



Planning and Transport Research Centre

Working Paper Series

The Networked Firm: A Framework for RBV

Nick Wills-Johnson *

October 2006

Planning and Transport Research Centre Working Paper No 9

Copyright © 2006 Curtin University of Technology, Edith Cowan University, Murdoch University and The University of Western Australia together as the Planning and Transport Research Centre (PATREC)

* Research Fellow, PATREC, Curtin University of Technology email n.wills-johnson@curtin.edu.au

Future Directions in Railway Management and Regulation

Nick Wills-Johnson n.wills-johnson@curtin.edu.au, 9266 3759
Planning and Transport Research Centre (PATREC)
Curtin University of Technology
GPO Box U1987, Perth WA

Abstract: This paper examines a potential approach to introduce a topology to the Resource Based View (RBV) of the firm to address the issue of the formation of intangible assets and predictions of the growth of the firm by RBV, both issues which have been identified in the literature as shortcomings of the RBV approach. The paper is a conceptual paper. It provides a brief review of and introduces concepts from the social networks literature, suggesting ways in which viewing the firm as a connected network of resources might usefully augment RBV theory. Viewing the firm as a network is a potentially powerful tool for analysing the notion of intangible assets in RBV and for providing a theory of the growth of the firm. The paper provides a useful framework for further work in the RBV field to assist in understanding what makes assets strategic and how firms grow through the accumulation of strategic assets, and highlights possibilities for cross-fertilisation between the social networks and RBV literature.

INTRODUCTION

The Resource Based View of the firm (RBV) posits that a firm's comparative advantage devolves from its ability to exploit the strategic resources under its control. This contrasts with the traditional Structure-Conduct-Performance model of industrial organisation theory, which focuses on the external environment of the firm in order to explain its behaviour. RBV has found wide acceptance, particularly in the management literature, but it has also attracted criticism. Two criticisms which this paper seeks to address, are the difficulty RBV has treating the interaction between resources and the lack of a theory of the growth of the firm in RBV. The paper does this by viewing a firm as a network of resources, with the entrepreneur or owner of the firm determining the shape of the network and hence its capabilities and capturing any synergy rents which might result from joining resources together in a network.

Section Two of this paper provides a brief review of the RBV literature. Section Three outlines the idea of 'social capital' from the social networks literature which allows for a generalised treatment of the relationship between network connection and the output of a network. Section Four outlines how notions of social capital might usefully be applied within the RBV literature. Section Five concludes.

THE RESOURCE BASED VIEW OF THE FIRM

Traditional industrial organisation theory is based upon the Structure-Conduct-Performance (SCP) framework originally posited by Bain (1959) and later modified by Porter (1980) and his 'five forces' model. In SCP, the main determinant of firm performance is market structure which drives a firm's behaviour. There is little attempt to look within the black box of the firm and examine its internal operations to ascertain whether these might affect firm performance. SCP sits squarely within the

neoclassical tradition, which posits that competition will lead to the discovery of the cost-minimising production technology that will be adopted by all surviving firms.

RBV is an attempt to look inside the firm, and examine how its inputs might drive the outputs it can create. The seminal works are those of Wernerfelt (1984) and Barney (1991) who introduced and refined (respectively) the idea that some of the more strategic assets of the firm might drive the outputs it can create. The notion that a firm's inputs might drive its outputs is much older, as both authors acknowledge. There is a long tradition of attempting to ascertain how value is created; Aristotle addressed the issue, somewhat briefly and unsuccessfully, and his analysis was taken up by Thomas Aquinas and the Medieval Scholastics who sought to define the notion of a "just price" (see Schumpeter, 1954, for a survey of this historical literature). The French physiocrats, following a political more than an economic agenda, sought to establish land as the primary repository of value (see Blaug, 1978 for a brief analysis) and Marx (1867) suggests that labour drives the value of products. Ricardo (1817) presaged the core idea of RBV: that some assets are strategic, by noting that there were a small class of assets (mostly land) whose supply was limited. In the 20th Century, Chamberlin (1933) and Robinson (1933) discussed several key resources possessed by firms such as know-how and brand name. Penrose (1959) examined the interaction between resources and their management in an hierarchy and began to look at a wider range of inputs with inelastic supply than Ricardo. Nelson & Winter (1982) develop a theory of evolutionary economics which models the way in which entrepreneurs initiate change in firm and industry structure. Rubin (1973) suggests that resources are inputs specialised to a firm whose value inside the firm is larger than their value outside it and develops a model describing how a firm decides to hire new resources or make use of its existing stock. The transactions cost economics literature, beginning with Coase (1937) and continued by Williamson (1975) and others also has strong links with the ideas of RBV.

