

Fuzzy Boundaries and networks: a theoretical framework of analysis

Theme 1: Network evolution (1.1 and 1.4)

Competitive paper

by

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Abstract. *This paper proposes a framework for the analysis of business networks from the standpoint of the firm. A wider view of networks is taken than the purely inter-firm partnerships usually considered in the literature. The framework put forward has two main features. The first one relates to the analysis of the boundaries and networks from the perspective of three main dimensions: the organisational, locational and proprietary/asset ownership dimensions. Several typologies are considered within each of these dimensions. Correspondingly to the three dimensions, the typologies exhibit different degrees of internalisation or geographical or ownership fragmentation. The second feature relates to the analysis of the following elements which affect the choice of network configuration by the firm: strategic objectives; efficiency elements and scope for control. Several strategic and efficiency objectives are considered. The control elements are broken down into strategic and operational control. The possible uses, advantages and limitations of the framework are analysed.*

Key words: Firms, Networks; Organisation of production

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1. Introduction

Contemporary writings on business, the economy or society in general, contain a good deal of works on networks and the network society (Freeman, 1992, Grabher, 1993, Castells, 1996, Hagedoorn, 1996, Dunning, 1997 and 1998, Ebers, 1997). Both theoretical and applied aspects of networks figure prominently in the literature.

In many business/economics writings the expression “business networks” is used to indicate a large variety of inter-firm or inter-organisation partnerships. These may refer to vertical relationships (backward or downward linkages) or to relationships between firms involved in the same or similar product lines and, in general, at the same stage in the value system. Easton and Araujo (1997:67-8) consider “...Inter-organisational networks to refer to modes of economic co-ordination characterised by dense and relatively stable patterns of economic exchange, embedded in concrete time-space and institutional contexts.”

The inter-organisational network has usually been seen as a business organisational form to be compared and contrasted to the other two major forms: firms/hierarchies and markets. Inter-organisation networks are therefore seen as

having an intermediate position between hierarchies and markets. Richardson's perceptive analysis (1972) places inter-firm networks in the context of the organisation of industry and the division of labour within it. He considers the need for qualitative and quantitative co-ordination of complementary activities within an industry and writes: "...this co-ordination can be effected in three ways; by *direction*, by *co-operation* or through *market transactions*. ... Co-ordination is achieved through co-operation when two or more independent organisations agree to match their related plans in advance." (p. 890).

More recent studies of inter-organisational networks have tended to focus on the network itself: its relational basis, the motives for its establishment, its patterns, its co-ordination mechanisms, its costs and performance (Ebers, 1997; Grabher, 1993; Hagedoorn, 1996). Implicit in this type of analysis are two assumptions: (a) that networks are inter-firms or inter-organisations, and that (b) the partners in the network have equal power.

The recent research on inter-organisation networks has contributed substantially to our understanding of the organisation of production in its economic and social aspects. However, there are limitations due, in particular, to the following issues. First, it is not possible to identify when the networks are indeed inter-organisation because it is not always easy to establish when an organisation/firm is independent. Second, there are other types of networks that the firm/ organisation may establish to help achieve its objectives.

For these reasons the approach here presented takes a wider view of networks. The wide variety of networks in which the firm is involved, are all related to the fact that the boundaries of the firm itself have become increasingly blurred and flexible. The paper sets out a framework for the analysis of networks in their wider context and

it is developed along two basic concepts. First the notion that the networks emerging from the evolving boundaries are characterised by three dimensions: organisational, locational and proprietary dimensions. Second, that the firm's choice of network configuration - within and between these dimensions - depends on a variety of strategic objectives, efficiency constraints and perceived scope for control.

The use of these two concepts has the following potential advantages. It allows us to: (a) Analyse different network dimensions - organisational, locational and proprietary dimension - and consider interactions between them. (b) Consider the extent to which different dimensional networks give the firm specific advantages or costs. (c) Analyse whether capabilities (including information and knowledge) acquired in the context of one type of network can help the firm in the establishment and performance of different networks. (d) Assess whether the ability to manage complex networks may itself become an ownership advantage or whether the complexity of multidimensional networks may be an obstacle to the achievement of the firm's objectives. (e) Distinguish between various sets of possible elements behind the choice of specific networks and in particular: the strategic objectives that the firm sets itself; its efficiency constraints and opportunities and the scope for control that the network affords. The distinction between these various elements allows us to: (f) analyse the role that each set of elements plays in the choice of dimensional configuration and, conversely, assess how effective a specific dimensional configuration may be in achieving specific strategic, efficiency or control objectives.

The paper deals mainly with firms though the network concept in general applies to wider organisations in both the private and public sector.² The paper is developed along the following scheme.

Analysis of “fuzzy boundaries” and their dimensional configurations.

(Organisational, locational and proprietary dimension)

(Section 2)

to

Analysis of typologies within each dimensional configuration .

(Section 3)

to

Elements that determine the choice of network.

Strategic, efficiency and control elements.

(Sections 4 and 5)

to

Possible uses, advantages and limitations of the framework.

(Section 6)

to

Conclusions

(Section 7)

2. Fuzzy boundaries

Over the last twenty-five years the organisation of production has undergone considerable changes. The ball started rolling with moves towards flexible production systems, casualisation of labour and less a hierarchical organisational structure of the firm. A gradual increase in inter-firm partnerships followed in the 1980s. All these changes have been greatly enhanced and accelerated in the last fifteen years by the development and diffusion of information and communication technologies (ICTs).

As a result of all these changes, the pre-1970s vertically-integrated firm has, to some extent, been replaced by a new type of firm where horizontal integration is more likely to be found than ever before and where rigid mass production has been replaced by more flexible production systems. High volumes of production which bring economies of scale and scope are still relevant and large companies are very much in control (Dunning, 1997:78; Cowling and Sugden, 1987a; Harrison, 1991 cited in Castells, 1996). However, their business activities are organised in a more flexible way, which involves, among other things, working more closely with other firms as well as producing internally.

