



Network Dynamics - The Impacts of the Bankruptcy of Wärtsilä Marine Ltd on the Finnish Shipbuilding Industry

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Abstract

In this paper, we will focus on the evolution of a specific network and nets in the Finnish shipbuilding industry. The bankruptcy of the largest shipyard in 1989 changed dramatically the supply nets between the shipyard and its subcontractors in each individual shipbuilding project. We found Håkansson and Lundgren's (1995) conceptualisation of network evolution highly useful for analysing industrial networks having not only technological changes but also other type of changes.

Introduction

This paper focuses on the long-term development processes of a specific network and nets in the Finnish shipbuilding industry. The shipbuilding industry has a lot of features that distinguish it from other industries. Shipyards build ships only when an order has been made. Ships are some of the biggest single products that are produced in any industry. In 1989, the largest shipyard in the industry in Finland went bankrupt. The bankruptcy precipitated a lot of tension and insecurity within the industry. The shadow of the bankruptcy is still affecting the exchange between the shipyard and its subcontractors. In the literature there are several ways to define a network and a net. A firm can be a member in several nets. According to Mattsson (1985) a net can be defined by the activities of a single powerful organisation. It is our definition that the network is formed between the shipyard, Wärtsilä Marine and after its bankruptcy (Oct. 23, 1989) between the successor, (Kværner) Masa-Yards and its subcontractors, small and medium size enterprises (SMEs). The supply net in our study is the network build between the shipyard and its subcontractors for each individual shipbuilding project. A subcontractor can be a member in several supply nets. This choice is a result of empirical findings in the industry. We focus on the nets created for each individual project to build a ship. Thus, we regard this research as a study on the long-term evolution and change in macro networks, which has received relatively little attention (Håkansson & Henders 1995; Håkansson & Lundgren 1995).

Håkansson and his colleagues suggest that network change can be described and analysed through six fundamental network "patterns" or processes, which are based on a firms' behaviour (Håkansson & Henders 1995, Håkansson & Lundgren 1995). "Specialisation" and "generalisation" are based on how the activities performed by

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actors are distributed among firms. “Hierarchisation” and “extrication” refer to two primary tendencies to control resources. “Structuring” and “heterogenisation” processes are related to the combining of activities and resources by the firms. Håkansson and Lundgren (1995) argue that these six network patterns jointly form the “coalescence” and “dissemination” tendencies describing the macro-evolution of networks. Coalescence represents strengthening of network structures and takes place through specialisation, structuring and hierarchisation; dissemination refers to the breaking up of network structure and is related to radical change. In this paper, we attempt to employ these conceptual tools to the analysis of the evolution of the Finnish shipbuilding industry in 1986-1997, in other words three years before and eight years after the bankruptcy of the main actor.

We aim to analyse the dynamics of the development of two nets of a shipyard and its SME subcontractors from the late 1980’s to the mid 1990’s in Finland. In order to manage this long time frame we adopt two guiding perspectives. First, we emphasise the role of organisational change in the development of the nets. Second, we use a specific phenomenon, the bankruptcy of the shipyard in the overall development as a “plot” in our discussion. There are several points, which support our choice of the case, the adopted research perspective, and the research focus. The Finnish shipbuilding industry is relatively well researched by intensive case studies by the other author of this paper (Malinen 1995 a&b, 1998; Malinen & Toivonen 1994). This is necessary for being able to carry out a concise analysis. The bankruptcy of Wärtsilä Marine, the leading shipyard in Finland of its time, is an attractive and dynamic phenomenon affecting the creation of networks and nets. Dynamic because of the fact that shipbuilding was not finished in the bankruptcy

The rest of the paper is divided in three sections. First, we review briefly the network (Håkansson & Henders 1995; Håkansson & Lundgren 1995; Uusitalo & Möller 1997), buyer-seller relationship (Ford 1980; Cunningham & Homse 1986) and change (technological or other type) related literature pertinent for our work. Second, the evolution of relationship between Wärtsilä Marine / (Kværner) Masa-Yards shipyards and its suppliers in 1986-1997 is illustrated from the network perspective. The paper concludes with a conceptual and managerial discussion.

Evolution of Industries: Technological Change and Network Dynamics

Industrial network research, being about a decade old has given relatively little attention to the long-term evolution and change in macro networks (Håkansson & Henders 1995; Håkansson & Lundgren 1995; Lundgren 1993). There can be several reasons for this. First, it is difficult to collect long-term, historical data, which is detailed enough for determining network relationships. Second, the theoretical aspects of describing and understanding long-term development processes are rather underdeveloped, thus, making it difficult to “make sense of the data”.

Perspectives into Industry Evolution

Industry evolution, a topic practically neglected in classical economics and in a relatively static way examined by the theory of industrial organisation, has been

attracting increasing interest in several disciplines. In the new evolutionary economics, the focus is on understanding the path-dependency of development (David 1988) and the major technological trajectories of development are seen as interplay between technological, economic and institutional factors (Dosi et al 1988). Institutional approach to industry change emphasises the role of prevailing rules and norms, beliefs and expectations of actors on a firm level behaviour (Di Maggio 1988; Scott 1987). By understanding how institutions develop and impose pressure on organisational behaviour we might have a more socially and culturally based comprehension of industrial evolution. A cognitive or knowledge-based view on studying industries is also emphasised by a group of researchers focusing on the “recipes” of how industries work and how firms operate within industries (Spender 1989).

