ON THE EMERGENCE AND DEVELOPMENT OF INDUSTRIAL NETWORKS: THE CASE OF PHARMACEUTICALS IN FINLAND

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Abstract

So far, we know little about how networks are created and how they evolve and develop over time. Learning more about the stages or phases that a network goes through can for instance enhance our understanding of how to deal with management aspects associated with network development.

This paper discusses, from holistic perspective, how networks are created and developed over time. There are a large variety of networks in high technology industries. A company can belong to several networks at the same time, which means that different networks are overlapping.

The creation and development are illustrated using as an example a new issue-based network of the Finnish pharmaceutical industry. The data are based on written documents of companies and their network. In addition, discussions with owner-managers of the main companies and local industry experts on different occasions complemented the picture.

The results show that the new pharmaceutical industry in Finland has succeeded in building a growing national network, where actors work together in order to increase the value of the network. The case summary concluded that to a large extent the phase models presented in the theoretical framework were appropriate in describing the formation and development of the new network of pharmaceuticals in Finland during its first operational years.

The phases of network formation and development discovered were the following: (1) the awareness phase, (2) the formation phase (the identification phase, the negotiating phase and the launching/establishing phase), (3) the growth phase and (4) the stabilisation phase. There have also been minor changes in the type of participating organisations over the course of time. In addition, the network has tried to strengthen its identity and it has changed its objectives.

Introduction

The concept of network has become very popular in describing and analysing the industrial structures of the economy. A review of the relevant literature reveals many definitions of networks (Easton and Araujo 1992, p. 63; Bengtsson and Kock 1999, p. 180; Huggins 2000, p. 112). As with the variations in definition, there are also numerous taxonomies and typologies that exist with regard to inter-firm networks (Huggins 2000, p. 112; Rosenkopf 2000, pp. 341, 344).

Much of literature on inter-organisational networks has focused on structural features of the networks or different management mechanisms of networks (Lamming et

al. 2000, p. 677). However, we know little about how networks are created and how they evolve and develop over time. Learning more about the stages or phases that a network goes through can for instance enhance our understanding of how to deal with management aspects associated with network development.

There are a large variety of networks in high technology industries. A company can belong to several networks at the same time, which means that different networks are overlapping. This paper discusses, from holistic perspective, how networks are created and developed over time. The creation and development are illustrated using as an example the new issue-based network of the Finnish pharmaceutical industry. The network was in its identification phase in 1996, the negotiating phase in 1997, and it was officially established in 1998. Since the development of the network continues, some of the most recent developments will be pointed out.

The paper is divided into five sections. The first addresses typical networks in high-technology industries, and especially the notion of an issue-based net. The second section discusses some of the most relevant literature relating to the formation and development of industrial networks. The third section analyses the emergence and development of a new issue-based pharmaceutical network. The last section offers a brief conclusion to the contents of the paper.

Typical Networks in High-Technology Industries

A large variety of classifications of networks have been shown, based on many different dimensions of network (Lamming et al. 2000, p. 677). Apparently the innovative products typical for high-technology industries have had a great impact on the types of networks, which have either evolutionarily developed or have been consciously formed.

Many networks in high-technology industries can be called supply networks. They can be defined as a number of entities, interconnected for the primary purpose of supplying goods or services required by end-customers (Zheng et al. 1998, pp. 596-97; Lamming et al. 2000, p. 676). The genesis of a supply network can be dictated by scope-economies: the core-firm decides to concentrate its resources on the development of core competencies, while benefiting from the external supplier's innovation and specialised professional capabilities, and spreading the company's risk for component and technology development among a number of suppliers (Nassimbeni 1998, p. 542). The boundary of the supply net is quite specific, as only relationships involving a transaction of materials, products and services are included.

A (formal) knowledge network is an inter-organisational network dedicated to the creation and dissemination of knowledge assets (Clark 1999, p. 404; Swan et al. 2000, p. 104). Knowledge networks are dynamic. Their structure and boundaries will change over time as actors are included or excluded from the networks, and activities and resources are superseded or they become obsolete (Swan et al. 2000, pp. 104-05). The networks transcend the boundaries between sectors (e.g., academic, industrial, financial, governmental) to contribute to sustainable development (Clark 1999, p. 304). In recent years, various sub-types of knowledge networks, such as collaborative R&D networks and strategic alliances, have also increased considerably.

