briefly mention the methods employed and case construction.

Note on Case Vignette- Methodology employed and case construction and analysis:

The brief case presented below is to illustrate the use of SAB's on the development of new ventures and is taken from a longitudinal case study carried out by one of the authors (Keating ,2008). The original case consisted of a single longitudinal case study (Yin, 1994; Stake, 2000) where primary data was collected over a five year period, from 2001-2006, with multiple sources of evidence used to construct the case (Yin, 1994) ranging from formal face to face interviews to the collection and use of company business plans. The construction and analysis of the case was based upon the qualitative, longitudinal, and case construction ideas outlined by Strauss and Corbin (1990), Miles and Huberman(1994), Ropo and Hunt (1995) and Van der Ven, Angle and Poole (1989). Further explanation of the methods used for the broader case can be seen in Keating and McLoughlin (2009). Although the role and use of SABs was not the central target of the data collected, throughout this period information and insights around the construction, role and use of SAB's was collected and it is this information that is used to provide an empirical illustration of ideas outlined below on the role and use of SAB's in the development in general and market development in particular of a new venture.

The structure used in the presentation of this case is derived from the larger case developed by Keating (2008). A chronological approach to the process of new venture development (Ropo and Hunt, 1995) is taken and breaks new venture development down into a variety of phases of development. In the original broader case there were four phases of development presented but as this is a work in progress and is therefore limited in size and scope what is outlined here is two phases which consist of an amalgamation of the two phases that represented the pre-funding phases and an amalgamation of the two phases that represented the post funding phases of development of the firm at the centre of this case. Each of the two phases presented here begins by looking at the aims of the venture in each phase, the activities carried and the outcomes of each of these activities. Following on from this the use of the SAB during each of these two phases is outlined with the intent to illustrate the role and use of the SAB in supporting a number of critical activities undertaken by the venture during each period. Finally a number of observations made by the authors on the role and use of SABs derived from this short case vignette are presented. This is done to help highlight the use of SABs and the similarities and differences in their use value during each of the periods outlined.

Case Vignette: Levodex (1999-2006)- phases of development and the role and function of a SAB

Phase 1: Discovering, developing, communicating and convincing on a perceived market opportunity (October 1999-April 2004)

Background to phase and activities:

Levodex is an Irish start-up venture started by two Irish Scientists working in a Dublin University. The nascent firm wished to specialize in the field of asymmetric chiral catalysis and wished to initially operate as a chiral platform provider that would help in the eventual end production of pharmaceutical products (such as for example Advil or L-Dopa), agro-chemicals or flavours and fragrances. The initial idea for the venture was to industrialise this process by using high through put experimentation and screening machinery (known as combinatorial technology) to greatly speed up the discovery and development of chiral catalysts. The idea originated in 1998 but it was not until late 1999 that the two principle promoters agreed to form company. Throughout 2000 they took part in a campus company programme in their university about basic business principles for starting your own company. The venture really started to operate on a full-time basis when they were accepted onto a campus company programme in early 2002.

The key activities of the venture during this period centred on developing their perceived opportunity and initially gaining a (relatively) substantial amount of finance (€2 ½ million for 18-24 months). They were aiming for funding through venture capitalists. Through many troughs and a few peaks Levodex managed to secure €650,000 in funding for proof of concept. Along the way they had hired and fired a CEO and taken on a new CEO with industry experience as well as radically changing their initial plan to developing a potential piece of IP that came from the senior scientist's lab.

Scientific Advisory Board and perceived uses:

Levodex constructed their SAB in late 2000. It consisted of six scientists- four were academic scientists and the remaining two were commercial scientists. The head of the board was the most eminent scientist in the field of chiral chemistry who went on to win the Nobel Prize for chemistry in 2001. The senior scientist promoting the start-up had worked with the Nobel Laureate in the US. Two others were UK based scientists and were also leading academic scientists in this field. All were recruited through being contacts of the senior scientist promoting the venture.