Network View into Industry Evolution

The network perspective to industry evolution is close to the relational dimension of the industry field metaphor. Network theory postulates that industries can be described through sets of interrelated actors performing interconnected activities by employing interdependent and primarily heterogeneous resources (Lundgren 1993; Hakansson & Snehota 1995). Actors can be individuals, groups, organisations, or collectives as a net of firms. A simple but working way to describe industries is to identify the key actors, assess the resources they possess and the activities they predominantly perform, and the relationships established between actors. This descriptive information indicates the macro characteristics of the network. The following questions and issues provide an idea of the richness of a network description:

- How hierarchically organised is the industry; how many layers of actors can be found in a value-added chain? The hierarchy may also indicate power as to how the control of resources is dispersed within the industry.
- The relationships between actors and their interdependence describe the density of the network. Highly interdependent and dense networks tend to be resistant to external change. Reorganisation or innovation in one part of a network calls for adjusting actions from interrelated actors.
- Many industries are characterised by competing clusters of actors providing similar end products through different sub-nets or actors and activities. Clustering of a network reflects the spreading and structure of relationships.

In sum, through a set of relatively sparse constructs network theory strives to provide a constructive description of the contents of industries. This is, however, only a structural aspect of industrial network. Another and more complex aspect of understanding how industries work is the dynamic process shaping industrial landscapes. Two macro issues dominate the discussion: technological change including innovation research and change in the governance structures within an industry. In this paper we are interested in the latter one.

Governmental actions either through direct regulations or changing the existing balance of power in favour of some actors or re-valuing specific resources provides another driving force of a change. Actually, any major force influencing either the supply or demand side of an industry or its production and logistics systems generates industry wide change. The increased use of recycled fiber as a raw material for paper production



is an example of how the hanging on of a system, and especially our way of valuing ecosystem produces technological and industrial change.

Håkansson and his colleagues suggest that network change can be described and analysed through six fundamental network “patterns” or processes which are based on a firms’ behaviour (Håkansson & Lundgren 1995; Håkansson & Henders 1995). “Specialisation” and “generalisation” are based on how the activities performed by actors are distributed among firms. Specialisation tendency refers to the specialisation of firms into certain activities. Specialisation demands that other parties carry out other specialised activities. This process increases the efficiency of firms and the network, but tends to decrease flexibility. Firms wanting to use their resources and capabilities in several application areas provide the counter-force to specialisation. This is a generalisation tendency within a network.

“Hierarchisation” and “extrication” refer to two primary tendencies to control resources. Competition for control of critical resources and capabilities leads to concentration/hierarchisation over time. This is counteracted by companies who have less control. These companies try to develop alternative technical or organisational solutions to reduce the criticality of hierarchised resources. Extrication is about getting rid of resources, which are becoming less valuable – which, in turn, frees resources for other application domains (Möller & Wilson 1995). “Structuring” and “heterogenisation” processes are related to the combining of activities and resources by the firms. Structuring refers to the efforts of rationalising the use of resources in key activities. It can be recognised in the tendency to standardise both resources and activities. Heterogenising is a counteracting process depicting firms’ innovative behaviour of seeking new solutions that combine activities and resources for carrying out transformation or exchange activities. Generally, heterogenising works within an existing network but large-scale innovations may also lead to the emergence of a new competing network.

Håkansson and Lundgren (1995) argue that six mentioned network patterns jointly form the “coalescence” and “dissemination” tendencies describing the macro-evolution of networks. Coalescence represents strengthening of network structures and takes place through specialisation, structuring and hierarchisation; dissemination refers to the breaking up of a network structure and is related to a radical change.

Networks as Positions

Networks as positions perspective is primarily concerned with the nature of network connections. Mattsson (1985) defines a position as a role “that the organisation has for other organisations that it is related to, directly or indirectly”. According to Johanson and Mattsson (1988) “micro positions are characterised by: a) the role of the firm in relation to the (other) firm(s), b) its importance to the other firm and c) the strength of the relationship with other firm. Macro positions are characterised by: a) the identity of the other firms with which the firm has direct and indirect relationships in the network, b) the role of the firm in the network and the strength of the relationship with other firms.” Positions in networks provide a language to describe network changes. According to Easton (1992), the relationship should not entirely be viewed as



harmonious. There are possibilities for several tensions, for instance prices. The tensions are expected to be more important during the mature stage of a product cycle or during phases characterised by a stable technology. The power/interests distributions dictate the way in which the network both operates and develops. A single powerful company may dominate a part of a network and a part of its interest structure may be a desire to remain in control at the expense of other possible goals.

Industrial Buyer-Seller Relationships

Ford (1980) suggests that buyer-seller relationships in business-to-business markets evolve over time, and considering the process of relationship development, careful management can obtain the best possible value from these relationships. Furthermore, Ford (1980) analyses the process of establishment and development of buyer-seller relationships over time according to such variables as experience, uncertainty, distance (including aspects of social, cultural, geographical, technical and time distance), commitment and adaptation. He suggested that buyer-seller relationships follow a five-stage evolution process, namely pre-relationship, early, development, long-term, and final stage. The development of buyer-seller processes can be seen as an evolutionary process in terms of increasing experience of both parties, reduction of their uncertainty and all kinds of distances in the relationship, growth of commitment and informal and formal adaptations (Ford 1980).

