PERFORMANCE AND THE LIFECYLE OF THE FIRM AND ITS NETWORKS

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ABSTRACT
This empirically driven paper presents a conceptual model which relates performance to both the lifecycle of the firm and of its networks. The data imply that the ability to fundamentally change network focus, what we have called network revolution, might enhance firm performance. This network structure-process-performance nexus is explored by combining the entrepreneurial and IMP literatures. We suggest that bringing these two literatures together in this way will contribute to expanding the scope of network studies by focusing on the dynamic processes and outcomes of networks, both from an intentional (revolutionary) and from a static (evolutionary) perspective.

INTRODUCTION
This paper presents a conceptual model in an initial attempt to relate performance to the lifecycle of the firm and to two perspectives on the lifecycle of networks, namely their evolution and revolution. The paper arises from the findings of a recently completed empirical study that indicated that performance might be dependent on the ability of the firm to alter its network configurations over time. In order to explain this result, we revisit the entrepreneurship literature informing the original study in relation to perspectives on network lifecycles from the IMP school of thought. Bringing the entrepreneurship and IMP literatures together provides a unique opportunity to add understanding to the structure-process-performance nexus of networks. As Araujo and Easton (1996: 68-71) demonstrate in their overview of network theory, these are the only two key "network approaches" whose orientation covers both structure and process. Further, we would argue that the entrepreneurship literature provides insight on network performance, allowing us to conceptualise a model relating structure, process and performance.

Meanwhile, the next section highlights the empirical evidence informing this conceptual paper. We then go on to confront the findings with the IMP and entrepreneurship literatures before the presentation of the model informing our further research.

THE EMPIRICAL EVIDENCE

Although not the original focus, a cross sectional empirical study of the use of networks by 65 New Zealand-based, high technology entrepreneurial firms highlighted some interesting findings in terms of the lifecycle of the firm and its networks in relation to performance (Wilson & Appiah-Kubi, unpublished). These results are highlighted after a brief summary of the method and measures employed, which set the data in context.

Method

Postal questionnaires were sent to the managing directors of 300 broadly defined high technology manufacturing firms in New Zealand comprising the population of software developers, which were also responsible for the manufacture of the software, and electrical and electronic manufacturing firms. Originally, the intention was to conduct a single industry study, however, the small overall New Zealand company population led to this multi-industry study. Chi square tests of the categorical versions of the study variables by industry led the authors to conclude that there were no significant industry effects and, therefore, that it was possible to aggregate the data.

A follow up mailing led to a final effective response rate of 24 per cent (65 useable questionnaires, 2 non-useable returns and 32 questionnaires returned to sender). A t-test conducted on the employment figures of the responding and non-responding firms, the only variable for which consistent data were available, revealed no significant difference between the two groups (p=0.17). All firms in the sampling frame were established in 1980 or later and employed 200 employees or less, the aim being to target SMEs in which the original founder(s) was (were) present. This eventuated in eighty two per cent of cases (53 founders). However, since the other 12 respondents indicated that they were able to answer the questionnaire, they were also included in the analysis.

Measures

Respondents were asked to rate their network contacts on a five point interval scale, with '1' representing that the external resources accessed were 'not central to core operations' and '5' being 'very central to core operations.' The original study was attempting to arrive at classifications of networks in terms of their social, vertical or horizontal characteristics. Factor analysis with varimax rotation was first performed on the nine response items in order to understand the nature of the data and potential correlations. The rotated factor pattern indicated that ex-employers and competitor firms loaded significantly on one factor, suppliers and customers loaded on another factor, professional bodies, government bodies and trade associations loaded on a third factor, while family/friends and financiers loaded singly on to two further factors. The items loading highest on each factor were then chosen as inputs for the cluster analysis, namely competitors, suppliers, financiers, family/friends and trade associations.

Instead of the anticipated 3 classifications of networks, namely social, vertical and horizontal, only two groupings were discernible from the clustering solution. Higher means were recorded for Cluster 1 firms with the categories of family/friends and suppliers (and customers given the correlation from the factor analysis) and for Cluster 2 firms with competitors (and ex-employers given the factor analysis correlation). These clusters were well separated based on the Euclidean distances from their centres. Additional cluster solutions failed to distinguish between firms employing social and vertical linkages. This led the researchers to revise their classification of social, vertical and horizontal networks;

instead, it was inferred that Cluster 1 firms relied more on 'social/vertical networks,' while Cluster 2 firms relied more on 'horizontal networks.' In addition, the researchers decided to include only competitors, suppliers and family/friends in subsequent analyses due to the failure of financiers and trade organizations to discriminate clearly between the two clusters.

