The evolution and transformation of industrial clusters: a conceptual model

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Abstract: Building on a global supply chain perspective, this paper aims at developing a conceptual model, which describes and explains the emergence and transformation of industrial clusters over time and in line with the recent development with globalisation of cluster value chains. The model puts particular emphasis on governance as an exponent and agent for change. It incorporates the cluster ‘macroculture’, which links the macro and transaction levels in the cluster, in order to explain cluster changes and transformations. The case of the maritime cluster in North West Norway is used to demonstrate the applicability of the approach. However, the model is applicable when studying industrial clusters, in general, and in particular in emerging economies experiencing rapid growth.

Keywords: global supply chains; GSC; cluster; evolution; transformation.


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1 Introduction

Over the past three decades there has been a growing interest in the observed tendency that some industries concentrate in particular locations, named clusters (Asheim et al., 2006). The underlying principle of this research field was first described by Alfred Marshall, who introduced the concept ‘industrial districts’, and characterised them as the ‘concentration of specialized industries in particular localities’ (Marshall, 1920). Since
Michael Porter rekindled Marshall’s idea of industrial districts in the early 1990s, clusters have attracted a considerable amount of attention in research and policy. Porter claims that the success of clusters lies in the proximity of companies in the supply chain, demanding customers, and a shared knowledge base (Porter, 1998). Coordination and knowledge exchange between companies largely happen through informal interaction between personnel in the cluster, with trust and social capital being of vital importance.

The last decade has witnessed an increasing globalisation of clusters’ value chains. Reduced trade barriers and transportation costs, as well as improved communication technologies have contributed to more open global markets. Capital, goods, information and technology can be sourced from around the world. Cluster-based firms increasingly engage in multiple knowledge networks, production networks and value chains on multiple geographical scales (Gereffi et al., 2005; Gupta and Subramanian, 2008). This development may be seen as a threat, or at least a challenge to local clusters, since the competitive advantage emanates from proximity (Porter, 1998). A central question is how (or whether) cluster dynamics change as value chains, which were earlier contained inside a geographically limited region with close ties between the actors in the chain, are transformed into globally distributed supply chains. Why some clusters decline and some reemerge seems to be a puzzle, and the lack of evolutionary models is limiting our knowledge of transformative processes in clusters, their cause, effect, and direction.

By combining the supply chain perspective with institutional theory, this paper aims at gaining new insights into how clusters evolve. The paper suggests, that by combining the transaction level in the supply chain, and the institutional level, it is possible to improve our understanding of the evolution and transformations of clusters. This understanding is vital in order to analyse the transformations clusters now are facing with increasing globalisation. Globalisation may alter basic cluster dynamics, so that actors create new and irreversible path dependencies. The benefits may be substantial, but the costs of changing governance structures may also be severe.

The paper proceeds as follows: The next section starts by giving a short introduction to cluster theory, and then argues for introducing a supply chain perspective on clusters in order to capture how clusters change when they become global. The paper proposes a co-evolutionary conceptual model by addressing how a supply chain perspective can be expanded by focusing on the interplay between cluster macroculture and the transaction level in changing modes of governance. Based on this theoretical foundation, a conceptual model of cluster evolution is proposed. Finally, the explanatory potency of the model is demonstrated by using secondary and primary data from the maritime cluster in North West Norway.

2 Theoretical background

2.1 Supply chain perspective on clusters

Traditional literature on clusters has focused on the internal structure, relations and dynamics of industrial districts or regions. The importance of proximity between companies has been highlighted as an important factor for competitiveness. Co-location of companies in a region enables a ‘pool’ of qualified workers in the region, and a deep and specialised local supplier base (Porter, 1998). Use of local suppliers reduces transaction costs, reduces the need for inventory, and eliminates import costs and delays.
Perhaps most importantly, the proximity allows for face-to-face communication, which eases problem-solving and provides a good environment for product development and innovation (Ketelhöhn, 2006). Especially knowledge concerning buyer needs from sophisticated customers is important. The circulation of employees across the cluster facilitates the interchange of information and knowledge within the cluster. Furthermore, the easy access to specialised information stimulates strategic competition rather than price competition and imitation (Porter, 2000).