RBV focuses on "strategic" resources. Wernerfelt (1984) coined the phrase, examining the role of strategic resources in raising barriers to entry and Barney (1991) built upon Wernerfelt's ideas, codifying what made a resource strategic in a way which has since become germane to the literature. According to Barney, a strategic resource has four qualities:

- Value: the resource can produce something which is valued by consumers.
- Rarity: the resource must be limited in supply.
- Inimitability: the resource must be difficult for other firms to imitate.
- Non-substitutability: the resource must have few close substitutes.

The first two of these characteristics are essentially those which render a resource strategic, and the second two are those which perpetuate that strategic nature and enable firms to appropriate a sustained competitive advantage from them. A key focus of RBV literature is the third characteristic, determining what it is which makes a resource inimitable. Much of this literature focuses on the 'intangible assets' of a firm (first delineated as distinct from tangible assets by Itami & Rohl (1987)) as these are held to be less imitable than tangible assets. There are, according to Galbreath (2004) five sources of inimitability cited in the literature:

- Causal ambiguity: it is not possible for outsiders to understand how the intangible assets have been built, nor how they contribute to value creation (Dierickx & Cool, 1987 and Reed & Defillippi, 1990).

- History: firms evolve via a path dependency which is hard to replicate
- Legal property rights: firms hold patents and other assets which cannot legally be imitated.
- Social complexity: firms are social organisations and the informal social interactions which occur between resources in a firm are hard to replicate without detailed insider knowledge (Nelson & Winter, 1982 and Barney, 1986).
- Time compression diseconomies: it takes time to learn firm knowledge through experience or to train workers in a skill, which can confer competitive advantages. Wernerfelt (1984) refers to this as the 'experience curve'.

Since its inception more than 20 years ago, RBV has branched into a number of different fields. The core competency field (Prahalad & Hamel, 1990) examines the firm in terms of its collective learning and the ways in which it does its tasks rather than the tasks it performs. The capabilities literature began in the 1980s with a focus on R&D strategies, and moved to dynamic capabilities during the Nineties. Teece & Pisano (1994) suggest that strategic advantage is delivered not by that which allows a firm to operate well in its own environment, but by that which allows a firm to create new products and processes in response to environmental change. The knowledge based theory of the firm examines the firm from the perspective of its abilities as a knowledge manager (Grant, 1996). Taking inspiration also from the transactions cost economics literature, it posits that the main comparative advantage a firm has over the market is its ability to manage and coordinate knowledge amongst its resources

Other authors have sought to place RBV within the context of other theoretical paradigms. Thompson and Lockett (2001) examine ties between RBV and economics, noting particularly the ties between RBV and transactions cost economics. Lewin & Phelan (1999) explore the links between RBV and economics, and Matthews (2002) focuses on the links between RBV and Schumpeterian economics, noting that the "creative gales of destruction" which Schumpeter suggests are central to capitalism are very similar in character to resource recombinations seen in the RBV literature. He also notes that the disequilibrium framework of the resource economy is more similar to Schumpeterian economics (as is the role of the entrepreneur as resource manager) than it is to the equilibrium framework of neoclassical economics.

Whilst RBV has attracted adherents, it has also attracted considerable criticism, including an accusation of vagueness (Nanda, 1996, Hax & Wilde, 2001 and Bontis, 1998). Barney's categorisation of what makes a resource strategic leaves open a wide range of possibilities without a rigorous framework within which to judge taxonomies. It is also accused of being tautological. Porter (1991) comments that RBV can be circular because it posits that a successful firm owes its success to its unique resources and that one can see which resources are unique because they are utilised by successful firms. Tautology means that the central tenets of RBV may be difficult to verify, debilitating its applicability as a tool of scientific analysis. Foss (1998) criticises RBV for not having a theory of how firms grow and in particular of how strategic resources drive growth. A final criticism is that RBV, by focussing on the single resource as the unit of analysis, misses interaction between resources (Foss, 1998). It may be that interaction between resources, rather than some intrinsic property of individual resources themselves, is a more useful focus of analysis for those seeking to understand the strategic aspects of firm construction. Dierickx &

Cool (1989), Black & Boal (1994) and Amit & Schoemaker (1993) represent three papers which have examined the issue of resource interaction.