Cunningham and Homse (1986) introduced marketing-purchasing interface concept. According to them supplier-customer interdependence is a feature of many concentrated industrial markets. Marketing and purchasing can be constructed as an exchange process leading to the adaptive behaviour of both parties over time. This is achieved through the mechanism of organisational interaction. The authors discussed the allocation of human resources among different customers and markets, the correct balance between technical, marketing, and purchasing and senior managerial staff required having personal contact with customers. The frequency of personal contacts and the place (either at the customer' or supplier's site) of meetings were also tackled. Various organisational mechanisms in supplier-customer relationships were also presented. These mechanisms included marketing and purchasing controlled, marketing and purchasing co-ordinated and stratified contact patterns. A controlled contact pattern occurs when all contacts are physically challenged through a single department or individual, typically via the marketing or purchasing department. In a co-ordinated contact pattern, many different departments have direct personal contacts with other companies, but there is usually one person from the marketing or purchasing department who is personally involved in all other contacts that take place. In a stratified contact pattern, there are no persons or functions either controlling or co-ordinating personal contacts. According to Cunningham and Homse (1986), for a stratified contact pattern to occur both the supplier and the customer organisation have to be highly specialised in terms of functional departments. Moreover, it seems that one of the following three conditions has to be present: 1) good internal communication, 2) an explicit strategy for dealing with the counterpart company, or 3) an open relationship based on trust, integrity and loyalty.

In the section after the brief description of data and methods, we attempt to employ Håkansson and Lundgren's (1995) conceptual tools in the analysis of the evolution of the of supply nets between the Finnish shipyard, Wärtsilä Marine and (Kværner) Masa-Yards and SME subcontractors in sequential and / or parallel shipbuilding projects.

Description of the Data & Methods

In this study, a total of 17 employers of the shipyard and 31 shipyard subcontractors were interviewed.³ Additionally, a large amount of secondary data was used and three pre-interviews as well as two validation interviews after the study were conducted. All this aimed at triangulation (Yin 1990). The empirical data was analysed with QSR Nud•ist software package⁴ four times according to the approach in question. In every partial analysis, the data was analysed by the most used concepts of each approach. QSR Nud•ist was used in order to carry out a systematic and comparative analysis with such a large database that was available to us.

Wärtsilä Marine and (Kværner) Masa-Yards

In 1987, Wärtsilä Marine employed over 8.000 employees and its turnover was a bit over FIM2.000 million. Wärtsilä Marine concentrated in specialised ships, such as icebreakers, cruisers, passenger ships, LPG-ships, cable vessels, and dredgers. In 1989 there were signals from the shipyard that its operation was in danger. Late payments, delaying building processes and many strikes were signs of problems in the shipyard. Interestingly enough, the order book was full at the time for years to come.

The bankruptcy of Wärtsilä Marine shipyard in October 23, 1989 was one of the earliest large-scale bankruptcies in the series of bankruptcies that took place during the late 80's and early 90's in Finland. The bankruptcy resulted to a lot of tension and insecurity within the industry. The shadow of the bankruptcy is still affecting the exchange between the shipyard and its subcontractors. The reason behind the bankruptcy was never completely researched. Different stakeholders have different opinions about the reasons for the bankruptcy. However, too large an order books, too low selling prices, strikes in the shipyards and lack of trust among financiers and investors are some of the reasons behind the bankruptcy (for further information about the bankruptcy, see Malinen & Toivonen 1994 or Malinen 1998).

Today, there are two international shipbuilding companies operating in Finland at the moment, namely Kværner Masa-Yards in Helsinki and Turku and Aker Maritime in

³ A total of 821 pages verbatim written interviews (4,11MB in size).

⁴ The software has been designed to aid users in handling non-numerical unstructured data in qualitative analysis.

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Rauma.⁵ Kvaerner Masa-Yards is the successor of Wärtsilä Marine. It is specialising in cruisers, LNG-vessels, ice-breakers, and highly specialised vessels such as cable vessels. In 1998, the shipyard employs over 4.200 people and its turnover was over FIM4 600 million.

Development of the Individual Supply Nets between a Shipyard and Its Subcontractors in Consecutive Shipbuilding Projects

This section provides an illustration of the evolution of the shipyard industry (and its individual supply nets in consecutive shipbuilding projects) in Finland. The chapter contains three sections. The first section illustrates the network and nets before the bankruptcy of Wärtsilä Marine. The second and third part describe the impacts of the change in the subcontracting policy of the new established shipyard, (Kvaerner) Masa-Yards, on the network just after the bankruptcy and at a later stage.