The changes encompass a variety of developments which range from employment contracts to inter-firm collaborative agreements to location of production to asset ownership rights. One thing they all have in common is the fact that all these changes lead to less well defined boundaries of operations of the firm. The boundaries that have been evolving in the last twenty-five years have acquired a “fuzzy” character.

The Collins English dictionary defines “fuzzy” as “indistinct; unclear or distorted”. In our context the adjective “fuzzy” is used in the following meanings which cover a variety of situations.

- (a) Indistinct, indeterminate, rugged, blurred, lacking sharp edges/borders/boundaries;
- (b) flexible at any given time and/or through time;
- (c) expanding in a variety of directions and through a variety of dimensional patterns.

The term fuzzy is used here rather than the more usual blurred or flexible³ to convey the idea that the boundaries are not just indeterminate and blurred, they have become also more flexible and expanding in a variety of dimensions.

The “fuzziness” of the boundaries can, in fact, have *locational, organisational or proprietary/asset ownership* dimensions. Some examples from economic and social life situations will illustrate these meanings of fuzziness within each dimensional characteristic. Let us start with *locational* fuzziness and thus with the evolving locational boundaries of the firm as a first example. The locational fuzziness can be looked at with respect to (i) the relationship with the workforce which produces the firms’ products; (ii) the location of production (iii) the relationship with the buyers of the firm’s products.

As regards the relationship with the workforce (i), considerable changes are already taking place and all the indications are that they will accelerate in the future. In the pre-ICTs era, a contract of employment with a firm or other private or public institution usually involved performing one’s duties mainly in a specific locality (be that the factory or office) with which the firm was spatially identified. Now whatever the nature of the employment contract - full or part-time, permanent or temporary - an

increasing amount of work can be done at a distance for example from the employee's home. Thus the identification of the firm/institution with a locality has broken down and so the locational boundaries of the employment relationship have become more indeterminate. This is the case even when the contract of employment is no different from what it might have been thirty years ago; for example when it is a full-time contract on a fairly permanent basis.

The second element of locational fuzziness (ii) is in relation to the expanding territory of operations of the firm and in particular to its expanding multinational domain. Most large firms now operate across national boundaries either as direct producers in other countries or as exporters or via linkages with local suppliers or distributors or with a combination of these entry strategies. This type of spatial expansion across nation-states involves mainly big firms. However, smaller firms participate in this process in various ways. First, because an increasing number of smaller firms are becoming transnational. Second because many smaller firms cooperate in a variety of ways with large firms in cross-border activities (Fujita, 1995, Molero, 2000). Third, because groups of small firms linked horizontally may cooperate in developing strategies of multinational reach (Cowling and Sugden, 1998).

The third element of locational fuzziness (iii) relates to the relationship between the firm and its customers. Up to recently, most consumers would go to the distributors; select the products and either carry them away themselves or have them delivered. On-line shopping is gradually introducing a different relationship; one in which the selection and ordering of the products - by both business and non-business customers - increasingly takes place away from the location of the firm and its products.

What about *organisational* fuzziness? Again there are various aspects to this element. From the perspective of the firm and other institutions the following should be mentioned. The relationship between people working for a particular firm and contributing to its output has undergone considerable developments and is still in the process of change, in several respects. First, because the employment contracts are no longer - or not only - full-time and permanent as in the pre-1970s decades. Alongside traditional contracts we now have a variety of temporary and/or part-time contracts which have led to a casualisation of labour (Friedman, 1977; Solinas, 1982; Atkinson and Gregory, 1986) in many industries and in many countries throughout the world. This has brought about an organisational ruggedness and flexibility in which the boundaries of relationships between the firm and its labour force have become more “fuzzy”.

Moreover, there is a wider organisational fuzziness of the boundaries of firms due to the fact that an increasing number of people working for a firm and contributing to produce its products, may not be employees of the firm itself. They may be subcontracting homeworkers or people working for a subcontracting firm that is supplier or distributor to the main firm/organisation.⁴

The *proprietary/asset-ownership* fuzziness refers to the fact that, increasingly, companies acquire control of business facilities and are involved in production activities via partial as well as full ownership. This process is enhanced by the high rate of acquisitions and disposals which give the companies control of activities though their ownership of the relevant assets may only be partial. Moreover, partnerships with other firms - whether on a vertical or horizontal basis - may or may not have an equity element in them. Yet these partnerships are affecting the sphere of influence, control and capabilities of the firm. Their effects are such as to lead

Dunning (1997:89) to write: "...the traditional assumption that the capabilities of the individual firm are limited to its ownership boundaries (and that, outside these boundaries, factors influencing the firm's competitiveness are exogenous to it) is no longer acceptable whenever the quality of a firm's efficiency-related decisions is significantly influenced by the collaborative agreements it has with other firms." Similarly, Cowling and Sugden (1987a, 1987b and 1998) develop a new definition of the firm based on the sphere of control rather than the ownership boundaries (as we shall discuss in section five⁵).

Two further points should be mentioned. First, many of the changes here highlighted involve not only firms in the private sector but also many institutions in the public sector or those that have an intermediate public/private position. Second, some of the organisational and locational changes have preceded the advent of the ICTs. The new flexible production methods and related outsourcing of stages of the production process go back to the 1970s (Atkinson and Gregory, 1986; Castells, 1996; Oman, 1994) before the ICT revolution. Similarly, multinationality goes back a long way (Jones, 1996) before the introduction of ICTs. However, in both cases the ICTs as well as the improvements in the technology and costs of transportation have greatly enhanced the process for both the locational and organisational dimensions. In fact, it could easily be claimed that some of the developments here highlighted date back to over a century. The putting-out system is nothing new, neither are sub-contracting or multinationality of production. The point, however, is that the changes have all accelerated; they are now extensive, cumulative, and multi-dimensional and they affect each other. Quantitative changes are leading to substantial qualitative changes which affect the nature of the firm, the nature of business governance, the organisation of industries and the division of labour within them.