NETWORKS AND SOCIAL CAPITAL

The way in which groups are connected and networks form is an area of growing interest (see Barabasi, 2002, or Demange & Wooders, 2005, for interdisciplinary surveys of this literature). One area in which the study of networks is particularly advanced is that of mathematical sociology and the study of social networks. Wasserman and Faust (1994) provide a textbook treatment of this field and a comprehensive review of the literature. The social network literature focuses on inter-relationships between actors and most particularly the ties between actors within a network framework and how the patterns of such ties contribute to outcomes.

There are many aspects of the social networks literature which could find application in the study of the internal workings of the firm, but for the purposes of this paper, the idea of 'social capital' seems a useful tool. In economics, social capital has a macro-focus; on aspects of societies which are cannot be traded in markets but which nevertheless make a crucial contribution to the operations of a market economy. Bjornskov (2006) provides a recent review of this 'macro' literature which tends not to measure social capital directly, but rather to infer it through the presence or absence of indicators such as membership of associations, bribe taking, corporate governance, schooling, ethnic composition and diversity, political ideology and democracy.

In the social networks literature, social capital refers to aspects of individual networks. Coleman (1988) defines social capital as the 'something extra' in a network which allows the actors in the network, when working together, to create a whole which is greater than the sum of their individual contributions; in essence, social capital is a measure of the synergies or superadditivity networks can create.

It is useful to define social capital with reference to networks because it can then be quantified directly. Jackson and Wolinsky (1996) examine the issue of network value from the perspective of individual participants; suggesting that networks links are formed because of the (nett- after the costs of link formation) utility which network participants (nodes) gain by the formation of a network and thus that the value of the network is the sum of these utilities. Hornby & Wills-Johnson (2004) offer a different approach, positing that network participants bring private information to a network, which they then share along the network pathways, resulting in a change in the 'information space' which the network occupies and thus a superadditivity in the network which is its social capital. This superadditivity can be measured directly via a relatively simple measure based on the determinant of the adjacency matrix which describes the network.¹ Whilst the two approaches have a different genesis, if utility is gained by the sharing information then conceptually they are very similar.

A key issue pertaining to networks is how they grow and whether growth can be predicted. There is a growing body of research within the game theory literature attempting to ascertain whether and how a network might be expected to grow and when one might expect a network to stabilise. Dorien (2006) and Goyal & Joshi

¹ Adjacency matrices are commonly used in the social networks literature. They are symmetric around a main diagonal of zeroes, and have a one in the ij th position (and, by symmetry, the ji th) if nodes i and j are connected and a zero if they are not.

(2003) provide two approaches. Demange & Wooders (2005) provide a comprehensive literature review. Hornby & Wills-Johnson (2004) posit that network growth is the result of the tension between the interests of the group as a whole to increase its value and the interests of individuals within the group to maximise their share of the outputs of the network. The degree to which individuals can 'veto' network decisions is dependent upon the power of an individual in the group, which the social networks concept of 'centrality' (see Bonacich, 1972, Freeman, 1979 and Stephenson & Zelen 1989 for three different treatments) can be used to calculate.

SOCIAL CAPITAL AND NETWORKS AS A FRAMEWORK FOR RBV

The idea that a firm is a network is an attractive one for the study of firm behaviour within the context of RBV, for it provides a framework (outlined above) within which one might analyse the interactions between strategic assets in the firm and how these interactions might drive the growth of the firm. In particular, there would appear to be two ways in which the notion of social capital might be useful for RBV:

- The formalisation of the notion of intangible assets.
- The provision of a theoretical framework to examine the growth of firms.