Both continuous and categorical measures of age were employed. The categorical variable was based on the median age of the firms in the sample, which also happened to coincide with the mean age; namely nine years, ranging from less than one year old to sixteen years old. Younger firms were categorised as those that were nine years old or less, and older firms were classified as 10 years old or more.

Three objective measures of growth were adopted, acknowledging that there is no generally accepted set of performance measures to evaluate new ventures (McGee and Dowling, 1994). These were growth in sales, profit and assets, measured over a two year period. According to Feeser and Willard (1990), strong sales growth generally is indicative of technical quality, market acceptance and the perception of differentiated advantages. Profit growth can be used as a measure of aggregate company performance (Mosakowski, 1991), and asset growth is less subject to economic fluctuations when compared with sales and profit figures (McGee and Dowling, 1994).

Results

The original study attempted to determine whether the age of the firm acted as a distinguishing variable in the use of different types of network. However, the resulting discriminant function failed to distinguish firms according to the two categories of social/vertical networks and horizontal networks (p=0.38). Nevertheless, the MANOVA indicated that those firms employing horizontal networks achieved significantly higher sales growth, followed by firms focusing on social/vertical networks, then by no networks (p=0.02). Although there were no significant direct relationships with the other two growth variables, the mean values followed the same sliding scale pattern as for the sales growth measure. This result implied to us that performance may be contingent on the nature of the networks employed by the firm.

In addition, the MANOVA revealed that there was a significant interaction, at the 10 per cent level, between profit growth and age: for firms employing no networks versus those employing social/vertical networks (p=0.08); and for firms employing social/vertical networks versus those employing horizontal networks (p=0.08). The interaction effect for all three network types just failed to return significance at the 10 per cent level (p=0.12) due to the lack of an interactive relationship between age and profit growth for the firms not involved in networks versus horizontal networks. Thus, younger firms using social/vertical networks exhibited higher profit growth initially, but older firms employing social/vertical networks experienced lower profit growth compared to older firms employing horizontal networks or no networks.

This result was reinforced by the preliminary findings of a single industry case study. In this ongoing research, Benson-Rea (1999) found that, of firms which pursued similar strategies and were of similar size in terms of volume of production, the use of particular networks within strategy varied considerably by age and across time. All were embedded in industry relationships but used them in very different ways. Similar to the empirical data cited above, one older firm was no longer using social relationships while one younger firm was primarily using vertical relationships to build its position in the industry. Profitability and broader

performance measures have yet to be explored within these cases. These results require further investigation and, therefore, in the next section we explore them in the context of the literature arising from the IMP and entrepreneurship schools of thought.

THE EXTANT LITERATURE

The Lifecycle of the Firm and its Use of Networks

The empirical study found that age was not significantly related to a particular network focus, although we did find an intervening relationship; that is, higher profitability was dependent on the use of social/vertical networks at the early stage of development of the firm (see next subsection). There follows a review of, primarily, the entrepreneurship literature in relation to this finding.

Hudson and McArthur, in a theory building article, predicted that many entrepreneurs would not be active users of networks at or near the start up of their ventures. Further, they anticipatedthat it would be the recognition of severe resource constraints which would lead them to prefer 'inter-firm transactions' over 'internalised contracting,' (1994:45). Some years earlier, Birley (1985) investigated the critical relationships during the founding stage of the new venture and distinguished between informal and formal networks. Informal networks, which included relations with family, friends and colleagues and can be termed social networks, were found to be more important for the resource accumulation process than formal networks, comprising professional services (banking, accounting, legal services and realty) and sources of new enterprise advice (Chambers of Commerce and the US Small Business Administration). Ostgaard and Birley, drawing on the Birley classification (1985), also established the critical role of social relationships in the provision of resources during the start-up process of the entrepreneurial firm (1994).

Ramachandran and Ramnarayan (1993) found that pioneering and innovative entrepreneurs employed networking behaviour more than other entrepreneurs, and that the 'inner circle' of family and friends provided the major share of the external resources. Thus, there appears to be some correspondence of Ramachandran and Ramnarayan's inner circles and social networks, although the stage of development of the firm is not clear from the authors' secondary analysis of 67 published case studies.