There are also major developments connected with boundaries, linkages and networks at the macro, social and political levels. For a start the boundaries of many nation-states have been changing with the evolving political situations particularly in central and eastern Europe. In other parts of the world the boundaries of governance and its forms have changed either because of the formation of regional blocs - as in the EU - or because of devolution policies within the nation-state as in the case of the UK.

There is also another sense in which the boundaries of the nation-state are becoming looser. The population movements across countries have led to the increasing formation of multi-ethnic and pluralistic societies in many countries. This means that communities retain strong linkages and allegiances with similar communities across the borders of nation-states (Castells, 1997, Held *et al*, 1999). Moreover, the use of ICTs facilitates the networking across space and borders of a variety of groups linked by political, religious, academic or other interests. It could be pointed out that strong bonds between groups and communities linked by religion, ethnic/national origin or ideologies across national boundaries are nothing new in history. This is true, but what is new is the fact that those linkages can now manifest themselves in communication flows that are much speedier and can also take place more often and on a more personal basis owing to the lower costs of communication and transportation.

3. The network firm: typologies within dimensional configurations

The institution whose boundaries have become most fuzzy is the firm and in particular the modern large transnational firm. Fuzzy boundaries are part and parcel of

an increased variety of networks which the firm is involved in. These business networks can be seen as ties, linkages within different units of the firm or between the firm and outside institutions.

To each dimension and element of fuzziness considered in section two corresponds specific types of dimensional configuration of networks. Thus the network has an *organisational* dimension as in the case of networks between the firm and its casual labour, its homeworkers or sub-contractors or franchisees or joint ventures partners. The network may have a *locational* dimension which allows the distinction between spatially differentiated production or distribution points. The network may be between units linked by different asset *ownership* arrangements.

Grid 1 illustrates the various network typologies within the above dimensions. Corresponding to each of the three dimensions we have three sets of typologies characterised, respectively, by the following: different degrees of internalisation/externalisation; various degrees of locational/spatial concentration or fragmentation and various degrees of proprietary/asset ownership configuration.

On the organisational side it is possible to have various degrees of externalisation (A to D) of both labour and production activities. Type C and D arrangements are the ones usually studied under inter-firm partnerships. They embrace all stable, long-term contracts with suppliers and distributors along the vertical chain of production. They also include partnerships between firms operating horizontally along the same or similar product lines or at the same stage in the production chain⁶. The organisation of production in A and B falls under what Richardson (1972) considers “the direction way” while that in C and D falls under his category of co-operation.

Grid 1: The Modern Firm and its Fuzzy Boundaries. Dimensional Configurations and Typology.

Organisational Dimension <i>in descending order of internalization degree</i>	Locational Dimension <i>in descending order of geographical concentration</i>	Proprietary/Asset Ownership Dimension <i>in descending order of ownership stake</i>
<p>A. Permanent, full-time labour contracts.</p> <p>B. Homeworkers; Putting out work. Casual Labour.</p> <p>C. Sub-contracting; licensing; franchising.</p> <p>D. Inter-firm partnerships. Vertical type (stable contracts with suppliers/distributors) or Horizontal type (Joint Ventures; Alliances; Co-operatives)</p>	<p>E. Single or few production locations. Employees work in factory/office.</p> <p>F. Work from home.</p> <p>G. Domestic, multi-plant locations.</p> <p>H. International production.</p>	<p>I. Full ownership of assets.</p> <p>J. Partial ownership with majority or controlling stake.</p> <p>K. Partial ownership with non-controlling stake.</p> <p>L. Non-equity agreements (vertical or horizontal type).</p>

The second dimension considers the spatial profile of networks at either the intra- or inter-national (E to H). The scope for geographical dispersion of the firm's production activities has been enhanced by: (a) the gradual reduction in the cost of transportation and communication⁷ and (b) the introduction of flexible production processes in which smaller production units - in the context of large scale production and business activities - allow the achievement of both scale and scope economies. Both developments have pushed towards a spatial fragmentation of production. They have therefore enhanced the removal of some constraints to the internationalisation of production.⁸ The growth of the TNCs and their activities led to an increasing scope for internal networks across national boundaries. However, the inter-national networks can take also an external organisational dimension as in the case of cross-country inter-firm partnerships. They can also be vertical or horizontal and be based on different ownership stakes of assets. The scope for business activities with a variety of proprietary stakes of the assets involved in those activities, is illustrated in the third column (I to L).

The firm can choose an overall configuration corresponding to a variety of positions along the internalisation/externalisation spectrum in the organisational dimension; along the locational spectrum and along the assets ownership spectrum. Indeed the firm may have a variety of networks within each dimensional configuration. The typical, traditional hierarchical pre-1970s firm would have all its labour force on permanent, full-time contracts. It would be located - largely - in one or few production sites to benefit from economies of scale. Its assets would be fully or majority owned. This is illustrated by the first row in each of the three dimensions in Grid 1. All the other rows in the three columns of Grid 1 involve fuzzy boundaries and networks with an organisational and/or locational and/or proprietary dimension.

The various dimensions of networks are not mutually exclusive and, in fact, many large companies are likely to exhibit an overall network configuration with elements of all three dimensions. The large companies may have subcontracting or franchising relationships with smaller companies while being involved in collaborative agreements with large competitors. They will operate some of these external vertical or horizontal networks at the international level (Germidis, 1980, Michalet, 1980) and some at the national level. At the same time they will all have internal organisational networks between different plants or subsidiaries wherever they are located. The networks may involve full or partial ownership of assets.

The concept of business network here developed differs from the concept of inter-organisational network for the following reasons. First, because the business networks here considered allow us to incorporate specifically and separately the three key dimensions of fuzziness and fragmentation: the organisational, locational and ownership dimension. Second, because they allow us to consider various degrees within each dimension and in particular various degrees of internalisation/externalisation, geographical concentration and ownership stakes. They therefore allow us, for example, to recognise that spatial fragmentation, particularly across national borders, gives rise to a specific set of linkages and networks even when the assets are fully owned by the same firm⁹.