Explaining Intangible Assets

Chamberlin (1933) and Robinson (1933) speak of know-how, brand name and reputation as part of the assets of the firm.² Teece & Pisano (1994) and Nelson & Winter (1982) speak of the 'routines' of firms; the regular and predictable patterns of their operations as being crucial intangible assets. Collis (1994) speaks of a firm's 'capabilities'; its basic activities, the activities which allow it to learn and the 'metaphysical' activities which allow it to recognise the intrinsic value of other resource. Prahad & Hamel (1990) speak of a firm's 'core competencies' and the knowledge based theory of the firm suggests the firm is a 'knowledge manager'. All of these definitions have one thing in common; they are all in some sense the end products of information synergies and transfers between different people within the firm. The 'culture' of a firm, for example, is the end product of what happens when the private information of people in the firm is exchanged time and time again and they develop a mutual understanding of how to behave around each other. Firms, moreover, are not amorphous collections of assets, they are hierarchical structures. The hierarchies may be formal or informal, but the point remains that the assets in a firm are 'connected up', and information flows between assets in the firm according to how they are connected up. We thus posit the following:

The intangible assets of a firm are created through the repeated interaction of its tangible assets along the network pathways which comprise the formal and/or informal hierarchy of the firm. The collective value of these intangible assets can be calculated via the social capital methodologies above. The entrepreneur, as owner of the firm, owns these intangible assets, and appropriates the 'synergy rents'.

Characterising the intangible assets of the firm based upon the interaction of tangible assets through the network which comprises the (formal or informal) hierarchy of the firm seems a useful analytical tool. In particular, it provides a potential theoretical underpinning for the genesis of intangible assets, by grounding them in the interaction

² Brand name and reputation suggests repeated information transmission from a firm to its customers (and perhaps back again). This is an extension to the social capital idea not explored in this paper.

of tangible assets. This allows for predictions to be made about the value of intangible assets to a firm, by reference to the social capital created by the pattern of their interconnection. Predictions can then be tested against the actual market outcomes achieved by a firm such as its price-cost margins. This begins to address the criticism of tautology levelled against RBV (Porter 1991). Moreover, separating out the tangible and intangible assets in this way allows analysts to distinguish between the effects on outcomes which pertain to individual tangible assets and the effects which pertain to how those assets interact and act in concert with each other, which cuts through some of the confusion on this issue noted by Foss (1998).

Whilst the total effect of intangible assets can be quantified, the measure does not allow an analyst to distinguish between aspects of intangible assets. For example, one cannot determine whether the firm's routines or its culture have been more important in creating the (now quantifiable) bundle of intangible assets. However, this is an issue which may be solved through empirical work surveying firms to ascertain which aspects of the intangible assets are more important in that firm. Indeed, by examining the structure of communication within surveyed firms, it may be possible to ascertain structures which are conducive to developing different types of intangible assets.

The notion of the entrepreneur as the residual claimant of synergy rents by virtue of her establishing and managing the network of the firm which creates those rents begins to answer Porter's (1991) question of why the value of strategic assets suggested by RBV is not simply bid away.³ To see how this is so, consider first a single-round game where firms bid for resources to use in production, but the product market is held exogenous, meaning that competition in the product market does not alter prices charged or economic rents earned. In such a situation, one might expect bidding for resources, particularly if they are scarce, to dissipate all economic rents, leaving zero economic profits for firms. However, if firms are networks, and networks are able to create super-additive value by virtue of the way in which they are connected, this need not be the case. The entrepreneur, when negotiating with the asset owner has some bargaining power in that, whilst she cannot produce output and earn a certain level of synergy rent without the asset, the asset owner cannot realise those rents unless the asset is connected up with the rest of the assets the entrepreneur has in her firm already. The entrepreneur is able to earn synergy rents by virtue of the social capital in the network she has created that constitutes her firm. Even if the asset is owned by a monopolist and many firms are bidding for it, provided the firms are heterogeneous in structure and have differing social capital, the firm which wins the bidding for the new asset will still earn some of the rents from it because the asset owner will only be able to demand from well-informed bidders the synergy rents which the entrepreneur with the second-best firm can command.⁴ If there is competition in the asset market, then asset owners will only be able to command their unconnected marginal value, and all entrepreneurs purchasing assets will appropriate all of the synergy rents in the networked firm. Thus, because an entrepreneur has the potential to earn synergy rents through her ownership of the network structure of the

³ We characterise firm 'ownership' in the person of the entrepreneur. In a more complex organisation, synergy rents may be captured by the upper echelons of the management of the firm, rather than by its shareholding owners. Shapley & Palamara (2000) suggest an authority framework involving 'bosses', 'approvers' and 'free-agents' which may be more than the economist's idea of an entrepreneur.