The literature on regional innovation systems claims that diffusion of new knowledge tends to be occurring more efficiently among actors that are closely located, as in clusters (Asheim and Gertler, 2005). The effectiveness of regional innovation networks is, however, dependent on intangible assets as social capital, which is embedded in the region (Rutten and Boekema, 2007). Social relations, based on common norms and values, are developed over time, and facilitate knowledge exchange and collaboration for mutual benefit.

However, the cluster literature seems to have some limitations when it comes to capturing the role of the cluster’s external linkages, which is necessary in order to analyse the impact of globalisation on clusters. In order to meet this shortcoming some authors have suggested a supply chain perspective on clusters (Bair and Gereffi, 2001; Humphrey and Schmitz, 2002; Sammarra and Belussi, 2010). Humphrey and Schmitz recognise that cluster theory mainly has focused on regional level cooperation, while literature on supply chain has emphasised links to the external world, leaving the local level weakly theorised. Another shortcoming in the cluster literature is the focus on aggregate constructs. The individual cluster actors, and their decisions, are downplayed at the expense of macro analyses. The model developed in this paper suggests that it is of crucial importance to consider the actions of individuals, in their social setting, in order to understand cluster development.

The global supply chain (GSC) approach focuses on the relationships between companies constituting value chains that span larger geographical areas, and provides theories which seek to describe the structure and organisation between companies in supply chains (MacKinnon and Cumbers, 2011). This approach allows for an investigation of how global value chains interact with local clusters, and how they are governed. Specifically, the approach enables us to investigate agents’ choices, and the contexts in which choice is made. This perspective may contribute to the understanding of the emergence and evolution of clusters.

Transaction cost theory is an important theoretical base within supply chain theory. Transaction cost theory explains the organisation of relationship – or governance – between companies in the supply chain (Williamson et al., 1993). Authors provide different typologies of governance, with governance forms ranging from arm’s length market dynamics at one end of the scale, to hierarchical structures on the other. The supply chain perspective and transaction cost approach provide a consistent method of classifying cluster types (Iammarino and McCann, 2006; Gereffi et al., 2005), which simplify the analysis and capture the variation of cluster structure and governance. Gereffi et al. (2005) distinguish between five analytical types of value chain governance. Market, modular, relational, captive and hierarchical types represent different degrees of explicit coordination and power asymmetry. In the market type of governance, products specifications are simple, information exchange is mainly price information and there are a large number of possible suppliers. In modular value chains, the product complexity is greater, but it is possible to codify the information through the use of standards, which
makes it possible to switch supplier easily. The relational form of governance is based on mutual dependence, loyalty and trust, which is based on a common culture developed through shared history and the agents’ experiences. Relational governance emerges when the information transferred is largely tacit, which is greatly facilitated by face-to-face contact between actors. Hence, this form of governance requires geographical proximity between actors in the supply chain. The cluster literature has, to a large extent, focused on this ‘ideal’ form of governance, where openness, cooperation and information sharing is prominent. In captive value chains, the supplier is dependent on the much larger buyers, and is characterised by a high degree of control by the lead firm. This mode of governance will emerge when products are complex, it is difficult to codify information, and the supplier capabilities are low (Gereffi et al., 2005). The hierarchal type of governance corresponds to the vertical integration of suppliers.

2.2 The cluster macroculture and evolution of clusters

One major criticism of transaction cost is that it has ignored the role of the institutional or cultural context and the importance of normative structures surrounding the transaction (Granovetter, 1985; Martinez and Dacin, 1999; Kim et al., 2009). Transaction cost theory puts emphasis on rationality, although bounded, which neglects the social construction of organisational behaviour. The founder of transaction cost theory, Oliver Williamson simply left this to “economic historians and sociologists” [Scott (2008), p.112]. This understanding runs counter to the conception of the cluster, however, since it is exactly the local institutional context that explains the interaction of agents. Institutions provide a micro context for firms and individuals, affecting their actions and decisions (North, 2009). This means that transactions in the supply chains must be analysed as embedded in institutional contexts, at local, national and global levels (Boschma and Frenken, 2006). The institutional context influences how the actors perceive reality, and confines the possibility space within which they make choices (Battilana et al., 2009). By introducing the institutional context into the supply chain perspective, the historical development of a cluster value chain will be captured as well.