Each of these three dimensions and each typology within them, gives the firm specific capabilities and it may also generate specific problems and costs. The firm's cohesiveness and ability to control activities may depend on the level of overall fragmentation in all three dimensions. To keep control of its overall activities, flows of resources and information and to strengthen its cohesiveness, the firm may have to set up formal co-ordinating mechanisms. Such mechanisms may be needed to deal

with casual labour, sub-contracting or franchising arrangements and wider inter-firm partnerships as well as with the geographical dispersion.

4. Strategic objectives and efficiency elements in the choice of networks

What determines the choice of a specific network configuration on the part of a firm?

The standard reasons usually given for the increase in stable inter-firm partnerships of the vertical type is the increase in flexibility and the saving on transactions costs - compared to arm's length contracts - to which they give scope. The move from arm's length market-based relationships has been explained mainly via the need to overcome market imperfections and associated transaction costs.

Most literature dealing with the choice between internalisation and externalisation of the firm's activities, emphasise efficiency elements in the choice between the two growth strategies. Building on some elements in Coase (1937)¹⁰ and following the further developments by Williamson (1975 and 1981) and the applications to the multinational company (McManus, 1972, Buckley and Casson, 1976, Rugman, 1981, Hennart, 1982) transaction costs analysis¹¹ has been used to explain growth via internalisation/hierarchy rather than via the market at both domestic and international levels.

Several authors criticise the transaction cost approach to networks (Grabher, 1993). Ebers and Grandori (1997) point out that there are relevant costs besides the transactional ones in inter-organisational partnerships. A wider view is taken here not only of network themselves (as developed in section three) but also of the motivations for (and the constraints to) their establishments. Efficiency constraints - of which transaction costs are part - are seen as only one of the sets of elements

affecting the choice of network dimension. There are, in particular, relevant strategic elements¹² as well as issues of control which should be considered among the motivations leading to a specific configuration.

I consider therefore that the choice of network configuration - with its dimensional characteristics and degree of internalisation, geographical concentration and ownership stake - depend on the following three sets of objectives of the firm: strategic, efficiency and control objectives.

The *strategic objectives* are those objectives which emerge from the firm's strategic directions. The following ones seem particularly relevant.

1. Flexibility towards fluctuations in demand.
2. Strategies towards rivals; increase in market shares.
3. Penetration of new markets. Products and or geographical diversification.
3. Power towards labour.
4. Risk minimisation and risk sharing.
5. Acquisition of knowledge.

The choice of configuration and the achievement of strategic objectives depend also on *efficiency elements*, in particular the following ones:

- (i) Transaction costs of operating on the market;
- (ii) Managerial costs;
- (iii) Costs of co-ordination;
- (iv) Advantages of using internal firm- and asset-specific resources.

The managerial costs refer to the costs of managing the flows of resources and information once the network is in place. The constraint here is seen in terms of shortage of managerial capacity. However, if the firm has surplus managerial capacity which it wants to retain it may set itself the objective of finding outlets for its full utilisation. The co-ordination costs refer to the costs of establishing and managing the networks. Some of these costs can be considered as transactional. The specificity of assets may lead to higher productivity of resources used internally compared to external activities which rely on non-specific assets. Assets-specificity becomes one of the key elements in the efficiency approach to employment contracts¹³ (Penrose, 1959 and 1987; Williamson, 1981).

Grid 2 highlights the relationships between dimensional configuration and strategic objectives. Grid 3 considers the relationship between efficiency elements and dimensional configuration. Both grids attempt an assessment of the typologies from grid 1 in terms of their ability to achieve the stated objective. The types are grouped into those with 'high' or 'low' potential for achieving the stated objective.

Grid 2 illustrates the following. The *strategic* objective of achieving flexibility towards fluctuations in demand¹⁴ can be achieved via a variety of networks within the organisational dimension (homework; sub-contracting; inter-firm partnerships) or within the locational dimension (international diversification of markets).¹⁵ Strategies of product diversification - not illustrated in the grid - may also help to achieve this objective. The penetration of new markets may be enhanced by inter-firm partnerships. Indeed, in some host countries the entry mode via joint ventures with local firms may be imposed on the foreign firm by government regulations.

What about the strategic objective of increasing the balance of power over labour? The internalisation drive and the hierarchical governance of the pre-1970

Grid 2: Dimensional Configuration and Potential for Achieving Specific Strategic Objectives.

Strategic Objectives	Organisational Dimension		Locational Dimension		Proprietary/Asset Ownership Dimension	
	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
<i>Dealing with Fluctuations in Demand</i>	Home work; Subcontracting; Vertical Inter-firm partnerships. (B, C & D)	Permanent, full-time contracts. (A)	International Diversification of markets. (H)	Narrow localization of markets. (E & G)	n/a	n/a
<i>Increase in Market Shares. Market Penetration.</i>	Specific horizontal inter-firm partnerships. (D)	n/a	International production. (H)	Domestic only markets. (E & G)	n/a	n/a
<i>Strategies towards labour</i>	Casual labour; Subcontracting; Vertical inter-firm partnerships. (B, C & D)	Permanent full-time labour. (A)	International production (H)	Limited and domestic only production location (E & G)	n/a	n/a
<i>Sharing of risks</i>	Inter-firm partnerships. (D)	All others. (A, B & C)	n/a	n/a	Partial ownership and non-equity agreements (J, K & L)	Full ownership. (I)
<i>Acquisition of knowledge</i>	Inter-firm partnerships. (C & D)	(A & B)	International production. (H)	(E & F)	n/a	n/a