The initial perception of the two founding scientists was that the SAB was to help in their search for and development of catalysts. They also thought that the SAB may be potentially useful in helping with commercial advice and contacts as well as in helping with financing because "...“...*their purpose*

is to make us look good, I suppose, and it is an impressive thing to say that we have this expertise at our disposal.” (Junior scientist, 25/04/02)

SAB- Actual Use during this Phase of development:

With the desire to develop, communicate and convince others of the venture’s potential, individual members of the SAB did play a role in helping the firm in their key activities in these early stages of development. With regard to gaining initial financial and physical resources, both the senior and junior scientist pointed to the fact that when they went for interview to be accepted onto the campus programme which would provide them with initial funding and an office space, the fact that their SAB chairman had just won the Nobel prize impressed the manager of the programme to such an extent that at the end of the interview he offered them a place on the programme. As the senior scientist stated of the meeting: “...’you know your man had just won the Nobel Prize’, he says... he didn’t mess around or anything to that effect he just said ‘That would be helpful.’ So I think that sold him right there” (Senior Scientist, 11/08/04).

Unsurprisingly, throughout iterations of the venture’s business plans during this phase the perceived skill and expertise of their SAB was given great prominence. During their search for venture funding, they requested meetings with over 15 venture capital funds in Ireland in which all but two declined. They partly attributed the initial interest in their venture by having a Nobel Laureate on their SAB. However, although this did gain initial meetings having a prestigious SAB was no guarantee of success in gaining financing; as one venture capitalist stated: “*In these advisory boards you do kind of see... often what you see is these advisory boards have great names on it but how often have they met? They have never met, they are purely just names on a sheet and that is no use*“(Irish Venture Capitalist 8/11/03).

During the protracted negotiations with a venture capital fund that ended up investing in the venture, they found that they were able to use members of their SAB for help in convincing the eventual investor. They convinced one of the commercial scientists from their SAB to meet with and discuss the commercial potential of this particular field and their potential piece of IP with the principals of this fund, while another member arranged for the principal investors to visit a major pharmaceutical firm’s senior process scientists to discuss the possible uses of Levodex’s potential IP.

Phase 2: Developing to deliver on Market Opportunity (April 2004-July 2006)

Background to phase and activities:

This phase in the development of Levodex is focused on three key issues, namely gaining further financing, developing their technological resources and developing commercial contacts and generating revenue. A key part of this is 'proving the concept'. During this period the venture, again though carrying out many different activities with variable outcomes, managed to develop across all of these areas. The venture gained grant funding of approximately €700,000 from two awarding bodies - InterTrade Ireland and the EU. In accessing this funding they created a partnership with a University in Northern Ireland and in particular developed a relationship with a senior scientist in this University who specialized in enzymes, which was complimentary to what Levodex did. The enzymatic technology was then licensed into the venture to add to their thin product line. Furthermore, the venture took part in a Business Expansion Scheme² and raised an additional €1 million in funding from individual private investors. With regard to their technology, although initially slow and haphazard in its development, the venture managed through their piece of IP to produce a small number of samples for testing in industry and at the very end of the period had what they perceived to be their first viable commercial product line. Finally, throughout this phase they attempted to initiate commercial relationships and managed to carry out a small research project trying out a number of their ligands (used to make catalysts) in a drug production process for a very large multi-national pharmaceutical manufacturer, made a small sale of ligands to a multi-national chemical company, and sold a small amount of samples from their licensed enzymatic technology to another large pharmaceutical firm.

Through this period they took on a number of staff in both full-time, part-time and on contract/consultancy positions. Key appointments included a senior lab director with industry experience to take over from the senior scientist who helped start the venture, a lab manager with a commercial background and a research funding manager (contract/consultant for specific grants). They also added the key scientist from the Northern Irish University to their SAB.

Use of SAB during this period of development:

This phase of development, centred on developing to deliver to market, was driven by three intertwined sets of activities: developing their technology, generating commercial relationships to

² Business Expansion Schemes (BES), through a tax relief bill in 1984, were introduced as an incentive to get private investors to invest long-term capital into new and smaller firms in certain sectors of the Irish economy that might otherwise struggle to find investors. Sector included manufacturing, tourism, and firms involved in R&D. What a BES, at this particular time offered was tax relief of up to 42% on investment of up to €31,750 p.a., and the investor in the firm receives a guaranteed but capped return on investment after a set time period (between 2-5 years).

start garnering revenues, and accessing additional financial resources. The SAB, directly and indirectly, had an impact on all three.