Institutional theory has evolved as a major theoretical approach considering the “processes and mechanisms by which structures, schemas, rules, and routines become established as authoritative guidelines for social behaviour” [Scott (2005), p.408]. These guidelines are embodied in institutions, or the institutional context of the organisation. This means that organisation, or market activity, can be explained from socially constructed norms and rules for acceptable conduct (Martinez and Dacin, 1999), which provide stability and meaning to social life (Scott, 2008). Institutions can be defined as the rules of the game in society, which shape human action, and reduce uncertainty by providing a structure to everyday life [North (2009), p.3]. Scott divides institutions into three pillars; the regulative, the normative, and the cultural-cognitive (Scott, 2008). The regulative pillar involves processes that have the capacity to establish rules, monitor compliance, and manipulate sanctions. Within economics, this aspect of the institutional context has traditionally been considered. The normative pillar emphasises normative rules that introduce a “prescriptive, evaluative, and obligatory dimension into social life” [Scott (2008), p.54]. This includes both values and norms, where values are, what is viewed as the desirable, while norms specify how things should be done. Normative systems both impose constraints and enable social action. The cultural-cognitive pillar
represents “the shared conceptions that constitute the nature of social reality and the frames through which the meaning is made” [Scott (2008), p.57]. The cultural-cognitive pillar focuses on how the individual responds to the external world of stimuli. The three pillars in Scott’s framework can be studied at different levels, ranging from sub-organisational levels, to the world-system level.

By studying cluster agent’s choices in light of different institutional levels, one can achieve a deeper understanding of how clusters evolve. North (2009) argues that transactions costs actually lead to the evolution of the economy, and that decision-makers in organisations are the change agents. According to North, decision-makers acquire knowledge altering mental modes and potential choices, which lead to institutional change. An analogous approach is suggested by Bell et al. (2009), who show how firms’ governance designs are shaped in the relationship between transaction level characteristics and macroculture. They distinguish between two main types of governance and macroculture; relational and hierarchical, and view cluster macroculture as a part of the institutional environment which represents common attributes like general norms, values, and practices. They define the relational and hierarchical macroculture as respectively “the shared values of forbearance, cooperation, and bilaterism”, and “the shared pattern of authority and rules across organizations in a cluster” [Bell et al. (2009), p.628]. According to Scott’s framework, these aspects represent the regulative and the normative dimension of the institutional context. In this paper, the term ‘cluster macroculture’ is used, but this includes also the cultural-cognitive aspect of the institutional context.

In the framework presented by Bell et al. (2009), the efficiency of transactions is dependent on the ‘match’ between the interorganisational modes of governance and the cluster macroculture. Transformation between modes of governance is path-dependent (Martin and Sunley, 2006), as it is difficult to reverse from a hierarchical to a relational form of governance. However, the model proposed by Bell et al. (2009) does not explain why change happens. What triggers change from relational to hierarchical governance? In their model, the ideal situation is a ‘natural match’ between the mode of governance and the cluster macroculture, illustrated by the case of Silicon Valley where both the cluster macroculture and the mode of governance are relational. In this situation, there are no forces that will initiate changes in the mode of governance or in the cluster macroculture. Furthermore, the decision of governance mode is portrayed as a decision, which alone shapes the path, but the model does not capture the fact that the change in governance structure will feed back on the cluster macroculture, or the institutional context in which the actors are embedded. In their article, the cluster macroculture is represented as something immutable, independent of the change in governance structure. Furthermore, the dichotomy of macroculture and governance is rather simplistic, since it does not capture how other aspects of the organisational context may influence decisions at the transaction level and, thereby, makes it difficult to describe and understand cluster evolution.

