

A critical realist interpretation of network dynamics

Abstract

This paper reviews the emergence of critical realism as a consistent set of ontological, epistemological and methodological positions in the social sciences. In addition, the paper reviews previous contributions on network dynamics within the IMP Group. As a corollary of such a literature review, the paper provides a critical realist interpretation of network dynamics based on analogies with aeronautics. In particular, the paper suggests a critical realist model of industrial network dynamics, based on aeronautics constructs such as weight, drag, turbulence, lift, velocity, and smooth. The resulting model – SUPER-I – allows a critical realist interpretation of network serendipity, uncertainty, propinquity, entropy, resilience, and inertia. The concluding section discusses possible applications of such a model of industrial network dynamics.

Keywords

Critical realism, network dynamics, aeronautics, managerial intangibles

Name of the author and affiliation

Ricardo Moraes

Research Officer, Idea Puzzle S.A.

Contact author's addresses

Rua da Galeria de Paris, 73, 3º

4050-294 Porto, Portugal

ricardo.morais@ideapuzzle.com

A critical realist interpretation of network dynamics

Abstract

This paper reviews the emergence of critical realism as a consistent set of ontological, epistemological and methodological positions in the social sciences. In addition, the paper reviews previous contributions on network dynamics within the IMP Group. As a corollary of such a literature review, the paper provides a critical realist interpretation of network dynamics based on analogies with aeronautics. In particular, the paper suggests a critical realist model of industrial network dynamics, based on aeronautics constructs such as weight, drag, turbulence, lift, velocity, and smooth. The resulting model – SUPER-I – allows a critical realist interpretation of network serendipity, uncertainty, propinquity, entropy, resilience, and inertia. The concluding section discusses possible applications of such a model of industrial network dynamics.

Keywords

Critical realism, network dynamics, aeronautics, managerial intangibles

Introduction

Research within the IMP Group is inherently process oriented since industrial networks are regarded as stable yet dynamic. In addition, IMP researchers appear to have favoured dialectic process theory in detriment of evolution process theory. Such models have been mostly descriptive of industrial markets and based on qualitative methods in contrast to a positivist philosophical stance which favours quantitative methods instead. The present paper contributes to such a methodological divide by reviewing the core assumptions of critical realism and by assessing its implications for research on network dynamics.

Critical realist philosophy contrasts with positivism by assuming that reality is stratified into real, actual, and empirical domains (Bhaskar 1979). As a result, the positivist concern with stochastic association of patterns of events can at best support the identification of events in the empirical domain (Tsoukas 1989) since a cause is whatever is responsible for producing change including unique and irregular events (Sayer 2000). The activation of a causal power depends on intrinsic conditions (why) and extrinsic conditions (how) i.e. internally and externally related mechanisms (Sayer 1992; Danermark et al. 2002).

A regular generation of events is achieved when both intrinsic and extrinsic conditions are met in spite of unlikely control in open systems (Bhaskar 1979). Explanation and prediction are only symmetrical under conditions of closure (Tsoukas 1989). However, in the social sciences conditions of closure are eventually unattainable (Sayer 1992) due to: individual capacity for learning and self-change which violates intrinsic conditions; and modification of social systems by human action which violates extrinsic conditions. Critical realist explanations thus involve a gradual transition from actions through reasons to

rules and thence to structures (Sayer 1992) i.e. real domain externally valid tendencies which may manifest in the empirical domain (Tsoukas 1989).

Since structures are not directly observable, research may postulate them through analogy with other fields of knowledge. The present paper thus suggests a critical realist interpretation of industrial network dynamics based on a model of aeronautics.

In the following section critical realism is briefly reviewed. The subsequent section reviews previous IMP contributions on network dynamics. Such a review of literature precedes the discussion of a new model of network dynamics: the SUPER-I model. The fifth and final section summarizes the conclusions of the paper.

Critical realism

Critical realism can be synthesized as an intermediate philosophical stance between realism and critical theory (Lincoln and Guba 2000). Its core terminology is generally attributed to two philosophers of science, Rom Harré and Roy Bhaskar. In Blundel's words (2007:49-50):

Harré's influential (1972) *The Philosophies of Science* established what was termed a 'transcendental realist' view of the relationship between the nature of human knowledge and that of objects of investigation in the natural sciences. In his (1979) work, *The Possibility of Naturalism*, Bhaskar extended these principles to the realm of the social sciences. In doing so, he reworked the term "naturalism", referring to the claim that there can be a unity of method between the natural and social sciences, into 'critical naturalism', which acknowledges real differences in the nature of the objects investigated. The core ideas of critical realism flow from this combination of transcendental realism and critical naturalism.