Shipyard-Subcontractor Net before the Bankruptcy of Wärtsilä Marine

The control of subcontractors was poor during the Wärtsilä Marine era. The shipyard's order book was full. There was a lot of work to do for all included in the shipbuilding process. During the Wärtsilä Marine era, transactions were neither planned nor coordinated. Transaction costs increased because of overlapping contracts, i.e. the same work was done at least twice, and too much emphasis was put on small and non-important purchases. Additionally, the pricing of contracts was uncontrolled. A lot of hourly priced subcontracting was bought and the control was almost non-existing. High transaction costs occurred especially in the 'areas' where horizontally or vertically different turnkey deliveries were joined and linked to each other (for example, between different decks (different floors) or between a restaurant and a staircase). To reduce risk in purchasing, the shipyard introduced a long-term co-operation to include several single shipbuilding projects with certain suppliers. This increased subcontractors' micro positions. Subcontractors used the situation opportunistically and in some occasions even the shipyard itself encouraged the subcontractors to do so. The co-ordination of subcontractors was also poor. The frequency of transactions was at highest just before the bankruptcy. The number of suppliers, almost five hundred, to whom the shipyard owed money at the time of the bankruptcy, indicates this. The situation was excellent for subcontractors to structure the individual supply nets in shipbuilding projects in a way that the same subcontractor could provide the same service in the coming projects. This could have provided the subcontractors with economies of scale. They were able to allocate for instance R&D cost of their equipment to at least two shipbuilding projects. Some of the subcontractors invested significantly on the shipyard specific machinery, which increased their dependence on and their commitment to the shipyard. However, in the late 1980's the Finnish economy provided other type of work in other sectors (i.e. in building constructing, other metal industries) for subcontractors. Subcontractors also balanced their workload by selling services and manpower to each other.

⁵ It should be noted that there are only two international shipbuilding companies in the world, Kvaerner Group and Aker Group, and they both operate in Finland. At the time of writing this paper, Kvaerner Group decided to sell its shipbuilding sector. Today, the name of the shipyard is something else (i.e. at least not including the prefix 'Kvaerner').



At the network level this coalescence led to a further hierarchisation of suppliers resources. However, the shipyard's internal control systems were not able to cope with this structuring. Moreover, the environmental changes in the late 1980's caused further problems for the shipyard. The economy was booming and thus, there was a shortage of suppliers, who saw this as an opportunity for extremely good deals with the shipyard. Many employees of the shipyard also saw business opportunities and founded their own companies to provide shipbuilding services. Ex-colleagues within the shipyard were now in a buyer-seller relationship. The seller or subcontractor, who had personally externalised the service (i.e. started own business), usually earned more than his/her ex-colleagues in the shipyard. This difference in earnings created tension between the ex-colleagues. There were several reasons why the shipyard was not able to control the supply nets. During the Wärtsilä Marine era (1986-1989), exchange between the shipyard and its subcontractors was described as informal, disorganised and financially beneficiary for the subcontractors. Co-operative solutions and an equal atmosphere were dominant features in the exchange of the Wärtsilä Marine era. The structure of nets in parallel and sequential shipbuilding projects at Wärtsilä Marine era (in the late 1980's) is illustrated in Figure 1. In the figure there is illustrated a network formed by the shipyard (SY) and its subcontractors (small circles)⁶. In this example, there are three supply nets (I, II and III) in sequential and parallel shipbuilding projects. In network terms, these supply nets were reasonably invisible, since the whole network was relatively strong and the same subcontractors performed the same jobs in each net. It was subcontractors' idea to keep individual nets more invisible and to work on long-term basis. Therefore, they tried, in network terms, to structure the co-operation between the shipyard and its subcontractors. However, Wärtsilä Marine was not able to cope with the structuring process. The lack of purchasing and subcontracting policy, i.e. co-ordination, deteriorated both the micro and macro positions of the shipyard and the shipyard lost the control of the situation as was mentioned earlier.

In the 1980's, development of the nets show consistent patterns of specialisation of subcontractors' activities, hierarchisation of the control of resources into the hands of suppliers, and through these patterns a coalescence type of structuring of the sequential and/parallel nets. Although this development was very beneficial for the subcontractors it also contained some risks of uncoordinated purchasing policy.

Shipyard-Subcontractor Net just after the Bankruptcy of Wärtsilä Marine

The radical change in the subcontracting (and purchasing) policy due to the bankruptcy of the shipyard provides an example of an organisational change. According to subcontractors, the purchasing policy of the shipyard was the main reason for inefficiency. The purchasing policy was also unplanned and uncoordinated, which increased the transaction costs. This poor subcontracting was a partial cause for the bankruptcy. Naturally after the bankruptcy, the new shipyard, Masa-Yards, did not renew the contracts between Wärtsilä Marine and its subcontractors. Masa-Yards introduced a new purchasing and subcontracting policy with tightened control and increased co-ordination. Numerous suppliers/subcontractors went also bankrupt. This

⁶ The same logic continues in Figures 2 and 3
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change in subcontracting policy of the shipyard meant generalisation of subcontracting. i.e. there was no more any specialised suppliers for parallel and sequential shipbuilding