3 Conceptual model for cluster evolution

Based on the theory briefly outlined in Section 2, a conceptual model for cluster evolution is proposed. The model (cf. Figure 1), which builds on Bell et al. (2009), captures three analytical levels, the transaction level, the cluster level and macro level
comprising of the world outside the cluster (including the cluster). The theoretical model consists of the following constructs: the transaction, governance of transaction, the cluster macroculture, and exogenous factors and/or events. These are briefly described in Subsection 3.1.

Figure 1  Conceptual model of cluster transformation

3.1 Constructs

3.1.1 Transaction

Whenever an exchange of resources takes place between two parties, we speak of a transaction. The resources may be goods and services, but may also involve favours, information, or other resources that may be exchanged. In this framework, the transaction takes place between two companies in cluster supply chains. The companies may be physically localised inside and outside the cluster, but they are connected in a supply chain.

3.1.2 Governance

Individual transactions are different because of their different attributes. This is expressed by the concept of ‘governance’. According to classical transaction cost theory, different modes of governance will emerge dependent on the variables of asset specificity, frequency and uncertainty (Williamson, 1979). In this study, a typology developed by Gereffi et al. (2005) has been chosen, where the mode of governance is dependent on the complexity of the transaction, the possibility to codify transactions, and the capabilities in the supplier base. Based on this, five modes of supply chain governance are generated – hierarchy, captive, relational, modular and market.
3.1.3 Cluster macroculture

The cluster macroculture describes the institutional context companies located in the cluster (Floysand and Jakobsen, 2001). According to institutional theory, the institutional context influences how the actors perceive reality, and confines the possibility space within which they make choices (Batilana et al., 2009). According to Scott’s framework, institutions may be studied along three dimensions or ‘pillars’: the regulative, normative and cultural-cognitive dimension (Scott, 2008). These pillars can be studied at different levels, ranging from sub-organisational levels, to the world-system level.

3.1.4 Exogenous factors/events

Clusters are not geographically isolated entities. They are influenced by the events and developments outside the clusters. People working in cluster companies may be recruited from outside the cluster, nationally or internationally. They meet with people from all over the world, either through personal networks or through business. Multinational companies (MNC) may decide to invest in the cluster, and in that way affect the cluster. Changes in the regulative regime on the national, multinational (EU), or global level may also affect the cluster. Furthermore, cluster companies have to deal with general technological developments, by variations in the world economy, and shifts in market conditions.

3.2 The model

At the lowest level in the model, we examine the transactions between actors in the supply chain, for example, between a focal firm and first tier supplier. This transaction may be organised in different ways, as described by the five types of Gereffi et al. (2005), or as disclosed in other governance typologies. According to Gereffi et al., the best way to organise a transaction is dependent on the complexity of the transaction and the capability of the supplier, reflecting the formal part of the transaction costs. The actual organisation of the supply chain may, however, be chosen according to other factors which are dependent on the institutional context or cluster macroculture (Bell et al., 2009). This is illustrated in Figure 1 by the arrow penetrating into the inner squares. The cluster macroculture can be described according to the Scott’s three pillars; regulative, normative, and cultural-cognitive (Scott, 2008).

The general model, in Figure 1, illustrates the transformation of a cluster from time $t_1$ to time $t_2$. At $t_1$ an exogenous factor influences the actors in the cluster, initiating a possible change in governance, which is carried through to time $t_2$. Before, during and after the transformation, the actors in the cluster are affected by the cluster macroculture. In a cluster, the macroculture, traditionally, has been described as relational (Bell et al., 2009), and as influencing the actor’s choice in a relational direction, which may deviate from the form of governance, predicted by transaction cost theory. Conversely, the governance mode of transaction may influence the macroculture, which is illustrated by the arrow in the opposite direction. This is the case when changes in the supply chain trigger changes in the mode of governance. The changes in governance will, over time, influence the cluster macroculture, as the actors change their ways of interacting with each other. A current example of such changes is when multinational corporations are making investments in cluster companies and dictate changes in the way
transactions are governed, from a relational form to a more formalised one (cf. arrow from exogenous events to transaction), with extensive use of contracts. This will change the relationships between actors in the cluster, but it will also, in the long run, change the cluster macroculture and, thus, the way future transactions are organised. This may represent a new evolutionary path of the cluster, as it may not be easy to reverse the change (Bell et al., 2009), and the process may be self-reinforcing (Schreyögg et al., 2011).

