ACTIVITY LINKS VERSUS RESOURCE TIES
AND
EFFICIENCY VERSUS EFFECTIVENESS
IN
THE INDUSTRIAL NETWORK APPROACH

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ABSTRACT
In the theoretical framework proposed by Håkansson and Snehota (1995) three layers of substance in relationships were introduced each related to different types of economic consequences. However, the relation between the layers has not been discussed in detail. Thus, the purpose of this paper is (1) to make the 'boundary' between the activity layer and the resource layer in the framework a little more clear, (2) to make the relation between these two layers and different types of economic consequences (i.e. efficiency and effectiveness) more explicit, and (3) to identify the parameters of activities and resources which are most central in the two different layers, respectively.

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1. INTRODUCTION

In the traditional economic literature, we have learnt that economy is about resource utilisation. Håkansson and Snehota (1995 p.383) note that "...the notion of economy and efficiency in this tradition is as a rule given the meaning of economizing on given resources for a given purpose". This is also discussed by Torvatn (1996), claiming that both in a production process as well as for the firm as a whole an important parameter to consider is the relationships between the input and the output in a closed system. Both Håkansson and Snehota (1995) and Dubois (1998) discuss the same phenomenon as the output-input ratio in resource transformation, which traditionally has been the amount of input of specific (given) resources used for producing each unit of a specific (given) output.

Having pointed out the importance of efficiency (or productivity)\(^1\) as a driving force in the traditional economy models, Håkansson and Snehota (1995) state the need for a broader concept of economy. This implies not only exploiting given resources for given purposes, but also considering the development of resources and thereby the effectiveness and innovativity\(^2\) of a firm. Thus, Håkansson and Snehota (1995) have developed a theoretical framework for analysing economic consequences of relationships which may be used for discussing concepts like efficiency and effectiveness.

In the following part of this paper we will present different concepts of the industrial network theory presented by the IMP Group (see for example

\(^{1}\) The two concepts are often used interchangeably both in traditional economics and in the industrial network approach, thus in this paper we will use the concept of efficiency to denote efficiency as well as productivity.

\(^{2}\) With industrial network theory as the point of departure, we regard innovativity as the process of (or ability to) creating effectiveness (even if increased effectiveness may not be achieved or become manifest instantaneously). However, in this paper we will not discuss the distinction between effectiveness and innovativity in detail. Thus, we will use only the concept of effectiveness.
Håkansson 1982, Håkansson 1989, Ford 1990, Axelsson and Easton 1992, Håkansson and Snehota 1995, Ford 1997, and Dubois 1998) relevant for our discussion of economical effects of business relationships. Furthermore, the activity and the resource layers in the framework developed by Håkansson and Snehota (1995) will be presented in more detail. In the last part of the paper we will discuss the ‘boundary’ between the activity layer and the resource layer, and how efficiency and effectiveness may be related to these two layers.

2. THE INDUSTRIAL NETWORK MODEL

Within the industrial network approach, a network model aimed at making integrated analysis of stability and change in industry possible has been proposed by Håkansson and Johanson (1992).

The model has three basic classes of variables or main concepts; actors, activities and resources. These three concepts are related to each other in an overall structure of networks. This is illustrated in figure 1.

FIGURE 1: The Network Model (Håkansson 1987 p.17)
The reason why these three concepts are interesting for the discussion of efficiency and effectiveness in industrial network is that Håkansson and Snehota (1995) have used these three concepts as the point of departure for proposing an analytical framework for describing relationships in business networks and for analysing economic effects of change in relationships. The theoretical framework is presented in the figure below:

![Diagram](image)

**FIGURE 2:** Scheme of analysis of development effects of business relationships (Håkansson and Snehota 1995 p.45)

Three different layers of *substance* can be identified in a relationship, i.e. activity links, actor bonds and resource ties. *Activity links* regard technical, administrative, commercial, and other activities of a company that can be connected in different ways to those of another company as a relationship develops. *Actor bonds* connect actors and influence how the two actors perceive each other and form their identities in relation to each other. Bonds become established in interaction and reflect the interaction process. *Resource ties* connect various resource elements (technological, material, knowledge resources and other intangibles) of two companies. Resource ties result from how the relationship has developed and
represents in itself a resource for a company" (Håkansson and Snehota 1995 pp.26-27).