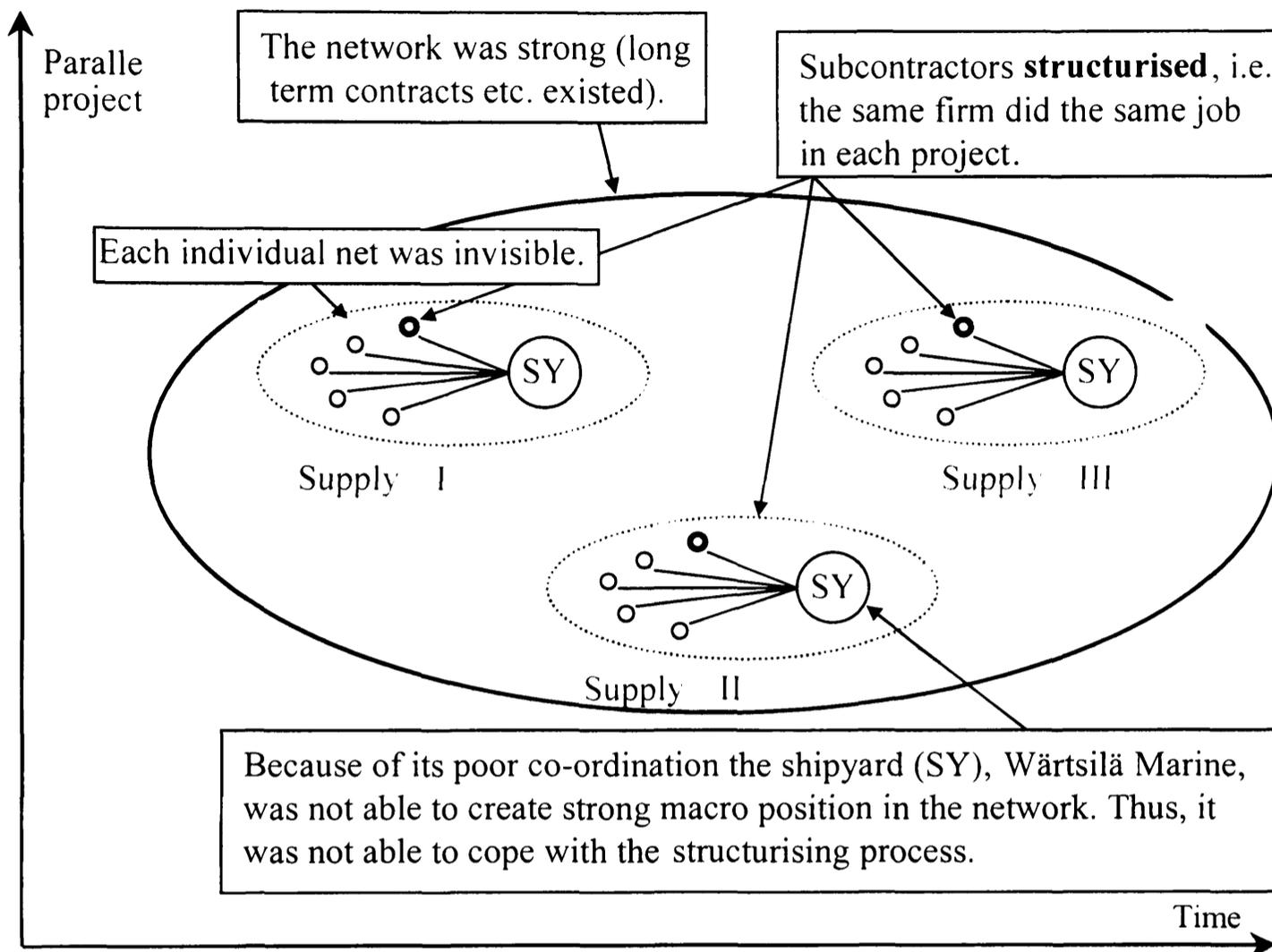


Figure 1. The structure of supply nets in parallel and sequential shipbuilding projects during Wärtsilä Marine era in the late 1980's.

projects. The purchasing became much more co-ordinated and the overall planning of a building process was increased. Subcontracting purchasing process policy was made clearer. Decisions were made jointly by a purchaser and a technical advisor. Subcontractors' long-term contracts (usually for the coming year) were dismissed. All purchases and subcontracting were bought based on a competitive bidding. The shipyard developed several kind of controlling systems. Turnkey concept was introduced. After the bankruptcy the new subcontracting policy of the shipyard broke the network of the parallel/sequential net of the shipyard and SME subcontractors. Subcontractors had little power to prevent the shipyard from breaking the long-term contracts covering several parallel or sequential projects. Other industries did not provide business opportunities for them since there were already, in 1990, signs of the coming low turn or recession in the Finnish economy. The new purchasing and subcontracting policy lead the increase in the micro and macro positions of the shipyard. As mentioned earlier, subcontractors' contracts in parallel and sequential shipbuilding projects were also cut. The weakened network with visible and separated supply nets is described in Figure 2. When comparing this situation (Figure 2) to the earlier one (Figure 1) the shipyard, MasaYards, had heterogenised the whole network by separating the supply nets in the shipbuilding projects (attached straight lines). The network naturally became weaker

(dotted line). The shipyard had also increased both its micro and macro positions (bolded SY).

Kværner Masa-Yards-Subcontractor Nets in the Mid 1990's

Kværner Masa-Yards has tightened the exchange (tight contracts, formal communication) and at the same time enlarged the value of a single contract. Today, competition and the power shift to the shipyard are dominant features in the exchange. The shipyard, being the dominant partner in exchange, takes full advantage of the situation. Kværner Masa-Yards also introduced a new layer, turnkey deliveries, between the shipyard and its subcontractors. In each of parallel and/or sequential shipbuilding projects the shipyard uses competitive bidding procedure for each turnkey and less important supplier. In the early 1990's, the Finnish shipbuilding was also internationalised, which often has resulted to the use of foreign (turnkey) suppliers. The strong macro position of the shipyard allowed Kværner Masa-Yards to control its network of suppliers. The situation of the supply nets in parallel shipbuilding projects with turnkey suppliers is illustrated in Figure 3. The shipyard introduced turnkey suppliers (attached larger circles in Figure 3) in its supply chain and increased even more the isolation of the nets (straight lines are thicker than the ones in Figure 2).