Moreover, specific knowledge that actors acquire from outside the cluster may directly affect transactions. An example of this is new management concepts and ideas, initiating new strategies. Actors may want to change the mode of governance according to what they perceive as ‘best practice’ in the industry. The new mode of governance will, if it is implemented, affect the cluster macroculture. Actors in the cluster, not being involved in the transaction itself, may, thus, contribute to shape the cluster macroculture in which the transaction takes place. This is expressed in the conceptual model as the arrow going from the exogenous ‘world’ into the cluster macroculture. Cluster actors will also influence the culture of the exogenous ‘world’, illustrated by the arrow going in the opposite direction.

The conceptual model proposed here does not explicitly show that changes may be generated endogenously. The model does not deny, however, that actors’ choices and clusters may be affected by endogenous factors. People making decisions in organisations will constantly change because new constellations of people generate new dynamics and new perspectives (Fonseca, 2002). These aspects are not clearly illustrated in the model, but these sources of change must also be considered when trying to understand the development of clusters.

The conceptual model, presented in Figure 1, represents an improvement in theory, in that it explains how changes may come about, and how it affects the mode of governance and the cluster macroculture. The model further captures the cluster macroculture, as well as exogenous factors, such as technological, market, or institutional changes, that may affect the mode of governance in cluster supply chains. Compared to transaction cost theory, which focuses on the transaction and its characteristics, this model provides a more realistic picture of how modes of governance are created by actors in the cluster. On the other hand, the model also focuses on the governance of transactions as an initiator for change, which is, to a large degree, downplayed in the cluster literature.

4 Operationalising the model

4.1 The case

In order to demonstrate the explanatory ability of the model, a case study involving the maritime cluster in North West Norway is presented. The Maritime cluster in North West Norway is situated in Sunnmøre, in the Møre and Romsdal county in Western Norway (Figure 2). The cluster is part of the offshore service sector of Norway, and includes a group of co-located firms that readily satisfies the criterion of representing a spatial agglomeration of similar and related economic activity. In 2010, the cluster consisted of approximately 200 companies related to the maritime sector. Between 2007 and 2010, the number of companies in the cluster had increased from 178 to 201. Turn-over peaked at 50 billion NOK (5.5 billion Euros) in 2008, reflecting a doubling of the value of market
transactions since 2005 (Hervik et al., 2009). The end products of the cluster are tailor-made highly unique ships mainly for the offshore service market, but also for other market segments, such as short sea shipping and fisheries. The cluster also includes companies which export other products related to the maritime sector, such as ship design, propulsion systems, deck machinery, and equipment for seismic and subsea applications. Specific demands, associated with each individual ship, makes production very complex, involving a wide range of components, work operations, suppliers, and sub-suppliers.

Figure 2  Map of Møre and Romsdal, Norway

4.2 Methodology

The mapping of changes over time was captured through a combination of historical, retrospective, and real time data (Pettigrew, 1990), including primary and secondary data sources. The historical data was based on previous research on the cluster, which involved a combination of surveys, financial data collection, and previous in-depth interviews in the cluster. Primary data was collected through semi-structured in-depth interviews with 32 respondents who had detailed experience from working in the cluster, and through observation in company meetings, conferences and workshops. In the interviews, the aim was to create a picture of how the cluster has evolved throughout the lifetime of the respondents, and how they perceived the historical and current changes experienced in the cluster.