So, while the literature is clear that social networks are important to the entrepreneurial process during start-up and the early stages of the venture, the empirical data informing this paper indicate otherwise. Both horizontal and social/vertical networks were evident across the entire age spectrum of the study firms. However, given that it was not possible to clearly distinguish firms employing social networks from those employing vertical networks, we should interpret the findings with caution. It might be the case that the high technology nature of the sample informing our perspective confounds this issue.

For example, Powell (1998) acknowledged that differing strategic intents drive collaboration and a variety of relationship portfolios may arise. Specifically, he argued that new technology intensive firms require collaboration with others to gain access to the emerging industry and to speed up the innovation process, although he fell short of explicating the nature of these relationships. Likewise, Larson's inductive studies of four firms and seven alliances (1991; 1992) established that "The use of a network exchange structure represents a critical leveraging opportunity whereby resources can be gained and competitive advantages realised without incurring the capital investments of vertical integration," (1992:78).

Lipparini and Sobrero established in their 1994 empirical study that incremental improvements, such as cost reductions, were a noted outcome of vertical networks. In addition, the transference of organisationally embedded knowledge was unique to the entrepreneur-supplier relationship, compared with the professional manager-supplier relationship, resulting in the joint development of radical and architectural innovations. Ostgaard and Birley (1994) found that firms employed different networks according to the strategies pursued. Specifically, 'patented and focused production innovation-based firms' had extensive networks centred on customers, market information, distribution channels, word-of-mouth advertising and product development ideas. This network exhibited both vertical and horizontal relations. 'Aggressive innovation and marketing-based firms' focused on maintaining contacts, especially with investors and suppliers. Finally, 'product offering-based firms' focused mostly on customer relations. These latter two networks contained strong vertical relation elements.

While the empirical study informing this paper does not contain data on the strategic *intent* of the firms employing different networks, it does allow us to draw some preliminary conclusions pertaining to the strategic *outcomes* in performance terms, and that is the subject of the review in the next subsection.

The Use of Networks and Performance

Both direct and indirect performance outcomes from the use of different types of network were discernible from the data informing this paper. First, in terms of the direct effect, firms experiencing above sample average sales growth employed horizontal, or competitor-based, networks. Second, in terms of the indirect effect, profitability was found to be dependent on the interaction of the age of the firm and network type. Noticeably, older firms employing social/vertical networks experienced lower profit growth compared to older firms employing no networks or horizontal networks.

Green and Browne (1997) posited a model of resource needs according to growth and innovation rates. According to the authors, social resources from individual and family sources are less crucial when firms pursue low growth, but relatively strong organisational, financial, physical, human and individual resources are important when firms pursue high growth. This model allows us to begin to draw more explicit links between an enterprise's strategy, resource needs and performance, however, there is no account of the impact of networks on the resource acquisition process since the internalisation of resources is an implicit component of their model. Golden and Dollinger (1993) linked the use of vertical and horizontal networks by small firms to the Miles and Snow strategy typology. They concluded that "… fewer small firm managers used Conjugate and Confederate strategies," (1993:50), which are the two categories best equating to vertical and horizontal networks. Further, they found only limited evidence of a relationship between the use of networks and the sales growth or net margins of the firm. Brown and Butler (1995) distinguished between competitor (horizontal) and stakeholder networks in their study of the US wine industry, and their stakeholder classification included relations with distributors and suppliers, or vertical networks. Higher growth in sales was associated with the use of competitor networks, while neither network was associated with profitability. Interestingly, there was no relationship between firm age and the type of network used or the growth of the winery.

Although the Wilson and Appiah-Kubi findings on sales growth support the results of the Brown and Butler study (1995), they stand in contrast to the research by Golden and Dollinger (1993). In addition, the use of age as a moderating variable revealed a relationship

between profitability and networks which was not discernible in the research of Brown and Butler (1995). In an attempt to explain the above performance results, we draw on the IMP literature on the lifecycle of networks in the following subsection.

The Lifecycle of Networks

In the Wilson and Appiah-Kubi study the older firms employing social/vertical networks recorded lower profit levels than both older firms employing no networks and older firms employing horizontal networks. Although these data are based on a cross-sectional survey, we can conjecture from this that, over time, performance may suffer if firms simply remain with the *status quo*.

While much of the existing literature focuses on the evolution of networks over time, we would argue that there is a need to think about networks in the context of partner exchange, our so-called network revolution. For example, according to Larson and Starr, social networks represent the first phase in the development of more critical strategic ties, however, the social, business and strategic networks are "… combined at the outset and throughout the organisational formation process," (1993:12). This view coincides with much of the IMP literature on the evolutionary nature of networks, both in the context of process change (Easton, 1992) and structural change (Holmen et al, 1999).