First, in the development and expansion of the venture's technology, members of the SAB helped by providing suggestions on developing their IP, which was a process for generating rare forms of chiral ligands. As the junior scientist who co-founded the company stated: *"...there was a lot of input on ways that we could think about improving the process, the (IP) process and also ways... of generating new ligands."* (junior scientist 05/07/06)

The addition of the Northern Irish scientist to their board gave them access to knowledge in a complementary field as well as helping them gain significant funding and additional products to potentially generate immediate revenue and broaden their market opportunities.

Second, regarding the market development of the venture, the SAB played a central role for two of three commercial contracts that they carried out. For the contract with the major pharmaceutical firm they used one of the commercial scientists on their board to gain that contract. This particular scientist was the head of the process development unit in this pharmaceutical firm and arranged the contract for Levodex to try out their ligands in one of the development processes of a blockbuster drug. The other contract was set up by another member of their SAB who put them in contact with a decision maker in a major chemical firm: *"Again, through our advisory board, Donald Andrews, who is on our board ...he works with Chemco [pseudonym] and he told us 'You should talk to this guy in Chemco who is interested in what you do... and see if he can use your stuff.' So, we did and he was interested and he only wanted to try a small amount from us"* (junior scientist, 25/11/05).

Turning to the final element, which centred on accessing financial resources, the SAB's influence, outside of the use of a partnership with a Northern Irish scientist for grant funding, was more based on symbolic aspects rather than on directly providing market access. In the business plan/prospectus for the BES investment the SAB was given a prominent role in laying out the expertise at the disposal of the venture. Furthermore, the addition of potentially commercial products gained from the Northern Irish scientist was highlighted as having significance in generating short- to medium term revenues for the venture. As such the use of their names and expertise was still very much to the fore in attempting to gain funding from private/venture capital investment for further market creation.

Observations and discussion of the use of the SAB during the early phases of market development:

In outlining this brief case vignette above it can be observed that the SAB fulfils a number of important and diverse functions in the development of this life science venture. Each of these functions plays a part in helping to develop the venture, although it is worth noting that their use was only one of a number of resources in the development of the venture.

Taking phase 1, one of the main functions of the board is to provide a sense of legitimacy to the venture in its attempts to gain financial resources, acting as a form of organizational endorsement (Stuart, Hoangs, and Hybels, 1999) that can act as a signal to the potential value of the venture (Keating, 2008; Chok, 2009) – a function that is summed up in the following case quotation: “*a lot of what we are doing... is just trading on his name because to say that we have him onboard is a big bonus*” (Junior scientist, 25/04/02)

For the case company, this reputational effect helped gain access to a campus company programme and at the very minimum audiences with potential investors. Although the reputation of the board itself was not enough to gain venture capital funding in itself, it did, at the very least, add positively to the legitimation process that new ventures pass through (Zimmerman and Zeitz, 2002). Furthermore, in searching for funding and in the negotiation process the use of the SAB was of value because as well as performing a symbolic function, individual members were used to interact with and perform a bridging function to others that would help lower the levels of perceived risk of potential investors in the venture. So they influenced the decision making of targeted resource providers by providing information and advice (Ozgen and Baron, 2006) on the scientific side and market opportunity and also by connecting potential investors to other commercial scientists in a major pharmaceutical firm to discuss the potential of the venture’s proposed IP.

What is interesting about this phase is that the use of their SAB is not so much focused on developing the scientific capabilities of the venture. In reality there were no technological resources for the SAB to advise on developing. Their use was focused in the main on complementing the primary focus of the venture, which was accessing targeted financial resources to begin to commercialize their perceived opportunity. However, it is certain that the SAB in this phase for this venture is not merely “... ballast to the letterhead” (Stuart et al, 1999, pp. 347).

Taking the next phase of development of the venture, which was focused on developing to deliver to market and incorporated the development of technological resources, commercial relationships, and gaining further finance the SAB, as well as further providing symbolic capital, began to fulfil a number of additional functions. First, the new member of their SAB provided products to a venture at

the time when they had a very thin product line. Second – and interestingly only at this stage - the board began to perform their primary function which was to provide advice on scientific decisions in developing the key technological resources of the venture (Isaacson, Mitchell, and Starr, 1994). Third, members of the SAB either directly set up commercial contracts or else acted as a bridge to a commercial contract for the venture. Although these contracts generated miniscule revenue they once again served a symbolic function, in the form of inter-organizational endorsements signalling to potential investors the legitimacy of the perceived opportunity and how it may be included in plans/prospectuses. Finally, the SAB impacted on the financing of the new venture directly through the use of the new member of the SAB for grant funding, and indirectly by the new member providing access to products for sale (therefore providing evidence of development to be communicated to potential investors), in helping in the development of commercial contracts, and in helping in advising in the development of their technology.