Three different functions (or effects) of a relationship can be distinguished. “The function for the individual company (2). A relationship has effects on each of the companies, on what they each can do internally and in other relationships. The function for the dyad (1). This originated in the conjunction of the two companies; their activities, resources and actors, activity links, resource ties, and actor bonds in a relationship integrate various elements and thereby some unique outcomes and effects are produced. The function for third parties (3). Being a building element in the larger network structure, what is produced in a relationship can affect and is affected by other relationships that involve other parties” (Håkansson and Snehota 1995 p.27). Our understanding of the different functions of a relationships is illustrated in figure 3.

![FIGURE 3: The three functions of a relationship](image)

As mentioned earlier, we have chosen to focus on the activity layer and the resource layer and on the traditional economic parameters which have been used for describing economic effects in relation to these two layers, i.e. efficiency and effectiveness. So far, the two relationship layers have predominantly been discussed separately. What we attempt in this paper is (1) to make the ‘boundary’ between the activity layer and the resource layer in the framework a little more clear, (2) to make the relation between...
the two layers and the concepts of efficiency and effectiveness more explicit, and (3) to identify the parameters of activities and resources which are most central in the two different layers, respectively. The actor layer is not explicitly discussed in the paper; however, the relation between actors and activities and resources, respectively, is included in order to characterise and/or explain what is going on in the other two layers, i.e. for enabling the drawing of actor ‘boundaries’ around activities (performed) and resources (controlled) by the different actors.

2.1 The activity layer
In order to analyse activity structures and the efficiency of alternative ways of organising the same set of activities among a number of firms involved in interdependent activity chains, Dubois (1994, 1998) introduced an analytical framework comprising a number of concepts describing and delimiting organised activity structures.

The point of departure for the analytical framework is a single activity. Single activities are interrelated in activity chains which represents a particular sequence of activities. The output of an activity is a product, and this product forms the input for the subsequent activity in the chain. At the arbitrary end of an activity chain, an end product can be identified. All activities preceding the end product is coined an end product related activity structure. To perform a single activity requires one or more products from the activity or activities preceding the single activity as well as a resource unit consisting of one or more resources used for transforming the input product(s) into the product resulting from the activity. A single activity within an end product related activity structure may be related to other activities within the same end product related activity structure and/or to activities in other end product related activity structures. Either (1) the product resulting from the activity is used in several end product related activity structures in which case the activity is
general (and the product standardised), or (2) the **product** resulting from the activity is used in only one end product related activity structure in which case the activity is **specific** (and the product specific), or (3) (at least some of) the **resources** in the resource unit used for undertaking the activity are also used for performing other activities either (a) within the same end product related structure or (b) in other end product related activity structures. Dependencies of type (1) and type (2) are referred to as **vertical interdependencies**, whereas dependencies of type (3a) and type (3b) represent **horizontal interdependencies** due to resource sharing. Because of these interdependencies, an individual activity has to be analysed in relation to sequential activities as well as parallel activities in all the end product related activity structures in which it is embedded. For explaining why some ways of dividing activities among different firms are more efficient than others, Dubois (1998) elaborates on four concepts, originally introduced by Richardson (1972), which describe different types of interdependence between activities: complementary activities, closely complementary activities, similar activities and dissimilar activities.

**Complementary** activities represents “*different phases of a process of production and require in some way or another to be co-ordinated*” (Richardson 1972 p.889). Two activities are **closely complementary** if there is a need to “*match not the aggregate output of a general-purpose input with the aggregate output for which it is needed but of particular activities*” (Richardson 1972 p.891); or in the words of Dubois, “*if the results of closely complementary activities are restricted to particular purposes and, hence, cannot be used for other purposes*” (Dubois 1998 p.23). The concepts of ‘complementary’ and ‘closely complementary’ activities are related to vertical dependencies among activities. **Similar** activities are defined by Richardson (1972 p.889) as activities which “*require the same capability for their undertaking*”, or in the words of Dubois (1998 p.23), “*when a particular resource is used to undertake more*
than one activity". Consequently, dissimilar activities are activities which require different resources for their respective undertaking. The concepts of ‘similar’ and ‘dissimilar’ activities are related to horizontal interdependencies among activities.