First, focusing on process change, networks build up as activity links, actor bonds and exchange ties develop within relationships. The nature of these factors may change over time, deepening or becoming less important. Further, as relationships grow, they are combined and connected to others through direct and indirect linkages. Within the markets and networks approach (IMP), Johanson and Mattsson (1988:290) see networks as "stable *and* changing." Relationships change constantly through the parties' efforts to "maintain, develop, change and sometimes disrupt the relationship." These processes, they argue, take time and have a cumulative effect. Likewise, Powell (1998) alludes to the network exhibiting a lifecycle, whereby collaboration speeds up innovation (the 'ladder effect') which, together with the experience of collaboration, changes the nature of the interactions themselves.

Second, focusing on structural change, the micro-positions occupied by actors within a net or network, or the dyads which make it up, can become more numerous, as new actors become involved, or sparser, as actors leave. According to Araujo and Easton (1996:67) structures are the "temporary and transient effects of these primary network processes." Within the organisational, institutional approach, Walker (1998) argues, from a somewhat myopically dyadic perspective, the merits of constructionism (after Emirbayer and Goodwin, 1994) in which firm strategy and network structure interact over time. Crucially, network formation does not follow a predictable path, he argues, but changes by structural increments, again, and evolutionary perspective.

In terms of reconciling process change and structural change, Lundgren (1993) pursues the industrial network approach in his analysis of technology networks, sharing the view that networks are evolutionary. Attempting to understand the dichotomy of fluidity and stability, however, he sees networks as: "composed of two complementary, but contradictory processes; the generation of variety and the organizing of everyday life" (1993:149). He argues that the emergence of new industrial networks is a process in which individual actors create the network. Accordingly, such actors are required to build their own position within the network and simultaneously be involved in the evolution of the new network as a whole (1993:169). Hakansson and Snehota (1995) ascribe the process of networking, which they

build loosely on the Austrian School of Economics, to three sets of factors (two endogenous and one exogenous): those internal to the individual firm; those arising from a situation within an interaction, or; third party or societal developments. A network of business relationships is never stable, they argue, and, again, trying to reconcile structure and process, they maintain that "… [the network] is a structure with inherent dynamic features, characterized by a continuous organizing process," (1995:271). Arguing that there are identifiable patterns in the change processes in business networks, Hakansson and Snehota assert that such change is both evolutionary and continuous. The links, ties and bonds which are developed in one relationship are connected to others: they are the sources as well as the effects of change (1995:276).

Regardless of the structure or process focus, all of the above studies are based on an evolutionary approach to understanding network change. However, contrary to this view, Falemo (1989) maintains that once the start-up phase of a new venture is complete, organisational needs become more complex and different types of networks will be required. This implies a switch in emphasis on the part of the firm away from the network relations of its youth to the use of networks more fitting to its later stage of development. This perspective seems more fitting for our data.

So, have some of the older firms in the empirical study failed to change the social/vertical networks of their youth (our so-called revolution)? Is this a more static view of networks as identified by Easton (1992), or a reflection of Powell et al's over-connectedness arguments (1992), where decreasing returns to network ties ensue because they 'bind' the firm? Powell et al's views echo Uzzi (1997) who argued that embeddedness in close relationships could have positive effects up to a point, after which they damaged firm performance by making them less flexible and less open to new information. Uzzi advocates an integrated network approach which is neither under-embedded (arm's length) or over-embedded. When interfirm relationships are more deeply embedded they are more difficult to exit: according to the social capital view. Hakansson and Snehota (1995:277) argue that, although networks become more elaborately connected and more tightly structured over time, this is likely to slow down. Thus, they believe that new networks may have a greater potential for change than older ones. The change they describe in networks follows a "network logic" in which incremental adaptations move the interactions towards a steady state, echoing Lewin's (1947) force field equilibrium model. Coleman (1988), a leading proponent of the concept of social capital, defines this as existing or being created when network actors' relationships are embedded in dense interactions which develop behavioural norms which can enforce adherence to these. This idea is taken further by Axelrod and Bennett (1997) who identify metanorms, whereby actors punish others who do not enforce norms. Thus interaction within networks is highly complex and challenging to deconstruct.