⁴ If the firms have the same social capital (even if they have a different structure), the monopoly tangible asset owner will appropriate all of the firm's synergy rents in the resource market.

firm, the value created by intangible assets and posited by RBV theory need not be competed away through competition for resources in the resource market.

The discussion above does not completely answer Porter's (1991) question, for it does not address how the value of strategic assets might be bid away through product-market competition reducing rents earned by the firm. However, the product market may have features which allow a firm to retain synergy rents and/or to pay higher than the unconnected marginal value of the tangible assets in the resource market. The product market may, for example, have barriers which preclude entry and allow rents to be earned. Alternatively, the creation of a synergy capturing network within a firm, particularly if its shape is difficult to perceive, may act as a kind of Ricardian or resource rent for the firm, allowing it to enter competitive markets with lower costs than its rivals and earn super-normal profits.

A Framework for the Dynamic Growth of the Firm

Foss (1998) criticises RBV for not providing a coherent theory of firm growth. The notion of social capital and how social networks grow may be useful in developing such a coherent theory by providing some structure to the "search patterns" Nelson & Winter (1982) suggest growing firms employ. In particular, the notion of a tension between the interests of the network as a whole and of individual members within it (Hornby & Wills-Johnson, 2004) seems useful for RBV. If the owner of the firm is the residual claimant for the synergy rents of the network she has created, then it is in her interests to make all the connections within the network which would enhance such rents. However, she is constrained in doing this. Some of the strategic assets in her firm may be human assets. It is not generally possible to write complete contracts with human agents and nor to perfectly monitor their subsequent actions. In the context of a firm as a network, if strategic employees are required by the firm's owner to connect with others in a way which they do not like, they can sabotage the efforts of the owner, by only sharing their private information imperfectly. In addition, human assets are subject to limitations in the number of connections they can effectively maintain; even if the mathematics of social capital suggests connecting 400 people to the firm's computer programmer would increase synergy rents, that programmer might only be able to communicate with a dozen people per day.

For these reasons, the owner of a firm would be unwise to create network connections that are not to the advantage of the strategic human assets which she has already hired. If, as Hornby & Wills-Johnson (2004) suggest, unworkable connections are those which reduce the status (or 'centrality') of individual members of the network,⁵ then this suggests a mechanism for determining the path-dependent evolution of a firm. Firms, in this framework, will grow along pathways which increase the synergistic rents to their owners, without reducing the importance of those human strategic assets who are already employed by the firm.

This path-dependent process may be useful in two other ways. Firstly, Amit & Schoemaker (1993) suggest imitability (or a lack thereof) as one characteristic which defines strategic assets, particularly those which are intangible and hence harder for

⁵ There may also be a need to establish (exogenously) the physical limits of strategic assets in terms of how many connections they can maintain. This introduces an additional element of path dependency.

outsiders to perceive. However, one might usefully contain imitability within a broader category of “replicability”. Replicability can be defined as the ability to mimic the outcomes of a rival, whilst imitability can be defined as the ability to mimic both the structure and outcomes of a rival. The latter is extremely difficult, due to the causal ambiguity which attends to the structure of a firm. However, the former need not be too difficult, as different ways in which a given set of assets can be connected might have very similar outcomes.⁶ The social capital methodology of Hornby & Wills-Johnson (2004) creates social capital ‘scores’ for each network, which are not unique. In fact, a given score might be obtained by thousands of networks.⁷ This suggests that, even where strategic (tangible) assets are easily observed, path dependency might lead to a wide variety of firm structures.

Secondly, neoclassical economics suggests that the most efficient means of production will dominate any industry and hence firms will be identically structured. This makes it difficult to incorporate notions of path dependency into a neoclassical framework. However, if the outcomes of a firm are based on the synergy rents which an entrepreneur obtains, and one operates in a world of replicability rather than imitability, then there is still room for path dependency, as there many cases where the same synergy rents can be earned by a number of different firm structures.

