

Trading Company Relationships as an Integrated Network for Innovation:

Evidence from Two ‘Ordinary’ Industries of Textiles and Steel

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## Abstract

There is a large literature on innovation and the importance of a node and a network as important to creating an environment for such innovation. Most of the analysis of this system has been in high technology industries, and in the products and technologies that it creates. However, there is no reason why we can't analyze innovation in less leading edge industries and products, and in the development or organizational structures rather than products. This paper tries to illustrate the potential of this type of innovation institutions by looking at structures for business relationships as the innovation, and consciously chooses two very low technology industries (Japanese trading company relationships in textiles and steel) to illustrate the potential usefulness of innovation system concepts in less conventional venues.

Innovation is seldom done entirely within a given organization. The recent Handbook of Innovation (Fagerberg, Mowery and Nelson, 2005) has more than half of the articles that relate how firms use the country and geographical nodes to make the individual firm and researcher more productive. Silicon Valley and Route 128 are obvious examples in the US. Country level analyses of innovation systems are also frequently cited as important institutions that lead to innovation, emphasizing the Japanese experience (Mowery, 1993, 2009); (Goto, 2009); (Lynn, 2000, 2009).

In a recent article, Coenen, Moodysson and Asheim (2004) identify some key variables that allow the individual firm and researcher to effectively utilize the networks in the European biotechnology industry. This paper utilizes their list of attractive node and network characteristics to show that there are strong parallels between physical clusters and with the nature of transactional relationships. We illustrate the parallel by looking on the transactional relationships that the Japanese General Trading Companies (hereafter GTC) have turned into relationship clusters. The paper adds an additional insight by arguing that when dealing with relationship networks, it is not realistic for either firms or government policy to create the network. Rather the paper argues that the historical experience and the concomitant building of repetitive transactions generate the opportunities for innovation within the relationships.

#### What Makes for an Effective Cluster for Innovation: Conventional Criteria

Much work has been done on the nature and the value of a cluster of *firms*. A recent paper presented several criteria for the effectiveness of such networks, and we first present these criteria for these physical locational networks as a starting point to begin the

comparison with the informational clusters that we also argue can be an important node for innovation.

Table One: Effectiveness of a Physical Node and Network
Internal Firm Communication for R&D
Key Internal Scientist as a Node
Internal R&D Benefits from Network Exchange
Node Has More Value when Capital Access is Combined with Ideas
Node of University Drives Growth of the Network and the Node
Proximity Matters
Value of Network Increases with the Number of Exchanges

### *Physical Node*

It seems obvious that there must be a ‘place,’ where the interaction necessary for an innovation cluster can take place. Thus all discussion starts here, describing in much detail the characteristics involved. Even in other areas of the literature on knowledge creation, there is a similar attention to the importance of the physical interaction.

Professor Ikujiro Nonaka’s work on the ‘ba’ where members of firms and groups are socialized and where new ideas are exchanged is just one example (Nonaka and von Krogh, 2009, Nonaka and Toyama, 2005).

### *Internal Firm Communication for R&D*

The emphasis on the node has, the authors argue, ignored the importance of the internal firm communication and information exchange networks. They find that unless there is an ability to exchange information within the firms, the value of the network will be much diminished. Writers have argued from even an historical perspective that this ability is more natural in some societies than others (Haley, 2010). This element emphasizes the ability of firms to provide a mix of contributions to the cluster, and find multiple uses of the resources of the cluster.

Key Internal Scientist as a Node (this may go last)

Just as the internal organization is important for an effective node, individual managers or scientists can be key to the operation of a node, say the authors. Even if governments want to encourage the development of a cluster, the effective advocacy for the cluster requires an individual to make a commitment to the smooth operation of the venture, as well as the monitoring of commitments made by the various players.

*Internal R&D Benefits from Network Exchange*

Support for the cluster efforts within the firm are essential for the continued effectiveness of the interfirm relationships within the cluster. Participants in the cluster need to ask for resources and time commitments from various elements within their own firms. If the cluster relationships are isolated from the main activities of the firm, then it is harder to make the case for active participation by various players inside the firm. If there are multiple points where the cluster participation has value, then there is a greater likelihood that as the cluster's value evolves, there will still be organizational units within the firm that will find it valuable. This flexibility gives a kind of 'option demand' within the firm for further commitments to the cluster. Again, an excessive focus on the external relationships, while ignoring the internal relationships within the firm, fails to identify these key elements of cluster success.