Although realist and positivist ontology (e.g. Morgan & Smircich 1980) share the assumption that "the world exists independently of our knowledge of it" (Sayer 1992, p. 5), only realists assume a differentiated and stratified world into a real, an actual and an empirical domain (Bhaskar 1978; Harré & Madden 1975; Harré & Secord 1972; Outhwaite 1987).

In particular, realist ontology assumes the world to consist of generative mechanisms or causal powers located in the real domain, whose activation may generate events in the actual domain. Events are only observable as experiences in the empirical domain, and may be out of phase with the mechanisms that create them. In Sayer's (2000, p. 11) words: "the real is the realm of objects, their structures and powers. Whether they be physical, like minerals, or social, like bureaucracies, they have certain structures and causal powers, that is, capacities to behave in particular ways, and causal liabilities or passive powers, that is, specific susceptibilities to certain kinds of change". An example of objects are individuals, who are expected to possess an idiosyncratic set of causal powers, that is, "dispositions that are generative of behaviour" (Sayer 2000, p. 85) in virtue of their physical make up, socialization and education.

When two objects are necessarily related and thus have their identity mutually constituted, they form a structure, that is, "a set of internally related objects or practices" (Sayer 1992, p. 92). Such a structure is expected to have emergent powers itself, which are irreducible to those of its constituent parts

(Tsoukas 2000). Internal or necessary relations between objects thus determine (why) the nature of social phenomena (what), whereas external or contingent relations determine whether its causal powers will be activated (how, where, when) and with what effects (Danermark et al. 2002).

Whether a causal power is activated or not thus depends on intrinsic conditions, which preserve the nature of the object, and on extrinsic conditions, which are external to the object (Sayer 1992). A regular generation of events is achieved when both intrinsic and extrinsic conditions are met, but such a control of all interfering variables is only possible in closed systems (Bhaskar 1978; Harré & Madden 1975). In the social sciences such conditions of closure are virtually unattainable due to: a) individual capacity for learning and self-change, which violates intrinsic conditions, and b) modification of social systems by human action, which violates extrinsic conditions (Sayer 1992).

It follows that “neither objects nor their relations are given to us transparently” (Sayer 1992, p. 209) once that “it is almost impossible to attain complete knowledge of all these relations, and in addition many of them change rapidly” (Danermark et al. 2002, p. 187). Such a realist stance clearly contrasts with positivist ontology, which assumes reality to consist of determinate relationships between constituent parts whose behaviour is an objective and observable phenomena (Morgan & Smircich 1980). Positivism thus makes no distinction between the actual and the real domains of reality, assuming that objects of knowledge are atomistic events, whose regular co-occurrence may be equated with the causal laws underlying them.

Realism assumes instead that “a cause is whatever is responsible for producing change” (Sayer 2000, p. 94), which can also include unique and irregular events. Realist goals are thus primarily descriptive and explanatory once that “explanation and prediction are only symmetrical under conditions of closure” (Tsoukas 1989, p. 552). Given the impossibility of constructing closed systems in the social sciences, the positivist concern with deterministic or stochastic association of patterns of events can at best support the identification of events in the empirical domain. A constant conjunction of events is, however, neither a sufficient nor a necessary condition for a causal law. Causal explanation requires instead “finding or imagining plausible generative mechanisms for the patterns amongst events” (Harré 1972, p. 125), leading to “the postulation of a possible mechanism, the attempt to collect evidence for or against its existence, and the elimination of possible alternatives” (Outhwaite 1987, p. 58).

A critical realist perspective thus views social phenomena as concept-dependent and production of knowledge as a social practice, which influences its content (Sayer 1992). This is not to say that social phenomena exist primarily as interpretations of researchers nor that knowledge is exclusively linguistic, but rather that such influences must be accounted for in the evaluation of scientific knowledge. A critical realist explanation will thus involve a gradual transition “from actions through reasons to rules and thence to structures” (Sayer 1992, p. 112).