From an inter-organisational point of view, a collective actor is a net of relationships created in order to cope with a collectively perceived and shared issue through developing lobbying activities or struggling for a common goal (Brito 1998, pp. 159-60; Brito 1999, p. 93). In other worlds, a collective actor is an issue-based net (Brito 1998, pp. 159-60). Collective actors may or may not adopt formalised structures. Non-formalised or virtual issue-based nets may assume a central role on the dynamics of

industrial networks. In fact, virtual issue-based nets are likely to arise out of common and “official” perceptions of an issue (or set of issues) giving rise to a mobilisation of interests beyond institutionally represented groups of interests (Brito 1999, p. 93).

In large and heterogeneous groups, the emergence and development of issue-based nets may be dependent on the role played by an inner core of highly resourceful and interested members, which may provide the critical mass necessary for the establishment of the net of relationships. Such a small subset of interested actors may be sufficient to mobilise time, money and other resources towards the production of collective benefit, despite the fact that the majority of members do little or nothing (Brito 1999, p. 94).

Referring to the structural approach proposed by Lazega (see Estades and Ramani 1998, p. 485), one can find many separate and overlapping networks within the whole network structure. Lazega’s structural approach addressed networks from the viewpoint of individual companies. The network structure of a firm can be defined as a set of networks, one for every external agent with which the firm has a link. Estades and Ramani (1998, p. 486) have shown how five kinds of networks played an instrumental role in the evolution of the technological competence of new biotechnology firms in France and Britain. The five networks were a scientific network, a political network (associations with government bodies and regulatory agencies), a professional network, a financial network and an inter-firm (contracts, strategic alliances and financial participation by firms) network. We can claim that the "sum" of these overlapping networks forms a kind of total network.

Formation and Development of Industrial Networks

Purpose of Network Formation

Networks evolve gradually or they are formed consciously. The choice of participating in network operations is likely to be made through an assessment of its cost and benefits to each business, including the perceived costs and benefits of any solidarity, social or club aspects. The potential benefits of networks to participants depend on the network type concerned. Supply, knowledge and scientific networks can offer access to another actor’s resources and knowledge related to different phases of the value-adding R&D process (Hakansson and Johansson 1992, pp. 28-29; Ring 1996, pp. 19-20). The “shared context” is crucial for new, technology-based firms. It is likely that their innovativeness stems not only from their own technological and scientific expertise, but from their capabilities to interact with the environment as well (Yli-Renko and Autio 1996, pp. 224-25). In the case of political and issue-based networks, the possibilities of fostering common interests through group activities are an important motivating factor.

The life cycle of a co-operative network is closely related to the life cycle of the benefit potentials, and it can be understood either as a project or on a long-term basis.

Models of Network Formation

In the literature, we can find only a few models of how networks are formed. Table 1 summarises some of them.

TABLE 1
Models of Network Formation

Author	*Stages of Formation*
Chaston 1995, p. 11 (The Danish Technological Institute process model for creating SME networks)	Raising awareness of the networking concept in the business community→ Identification of potential ideas and possible forms of co-operation→ Validation of idea feasibility and development of preliminary business plan for new network→ Gaining formal agreement over structure, process and strategy of new network entity→ Launch and operation of new network
Zheng et al. 1998, p. 598	Network creation (designing resources and information)→ Operation processes (resource sharing and integration and co-ordination of activities)
Chaston 2000, p. 247	Idea generation→ Idea validation→ Network planning→ Network launch

Chaston (1995, pp. 10-11) has reported how The Danish Technological Institute, at the initiative of the Danish Government, tried to create SME networks in order to encourage growth and the generation of new employment opportunities. There was a need to evolve an approach to stimulate the formation process. The solution was to recruit network brokers who were assigned the tasks of seeking potential new opportunities for small firm networking, identifying potential members within the business community, and acting as a facilitator to create a commercially viable trading entity. Experience gained in analysing both success and failure in the network formation process led to the specification of the five-phase model.

Zheng et al. (1998, p. 598) have regarded networking as transformation process, which is divided into two separate processes in terms of creation and operation. Network creation refers to the formation of a set of relationships, with key players involved in the supply of goods and service, which is designed to build competitive advantage for the supply network as a whole. Network operation refers to all the operations activities that broadly involve resource sharing and integration and co-ordination of activities.