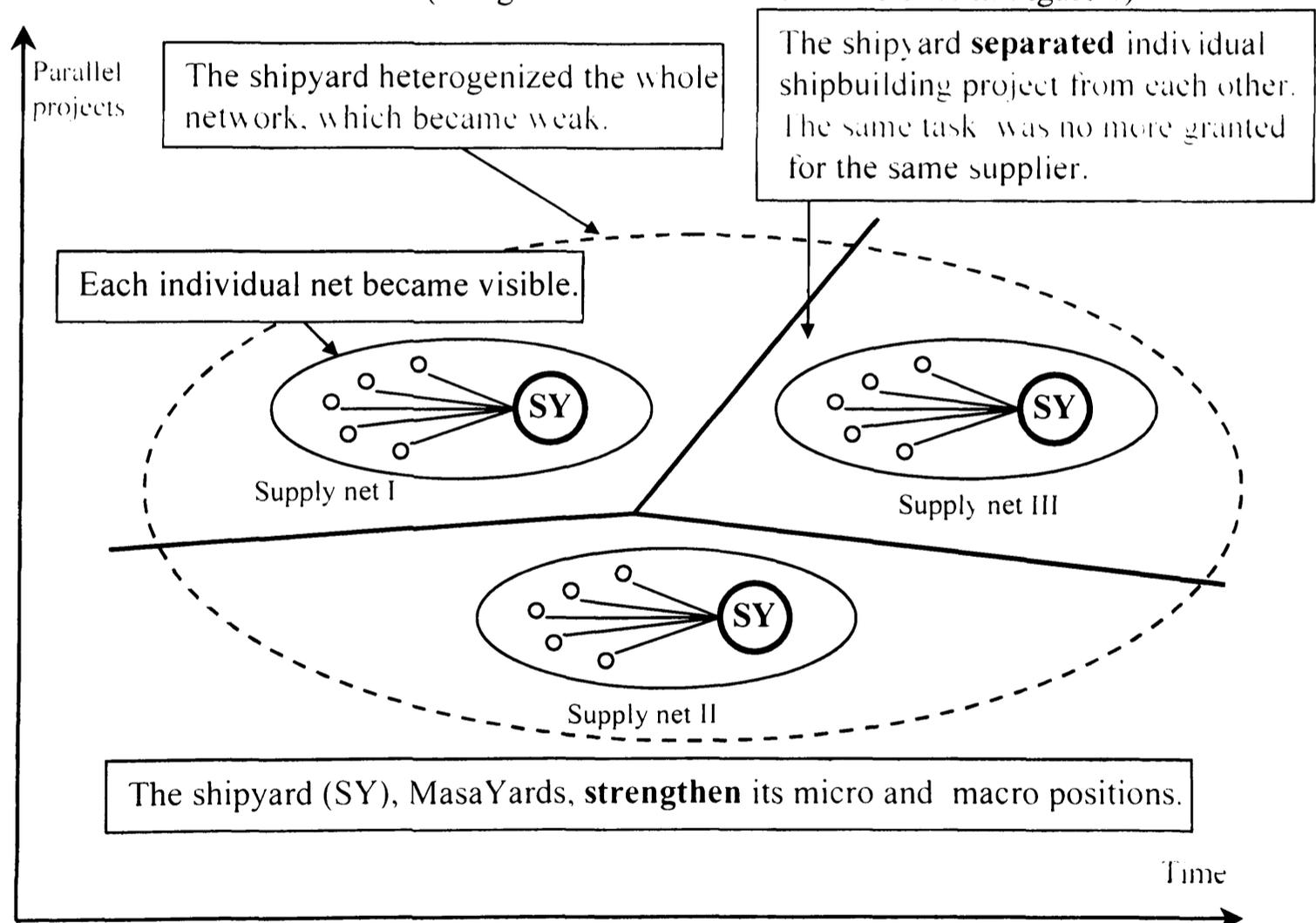


Figure 2. The structure of supply nets in parallel and sequential shipbuilding projects of Masa-Yards in 1989.