What can be seen during this phase is that once again there is a synchronicity in the use of the SAB and driving concerns of the venture during this phase of development in that they help in accessing finance, developing the technology, and most significantly accessing and developing commercial relationships to ‘prove the concept’ for which they had been funded.

Looking across the phases outlined it could be argued that in general terms the SAB performed similar functions in both, in providing advice and information (scientific or commercial), acting as bridges or providing direct access to targeted resources, and adding symbolic value in providing a sense of legitimacy to the venture. Furthermore they helped the venture develop across a number of types of resources. This included physical (gaining access to an office and combinatorial machinery), technological (guidance in developing their patented process and access to and development of enzymatic technology), human (access to their expertise and use of their reputation), social (use of their contacts) and finally financial (access to all types of funding- campus company, venture capital, grants, BES investments, commercial revenues).

However, from this case vignette, qualitative differences in their use across the phases of development can be seen, in that each matches the phases of development of the venture, which comprises of complementary but slightly different sets of activities and resource development. Interestingly, it is worth noting that in this case the SAB’s primary function on providing scientific advice and direction was only one small part of how it was actually used. Particularly, the most surprising finding of this case was the SAB’s (and particularly the two commercial chemists’) active involvement in detecting and creating market opportunities. This particular role of SABs has not yet been discussed in the

literature and, as will be argued in the following section, is worthy of focal attention from industrial marketers.

A Research Agenda

To date, the literature on SABs has considered board members resource impact only in light of their human capital in the form of scientific knowledge, expertise, reputation and advice, and essentially ignored their social capital (with the exception of Chok's (2009) study of regulator relationships). The preliminary investigation presented in this paper indicates that SAB members can have a much wider-ranging impact on a new venture's fortunes than previously assumed, but it has also indicated that this impact may vary in scope and form throughout the developmental stages of the venture's early existence. Further, it has been shown that the detailed mechanisms through which social capital is brought to bear has not been investigated exhaustively. While the resource based view has considered intangible capital, most research has shied away from providing a detailed picture of the activities, relationships and actors influencing the development of such resources developing over time, and particularly in the context of market development, at an individual level. The industrial networks literature, on the other hand, has provided detailed elaborations on the structure of social capital and the flow of influence in industrial networks from an organisational perspective, but this has rarely been linked to issues of strategic market development and customer acquisition in new ventures over time through individual involvement. We thus propose to fill this particular gap in our knowledge on new ventures by carrying out a longitudinal, process-oriented study of the use of SABs in new ventures in the life sciences.

We will pursue process research in the form of multiple case studies because the phenomenon that we study necessitates the in-depth investigation of relatively few organizations over time (e.g. Van de Ven and Huber, 1990). Nahapiet and Ghoshal (1998) remind us that all forms of capital, and social capital in particular, develops and changes over time. Process research leads us to focus on patterns as they unwind over time together with organizations' anticipations of the future and interpretations of the past as they contend with and shape particular events in the here and now. It also offers researchers the opportunity to engage in a form of 'case replication' (Leonard-Barton, 1990) by comparing a limited number of cases along a continuum of patterns and temporal criteria. Data collection and analysis will be guided by process research principles as suggested, for instance, by Van de Ven and Poole (1990), focussing on temporal relationships within the cases, but also heeding the difficulties inherent in such a process (Langley, 1999), for instance in deciding what counts as an 'event'. It is expected that such longitudinal case-based process research can shed light onto questions such as: Which scientists should new ventures add to their SABs and why? How can they be

recruited? How can they be used? What exactly can their impact on the market development of the venture be? How does this impact play out in different stages? While issues of scientific development and financing have been touched upon in past research, we will focus our exploration of these questions on market development and customer acquisition through relational and social capital in particular and thus contribute both to academic research in the areas of market creation, industrial networks and social resources, and to practitioner concerns over the value and use of scientific advisory boards.

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