Chaston (2000, pp. 246-47) sees the creation of knowledge networks as a four-phase process. In Phase 1 an idea is generated. In Phase 2 a series of meetings will occur as participants discuss the idea, refine their thinking and begin to evolve mutual trust and commitment. In Phase 3 an appropriate learning plan is crafted. In Phase 4 the network is formed and the agreed learning plan is implemented.

Because we can find only a few models of network formation, it might be possible to use models of collaboration as analogues of them. For example, Osborne and Murray (2000, p. 10) argue for a five-stage model of a collaborative process: the pre-contact phase; the preliminary contact phase; the negotiating phase; the implementation phase; and the evaluation phase.

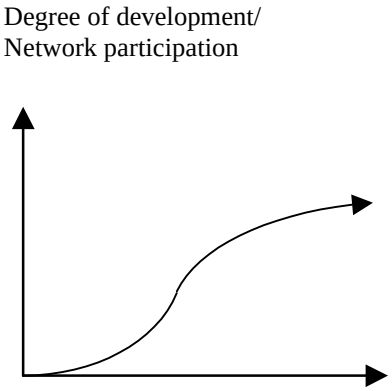
Network Growth

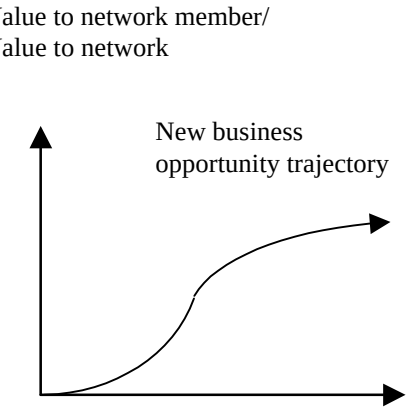
An individual firm has the potential to develop and grow over time (see, for example, Bhidé 2000, p. 242). When the perspective is that of a group of collaborating firms in so-called networks, the question then arises if it is appropriate to talk about growth in the same sense. It is possible to argue that networks have development phases similar to those of a single firm, which grows through different phases where different problems have to be solved by its members during the course of each phase (Wallenklint and Holm 2000, p. 244). Wallenklint and Holm (2000, pp. 244-45) refer to Nilsson & Nilsson, who have proposed a life cycle model where the development of SME

networks is measured as the degree of development over time. The degree of development can be evaluated in many ways. It can be a function of a degree of formalisation, complexity, centralisation and the intensity that exist in the network. It can be based on the number of functions conducted in co-operation with network members. In addition, participation in a network could be considered an alternative route to growth, one where small and medium-sized firms acquire resources and competencies through using and sharing them with other firms in the network.

Tovstiga and Fantner (2000, pp. 460-61) revisit the notion of "value" and "value creation" in the network context. In the network economy, value is derived from plenitude, and power comes with abundance. This new axiom is also known as Metcalfe's law. Mathematically, it states that the sum value of a network equals the square of the number of members - if the number of nodes of a network increases linearly, the value of the network increases exponentially. As in biological systems that follow a similar pattern of growth, there are naturally limitations to the trajectory. For example, growth up to a specific point along the trajectory can be quite slow. The two "life cycle" models are shown in Figure 1.

FIGURE 1
Growth Models of Networks





Network analyses based on growth models presuppose the availability of quantitative growth figures. However, networks do not necessarily grow quantitatively. It is more likely that the growth that occurs is qualitative, such as competence development, flexibility etc. (Wallenklint and Holm 2000, p. 245).

In literature on network development we can find only a few holistic phase models (see Table 2). In most cases the development is described implicitly or explicitly as a curve similar to a life cycle with different phases of development.

TABLE 2
Phase Models of Network Development

Author	*Stages of Development*
Easton 1994, pp. 49-51	Community→ Informal network→ Formal network→ Club→ Disappearance/Rebirth/Renascence
Human and Provan 2000, pp. 342-43	Pre-network→ Network formation→ Early growth→ Emerging legitimacy deficiencies→ Sustainment/Demise
Wallenklint and Holm 2000, p. 244 (Model a)	Awareness→ Formation→ Growth→ Stabilisation→ Decline
Wallenklint and Holm 2000, p. 245 (Model b)	One functional step→ Multiple functional step (growth, stability, decline)→ All functional step
Wilkinson, Young, Welch, and Welch 1998, pp. 498-502	Stage 1: "Getting people to the party"→ Stage 2: "Let's dance"→ Stage 3: "The outcomes"→ Stage 4:"Do it again or a different dance party?"