CONCLUSIONS

RBV, although very popular, has been subject to criticism in the literature. This paper addresses two criticisms; the nature of intangible assets and the way in which RBV deals with the growth of firms. It suggests that thinking about the firm as a network of strategic assets, with the owner of the firm appropriating synergy rents from that network, might be a useful way in which to address these criticisms. The social networks literature and in particular, the notion of social capital, presents a potential way in which to structure this thinking. The approaches outlined in this paper have yet to be fully formalised into a robust theory of the firm, and they still leave some questions pertaining to RBV unanswered, but they do suggest a potentially useful and fruitful avenue of future analysis.

⁶ With ten nodes, one can construct 35,200,000,000,000 networks. It seems unlikely that there would be 35,200,000,000,000 distinguishable outcomes in a set of firms with ten strategic assets each.

⁷ Not all scores are like this. Some are obtained by only a few networks, and the distribution of scores is such that scores obtained by many networks are interspersed between those obtained by few.

Bibliography

- Amit, R. and Schoemaker, P. (1993), "Strategic Assets and Organizational Rents," *Strategic Management Journal*, vol. 4, pp 33-47.
- Bain, J.S. (1959), *Industrial Organization*, John Wiley & Sons, New York, NY
- Barabasi, A.L. (2002), *Linked: The new science of networks*, Perseus Publishers, Cambridge Mass.
- Barney, J.B. (1986), "Strategic Factor Markets: Expectations, luck, and business strategy," *Management Science*, vol. 10, pp 1231-1241.
- Barney, J.B. (1991), "Firm Resources and Sustained Competitive Advantage," *Journal of Management*, vol. 17 (Special Issue), pp 99-120.
- Bjornskov, C. (2006) "The Multiple Facets of Social Capital", *European Journal of Political Economy*, vol. 22, pp 22-40.
- Black, J.A. and Boal, K.B. (1994), "Strategic Resources: Traits, configurations and paths to sustainable competitive advantage," *Strategic Management Journal*, vol. 15 (Special Issue), pp 131-148.
- Blaug, M. (1978), *Economic Theory in Retrospect (3rd ed)*, Cambridge University Press, New York.
- Bonacich, P. (1972) "Factoring and Weighting Approaches to Status Scores and Clique Identification", *Journal of Mathematical Sociology*, vol. 2, pp 113-120
- Bontis, N. (1998), "Managing Organizational Knowledge by Diagnosing Intellectual Capital: Framing and advancing the state of the field," *International Journal of Technology Management*, vol. 18, pp 433-462.
- Chamberlin, E.H. (1933), *The theory of monopolistic competition*, Harvard University Press, Cambridge, Mass.
- Coase, R.H. (1937), "The Nature of the Firm," *Economica*, vol. 4, pp 386-406.
- Coleman, J.S. (1988) "Social Capital and the Creation of Human Capital", *The American Journal of Sociology*, vol. 94 (supplement), pp S95-S120.
- Collis, D.J. (1994), "Research Note: How valuable are organizational capabilities?," *Strategic Management Journal*, vol. 15 (Special Issue), pp 143-152.
- Corbo, J., Calvo-Armegol, A. & Parkes D. (2006) "A Study of Nash Equilibrium via Bonacich Centrality in Contribution Games for Peer-to-Peer Networks" *Harvard Working Paper*, mimeo.
- Demange, G. & Wooders, M. (2005), *Group Formation in Economics: Networks, clubs and coalitions*, Cambridge University Press, Cambridge.
- Dierickx, I. & Cool, K. (1989), "Asset Stock Accumulation and Sustainability of Competitive Advantage," *Management Science*, vol. 35, pp 1504-1511.
- Dorien, P. (2006), "Actor Network Utilities and Network Evolution", *Social Networks*, vol. 28 pp 137-64.
- Foss, N.J. (1998), "The Resource-Based Perspective: An assessment and diagnosis of problems," *Scandinavian Journal of Management*, vol. 14, pp 133-149.
- Freeman, L.C. (1979), "Centrality in Social Networks: Conceptual Clarification", *Social Networks*, vol. 1, pp 215-39.
- Galbreath, J.T. (2004) *Determinants of Firm Success: A Resource-Based Analysis*, PhD Thesis, Curtin University, mimeo.
- Goyal, S. & Joshi, S. (2003), "Networks of Collaboration in Oligopoly", *Games and Economic Behaviour*, vol. 43 pp 57-85.
- Grant, R.M. (1996), "Toward a Knowledge-Based Theory of the Firm," *Strategic Management Journal*, vol. 17 (Special Issue), pp 109-122.
- Hax, A.C. & Wilde, D.L. (2001), *The Delta Project: Discovering new sources of profitability in a networked economy*, Palgrave, New York.
- Hornby, P. & Wills-Johnson, N.B. (2004), "Quantifying Social Capital in Networks: A Determinant Based Approach", *Institute for Research into International Competitiveness (IRIC) Discussion paper 07/04*, Curtin Business School.
- Itami, H. & Roehl, T.W. (1987), *Mobilizing Invisible Assets*, Harvard University Press, Cambridge, Mass.
- Jackson, M.O. & Wolinski, A. (1996), "A Strategic Model of Social and Economic Networks", *Journal of Economic Theory*, vol. 71 pp 77-74.
- Lewin, P. & Phelan, S.E. (1999), "Firms, Strategies, and Resources: Contributions from Austrian economics," *The Quarterly Journal of Austrian Economics*, vol. 2, pp 3-18.
- Marx K. (1867) *Capital: A Critique of Political Economy, (centennial edition, 1967)*, International Publishers, New York.