Actions constitute the phenomena under study, presupposing conditions in terms of which reasons are formulated. Reasons, in turn, are inferred from actors’ accounts as to why the actions have taken place. In this respect it is assumed that: a) reasons do not need to involve “true” or coherent beliefs to be causes; and b) many causal mechanisms are ordinary and fairly well

understood by actors (Sayer 1992). Such reasons are made intelligible in terms of the rules they invoke, through the identification of structures or objects responsible for such rules. A critical realist explanation will be complete with the identification of the set of circumstances in which causal powers of objects and structures are exercised.

Given the near impossibility of closure in the social sciences only causal powers can be considered externally valid. In other words, critical realism conceptualises contextual factors as either internally linked with the phenomena under study or as contingencies whose impact on the phenomena is variable. The former type of contextual factors is generally valid in the real domain whereas the impact of the latter must be empirically established. As a result, “researchers do not postulate ironclad laws, but tendencies, which may or may not manifest themselves in the empirical domain” (Tsoukas 1989, p. 558). For the particular case of qualitative research, such an explanatory effort has been described as follows (Tsoukas 1989, p. 558):

In conclusion, an idiographic organizational study, conducted within a realist perspective, moves concurrently on two tracks. On the first track it is “up in the clouds”, dealing with abstraction and theoretical conceptualization of the issues at hand. By contrast, the second track is “down to earth”, looking for the *differentia specifica* of the cases, namely by investigating the existing contingencies and their interaction with the postulated mechanisms.

The traditional view that explanatory claims based on qualitative research have low external validity may, therefore, be challenged from a critical realist perspective as long as causal powers are identified. In fact, such a quest for causal powers instead of single variables requires a logic of “retroduction” (c.f. Sayer 1992, 169-174) from actions (phenomena) through actors’ accounts to rules. Such logic transcends deduction, induction and even abduction logic (c.f. Danermark et al. 2002, pp. 88-95) which has also been put forward by IMP researchers (e.g. Dubois and Gadde 2002). The following section thus reviews previous IMP contributions on industrial network dynamics.

Network dynamics

The so-called interaction approach contributed to our understanding of industrial markets with the concept of buyer-seller relationship, which is richly described in a four element analytical framework (IMP group 1982). The concept of relationship remains, however, difficult to define. In this respect, Håkansson and Snehota (1995, p. 25) argue that “interaction between companies in industrial markets can be fruitfully described in terms of relationships essentially for two reasons: one is that actors themselves tend to see their interactions as relationships, another is that the interaction between companies over time creates the type of quasi-organization that can be labeled a relationship”.

The interaction approach took the relationship among business organizations as its unit of analysis, in order to study simultaneously the processes of selling and purchasing in industrial markets (IMP group 1982). Such an approach came to realize, however, that understanding an industrial firm requires the examination of not only its relationships, but also of the

network they form (Ford 1997). This wider perspective inspired the emergence of the so-called “markets-as-networks” approach, which can be seen as a development of the interaction approach beyond the analysis of dyads to networks (Hägg and Johanson 1983; Håkansson 1987; Axelsson and Easton 1992).

The network approach contributes to our understanding of industrial markets with the assumptions of heterogeneity (e.g. Forsgren et al. 1995) and inter-firm interdependence (e.g. Easton 1992). The notion of interdependence is captured with the concept of industrial network as a set of connected buyer-seller relationships (Cook and Emerson 1978), which encompasses not only actors, but also activities and resources (Håkansson and Johanson 1984). Such a structure is characterized by simultaneous stability and change (Gadde and Mattsson 1987) based on long-lasting actor bonds, resource ties, and activity links (Håkansson and Snehota 1995), which do not preclude the confrontation of actors’ interests.

Interdependence in industrial markets implies a certain division of labor among firms (Thorelli 1986), which requires, in turn, some sort of coordination (Richardson 1972). In this respect, it has been suggested that an industrial network constitutes an alternative governance structure to both markets and hierarchies (Williamson 1975). In particular, it is considered a viable mechanism of coordination in the context of changing and specific activity interdependencies (Håkansson and Johanson 1993) by allowing a stable yet dynamic distribution of power and knowledge among the actors (Håkansson and Johanson 1992).

The network approach thus appears to share some critical realist assumptions, namely that subjective actor accounts of relationships constitute a basis for theoretical developments. The following section thus suggests a critical realist model of industrial network dynamics based on an analogy with aeronautics.