The secondary data included document analysis of annual reports, strategy plans, internal documents and magazines, local newspaper articles, journal articles, research reports, and books that have been written in connection with the cluster companies.
The data collection aimed to map changes in the cluster macroculture, supply chain structure and governance in the time frame from 1970 to the present. Exogenous events that may have affected the cluster dynamics were identified. Moreover, events related to important innovations, acquisitions, and outsourcing of activities, were also mapped, as well as the internationalisation process of the companies. Finally, the data was categorised, with respect to forms of governance in the cluster, cooperation with foreign partners, knowledge sharing, cultural aspects and characteristics of the cluster, and changes in the cluster with respect to cooperation and knowledge sharing. The data collection revealed two major transformations for the cluster. The first was the shift from producing mainly fishing vessels for the fishing industry to producing offshore supply vessels for the oil industry. The second was the gradual globalisation of the cluster, witnessed during the last decade. These two transformations are described in the following sub-sections.

4.3 1970–1990: reinforcement of relational mode of governance

The highly successful development within the maritime cluster has its basis in the fisheries sector, where a large number of small companies each operated relatively few vessels, and where the regional configuration of socio-economic, socio-technological and cultural factors played a paramount role. Modernisation of the fishing fleet in the 1960s gave rise to close cooperation between owners and yards in developing new types of vessels and equipment. These links were crucial when new market opportunities emerged within the oil industry, after the Ekofisk oil field was discovered in 1969. The local industry was oriented towards the avoidance of “unnecessary and formal bureaucracy” [Andersen, (2002), p.471], implying a relational macroculture, as opposed to a ‘hierarchical’ macroculture, cf. Bell et al. (2009). In order to meet the market demand from the offshore sector, the structure of cluster supply chains was changed. In the 1970s, the percentage of companies, with multiple production plants, increased from 11% to 37%, and cluster companies started to establish themselves outside the cluster, both nationally and internationally (Smogeli, 1983). The number of equipment suppliers also increased, as shipyards increasingly subcontracted activities. The expansion of this part of the supply chain is also explained by a transformation of shipbuilding in the 1970s, from ships being built in its entirety at a single production site, to a module-based production process. This made it possible to include several companies in the production process. In the 1970s, there were about as many shipyards as engineering workshops and equipment suppliers (Andersen, 2002), while by the end of 1990s the ratio was one to seven (Hervik et al., 1998). By 1990, two shipbuilding groups had become the largest firms in the region. Some companies also expanded through vertical integration, but the dominating picture was an increased number of equipment suppliers in the cluster. Downstream, the number of shipping companies was reduced, from being small firms operating few vessels to few companies operating many vessels. The new market opportunities inspired new forms of collaboration, where contracts were shared between the shipyards, while they at the same time were competing for new ones. Furthermore, some of the companies developed common marketing and sales organisations. In parallel, with the integration of companies through closer collaboration, specialisation through division of functions occurred (Smogeli, 1983).
Contrary to the wider maritime industry in the West, which rapidly declined in the 1980s, the cluster in North West Norway consolidated and strengthened its position in this period. In 1970, the number of employees was 4,690, which had increased to 6,678 in 1980, and to 13,200 by 1998 (Smogeli, 1983; Hervik et al., 1998). The cluster growth has been explained by the development of flexible supply chains, where small plants shared production tasks, instead of developing large-scale specialised production facilities, as was the case in other regions (Andersen, 2002). This development also promoted knowledge sharing and innovation, which may also explain the success of the cluster at the time.

According to the proposed conceptual model, the new market opportunity in this period can be seen as an exogenous influence on the cluster. As described above, these changes gave rise to changes in the organisation of the supply chain, with a combination of horizontal integration among shipping companies and shipyards, and an increasing degree of subcontracting which led to the emergence of a large network of suppliers. Downstream the number of companies decreased, while upstream the number of companies increased. Moreover, the market opportunities led to a more integrated structure, with increased cooperation between companies, which is captured by the concept of relational governance (Gereffi et al., 2005). This form of governance was not new, but was expanded and strengthened. The stronger relational form of governance at the transaction level, in turn, contributed to developing the relational cluster macroculture (Bell et al., 2009), as the cluster companies gained awareness concerning the advantages of being a part of a collaborative network.

4.4 1990s to the present: towards divergent modes of governance

In this paper, two aspects, relating to the globalisation of clusters, are considered. The first is the global dispersion of supply chains that previously were confined inside a geographically limited region. The second aspect is investments by foreign MNC in the cluster.