Easton (1994, pp. 49-50) has described the changes that occur in networks as they develop. Four ideal typical stages of development are: a community, an informal network, a formal network, a club and a disappearance/rebirth/renascence. Growth is included in the model both in the form of growth of individual companies and in the growth or decline of the industry/network concerned as a whole.

Human and Provan (2000, pp. 342-43) have identified five stages of evolution for categorising and comparing how the networks evolve, consistent with earlier life cycle research. The stages are: pre-network organisational field, network formation, early growth, emerging legitimacy deficiencies and sustainment or demise of the network. In these contexts, they strongly highlight the importance of legitimacy (credibility) and the legitimacy-building process in contributing to the overall viability or demise of network. The successful evolution of networks will depend on legitimising the network as a form of organising, both to members and to external groups, such as funders. The network also has to develop a recognisable identity that would attract members, customers and funders. Effective interactions are especially critical to multilateral networks. Relationships must be established and sustained.

Wallenklint and Holm (2000, pp. 244-45) described the development as a curve similar to a lifecycle with different phases of development: the awareness phase, the formation phase, the growth phase, the stabilisation phase, and eventually the decline phase. In the awareness phase there exist several firms that become aware of threats and/or opportunities in the business environment. When entering the formation phase the degree of formalisation, centralisation, complexity and intensity is heightened due to intense discussions about co-operation areas and the content of co-operation. The growth phase includes a discussion about the scope of co-operation, which increases as new areas are considered and introduced. Specialisation of production will evolve in order to achieve a higher degree of co-operation instead of competition. Flows of resources, communication and social relations are activated at this stage. Stabilisation in the network is achieved when there are no new developments or ideas generated in the network. This model does not describe the decline phase, even though it is latent in the model due to the biological analogy used.

Wallenkint and Holm (2000, p. 245) also suggest an optional scenario on how a network develops over time. A common route of development could be when a simple network starts the co-operation in a network with only one function. The network can evolve from this "one functional step" to other steps where the network may develop other functions and management structures. The stage is called the “multiple functional step”. In this stage, it shows that there are likely to be at least three possible scenarios

for a network trajectory: some sort of growth, stability and/or decline/reversal. In the final stage, called the “all functional step”, the network may include “all” functions.

Wilkinson et al. (1998, pp. 493-494, 498-502) have used the metaphor of business dancing in the context of export groups. They are conceived and analysed as “dance parties”, which are viewed as temporary learning organisations. Dancing is about the co-ordinated, co-operative activities taking place among dance partners. In Stage 1, a significant issue for engineering a network is determining who should be invited to join. In Stage 2, firms have to recognise and perhaps learn the nature and tempo of the dances. As the dance party progresses, the participants’ knowledge is likely to grow, and bonds develop. In Stage 3, network dance parties provide valuable benefits to those that participate in them. The dance party organiser and the master of ceremonies play a critical role in all of this. Stage 4, the ending of the party is problematic. In some instances, it may be appropriate for networks to continue, while in other instances, there may be little justification for maintaining the group.

The Emergence and Development of a New Pharmaceutical Network

Formation Phases of the New Network

The empirical part of this paper concerns new pharmaceutical R&D companies and their co-operative network. The data are based on written documents of companies, including business plans, annual reports, www-pages and journal articles. In addition, discussions with owner-managers (CEOs) and local industry experts on different occasions complemented the picture. Also, a published study of the Finnish pharmaceutical industry (Brännback and Mäkinen 2000) was a source of knowledge for this paper.

The case companies that founded the new network are four small innovative drug discovery companies (also known as biopharmaceutical companies or R&D companies of pharmaceuticals) in the Turku region. They are highly focused, specialised R&D companies that have been established either as companies or as university spin-offs. In three cases the founders were researchers or managers in large pharmaceutical companies, which discontinued development of certain drug concepts. In consequence, the researchers or research managers of closed projects became nascent entrepreneurs. In order to access all kinds of resources needed, the CEOs of the new companies started to develop the idea of a co-operative issue-based network. Its purpose was primarily to foster common business interests and a benign regulatory environment. The access to risk financing was naturally a very important issue from the very beginning. The other purpose of the network was to strengthen scientific and industrial co-operation between the relevant parties.