- Notes: (1) High and low indicate the potential for achieving the specific strategic objective.
(2) The letters in brackets refer to the typology in Grid 1.
(3) n/a = not applicable

decades created several problems for capital. In particular the fact that labour working under the same ownership umbrella, often in single or well defined locations, finds it easier to organise and press for better pay and working conditions (Ietto-Gillies, 1992: Ch. 14). The flexibility offensive of the 1970s was to a large extent designed to counteract the power of organised labour by the development of organisational networks in which labour found it more difficult to organise itself. The firm can achieve this objective through externalisation strategies in the first place. However, externalisation produces its own problems in terms of efficiency constraints (quality controls, costs or co-ordination or transactions costs as highlighted in Grid 3). Another strategic network dimension which may help achieve the same objective - lowering the power of labour - is internationalisation. Labour finds it more difficult to organise itself across nation-states even when working for the same company and thus under the same ownership umbrella.¹⁶

Horizontal and stable inter-firm partnerships allow the firm to share risks and costs with other firms. So do strategies of partial ownership or non-equity contracts¹⁷. The risks may relate to the development of new products and processes and to R& D in general, or to the penetration of new markets/ locations. In fact the three dimensions of fuzziness can be considered also as diversification dimensions that is organisational, locational and proprietary/ownership diversification. Each separately and in combination may help to reduce risks for the firm.

The acquisition of knowledge is becoming a relevant strategic objective in the knowledge-based firm and society. The large and increasing number of joint R&D ventures also point to the relevance of knowledge acquisition and risk spreading for the establishment of networks. Joint ventures across borders may give the company

Grid 3: Dimensional Configuration and Efficiency Elements

<i>Efficiency Elements</i>	Organisational Dimension		Locational Dimension		Proprietary/ Asset Ownership Dimension	
	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
<i>Transactional Costs</i>	Subcontracting etc.; Inter-firm partnerships. (C & D)	Permanent, full-time contracts. (A)	n/a	n/a	n/a	n/a
<i>Managerial Costs</i>	Permanent contracts. Casual labour. (A & B)	Subcontracting, inter-firm partnerships. (C & D)	International production. (H)	Domestic only production. (E & G)	n/a	n/a
<i>Co-ordination Costs</i>	Inter-firm partnerships. (D)	All others. (A, B & C)	n/a	n/a	Partial ownership and non-equity agreements (J,K,L)	Full ownership (I)
<i>Asset-Specificity Advantages</i>	Internalisation (A)	Externalisation (C & D)	n/a	n/a	n/a	n/a

- Notes:
- (1) High and low indicate the potential for costs or advantages
 - (2) The letters in brackets refer to the typology in Grid 1.
 - (3) n/a = not applicable

vital information on the market, culture and business environment which facilitates market penetration¹⁸.

Any configuration must also be assessed according to *efficiency* elements (Grid 3). A firm that faces labour conflicts and wants to check the power of organised labour may resort to externalisation if the issues of product quality and transaction costs are not too relevant. However, if the firm wants to keep a high level of internalisation (for example to secure that firm-specific knowledge remains internalised) then a strategy of internationalisation via direct production may be preferable to high levels of externalisation.

An internalisation strategy will lack flexibility towards fluctuations in demand and may also give extra power to labour. However, it will minimise transaction costs and allow the firm to reap the benefits of its own specific assets. The external dimension of networks raises questions about the level of transaction costs. A high degree of externalisation may also be costly in terms of the costs of co-ordination and management of the network itself. Nonetheless, there may also be increasing costs of managing internal growth particularly if there is already a high level of utilisation of existing managerial capacity (as assumed in Grid 3).

5. Control, firms and networks

A third important set of elements in the choice of network configuration relates to the degree of *control* that the firm will have when operating within fuzzy boundaries and networks. Control issues feature in the choice of network configuration in two ways. First, via the power that a particular firm may have in determining the overall strategic direction of the network. Second, via the scope that a specific network

configuration gives to exercise control in a variety of areas. Control therefore depends on the firm's power as well as on the nature, type and dimension of the network.

An example of the first use of control is the following. A large firm entering into partnership with several small ones (whether on subcontracting or joint ventures agreements) is likely to have controlling power over the direction and strategies of the partnership's activities. Indeed Richardson (1972) writing about co-operative agreements between different firms states that: "Co-operation may come close to direction when one of the parties is clearly predominant..." (p.896). The second use of control may be illustrated by the following. The setting of strategic directions may be easier in the context of equity-based inter-firm collaborative agreements. Moreover, some networks may be easier to control, on a day-to-day basis, than others. For example internal activities may be easier to control than sub-contracting ones; single-location activities easier than multi-location ones; national easier than international ones.

In this context it is useful to distinguish between two types of control: strategic and operational control. Strategic control refers to control over the strategic direction of the firm. It includes strategies towards rivals or labour or technological directions or geographical or products direction. Operational control refers to control over day-to-day operations and in the implementation of strategies. It includes control over (1) the quality and reliability of the products and delivery dates; and (2) the co-ordination process; the flow of resources, activities and outcomes between different units involved in the network.

The scope for *control* can thus be summarised.

1. *Strategic control*: over the strategic objectives and directions of the firm as in section four above. Control over labour and the labour process.

2. *Operational control*: Over day-to-day operations such as:
 - 2a. Control over the quality and reliability of the products and over delivery dates.
 - 2b. Control over the co-ordination process and the flows of resources, activities and outcomes.
 - 2c. Control over the units/organisations that contribute to the production activities of the firm.¹⁹

This distinction between strategic and operational control is arrived at through an analysis of Cowling and Sugden (1998) which is very relevant to the content of this paper. The changes in the boundaries of the firm (discussed in sections two and three) have led Cowling and Sugden (1987a and 1987b) to cast doubts on whether the conventional concept and definition of the firm based on the ownership of assets is still an appropriate one or whether we should move towards a definition which takes account of external linkages. They then proposed the following definition: “A firm is the means of co-ordinating production from one centre of strategic decision making” (1987b: 60). They have built on those doubts and developed their analysis further in a more recent work.