Considering the first aspect, the maritime cluster in the North West Norway has a long history of operating internationally, especially on the downstream side of the supply chain. Shipyards have been selling vessels to shipping companies around the world, and sales offices abroad were established in the 1970s. This picture has become more prominent in the recent years, as market growth is seen mainly in markets outside the North Sea (Oterhals et al., 2008). At the upstream side of the supply chains, internationalisation started later, but has accelerated in the last decade. High wages and shortage of labour have made it difficult to maintain all parts of the production in Norway. During this period most of the construction of hulls has been outsourced to low-cost locations, such as Poland, Ukraine, Dubai, Brazil and China (Amdam and Bjarnar, 2010; Bjarnar, 2010). This strategy has led to a change in production principle, from being module based, to building the complete hull before equipping the vessel. In response, shipyards and regional equipment suppliers have established branch offices and production units abroad. It can be concluded that the upstream sides of cluster supply chains have developed, from mainly being contained within a geographically limited area, to be more geographically and globally distributed. This process has not only implied that hub companies, now to a larger extent, are using global suppliers, but these companies have also outsourced what was previously looked upon as core parts of their activity, such as the design and building of complete vessels.
Considering the second aspect, there has been an increased presence of MNCs in the cluster over the last 15 years. Cluster companies now draw on both local and global networks established by the MNC.

In the conceptual model, globalisation may be seen as a form of exogenous impact on the cluster. Global sourcing of activities has been driven by global competition that has forced cost reduction, but it may also be looked upon as a management trend. In the second aspect of globalisation, decisions are imposed directly on cluster companies, and subsequently on their decision making. Hence, global actors in the clusters have promoted a formalised way of organising relationships with local suppliers. Major players in the cluster have developed their own design and building programs, and there is a growing tendency that companies rely more on internal resources in product development than before. There seems to be an increased concern in protecting knowledge and ideas (Bjarnar, 2010). Furthermore, innovation processes have become more ‘structured’ and project oriented than they used to be, with shorter time horizons. The emergence of global value chains also implies an increased formalisation, in terms of negotiating procedures and contractual processes. The shift away, from a mainly relational form of governance, is confirmed by surveys performed by Møre Research Centre in the period 2001–2009. These surveys show that cluster companies’ assessment of the strength in their reciprocal relations have mainly been weakened in this period (Hervik, 2001; Hervik et al., 2009).

As described above, globalisation has implied changes at the transaction level, away from the relational mode of governance. The conceptual model, proposed here, predicts that these changes may over time affect the cluster macroculture. In a previous study, the respondents jointly stressed that the cluster had traditionally been characterised by widespread formal and informal contact between actors through daily practical work and social networks (Bjarnar, 2010). A strong norm of knowledge sharing had played a vital part and illustrates the relational macroculture, which still appears to be predominant in the cluster. These findings indicate that there is some degree of contradiction or a ‘mismatch’ between the macroculture and the governance at the transaction level (Bell et al., 2009). The resilience of the macroculture may suggest that institutional changes take time, but it may also indicate that the former success of this form of governance makes cluster members believe that this is the correct way of handling relations with other regional companies. However, the introduction of MNC into the cluster, and more globally dispersed value chains, make it difficult to stick to this mode of governance. Cluster companies are now in a phase where they search for new approaches to organising their supply chains, in order to meet coordination challenges. One of the central focal firms in the cluster follows a strategy of vertical integration of critical parts of its supply chains, which are located outside the cluster (Halse, 2014). This is a possible strategy when information is difficult to codify and the supplier capability is low (Gereffi et al., 2005). Another approach considered by another cluster focal firm is to move to a standardised form of production. According to Gereffi et al. (2005), this approach, named modular value chain, is feasible when it is possible to codify the information, and the supplier’s capabilities are high. Specialised vessels for offshore applications are complex products, and in many cases, tailored according to the customer’s need. Furthermore, late changes in design increase the complexity in projects. These conditions make it difficult to codify information between firms in the supply chain. Some focal firms have also adopted a more market-oriented
approach towards suppliers of simple products, which specifications are easy to codify, in order to achieve low prices. Respondents in this study report that this breaks with the traditional way of doing business in the cluster.