The analyses of data showed that to a large extent, the phases or metaphors of network formation presented in the theoretical framework are well suited to describe the building process of the network. Some managers of innovative companies in the Turku area had often discussed the possibilities of increasing local co-operation. According to some informants, this awareness phase (cf. Chaston 1995, p. 11; Wallenklint and Holm 2000, p. 244) had lasted for "at least 20 years". The identification phase (see Chaston 1995, 11) of the new network started in 1996, i.e. at the same time as the preparation phase of three new spin-off companies. Using Easton’s terminology (Easton 1994, p. 49), this phase can be described as a “community”. Social relationships were extensive among the key actors of the emerging network. In the same year, a provincial development organisation hired an active network broker to assist in the building of the new network. In the negotiating phase (cf. Osborne and Murray 2000, p. 10) in 1997, the broker initiated two co-operative development projects between two of the universities.

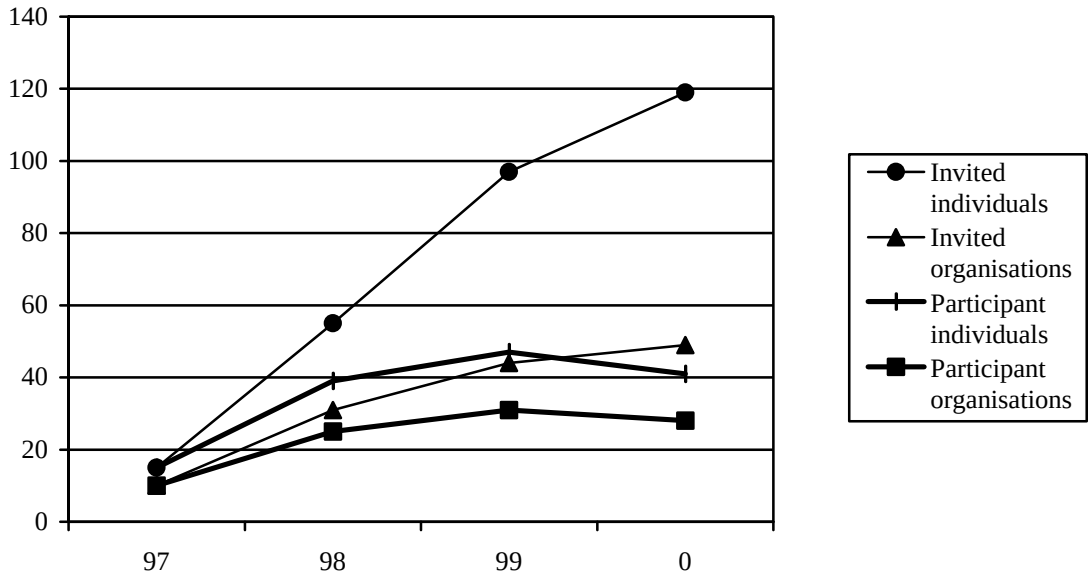
The purpose of the projects was to start intensive co-operation between university units in different functions of pharmaceutical research and development or commercialisation. In this stage the network was a kind of supply network or scientific network. The new network was then launched/established (cf. Chaston 1995, 11; Chaston 2000, p. 247) at the beginning of 1998, when the first "official" network meeting was arranged. In this phase, the network was extended to include university units, government bodies, risk financiers, etc., and it became a real issue-based network. By the end of 2000, nine network meetings had been arranged altogether. The network comprises several overlapping sub-networks (cf. Estades and Ramani 1998, 486), but the issue network is the most comprehensive.

Development Patterns of the New Network in 1997-2000

The development of the new network is described below using the following criteria: (1) the number of actors (organisations or individuals) that have been invited or that have participated in the network meetings, (2) the most active organisational participants in the network meetings, (3) the types of organisational participants by the phase of network development and (4) the most typical issues dealt with in the network meetings by the phase of network development.