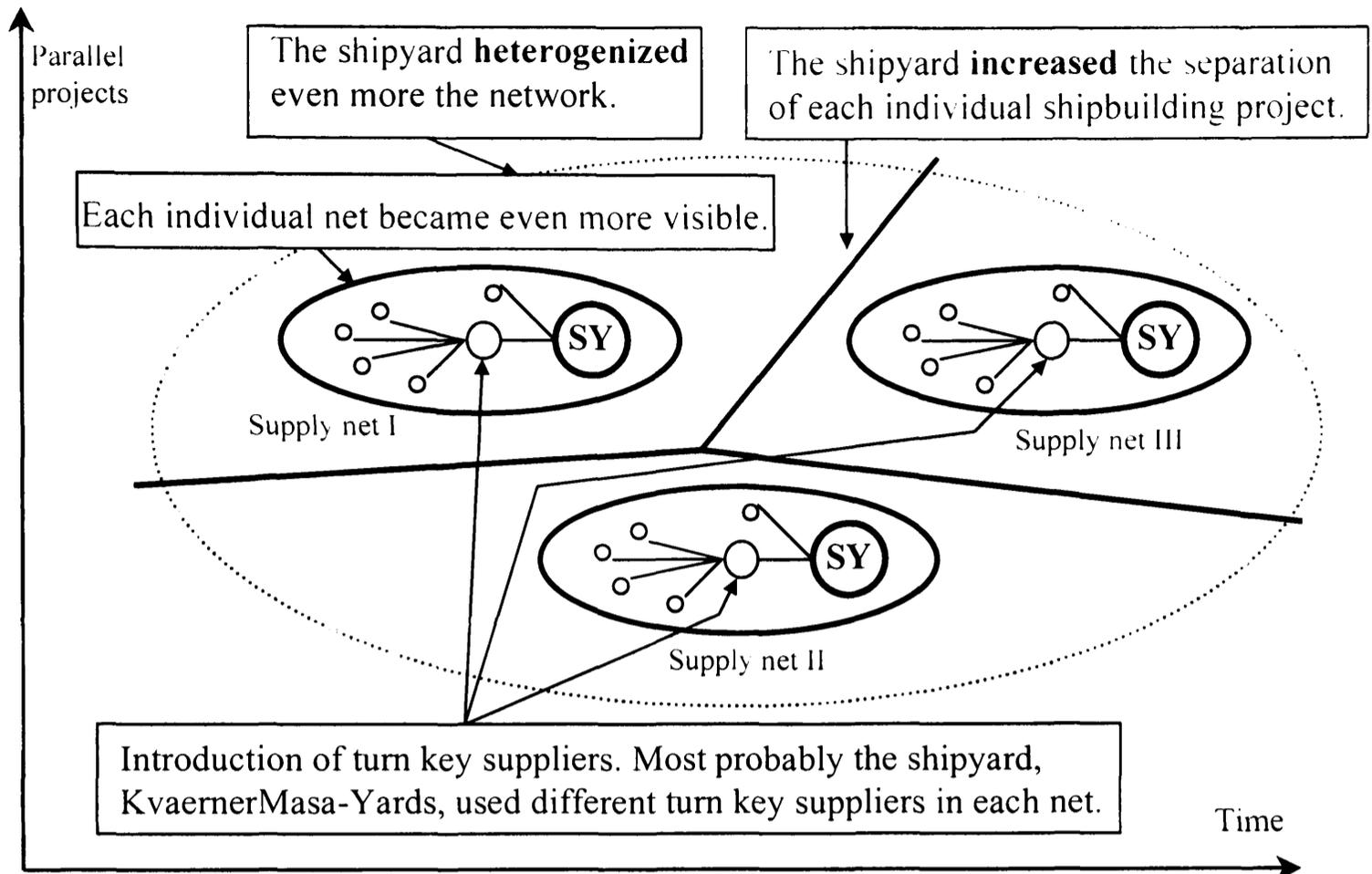


Figure 3. The structure of supply nets in parallel and sequential shipbuilding projects of Kvaerner Masa-Yards' in the mid 1990's.

To sum up, Figure 1 shows subcontractors' structuring process of the network between the shipyard, Wärtsilä Marine, and its subcontractors. However, Wärtsilä Marine was not able to cope with it. Figure 2 illustrates the change of the subcontracting and purchasing policy, which increased the micro and macro position of the new established shipyard, Masa-Yards. The network was heterogenised and individual supply nets were isolated, which resulted to the ending of long-term contracts. In Figure 3, the introduction of turnkey suppliers is shown. As mentioned earlier, in 1991-1995 recession in Finland helped the shipyard, Kvaerner Masa-Yards to heterogenise the supplier network and the creation of its strong macro position.

Conclusions and Managerial Implications

This chapter is divided into two parts. First, we discuss on theoretical implications by concentrating on network evolution. Second, we end this paper with a short discussion about managerial implications. Purchasing management is our starting point. In this paper, we have concentrated only on the changes in the supply side network of the shipyard and their impacts on the success or loss (bankruptcy) of the shipyards. We try to broaden our discussion to the pricing and product management in the managerial implication section.

Network Evolution

The longitudinal analysis of the shipbuilding industry provides several interesting examples of the evolution patterns for industrial networks. The following themes are briefly highlighted: (i) "general" development of a network, (ii) competition between a



major actor and minor actors, and (iii) impact of a radical policy change to existing networks. The development of the network of subcontractors in the mid 1980's showed a clear network pattern in which specialisation of activities was increased and where it was driven by the subcontractors. This pattern is interrelated with a hierarchisation of the subcontractors' control of key resources. Hierarchisation was not driven by the major actor's successful use of a strong macro position generated by large orders but by minor actors' opportunistic exploitation of the confusing situation caused by uncoordinated and poor controlled operations of the key actor. The specialising and hierarchisation patterns led to structured nets of individual shipbuilding projects in the late 1980's. Certain subcontractors provided the shipyard with same services in the parallel or sequential projects (see Figure 1). At the macro level, this network development can be described, employing the terminology of Håkansson and Lundgren (1995), as coalescence.