Cowling and Sugden (1998) criticise several mainstream views of the firm and arrive at a concept of the firm based on power, control and strategic decisions. In their view “... the power to make strategic decisions can be equated with the power to control a firm, where control implies the ability to determine broad corporate objectives. ... This includes the power broadly to determine a firm’s geographical orientation, its relationship with rivals, with governments and with its labour force.” (p. 64). Moreover, they see strategic decisions as being “... the pinnacle of a

hierarchical system of decision-making.” (p. 64), with operational decisions placed lower down in the hierarchy of decisions.

As well as a hierarchy of decisions there is a hierarchy of decision centres: some players have power of strategic decisions which affect other players. This applies to hierarchies of firms within inter-firm partnerships. The approach therefore denies notion of equality in the partnership and in the market. The hierarchy extends also to people/stakeholders within each firm. Some stakeholders have power to determine the strategic direction of the firm ‘despite the objections of others’ (p. 81) involved in production. The others - affected by those decisions - are passive players in the use of such power²⁰. This removes any concept of equality of power between stakeholders. Cowling and Sugden’s strategic decision-making approach brings in issues of distribution in the organisation of production: distribution between different stakeholders within the firm (for example managers or shareholders *versus* workers) and between different firms (for example large firms *versus* their small sub-contractors).

Consistently with the development of their analysis Cowling and Sugden (1998) “...define a corporation in terms of a nexus of strategic decision-making...” (p. 61). In their framework, the large firm incorporates other players (such as sub-contractors) which are directly affected by its strategic decisions. Cowling and Sugden therefore see the significance of their approach in terms of “...its identification of different boundaries to a firm compared with mainstream analysis; in particular it incorporates into the giant firm what the mainstream has identified as market *inter-firm* relationships.” (p. 81)

Much of what I have here called the network firm corresponds to what Cowling and Sugden define as the firm or to put in different form, Cowling and Sugden’s firm

is a subset of our network firm. Thus Cowling and Sugden's firm incorporates subcontracting units though it would not include partnerships between two or three large firms each of which remains a centre of strategic decision-making.

The distinction between different dimensional configurations in the framework developed in this paper allows us to analyse complementarities or trade-offs between different network dimensions in the achievement of the firm's objectives, including control objectives. The choice of configuration will be greatly influenced by the scope for control that it affords the decision-makers. Will the firm retain control over the strategic direction and objectives? This is the case for most typologies within the three dimensions in Grid 1. However, it may not apply in some cases of partial ownership with minority stake or in the cases of alliances and joint ventures (whether or not on an equity basis) between equally powerful partners.

As regards the operational control, different network configurations may require different systems of operational control as these have costs attached to them. Internalisation strategies give high levels of operational control while any configuration with high degrees of organisational and/or geographical fragmentation requires the setting up of special monitoring systems. Marginson *et al* (1995) report examples of international co-ordination in the internal provision of goods and services (p. 182) and in the organisation of personnel and industrial relations across countries (p. 183). These internal co-ordinating activities are aided by the TNC's internal computer linkages within and across countries.

How strict the control mechanisms need be depends on the level of trust²¹ within various actors in the network. The trade off between trust and control may vary with the length of time of operation of the network. A network which has been in

Grid 4: Dimensional Configuration and Control

	Organisational Dimension		Locational Dimension		Propriety/Ownership Dimension	
<i>Scope for Control</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
<i>Strategic Control</i>	Firm at centre of strategic decisions. (A, B, C)	Joint ventures and alliances between equal partners. (D)	n/a	n/a	Full or majority ownership of assets. (I)	Non-controlling stake. (K)
<i>Operational Control</i>	Internalised activities. (A)	External activities. (C & D)	Geographical concentration. (E)	Geographical dispersion. (G & H)	(I)	(K)

- Notes:**
- (1) High and low indicate potential for control.
 - (2) The letters in brackets refer to the typology in Grid 1.
 - (3) n/a = not applicable

operation for a long time is likely to be one in which there is a strong degree of trust between the players and thus requires less stringent control systems and procedures.

Control over the labour process and power towards labour is one of the main elements of strategic control facing the TNCs. It is an issue which, on the whole, is not much researched or considered by economists. A notable exception is the work of Stephen Marglin (1974) who explain the move towards the factory system via the wish to exercise control over the labour process. Sugden (1991) applies a similar approach to explain transnational activities.

In terms of our framework, a high degree of internalisation gives high level of control over the labour process. However, labour working under the same ownership umbrella and within the same nation-state may find it easier - *ceteris paribus* - to organise itself and acquire strong bargaining power in negotiating pay and working conditions. Thus organisational fragmentation while giving less control over the production process and the quality and reliability of the products, gives the firm a stronger bargaining power towards its workforce. An international strategy may also achieve this aim as mentioned above.

6. Possible uses of the framework: advantages and limitations

The framework here presented considers networks from a multidimensional perspective and analyses them in relation to their ability to achieve the firm's sets of objectives. The framework is therefore shaped around two specific overall characteristics. First the dimensional analysis of the firm's boundaries in terms of organisational, locational and proprietary/asset ownership dimensions. Second the analysis of the choice of dimensional configuration in terms of three sets of elements:

the firm's strategic objectives; the scope for control afforded by the network and the efficiency objectives of the various configurations. How do these two overall characteristics help us in understanding the firm and its network configuration?

The dimensional analysis of the firm's boundaries allows us to consider different aspects of network dimensions, their advantages, complementarities and their possible industry-specificity. The breakdown of elements leading to the choice of network configuration has the following advantages. It encourages the distinction between strategic, efficiency and control elements. This brings to the forefront of analysis two sets of elements often forgotten in the analysis and assessment of governance structures: strategic objectives and desire for control.