Number of invited and participant actors. The invitations to the first negotiation meetings in 1997 were sent to about 10 organisations. The invitations to the first extended network meeting in 1998 were sent to about 20 organisations and their 45 individual members. This phase can be labelled the informal network (cf. Easton 1994, p. 49). The development of the network described as the number of invited and participant individuals and organisations is depicted in Figure 2. The figures are given as average figures for each year.

FIGURE 2
Development of Network Participants in 1997-2000



Since its negotiating phase in 1997, the network has grown very fast. From the figures, we can notice some kind of stabilisation, measured by the participation in the network operations after 1999. Since the beginning of 1998, the core network has consisted of three small new drug development companies, universities and their

medicinal units, private research laboratories and services for commercialisation, as well as public and private advisory, regulatory, financing and education organisations (cf. Sydow 1996, p. 25, in the context of regional networks). It seems that network activities and related co-operation occur mainly in a vertical direction within the star-like structure of the network.

Evidently, the local network has increased the access to resources as well as developing the use of resources, both of which are essential to key learning processes. Network activities have brought about supplementary and complementary resources and competencies for the use of network members.

Today, about 60 organisations and 160 people belong to the mailing list of the network. This nationally operating network covers all the specialities needed in the development of new drugs. The network is partly formalised, as it has a president, a co-ordinator and a couple of other full-time employees. The network also holds network meetings, which are organised twice a year, at which the parties have the opportunity to meet, interact, engage in informed debate and dialogue and learn from scientific and financial colleagues, regulators and industry leaders.

The most active organisational participants. The organisations, which have most often taken part in the nine network meetings, are as follows: Group 1 has sent altogether 21-50 individual participants from the University of Turku and Turku Technology Centre Ltd. Group 2 has sent 15-20 participants from Innomarket (a market research unit at the Turku School of Economics and Business Administration), the National Technology Agency 'Tekes', Hormos Medical Ltd (a small R&D drug company) and the University of Kuopio. Group 3 has sent 10-14 participants from the University of Helsinki, Helsinki Science Park Ltd, Medfiles Ltd, Technology Centre Teknia Ltd. Kuopio, Orion Pharma Ltd (a large pharmaceutical company), Contral Pharma Ltd (a small R&D drug company), Pharma Industry Finland, and Finnish Bioindustries.

The most typical organisations by the phase of network development. There have also been minor changes in the type of participating organisations over the course of time, as shown in Table 3.

TABLE 3
The Most Typical Network Organisations in the Different Phases of Network Development

	Earlier Phases of Network Development (1997-1999)	*Later Phases of Network Development (1999-2000)*
Phase of drug development	• Organisations for pre-clinical and clinical research	• Organisations for technology transfer licensing and patenting
Nature of research	• Basic research in universities and research centres	• Applied research • Universities of technology
Type of industry	• Pharmaceutical companies	• Companies in related industries (diagnostics, vaccines, biomaterials)
Size and type of companies	• Small drug discovery, research and development companies	• Large foreign-owned pharmaceutical companies
Type of organisations for commercialisation	• Specialised business development companies	• General export development or management consulting companies
Type of risk financiers	• Seed financiers and specialised risk financiers	• General financiers
Type of support organisations	• Technology centres and science parks	• Local networks of companies and support organisations
Type of regulatory organisations	• Industry associations	• General regulatory authorities

When comparing the types of organisations in different phases, we can reveal the following changes. New members of the network may belong to the later, downstream phases of the value chain, such as licensing companies, for example. Also, new actors, for example those companies in related industries or organisations that are not particularly specialised in pharmaceuticals, have joined the network. Large international pharmaceutical companies have also gradually started to get interested in the operation of the network.

The most typical issues dealt with in network meetings by the phase of network development. The network meetings usually follow a very typical program. They are hosted by the network members in turn, they usually last for one day, and they deal with various issues arising from emergent problems experienced by the companies or the industry. Most often the local host organises lectures or presentations using the expertise of the local network members. Naturally, not all members can attend all the meetings due to various restrictions and varying priorities in each meeting. In general, the network meetings reveal that the network has followed the logic of influence (cf. Bennett 1998, p. 3), although the emphasis of network issues has changed somewhat during 1997-2000, and this is summarised in Table 4.