*The Node has More Value when Capital Access is Combined with Ideas*

It is not surprising that the authors find that capital is necessary to back up the ideas that are created by the cluster. Since the ideas are the result of the combinations of proprietary ventures, it may be difficult for firms to go the capital markets for financial resources. Often the capital that is committed is not easily redeployed because of the

complexity of the relationships that are supported in the cluster. This also means that the assets in the cluster need the longer-term support of persistent capital. This may require, the authors argue, that there be at least some larger firms involved in what needs to be an innovation cluster.

#### *A University Node Drives Growth of the Network and of the Node*

This result is also consistent with conventional approaches to clustering. While ideas come from entrepreneurial activity, the underlying support of an institution with a wider perspective will always have value. Analytically, it is possible to argue that non-university actors with the wider perspective can provide the same potential gains for the cluster.

#### *Proximity Matters*

It would seem obvious that there must be physical co-location for a cluster to work, but the researchers emphasized that there must be actual exchange between the units; geographic proximity is not sufficient, though it makes the exchange easier.

#### *Value of Network Increases with the Number of Exchanges*

This has two elements. The longer the cluster is in existence, the more interchange that can take place, and the more contracts will have been completed between resident firms in the cluster. Repeated deals may allow for more confidence in more complex relationships.

In addition, if firms simultaneously are have to have a variety of interactions, all parties can more easily identify with the cluster. Each member is going to have more experience in the region, and more players within each participating firm will be able to see the value

of participation in activities in the cluster. Thus, an overly focused cluster may not have as great a potential for these benefits.

### Trading Relationships as a Cluster

When we argue that trading relationships can be a cluster, we can cite some supporting research that includes these organizational elements. One of the early pieces of research on Japanese innovation and on research policy by Freeman (1987), as noted by Ludvall in his review (2004), gives substantial space to the importance of interfirm relationships and organization issues in the Japanese context. Ludvall (2007) argues that the conventional approach to clusters gives inadequate emphasis to the sociocultural elements necessary for their effective operations. John Haley (2011), in his comparative analysis of the legal systems in Europe, China and Japan, suggests that the cooperation that is necessary for rice cultivation led to a system of managing relationships that depended less on legal structures (and by implication, market transactions) and more on localized agreements between players, where relationships and experience matter.

Trading relationships, especially when reinforced by information technology, can have a similar clustering effect, and lead to a similar environment conducive to innovation. The key is the ability of the core firm in these trading relationships to manage the exchange of information necessary for effective creation of new and innovative ways to handle trading relationships. We first draw parallels in each of the elements of the clusters presented above, and then describe how this leads to transactions level innovation in two case studies of Japanese General Trading Companies in traditional industries not known for innovation, textiles and steel.

### Parallel Cluster Characteristics of Long Term Trading Relationships

*Parallel to Internal Firm R&D Communication: Cross Functional Information Exchange in GTC*

In order to have a cluster work well, information has to flow smoothly between not just the members of cluster, but within the various firms as well. In a parallel to effective R&D, information has to flow between the various units of the GTC effectively for the system to work well. This includes the various product units, but it also includes the units that provide financing, the units that provide the logistics, and the units that understand the macro level factors that underlie the international trading relationships within the cluster. Individual units may not be familiar with the potential benefits from the cluster participation, so substantial internal organizational efforts need to be done for this to work well.

*Parallel to the Internal Scientist as a Node: The Key Trading Company Manager as a Node*

Within in given firm, it is not easy to see the potential for benefit from cluster participation and innovation. This is just as true for a relationship cluster as for the more conventional cluster. In order to create an innovative trading relationship within the cluster, someone must be an advocate and persuade a large number of players to accept the challenge. Players may not feel that the returns consistent with the efforts involved. Here innovation needs a strong advocate who can make contact with the important parties, and then continuously work with them to develop the new systems and information exchange necessary to carry out the new trading relationships.

*Parallel to the Internal R&D Benefits from Network Exchange: Relationships Require Commitment That Benefit All Internal Players*

If the benefits are clear to all the players, then there is no need for a transactions cluster. Here both internal markets and product markets can work well. However, when the



innovation is unconventional, the internal organization will be hesitant to make the commitment to the venture or relationship. As with the conventional cluster, various internal organizational units have to be willing to commit resources and personnel in order for the venture to work out well. In transactions, this may include the conventional capital of a physical network, but it may also require the sharing of internal information, the time of key personnel whose local value added is significant to the unit, and the sharing of relational ties of that unit for the wider innovation unit's good. Internal organizational issues are as key here as they are in conventional clusters.