As mentioned, the four concepts are used for explaining efficiency-based logic for dividing activities among firms (i.e. hierarchies) and the different types of exchange relations between these firms (i.e. market or relationship). The efficiency of a certain division of activities among firms will depend on the respective firms’ abilities to capture similarities (i.e. scale advantages) among activities. Consequently, the efficiency of different ways of dividing the activities among firms will differ. The logic for the division of activities among firms and the type of exchange between them is illustrated in figure 4.

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**FIGURE 4:** Example of a firm as a ‘pool’ of resources and as a ‘switchboard’ of activities in relation to the suppliers and customers of the firm (modified from Dubois 1998 p.103)
In addition to horizontal and vertical interdependencies, Dubois (1998) propose that different types of technical interdependencies must be taken into account when analysing the division of activities among firms. Technical interdependencies within one end product related activity structure may be of three types (1) between two products, (2) between a product and a resource in a resource unit, and (3) between two resources in different resource units. Furthermore, as some the resources and products in one end product related activity structure are (or may be) related to products and resources in other end product related activity structures, the technical interdependencies between different end product related structures must also be taken into consideration when reorganisation of activities among firms is considered. As an additional aspect to be considered, technical interdependencies between the different resources and products may be mutual or unilateral, depending on the resources or products being standardised or specific.

According to Dubois (1998), the efficiency of a single firm depends on the firm's ability to combine the horizontal, vertical, and technical interdependencies in relation to their different counterparts. "Creation of similarities is not always the best way for the firm to be efficient vis-à-vis individual counterparts. Counterpart specific solutions may be needed since their value for the counterpart may exceed the costs of not taking advantage of economies of scale." (Dubois 1998 p.107).

These three types of interdependencies are discussed by Dubois and Håkansson (1997) as integration, direction, and effects on activated structure of resource units, and the general conclusions with regard to efficiency concur with those in Dubois (1998). "The internal efficiency is dependent on its (the firm's) ability to combine and to integrate different resource elements needed to perform the activities, as well as on its ability to create unique solutions with a high value for its customers." (Dubois and Håkansson 1997 p.51).
Efficiency is put forward as the main issue when analysing activity structures, and efficiency is achieved through activity links, as "by linking, different actors can take advantages of internal economies of scale and integration effects, even when they need to produce something individualised." (Dubois and Håkansson 1997 p.51). In the same vein, Dubois and Håkansson (1997 p.48) argue that "linking [...] can be done either in order to reduce the use of resources or to create special values for counterparts."

In summary, the focus in the activity layer is on creation of an efficient division of activities among firms performing parts of different interdependent end product related activity structures, where the division of activities is related to firms' different possibilities for capturing scale advantages (i.e. similarities) when performing activities within different end product related activity structures and the advantages of creating unique products for their counterparts. The specific activities within an end product related activity structure which is divided among firms are coined activity links.

2.2 The resource layer
Economising on and controlling scarce resources has often been pointed out as important issues for firms to handle. However, Håkansson and Snehota (1995) propose that development of resources may be equally important as handling issues of resource scarcity and control. The focus on development of resources is related to the underlying assumption regarding resources in the industrial network approach, i.e. use-related heterogeneity of resources which has e.g. been proposed by Alchian and Demsetz (1972). "A resource is said to be heterogeneous when its value (performance) is dependent on which other resources it is combined with. Consequently, a homogeneous resource has the same value regardless of which resources it is combined with" (Håkansson 1994 p.258). Håkansson
and Johanson (1984 p.9) has interpreted Alchian and Demsetz' heterogeneity concept in the following way "they (Alchian and Demsetz) seem to be saying that heterogeneous resources have a number of properties, and that the relative importance thereof depends on the specific heterogeneous resources with which they are combined." Use-related heterogeneity of resources is depicted in figure 5 (a) where the value of combination 1 is higher than the value of combination 2 because the two resources in combination 1 are better adapted to each other than the two resources in combination 2. The value of resource A can thus be assumed to be higher in combination 1 than in combination 2, even if it is difficult to define as well as determine the marginal contribution of each of the resources being combined (Alchian and Demsetz 1972). In addition to the use-related heterogeneity, different resources have different properties and are thus, by nature, heterogeneous. This is illustrated in figure 5 (b).