5 Discussions

Through operationalising the conceptual model for cluster evolution, using collected data from the Maritime cluster in North West Norway, it has been demonstrated that the cluster is in a middle of a transformation process, representing a new evolutionary path. This path marks a break with the history of the cluster, and the outcome is still uncertain. Should the cluster continue along this path of globalisation, the cluster actors must find ways of coping with the present coordination problems in their GSCs (Halse, 2014), which presumably will imply further development from the relational form of governance, perhaps, to some of the other forms indicated by Gereffi et al. (2005). From the conceptual model, one should expect that the cluster macroculture, over time, will be influenced by these changes at the transaction level, and that new norms concerning the relationships between companies will predominate, involving more formalisation and exchange of explicit knowledge rather than tacit knowledge. This possible path may have consequences for the cluster’s innovative capability, which has previously depended on the close and relational form of collaboration between cluster companies. However, other evolutionary paths are also possible, as other exogenous and endogenous factors may enable the actors to retaining the traditional way of organising the relationships between companies. New markets opportunities may emerge which require the companies to cooperate, as in the described transformation from fishing vessels to OSV’s, or new technological breakthroughs may change the rules of the game. Recent market changes, in the oil market, may represent an exogenous factor that may induce changes in the interorganisational relationships, as this may trigger a need for closer cooperation in order to improve innovativeness. Moreover, we are now observing a small, but increasing, trend of backsourcing in the cluster (Nujen et al., 2015), which is inspired by a wider trend in Western economies (Kinkel, 2012, Sirkin et al., 2011). This may indicate that the globalisation process is about to reverse. However, the path dependent nature of globalisation may make it difficult to return to the previous state, with a strong match between governance and cluster macroculture.

The model and empirical findings in this paper contribute to cluster theory in two specific ways: First, the paper provides a further development of the evolutionary model by Bell et al. (2009) in that it introduces exogenous factors that initiate change. Furthermore, it highlights the importance of the interaction between the transaction level, and the cluster macroculture, for cluster success and development, which is demonstrated using data from the Maritime cluster in North West Norway. The study contributes to supply chain theory by showing how the governance in supply chains is shaped by the institutional context, expressed by cluster macroculture. This introduces the role of geography into the design of governance in interorganisational relationships. Moreover, the conceptual model demonstrates how changes in governance structure may feed back to the cluster macroculture, and shape a new evolutionary path.
6 Conclusions

This paper proposes a theoretical conceptual model of cluster evolution. This model illustrates how transactional and macrocultural levels interact when exogenous factors are acting on the cluster, and how this may create new evolutionary paths for the cluster. The applicability of the model has been illustrated by using primary and secondary data from the maritime cluster in North West Norway, where two transformations were highlighted. The first transformation in the 1970s shows how new market opportunities have reinforced the relational mode of governance, which may explain the subsequent success the cluster experienced. The present transformation illustrates how globalisation has provoked divergent patterns of governance. The outcome of this development remains to be seen.

The strength of the conceptual model, presented in this article, is that it highlights possible tensions between the transaction level and the cluster level. The findings, in the case presented, indicates that changes in mode of governance at transaction level may take place in a relatively short time frame, while changes in institutional contexts is more resilient. However, changes in the transaction level may feed back on the cluster macroculture, shaping a new evolutionary path. As this transformation is currently unfolding, further research will be carried out on this specific cluster in order to map changes in macroculture and governance in the Maritime cluster, specifically in relation to the recent changes in market and sourcing strategies, and how these may moderate the globalisation process. Further studies will be carried out to explore this phenomenon, and in particular, whether the globalisation process has restricted the possibilities through path dependency. Moreover, future research will examine how the match between governance structure and macroculture affects a cluster’s short and long-term performance.

Finally, the model will be tested on other clusters or industries, using longitudinal data, in order to test its wider applicability.

References


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