From the beginning, the network has tried to establish a high degree of credibility and trust with the public and all other stakeholders concerned, and given the plural demands of stakeholders, the network has issued multiple identities to meet these demands. The co-ordination of identities becomes more complicated in proportion to the multiplicity of identities for which and to which a network must speak, including both members and outsiders. The shaping of such identities is thus fundamentally rhetorical and symbolic (cf. Cornelissen and Harris 2001, p. 62). The case shows that network communication has adhered to a rhetorical view of network communication in the

earlier phases of network development, while a symbolic view has prevailed in the later phases.

TABLE 4
The Most Typical Issues of Network Meetings in Different Phases of Network Development

Earlier Phases of Network Development (1997-1999)	*Later Phases of Network Development (1999-2000)*
Planning of 'what the network is' (purpose, identity, actors, activities, resources)	Planning of total network communication (e.g., logos, visuals, intranet, business directory of members, administrative activities, participation at specialised trade fairs)
Concern over the lack of power of the new pharmaceutical industry vis-à-vis government and other political actors	Planning of a new target programme of the Finnish pharmaceutical field and the launching of it in 2001
Information on the possibilities of joining industry associations and accessing their supporting services	Information on public actors controlling drug development and safety
Information on the possibilities of accessing external financial resources (science and technology policy, centres of excellence, role of science parks, seed and risk financiers)	Information on the possibilities of accessing project-specific external resources (funding of applied R&D and co-operative research projects)
Concern over the lack of qualified human resources in professional areas of the pharmaceutical industry (employees and management)	Detailed information on the training needs of employees and management in specific professional areas, based on inquiry among network companies
Building visibility and searching for partner actors in terms of presentations of core actors and their R&D activities (universities, service units, companies)	Building visibility and searching for partner actors in terms of presentations of other actors and their R&D and drug testing activities, located mainly in other parts of the country

The network has continually striven to enlarge its sphere of influence in its environmental context: the network has tried to strengthen its identity and it has changed its objectives. The emphasis has moved from fostering common business interests to specific targets. The National Pharmaceutical Network of Finland has started to prepare a new target programme in the Finnish pharmaceutical field. It includes such development areas as business (e.g., government policies, science parks, funding bodies, national and international networking), science (e.g., public acceptance of biotechnological drugs, acceleration of drug development and regulatory process, utilisation of information technology) and education (e.g., additional resources at all levels of education, collaboration with industry). On the other hand, the social enthusiasm and the density of interaction may have decreased a little. The key companies lately seem to have concentrated more on the internal development of their businesses instead of excessive professional and social networking.

Conclusions

The new industrial network has been analysed in order to test the validity of the conceptual models presented earlier in this paper on how a network is created and developed over time. These conceptual models were a result of a literature overview on different models that show development over time, and often illustrated in steps or life cycles.

The case summary concluded that to a large extent the phase models were appropriate in describing the formation and development of the new co-operative

network of pharmaceuticals in Finland during its first operational years. Especially, the models of Chaston (1995, p. 11) and Osborne and Murray (2000, p. 10) offered the bases for understanding the nature of network formation process. Thus, three phases of network formation were discovered here: the identification phase, the negotiating phase and the launching/establishing phase. Concerning the nature of the whole network development, the model (Model a) of Wallenklint and Holm (2000, p. 244) demonstrated its validity. The phases of network building discovered were the following: (1) the awareness phase and (2) the formation phase (the identification phase, the negotiating phase and the launching/establishing phase). At the same time, (3) the network seems to have grown through the phases (the growth phase), although (4) the growth has stabilised (the stabilisation phase). There have also been minor changes in the type of participating organisations over the course of time. In addition, the network has tried to strengthen its identity and it has changed its objectives.

The results show that the new pharmaceutical industry in Finland has succeeded in building a growing national network, where actors work together in order to increase the value of the network. Referring to Staber (1996, p. 4) the central idea, or hope, is that the national network can unlock important synergies, encourage innovativeness, raise efficiency, and thus strengthen the competitive advantages of the national economy in which the national network is embedded.

The significance of this paper is twofold. First, this paper is a contribution to our understanding of the phases of network formation and development. Particularly, it is of import to researchers seeking to understand networks as growing organisations. Second, this paper offers new insights and guidance to those practitioners seeking to form and manage new networks.

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