SUPER-I model

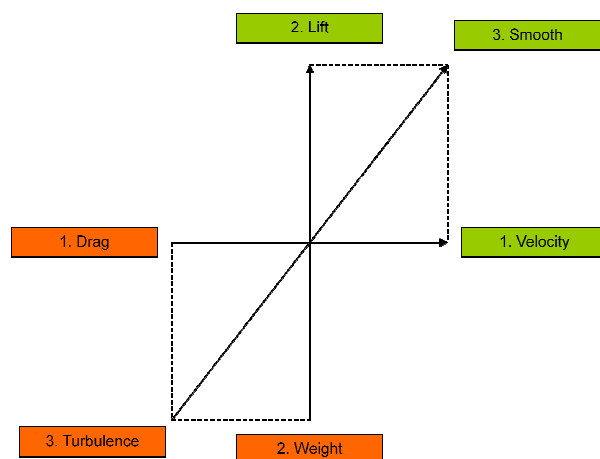
According Van de Ven (1992, p. 169) a process is a “sequence of events that describe change over time”. More recently, Van de Ven and Poole (1995) distinguish four process theories, two of which concern a single entity (teleology and life cycle) and two others multiple entities (evolution and dialectic). In similar fashion, the IMP Group has suggested life cycle models of relationships (e.g. Ford 1980) rather than networks of relationships. A critical realist interpretation of industrial network dynamics is thus confined to two possible types of process theories: evolution and dialectic.

According to Van de Ven and Poole (1995), evolution process theory regards change as recurrent, cumulative and probabilistic progression of variation, selection and retention, which may occur gradually/incrementally or rapidly/radically. Variation results from the emergence by random of novel forms which compete among themselves (selection) and are maintained by certain forces (retention). Dialectic process theory, by contrast, regards change as a struggle for dominance between contradictory forces (theses and anti-theses) which may be events of values. Equilibrium is achieved as an agreement on a synthesis or maintenance of the status quo.

In this respect, the IMP group appears to subscribe to the dialectic rather than evolutionary process theory given the assumptions of interdependence rather than competition, based on asymmetric network knowledge (Håkansson and Johanson 1992). Since such knowledge is objective as well as subjective (Håkansson and Snehota 1995), critical realism emerges as a viable philosophical stance in the context of which industrial network dynamics can be researched. For that purpose, an analogy is proposed on the following paragraphs since contextual factors which are generally valid in the real domain “may or may not manifest themselves in the empirical domain” (Tsoukas 1989, p. 558).

In particular, industrial network dynamics are modeled as an analogy with aeronautics (Figure 1) based on non-contradictory opposites. Such opposites include velocity and drag which together create lift as the opposite of weight. Smooth is the opposite of turbulence, being both the result of accumulated forces. Smooth is the accumulated result of lift and velocity, whereas turbulence reflects the accumulated effect of weight and drag. Aeronautics is thus an inspiring model of non-contradictory opposites since it is inclusive rather than exclusive of opposite forces.

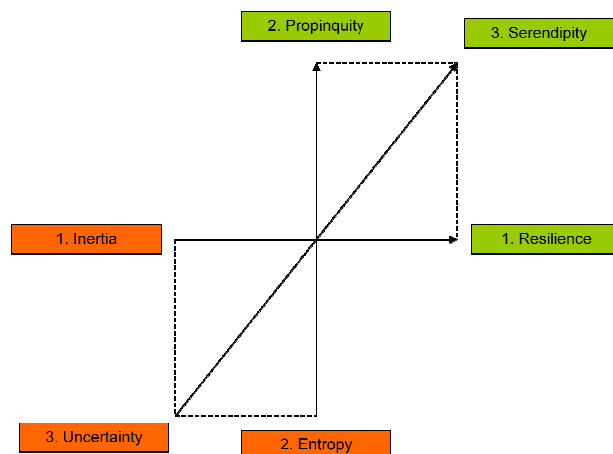
Figure 1. A model of aeronautics



By analogy, industrial networks may be regarded as sets of non-contradictory opposites which together form dynamic sets of power and knowledge (Håkansson and Johanson 1992). An analogous model of industrial network dynamics can thus be suggested (Figure 2). In such a model, actor resilience, propinquity, and serendipity are regarded as non-contradictory opposites of actor inertia, entropy, and uncertainty, respectively. The theoretical background for the elements can be traced back to Bourdieu’s (1996, p. 287) three forms of capital – economic, social and cultural – which supposedly impact the life chances and trajectories of individuals and groups. In particular, actors may invest in cultural capital thus increasing their social capital and ultimately economic capital. Resilience is thus associated with cultural capital, whereas propinquity is inherently relational. Serendipity is regarded as “life chances” necessarily different from pure luck. Such three elements – resilience, propinquity, and serendipity – represent a virtuous cycle in itself which may occur at any level of analysis.