The framework facilitates an analysis of which elements are being considered by the firm in the choice of configuration. The firm may want to assess its own choice of network configuration in the light of its overall strategic objectives or the scope for control or the efficiency constraints/opportunities posed by the networks. The assessment can be done *ex-ante* (before the setting up of new network structures) or *ex-post*, after the network is set up and running or indeed as a *post-mortem* to it. Conflicts and contradictions between specific strategic objectives and control elements or efficiency constraints can be brought into focus. For example there may be conflicts between the strategic objective of achieving flexibility via externalisation and the desire to exercise strong control over the labour process. Is the achievement of strategic control objectives always compatible with the achievement of operational control? The desire for strategic control may push the network firm in the direction of fragmentation in one or more of the three dimensions. However, this may make it more difficult to exercise operational control.

It is possible to analyse the potential complementarity or substitution between the different dimensional configurations. The complementarity or substitution may be in relation to the achievement of specific strategic objectives or in relation to efficiency and control elements. For example organisational or geographical (by nation-state) fragmentation may be complementary in the achievement of a strategy of shifting power away from labour.

The approach allows us to focus on advantages and disadvantages of specific network configuration for the firm. There may be high costs (including co-ordinating costs) in the establishment and operation of a network. To what extent is the firm affected positively or negatively by the fact that it may be operating a variety of networks? Are the firm's capabilities enhanced by specific networks compared to others? Is the network configuration balanced in terms of dimensional elements? For example is the firm overexposed to external linkages or too fragmented spatially or in terms of ownership structure?

Whether in the context of R & D or not, networks are seen, rightly, as vehicles for learning (Grundmann, 1999).²² To what extent does the firm learn from operating each type of network and to what extent can the knowledge be transferred to the operation of other networks with the same dimension or with different ones? For example: does the experience of operating majority-owned subsidiaries help in the coordination and management of inter-firm partnerships? Does the experience of operating networks of domestic sub-contractors help in the management of international joint ventures?

Firms with a strong history of past linkages may find it easier to establish new ones quickly and effectively. The marginal costs of establishing new networks may be reduced. Kogut, Shan and Walker (1993) explore various aspects of knowledge within

networks including information on who possesses what capabilities. Such information may reduce transaction costs. They write: “A firm’s history of external relations determines the kind of information that is available for the purposes of searching for suppliers and gathering bids” (p. 70). The authors refer to inter-firm networks. However, the learning process and advantages apply as well to intra-firm ones. For example the experience of setting up networks to deal with international production in a few countries helps in setting up production facilities in other countries.

The multi-dimensionality and complexity of the overall network configuration may itself tell us a considerable amount about the firm, its history, its strategic choices, its constraints and its advantages and disadvantages. Firms that are successful in operating multi- dimensional networks may be in a stronger position in penetrating new fields, be they new product or country markets; they may also find it easier to establish new networks.²³ What about the decision-making process leading to a network configuration? Is the overall network configuration the result of rational decisions linking dimensional configuration to strategic and efficiency objectives as well as to control elements? Or is it the result of *ad hoc* behaviour and/or historical opportunities and accidents? To what extent is the choice of configuration industry-specific?

Though the framework is developed from the standpoint of firms, it is possible to use it to analyse industries according to various degrees of dimensional configuration and fuzziness. In this context, it is possible to consider the degree of multi-dimansional fragmentation within an industry by organisation, location and or asset-ownership. In the context of the various configurations of fragmentation, it is then possible to analyse the benefits and costs for the industry as a whole, as well as the issues of power and control by key players within an industry²⁴.

Networks in all their three dimensions have also implication for the economy and society including some deriving from externalities. Ebers and Grandori (1997) draw attention to the externalities of inter-organisational partnerships. On the locational dimension side, externalities of regional industrial networks have been historically relevant for a long time as pointed out in Piore and Sabel (1984). The analysis of external economies of industrial districts goes back to Alfred Marshall and has now been adopted and adapted by the geography of 'New Trade' theorists (Krugman, 1985, 1991, 1998). Formal co-operative network linkages within industrial districts may enhance those externalities further. Other types of networks also generate externalities. The casualization of labour in all its forms generates negative externalities for society. However, homework or sub-contracting arrangements may facilitate the transfer of information and knowledge acquired by the workers in one type of contract across contracts, firms and industries.

We saw in the previous section how Cowling and Sugden (1998) have highlighted the power over strategic decision-making and the distributional issues it raises. Some networks are built on the basis of a powerful centre of decision-making, others are based on a more equal distribution of power. Examples of the first type is the vertical network of many suppliers and subcontractors controlled by a large firm (as in the Japanese keiretsu) or the large TNC and its network of subsidiaries spread all over the world.²⁵ Examples of the second type are horizontal networks such as co-operatives of small firms in industrial districts or alliances between a few giant firms equally powerful.

Thus the power of the firm affects the networks it is involved in. Conversely, successful networks may increase the power of the firm towards its rivals as well as towards those players in the economic environment which are less able to operate

within networks or within networks characterised by specific dimensions. For example those actors who cannot operate very effectively across nation-states whether on an intra- or inter-firm basis. The network configuration of large TNCs extend in all dimensions and this is one of their strengths and one of the advantages *vis-à-vis* smaller rivals as well as other economic actors such as labour and national governments. Smaller firms can also acquire considerable advantages when able to combine efficient internal networks with external co-operative arrangements with similar firms. It is partly in this context that Cowling and Sugden (1998) and Cowling and Tomlinson (2000) favour the promotion of multinational strategies for cooperatives of small firms.

The analysis here presented has several limitations. The first one derives from the fact that, as it stands, the framework is only theoretical and lacks applications. Moreover, there is a danger that the framework may be seen just as a taxonomic device with little explanatory power and scope for applications. A way round this problem is to concentrate on the dimensional configurations not *per se* but in relation to the possible strategic, efficiency and control objectives of the firm. This may help to develop the explanatory power of the framework. As regards applications, there are wide possibilities in terms of comparative analyses of firms or industries cross-section or through time. The latter analysis could refer to the same firm or industry before and after major structural changes.