(a) Use-related heterogeneity of resources

(b) resource heterogeneity

FIGURE 5: Resources and heterogeneity

The implication of resource heterogeneity and use-related heterogeneity is that resources have to be confronted continuously when being used together in order to identify ways in which the properties of the resources
(and/or their use) can be altered in such a way that the value of the combination can be increased.

In the theoretical framework proposed by Håkansson and Snehota (1995), the resource layer related to relationships is discussed as resources ties. Our understanding of the concept of resource ties is that a single resource tie between firms can be said to occur where it is difficult for one firm to substitute a particular resource of another particular firm with other resources, i.e. when the combination is unique because one or both resources have a unique combination of properties which are mutually (or in some cases unilaterally) adapted to each other. A resource tie can be planned, or it can occur by chance, however, regardless of the way in which the resource tie has been created, it determines the present value of the tied resources and thus the presently attained effectiveness. However, effectiveness can always be increased. Håkansson and Snehota (1995) suggest that the use-related resource heterogeneity assumption makes experimental learning a key issue. “Business relationships appear to be the mechanism for the continuous organizing for the purpose of an effective resource utilisation given that both the resources as well as the scope and the purpose of their utilisation are subject to change” (Håkansson and Snehota 1995 p.384). “Alchian and Demsetz (1972) argued that the results of a combination of resources that are heterogeneous are impossible to know in advance and have to be learned. The combinations have to be tried out in what they call ‘teamwork’. Joint learning can be accomplished through interaction of resource providers and users. The more that is known about how the different dimensions of resources can be used together, the more effectively they can be combined. In this way resources are developed” (Håkansson and Snehota 1995 p.135).
In relationships, the provision of a product is confronted with its use, and consequently with subsets of the heterogeneous resource collections of the counterparts. Being confronted with subsets of counterparts' resource collections and the way the different resources within these are combined and used, the involved firms are offered the opportunity to discover and learn new ways of using and combining the confronted resources and to get ideas for development and changes of resources (and the use hereof) which may increase the effectiveness of the combined resources. Requirements for knowledge development and different types of learning are discussed in Håkansson (1993).

When developing resources, a change of a single property of a single resource may cause changes in many different ways, partly because the properties of single resources are correlated and partly because a single resource can be tied to many different resources controlled or used by many different actors, i.e. they are embedded in resource constellations, and this embeddedness has to be taken into account when analysing effectiveness in the resource layer.

In summary, the resource layer concerns innovative creation of effective resource combinations (i.e. with higher joint value) though interaction and experimental learning. Creation of resource ties involves changes of provision and/or use of resources in relation to specific counterparts.

3. DISCUSSION

In later years, activity links, resource ties and actor bonds (Håkansson and Snehota 1995) have been proposed as concepts describing different types of economic consequences of relationships. At the same time more traditional parameters of economy as efficiency and effectiveness have been used when describing economic effects of relationships. However, the distinctions between the four latter concepts, their relations to the different
layers of relationships as well as their relations to three basic elements in the general network model (i.e. actors, activities and resources) appear somewhat blurred. The reason for this may be that researchers using the concepts often (a) concentrate on one of the layers in the framework (e.g. Dubois 1994, Dubois and Håkansson 1997, and Dubois 1998) or (b) combine two layers and discuss them as one (e.g. Laage-Hellman 1997).