On the other hand, an opposite vicious cycle is identified in the model which consists of inertia, entropy, and uncertainty. Such three elements are the non-contradictory opposites of resilience, propinquity, and serendipity, respectively. Since they also occur at any level of analysis, both cycles – virtuous and vicious – may be regarded as an overall cycle and causal mechanism.

Figure 2. A critical realist model of industrial network dynamics



In similar fashion, the IMP Group suggests heterogeneity in industrial markets which leads to actor, resource, and activity interdependence (Håkansson and Johanson 1984). In particular, “heterogeneity implies that the company will live in a world characterized by uncertainty” (Forsgren et al. 1995, p. 32) thus possessing a limited overview of the options available in input and sales markets.

The corollary of such an analogy between aeronautics and industrial network dynamics is that dialectical process theories of industrial networks may be further extended with critical realist interpretations. In particular, a set of three non-contradictory opposites may constitute a causal mechanism which operates at the real domain of reality. Such a model can be abbreviated as SUPER-I model based on the non-contradictory opposites that are associated: serendipity, uncertainty, propinquity, entropy, resilience and inertia. The “i” in the abbreviation can thus mean “inertia” as well as industry, innovation, and internationalization. It will depend on the context in which the SUPER-I model is applied.

Conclusion

The focus of IMP research is inherently dynamic since it concerns relationships and networks. Although networks are regarded as stable but not static (Gadde and Mattsson 1987) only relationships have been modeled in terms of stages (e.g. Ford 1980). On the other hand, both phenomena are regarded as partly enacted. Håkansson and Snehota (1995), for instance, attribute the term relationship to the perception of actors involved. In similar fashion, Håkansson and Johanson (1993) attribute the coordinating effect of industrial networks to the individual perceptions of power and knowledge. More generally, such

enacted dynamics are generalized as long-lasting actor bonds, resource ties, and activity links (Håkansson and Snehota 1995), which do not preclude confrontation of actors' interests.

Critical realism equally attempts to integrate macro- and micro-level dynamics, namely at the real and empirical domains of reality. The emphasis is, however, on unobservable causal mechanisms rather than observable variables. A critical realist explanation thus involves a gradual transition from actions (phenomena) through reasons (actors' accounts) to rules and thence to structures (Sayer 1992, p.112) based on 'retroduction' rather than 'abduction' logic (e.g. Dubois and Gadde 2002). In order to assess the empirical effects of unobservable causal mechanisms critical realist interpretations often involve analogies with other fields of knowledge.

The present paper thus establishes an analogy between aeronautics and industrial networks inspired by the non-contradictory opposites of the former. The result is the SUPER-I model which suggests serendipity, uncertainty, propinquity, entropy, resilience and inertia as non-contradictory opposites of industrial network dynamics. Such constructs, in turn, are inspired in Bourdieu's (1996) view on the cumulative nature of cultural, social and economic capital.

The model has research and managerial implications. In terms of research, it calls for cases in which the opposites are observable and prone to critical realist interpretations. In terms of management, it allows industrial actors to take account of uncertainty (Forsgren et al. 1995, p.32) but also of serendipity as its non-contradictory opposite. More importantly, it allows network management awareness of serendipity as the cumulative result of resilience and propinquity. In other words, resilience, propinquity, and serendipity may be regarded as valuable managerial intangibles which enhance network management at any level of analysis.

References

- Ackroyd, S. and Fleetwood, S. (2000) "Realism in contemporary studies". In S. Ackroyd and S. Fleetwood (eds.) *Realist Perspectives on Management and Organisations*. London: Routledge, 3-25.
- Axelsson, B. & Easton, G. (1992) (eds.) *Industrial Networks: A New View of Reality*. London: Routledge.
- Bhaskar, R. (1978) *A Realist Theory of Science*. Brighton: Harvester Press.
- Bhaskar, R. (1979) *The Possibility of Naturalism*. Brighton: Harvester.
- Blundel, R. (2007) "Critical realism: a suitable vehicle for entrepreneurship research?" In H. Neergard and J. Ulhoi (eds.) *Handbook of Qualitative Research Methods in Entrepreneurship*. Cheltenham, UK: Edward Elgar Publishing.
- Bourdieu, P. (1996), *The State Nobility: Elite Schools in the Field of Power*, Polity Press, Cambridge.