- Mathews, J.A. (2002), "A Resource-Based View of Schumpeterian Economic Dynamics," *Journal of Evolutionary Economics*, vol. 12, pp 29-54.
- Nanda, A. (1996), "Resources, Capabilities and Competencies," In Moingeon, B. & Edmondson, A. (Eds.), *Organizational Learning and Competitive Advantage*, Sage, London.
- Nelson, R.R. & Winter, S.G. (1982), *An Evolutionary Theory of Economic Change*, Harvard University Press, Cambridge, Mass.
- Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, Basil Blackwell, Oxford.
- Porter, M.E. (1980), *Competitive Strategy*, The Free Press, New York, NY.
- Porter, M.E. (1991), "Towards a dynamic theory of strategy," *Strategic Management Journal*, vol. 12 (Special Issue), pp 95-117
- Prahalad, C.K. & Hamel, G. (1990), "The Core Competence of the Corporation," *Harvard Business Review*, May-June, pp 79-91.
- Reed, R. & DeFillippi, R.J. (1990), "Causal Ambiguity, Barriers to Imitation, and Sustainable Competitive Advantage," *Academy of Management Review*, vol. 15, pp 88-102.
- Ricardo, D. (1817), *Principles of Political Economy and Taxation*, J. Murray, London.
- Robinson, J. (1933), *The Economics of Perfect Competition*, MacMillan Press, London.
- Rubin, P.H. (1973) "The Expansion of Firms", *Journal of Political Economy*, vol. 81 no. 4, pp 936-49
- Rumelt, R.P. (1987), "Theory, Strategy, and Entrepreneurship," In Teece, D. (Ed.), *The Competitive Challenge*, Harper Row, New York, NY, pp 137-158.
- Schumpeter, J.A. (1954), *History of Economic Analysis*, Oxford University Press, New York.
- Shapley, S. & Palamara, J.A. (2000), "Simple Games and Authority Structures", *UCLA Working Paper # 796*, March 2000.
- Stephenson, S. & Zelen, K. (1989) "Rethinking Centrality: Methods and Examples", *Social Networks*, vol. 11, pp 1-37.
- Teece, D.J. and Pisano, G. (1994), "The Dynamic Capabilities of Firms: An introduction," *Industrial and Corporate Change*, vol. 3, pp 537-556.
- Thompson, A. & Lockett, S. (2001), "The Resource-Based View and Economics", *Journal of Management*, vol. 27, pp 723-54.
- Wasserman, S. & Faust, K. (1999) *Social Network Analysis: Methods and applications*, Cambridge University Press, Cambridge UK.
- Wernerfelt, B. (1984) "A Resource-Based View of the Firm," *Strategic Management Journal*, vol. 5, pp 171-180.
- Williamson, O.E. (1975), *Markets and Hierarchies*, The Free Press, New York,.