We believe that one reason for the lack of clarity is the difficulty with setting a ‘boundary’ between e.g. the activity layer and the resource layer and between the different types of effects of relationships related to each of the layers. Håkansson and Snehota (1995 p.34) mentions that “every business relationship is an integrated entity and our ambition is not to decompose it into three different ones. When we propose to distinguish between the three layers of substance it simply serves the purpose of identifying possible variations in the effects of intercompany relationships.” Empirically, we would naturally expect the types of economic consequences to be intertwined, however, because we want to use the framework for analysing and discussing different types of economic consequences of relationships, we need a ‘boundary’ between the layers for analytical purposes. As mentioned earlier, the aim of this paper is (1) to make the ‘boundary’ between two of the three layers in the framework a little more clear (i.e. the activity and the resource layer), (2) to make the relation between these layers and efficiency and effectiveness more explicit, and (3) to identify the parameters of activities and resources which are most central in the two layers, respectively.

When analysing the activity layer, the parameters most frequently referred to are economies of scale, resource utilisation, capacity utilisation, and creation of value for the counterpart. When analysing the resource layer, resource utilisation, resource development, creation of value, and adaptation of resource properties are often used as parameters.
In the activity layer, economies of scale and utilisation of resources are primarily related to 'horizontal interdependencies', whereas value creation is related to 'vertical dependencies' in the activity layer (see Dubois 1998). When analysing efficiency in relation to horizontal interdependencies, utilisation of the capacity of given resource units is in focus, i.e. the quantitative aspects of resources like e.g. production volume per time unit or number of man-hours. However, utilisation of given resource units in counterpart-specific ways, is also related to horizontal interdependencies. This implies that qualitative aspects of resources such as technical properties, tolerances etc. are in to focus in addition to the quantitative aspects. The qualitative aspects of resources are also in focus when considering vertical interdependencies, i.e. creation of counterpart specific solutions or outputs with a high value (Dubois and Håkansson 1997 p.51). In summary, both qualitative and quantitative aspects of resources are central when analysing efficiency in the activity layer.

In the resource layer, the focus is on effectiveness and on creation of value by development and changes of resources, use of resources and resource combinations. This implies that qualitative aspects of resource properties and the qualitative use of these properties are in focus when analysing effectiveness in the resource layer. Thus, it seems as if the concept of efficiency overlaps with the concept of effectiveness. Furthermore, it becomes difficult to distinguish between the activity link and resource tie concepts.

It appears to us as if one of the reasons why it is difficult to separate efficiency from effectiveness (and activity links from resource ties) may be that resource utilisation sometimes refers to (1) utilisation of the (quantitative) capacity of resources with given (qualitative) properties used in given ways and sometimes to (2) new ways of using given (qualitative) properties of resources. Furthermore, the concepts of complementarity and closely complementarity actually reflect if resources are tied or not, i.e. if a
certain output (i.e. a product) is only used in one end product related activity structure or if it is used in several end product related activity structures. In addition, the concept of technical interdependencies is not discussed in relation to the concept of resource ties.

As our aim is to find a way for distinguishing between the two layers, the respective economic consequences used in relation to them, and for identifying central parameters for each of the layers, we have chosen one approach for separating between the layers. This involves assigning all issues related to change and development (of resources and use of resources) to the resource layer. Thus, with this as the point of departure, only when the resource properties as well as the use of these are given, it is possible to analyse efficiency in the activity layer without mixing (1) utilisation of (quantitative) capacity of given resources together with (2) new ways of using given (qualitative) properties of resources, (3) development of new (qualitative) properties of resources for given (qualitative) ways of using them, and (4) development of new (qualitative) properties of resources for new (qualitative) ways of using them. We therefore suggest making a distinction between resource utilisation (quantitative) and resource development (qualitative) as illustrated in figure 6, where (1) is related to the activity layer and efficiency, and (2), (3) and (4) is related to the resource layer and effectiveness. In this way only (1) is related to the 'flow', i.e. the extent to which the capacity of a resource is being utilised or economies of scale are captured.¹