- Danermark, B., Ekström, M., Jakobsen, L. and Karlsson, J. (2002) *Explaining Society: Critical Realism in the Social Sciences*. London: Routledge.
- Dubois, A. & L-E Gadde (2002) "Systematic combining: an abductive approach to case research." *Journal of Business Research*, 55(7), July, 553-560.
- Easton, G. (2000) "Case research as a method for industrial networks: a realist apologia." In S. Ackroyd and S. Fleetwood (eds.) *Realist Perspectives on Management and Organisations*. London: Routledge, 205-219.
- Ford, D. (1980) "The development of buyer seller relationships in industrial markets." *European Journal of Marketing*, 14(5), 339-354.
- Ford, D. (1997) (Ed.) *Understanding Business Markets*. Second edition. London: The Dryden Press.
- Forsgren, M., Hägg, I., Håkansson, H. & Mattsson, L.-G. (1995) *Firms in Networks: A New Perspective on Competitive Power*. Uppsala: Acta Universitatis Upsaliensis.
- Gadde, L-E. & Mattsson, L.-G. (1987) "Stability and change in network relationships." *International Journal of Research in Marketing*, 4, 29-41.
- Harré, R. (1972) *The Philosophies of Science*. Oxford: Oxford University Press.
- Harré, R. (1975) *The Principles of Scientific Thinking*. Chicago: University of Chicago Press.
- Harré, R. and Madden, E. (1975) *Causal Powers*. Oxford: Blackwell.
- Harré, R. and Secord, P. (1972) *The Explanation of Social Behaviour*. Oxford: Blackwell.
- Håkansson, H. (1987) *Industrial Technological Development: A Network Approach*. London: Croom Helm.
- Håkansson, H. & Johanson, J. (1984) "A model of industrial networks." *Working Papers, Department of Business Administration*, Uppsala: University of Uppsala.
- Håkansson, H. & Johanson, J. (1992) "A model of industrial networks." In Axelsson, B. and Easton G. (Eds.), *Industrial Networks: A New View of Reality*. 28-34, London: Routledge.
- Håkansson, H. & Johanson, J. (1993) "The network as governance structure: interfirm cooperation beyond markets and hierarchies." In Grabher, G. (Ed.) *The Embedded Firm. The Socio-Economics of Industrial Networks*. 35-51. London: Routledge.
- Håkansson, H. & Snehota, I. (1995) *Developing Relationships in Business Networks*. London: Routledge.
- Hägg, I. & Johanson, J. (1983) *Firms in Networks*. Stockholm: Business and Social Research Institute.
- IMP group (1982) "An interaction approach". In Håkansson, H. (ed.) 1982. *International Marketing and Purchasing of Industrial Goods. An Interaction Approach*. 10-27. Chichester: Wiley.
- Lincoln Y. and Guba, E. (2000) "Paradigmatic controversies, contradictions, and emerging confluences." In Denzin, N. and Lincoln, Y. (eds.) *The Handbook of Qualitative Research*. Second edition. Thousand Oaks: Sage Publications, 163-188.

- Morgan, G. and Smircich, L. (1980) "The case for qualitative research". *Academy of Management Review*, 5(4), 491-500.
- Outhwaite, W. (1987) *New Philosophies of Social Science: Realism, Hermeneutics and Critical Theory*. London: Macmillan.
- Richardson, G. (1972) "The organisation of industry". *The Economic Journal*, 82(September), 883-896.
- Sayer, A. (1992) *Method in Social Science: A Realist Approach*. London: Routledge.
- Sayer, A. (2000) *Realism and Social Science*. Thousand Oaks: Sage Publications.
- Thorelli, H. (1986) "Networks: between markets and hierarchies". *Strategic Management Journal*, 7(1), 37-51.
- Tsoukas, H. (1989) "The validity of idiographic research explanations". *Academy of Management Review*, 15(4), 551-561.
- Tsoukas, H. (2000) "What is management? An outline of a metatheory". In S. Ackroyd and S. Fleetwood (eds.) *Realist Perspectives on Management and Organisations*. London: Routledge, 26-43.
- Van de Ven, A. (1992) "Suggestions for studying strategy process: a research note". *Strategic Management Journal*, 13, 1-22.
- Van de Ven, A. & Poole, M. (1995) "Explaining development and change in organizations". *Academy of Management Review*, 20(3), 510-540.