If we follow the new economic sociology approach, the position of Grabher and Stark (1997) on change in the context of restructuring networks may be helpful. Thus, "Change, even fundamental change, of the social world is not the passage from one order to another, but rearrangements in the patterns of how multiple orders are interwoven" (1997:536). Whilst new network connections may arise from previous interactions, why do some new relationships appear revolutionary? Is the problem, then, that we can observe structure as it changes but we cannot readily do the same with processes? The revolutionary approach may be akin to the view put forward by Araujo, Bowey and Easton in their discussion of social capital, industrial networks and entrepreneurs. Their analysis suggests that the distinction may lie in what is purposive action and what is a "by-product of other activities" (1998:82).

Thus, an evolutionary approach may see networks as emergent over time but the revolutionary view may take a more strategic, intentional approach.

The entrepreneurial act is inherently revolutionary where networks are viewed as a mechanism to leverage resources from their owners; that is, gain access to other people's resources to pursue an opportunity to earn entrepreneurial or superior rents (Timmons, after Stevenson, 1994). The entrepreneur has to take a revolutionary perspective for two principal reasons. First, resource ownership, or internalisation, is disadvantageous. An internalised resource represents a cost to the entrepreneur if it is not employed to at least a 'boundedly rational' efficient level, and organisational pressures to reduce resource slack limit the scope for discovery of alternative uses. As Casson points out, "An emphasis on *scarce resources* confines attention to decisions of an economic kind," (1993:31) where the focus is on the efficient 'achievement of ends by a given means,' a role that can be considered much more managerial (Kirzner, 1982). We lose sight of the entrepreneurial, opportunity-driven element when we confine our analysis to such considerations.

Second, it takes considerable effort to conceive of, and realise, the reallocation of resources due to 'psychological inertia' (Leibenstein, cited in Casson, 1982). This perspective accords with the above noted inertia relating to network evolution. Freed from the constraints of owning and efficiently managing resources, entrepreneurs are able to conceive of 'new combinations' (Schumpeter, 1939). "Reference to the *coordination* rather than the allocation of resources emphasises the dynamic aspect - coordination *changes* the allocation in order to improve the situation," (Casson, 1993:31).

Thus, entrepreneurs can focus on the identification of profitable opportunities pertaining to resource 'misallocation' - where resources are being bought or sold at above or below their intrinsic value (Cantillon, cited in Murphy, 1986; Kirzner, 1973), where resources can be obtained and used that were not well marketed (Leibenstein, 1978), where resources have become newly available (Kirzner, 1973), or where resources are being employed wastefully or wrongly (Leibenstein, 1978). As Shane and Venkataraman point out, "An entrepreneurial discovery occurs when someone makes the conjecture that a set of resources is not put to its 'best use,'" (2000:220).

Thus, much of the IMP literature highlights the equilibrium-seeking nature of network processes and structures which, we argue, is likely to lead to sub-optimal performance over time. Meanwhile, much of the entrepreneurship literature is concerned with challenging the equilibrium network state in order to earn superior profits, which should then be reflected in changed network configurations. In terms of reconciling the literatures, we do not reject the IMP tradition of network evolution, but we argue that there is a need to expand this somewhat static view of change to take account of the more dynamic case of network revolution . An initial attempt to bring these perspectives together is presented in the following section.

THEORETICAL MODEL

In conceptualising the ways in which firm performance and network change may be interrelated, we propose the following model and pose some tentative questions:

Focus on Network Evolution (Static)		Low	High
	High	Satisfactory performance (evolutionary but stable networks) (2)	Highest performing firms (4)
	Low	Under-performing firms (1)	Satisfactory performance (evidence of changed network configurations) (3)

Focus on Network Revolution (Dynamic)

(1) Do under-performing firms fail to evolve along with the network; that is, have the networks outgrown the firm? Do under-performing firms fail to be revolutionary in their use of networks; that is, have the firms outgrown the network? (Low/Low)
(2) Is performance related to joint firm and network evolution, with a focus on changing processes and structures within essentially the same relationships? Is this a static perspective? (Low/High)
(3) Is performance related to firm and network revolution, with a focus on moving to networks of a fundamentally changed nature? Is this a more dynamic perspective? (High/Low)
(4) Is highest performance related to both an evolutionary and revolutionary perspective on the use of networks? (High/High)

The next step is a series of in-depth case studies which are currently underway to develop the constructs of the model. This will then be tested in two ways; by re-surveying the firms comprising the Wilson and Appiah-Kubi study and by conducting a wider cross-sectional survey to test for generalisability. Our intention is contribute to expanding the scope of network studies by focussing on the dynamic processes and outcomes of networks, both from an intentional (revolutionary) and from a static (evolutionary) perspective.

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