7. Conclusions

This paper presents a theoretical framework for the analysis of business networks. The analysis takes a broader view of networks than the one usually found in the

business and economics literature. The firm is put at the centre of analysis and the paper starts by highlighting changes in the boundaries of firms/organisations and the tendency towards less well defined, more “fuzzy” boundaries. The fuzziness of the boundaries is identified as having a locational, organisational and proprietary/asset ownership dimension. Within each of these dimensions various types of networks are possible according to the degree of externalisation, geographical concentration and ownership stake (Grid 1). From this emerges the wider, multi-dimensional view of networks presented here compared to the inter-organisation networks of much literature on the subject.

The choice of network configuration is seen as emerging from the combination of the firm’s strategic objectives, its efficiency constraints/opportunities and the scope for control it affords. The strategic objectives comprise: flexibility towards fluctuations in demand; power towards labour; risk minimisation strategies; strategies towards rivals, market shares and market penetration. The efficiency elements include: transaction costs; managerial costs and constraints; co-ordination costs and assets specificity. The paper distinguishes between strategic and operational control and it analyses how they affect the choice of network configuration.

In most cases firms - particularly the large ones - will establish an overall network configuration which is a mixture of various dimensions and achieves a variety of objectives. The balance between the various dimensions depends on the strategic objectives that the firm sets itself, on efficiency elements and on the level of control it is afforded by the network as well as the power to control that the firm has. The strategic and efficiency objectives and the control elements vary from firm to firm and from industry to industry.

The different types of networks are analysed in relation to their ability to meet a variety of strategic objectives (Grid 2) as well as a variety of efficiency constraints and controls (Grids 3 and 4). The possible uses, advantages and limitations of the theoretical framework are discussed in section six. The framework helps to formulate relevant questions. The answers come from further research which applies the framework to specific firms or industries.

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Notes

1. I have received useful comments on earlier drafts of this paper from my colleagues, Howard Cox, Simon Mowatt and Martha Prevezer
2. It will be made clear when a specific statement refers to other organisations besides the firm itself.
3. Dunning (1997:102) talks of “soft” boundaries of the firm.
4. Empirical evidence for the UK is in O’Farrell (1995) and Colling (1995).
5. Amin (1993:290) sees the “blurring of ownership boundaries across territorial borders” as a new form of integration. Similarly OECD (1992) sees inter-firm partnerships as the most recent mode and pattern of internationalisation.
6. The relevant antecedents to those organisational models have been traced to eastern business practice, from the Japanese *keiretsu* to the Korean *chaebol*, (Castells, 1996) or to Victorian Britain (Casson and Cox, 1997). The co-operative arrangements of small firms in industrial districts fall also under this group.
7. The new trade and location theories (Krugman, 1985; 1991; 1998) predict concentration of production. For critiques of the application of these theories to the TNCs, cf. Dunning (1998) and Ietto-Gillies, (2000).
8. Such removal by itself does not, of course, explain why firms want to engage in international production. This is the subject matter of theories of international production, the MNCs and FDI for a review of which see Buckley (1981), Cantwell (1991), Ietto-Gillies (1992) and John *et al* (1997: Ch. 5).
- ⁹ The inclusion of the assets proprietary dimension avoids the issue of whether non-equity partnerships (such as non-equity joint ventures) should or should not be included in inter-organisational networks. In the framework here presented they are all included and their non-equity characteristic is considered as a typology within the relevant dimension
9. Cowling and Sugden (1998 point out how a (“the”?) major element in Coase’s analysis (the allocation of resources via planning within the firm) has been rather overlooked in subsequent literature, compared to the element of transaction costs economising.
10. Cf. Pitelis (1993) for a comprehensive analysis of transaction cost theory of the firm.
11. Some authors do consider strategic elements in the establishment of inter-firm partnerships. Cf. in particular Glaister and Buckley (1996). Narula and Hagedoorn (1999) distinguish between strategic and cost economising inter-firm technology agreements.
12. This approach and the assumed behaviour of employers and employees is strongly and effectively criticized in Marginson (1993).
13. Cf. Semlinger (1993). Easton and Araujo (1997) analyse the use of inter-organisational networks to meet heterogeneous demand thus demand that varies qualitatively rather than quantitatively as in the example above. Cowling and Tomlinson (2000) point out that the Japanese keiretsu provides may insure an income stream for the sub-contractor in the face of fluctuations in demand.
14. Kogut, Shan and Walker (1993: table 4.3, p. 82) consider ‘between’ and ‘within firms’ sources of flexibility which are of technological, organisational and spatial type.
15. See Ietto-Gillies (1992: Ch. 14) and also Cowling and Sugden (1987a) ‘divide and rule’ strategies of TNCs.
16. The strategic move towards partial ownership is implicit, for example, in this passage from the Annual report of Rueters Group PLC (1999): “In framing a collection of assets, we do not need to own them 100%, as we used to (p. 9).
17. The role of information in organisations and networks is explored in Casson (1997) and Casson and Cox (1997).
18. The cost of co-ordination has been included in the list of efficiency elements in section four above.
19. Cowling and Tomlinson (2000) apply this approach to the analysis of the negative effects of transnational strategies by Japanese TNCs in the context of the keiretsu system.
20. It has been pointed out that trust is relevant in all aspects of business relationships (Lane, 1998), from industrial relations (Marsden, 1998) to inter-firm partnerships (Ebers, 1997: part III; Humphrey, 1998; Child, 1998). Nonetheless the higher level of fragmentation along any of the three dimensions, the higher the need for trust as well as for effective co-ordinating systems and for well defined contractual relations (Deakin and Wilkinson, 1998).
21. Some of these issues are also touched on in Narula (1999).
22. The ownership advantages given by existing networks in developing new FDI type of networks has been explored in the literature. So is the search for networks as channels for acquiring competitive advantages (Chen and Chen, 1998).

²⁴ The social costs of the organisational and proprietary fragmentation of the UK rail industry after privatisation, include safety risks and high government grants.
23. For evidence on the latter cf. Ietto-Gillies (1996 and 1998).