This development led to an impossible situation where the manufacturing costs of a ship increased tremendously. Too large an order book, too low selling prices of ships, strikes in the shipyards, and poor control of subcontractors were reasons behind the bankruptcy of Wärsilä Marine in 1989. The bankruptcy precipitated a lot of tension and insecurity within the industry. A lot of subcontractors went also bankrupt. The exchange between the newly founded shipyard, Masa-Yards, and its subcontractors changed dramatically. The shipyard introduced overnight a new subcontracting policy through organising its own internal activities. Shipyard increased the control of its subcontractors. The long-term contracts with subcontractors to supply the same products or services to parallel and sequential shipbuilding projects were no more valid. Taking good care of the tasks in the previous building project did not predict succession promises for the same job in the coming project. The subcontractors lost much of their power and a quick extrication pattern and heterogenisation of supply nets in parallel or sequential shipbuilding projects took place. By this quick and radical change of the subcontracting policy Masa-Yards increased dramatically both its micro and macro positions in the network (see Figure 2), and consequently, the new policy exhibits the heterogenisation pattern of the existing nets. The recession in the Finnish economy in the early 1990's helped the unstructuring and heterogenisation processes of the subcontractors' net. After the bankruptcy of Wärsilä Marine, there were no work opportunities in other industries available for the existing or newly started subcontractors.

The shipyard, Kværner Masa-Yards, further developed its subcontracting policy. Additional parts of the building process were externalised, which created a need for turnkey suppliers. Turnkey suppliers are responsible for the production of a large partial entity, 'an area', and they themselves buy services from other companies. This arrangement furthermore lowered the network position of SME subcontractors (see Figure 3). This led to a continuing struggle within the supplier base. Based on our results, we can conclude that the conceptualisation of network evolution suggested by Håkansson and Lundgren (1995) seems highly useful for analysing the development of industrial networks having not only pure technological changes but also other type of changes. Hopefully, this will lead to an increasing number of evolutionary analyses.

Håkansson and Lundgren (1995, p. 304) suggest that coalescence represents the strengthening of specific network structures and is most often associated with

conservative technological change. Dissemination refers to the breaking up of certain network structures and is most often associated with more radical changes. In our case, the change was not technological. On the contrary, it was a radical change in the subcontracting policy of a shipyard. Thus, we apply Håkansson and Lundgren's typology in another type of a change. The typology appears to fit in also in this kind of research setting. In the late 1980's, there was a gradual structuring and hierarchisation process lead by subcontractors. Coalescence represents the gradual strengthening of specific network structures. The bankruptcy of Wärtsilä Marine caused the heterogenisation of subcontractors' well-structured nets (the same supplier provided the same service in each supply net) in parallel and sequential shipbuilding projects. This heterogenisation represents the dissemination of the nets as proposed by Håkansson and Lundgren (1995).

Positions in networks provide a frame and language to describe network changes. According to Easton (1992), the power distributions dictate the way in which the network both operates and develops. This was clearly illustrated in the case. A single powerful company, the reformed shipyard, started to dominate the network. We believe, however, that the shipyard did this at the expense of other possible goals. Kvaerner Masa-Yards seemed to break several long-term relationships, which are, according to Ford (1980), difficult to create

Managerial Implications

Wärtsilä Marine's specialised functional departments had separate contracts with subcontractors. These decentralised purchasing activities of the shipyard resembled Cunningham & Homse's (1986) stratified pattern. Unfortunately, none of the three conditions required in the stratified pattern - good internal communication, an explicit strategy for dealing with the counterpart company or an open relationship based on trust, integrity and loyalty - were present. It is interesting to notice what kind of consequences collective opportunism, i.e. structuring the network and supply nets in parallel or sequential shipbuilding projects, among suppliers could have. This case presented clearly the risks of the stratified organisational mechanism of supplier-customer relationships.

This case also illustrates clearly the impacts of good purchasing and subcontracting policies. After the Wärtsilä Marine bankruptcy, the newly founded shipyard, Masa-Yards, re-organised its policies. The shipyard started to use one of its main "resources", the orders from its customers, within the network. The organisational mechanism of supplier-customer relationships was changed to purchasing controlled pattern. Also several other functional departments became involved. The purchasing controlled pattern also let the shipyard isolate the supply nets in the parallel and sequential shipbuilding projects.

One interpretation of the obvious short-sightedness of Kvaerner Masa-Yards is how it exercised its strong macro positions against the subcontractors. The successful increase in its macro position in 1990-1997 was partly due to the decrease in number of shipyards in Finland and the recession in the construction sector. Today, the economy in Finland has recovered from the recession offering a lot of work for subcontractors. The



avoidance of the long-term co-operation has lead Kvaerner Masa-Yards to a situation where its suppliers have started to charge higher prices. The increasing costs were reported by Matikainen (1998). A certain “déjà vu” phenomenon is inescapable. Yet again, the history of the shipyard and its relationships vis-à-vis its subcontractors rise some dark clouds over the future of the whole industry in Finland.

We believe, that poor co-ordination and control in purchasing and subcontracting was one of the major reasons for the bankruptcy of Wärtsilä Marine. Good project management and clear and accurate pricing are crucial in the production of large industrial products like ships. It seems that these operations were not in a good condition in Wärtsilä Marine.

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