¹ We realise that capacity and output may correlate and thus that the capacity of a resource may be variable in that the quality of the output from an activity may depend on the speed of the flow, i.e. the capacity.
Making this distinction implies that the ‘capacity’ aspect of resources is related to the activity layer\(^1\), whereas the ‘technical properties’ aspect of resources is related to the resource layer. If this distinction is used, the resource layer comprise ‘establishing’ (the qualitative content of) complementarities and closely complementarities between resources reflecting how and the extent to which resources (including resources in ‘resource units’ as well as ‘products’) are (or could be) related to each other\(^2\). Consequently, ‘unsatisfactory’ flow due to low degree of tying of resources resulting in high rejection rates, production downtime etc. is related to the resource layer. Furthermore, synchronising of qualitative changes of resources among firms is related to the resource layer. The activity layer, in turn, comprises ‘establishing’ (keeping or moving) the ‘actor-activity’ boundaries. Consequently, ‘unsatisfactory’ flow due to

\(^1\) The matching of the capacity of two resources could be regarded as a resource tie. However, we have chosen to relate the capacity aspect of resources to the activity layer only.

\(^2\) In her thesis, Dubois (1994 p.158) also suggested that further research should be carried out on the setting of complementarities during development of technical systems which influence the conditions for dividing the related production activities among firms.
unsatisfactory capturing of scale economies (i.e. similarities) among activities (activating the same resource units) is related to the activity layer. Furthermore, synchronising of the quantitative aspects of resource utilisation is related to the activity layer.

If the distinction suggested in figure 6 is used in relation to analysis of efficiency (activity layer) and effectiveness (resource layer), respectively, we get a certain picture of which elements are given and which are (or may be) variable when analysing the activity and resource layers, respectively. This is depicted in figure 7.

4. CONCLUSION AND FURTHER RESEARCH

In the beginning of this paper we claimed that there was a need for making the 'boundary' between the activity layer and the resource layer in the theoretical framework proposed by Håkansson and Snehota (1995) a little more clear, and thereby also making the distinction between efficiency and effectiveness more explicit within the industrial network approach. In the discussion we have tried to do so by distinguishing between activity layer and resource layer related parameters of two specific aspects concerning the 'boundary' between the two substance layers of a relationship.

The first aspect is the concept of resource utilisation, frequently used both for analysing activity links and resource ties. With regard to this aspect, we have proposed a distinction between (1) (quantitative) capacity utilisation of resources which we have related to the activity layer, and (2) technical (qualitative) properties of resources which we have related to the resource layer.

The second aspect is the distinction between given and variable resource properties, and between given and variable use of resource properties. With regard to this aspect, we have related given use of given resource properties to the concept of capacity utilisation, claiming that
(a) activity layer - efficiency

(b) resource layer - effectiveness

FIGURE 7: The distinction applied in relation to each of the two layers
this will affect the efficiency and thereby the activity layer. Furthermore, we have related given use of variable resource properties and variable use of both given and variable resource properties to the concept of resource development, claiming that this will affect the effectiveness and thereby the resource layer.

Closing up, we would like to stress that the overall purpose of the paper is to create a discussion on two of the substance layers in the framework proposed by Håkansson and Snehota (1995) which is so central in the industrial network theory, and which has been and currently is used by a large number of researchers within this research tradition (e.g. Harrison and Easton 1997, Laage-Hellman 1997). This implies that our ambition is to share with other researchers our understanding (and confusion) of the concepts and not to classify activity and resource related concepts once and for all. In our opinion, it is rather apparent that we (researchers with the industrial network approach) have come a long way partly by the general industrial network model and the framework introducing the three layers and partly by the brilliant analytical framework related to the activity layer proposed by Anna Dubois (1994, 1998). However, what we are still lacking is a 'similar' analytical framework for the resource layer in order to take the discussion on the 'boundary' between the two layers further. Furthermore, the development of a theoretical framework regarding the actor layer would naturally also be required in order to further the understanding of the interplay among the three layers in the framework developed by Håkansson and Snehota (1995), their concept of 'vectors of change', as well as the network model and its three basic variables, i.e. actors, activities and resources.
REFERENCES