*Parallel to Node's Value Combining Capital and Ideas:  
GTC Capital, Offices and IT Resources Enable Relational Innovation*

For relational innovation to take place, both the firm organizing the cluster and the partners need to be willing to make 'relation-specific capital' to let the innovation take place. Thus, more than financial capital is necessary to make a relationship network work. Information has to be contributed, and on-going commitment of personnel to manage the relationship is necessary. A transactions relationship is not and organizationally discrete 'arms-length' action within the firm.

*Parallel of University Driver for Growth and Effectiveness:  
GTC Information and Connections Support a Strong Trading Network*

The 'organizer' of the trading relationship assumes the same role of the driver for new opportunities as the university in the physical setting. This unit needs to have a wider perspective, and it needs to have access to a wide variety of information on various levels. This can be on the external political and societal environment facing the trade; it can be about the potential new sources of technology or of new, unexpected sources of competition from outside the narrow product area. If this function is credible, then there

is a willingness to commit to the cluster from all the players. If this is not in place, markets can easily displace the cluster to organize the function.

*Parallel to Proximity Matters:*

*GTC Provides Information and Connections to All Parties*

Proximity in a transactional relationship implies the depth and length of the trading experience. The ‘organizer’ of the trading relationship enables all the players to be in closer proximity because of the ties it retains with all of the various players. Without a tradition of exchange, it is unlikely that individual players will have the confidence to participate in an innovative structure for trading, so experience is also part of the proximity element to a successful transactions cluster.

*Parallel to Value Increased Value of Network as Exchanges Increase:*

*GTC Repetitive Transactions Allow for a Stronger Relationship Network*

While this is a distinct element in the physical network, it is combined with the proximity element in a transactions network, and thus needs no further elaboration.

Table Two: Nodes and Networks: Parallels to Trading Relationships	
Physical Node and Network	Relationship Node and Network
Internal Firm Communication for R&D	Cross Functional GTC Information Exchange
Key Internal Scientist as a Node	Key Trading Company Manager as a Node
Internal R&D Benefits from Network Exchange	Relationships Require Commitment That Benefit All Internal Players
Node Has More Value when Capital Access is Combined with Ideas	GTC Capital, Offices and IT Resources Enable Relational Innovation
Node of University Drives Growth of the Network and the Node	GTC Information and Connections Necessary to Create a Strong Network
Proximity Matters	Good Information Exchange is the Proximity in a Relationship Network
Value of Network Increases with the Number of Exchanges	Repetitive Transactions Allow for a Stronger Relationship Network

Building the Relationship Information Cluster

It is not possible to create an information cluster via government policy or other fiat. To create a relationship cluster, firms, and most probably a key player, must over a period of years go through four stages: establishing an arms-length relationship.

It may seem counter to the nature of a cluster to suggest that firms might begin with rather undifferentiated exchanges. But to make a transactions relationship cluster work, it is impossible to immediately expect that firms will have confidence in this more complex system. Firms must first establish market-based relationships with players at various positions in the eventual structure. Second, the cluster must change the nature of those relationships, turning them into repetitive exchanges in which non-market exchange of information starts to accrue. Third, to provide for more potential future value, the cluster has to identify issues in the transactional relationships that require more complexity, and focus on those issues. Finally, the cluster, and usually a key player that organizes the cluster, has to develop the information links necessary in order to give all participants in the cluster the ability to use the appropriate set or subset of information to carry out their role in the cluster. For this reason, we may see the above transactional cluster relationships after the fact, but the cluster must evolve through these stages.

#### *Description of Japanese General Trading Companies*

Japanese general trading companies (hereafter GTC) are a good case study for considering the value of a relationship network. Their 'general' nature extends across various product lines, across various steps in the production process of an individual product line, and across all the 'logistics' and finance elements that have been cited above to improve the value of a cluster. Initially, it was the lack of markets, and the

challenge of incomplete information, that led to the establishment of these general traders (Yamamura, 1976, Roehl, 1983), consistent with the conventional theories of business groups (Khana, 1995). However, the firms, or at least some of their transactions relationships they handle, have been able to evolve and maintain a significant share in the market for handling transactions as the Japanese economy has a) become increasingly international and b) as the information revolution has increased the ability of firms to deal directly with partners in market environments predicted by economic theory (Roehl, 2005; 2011). By understanding the value of the cluster, we can more easily explain why some types or transactions of the GTC can be successful against the dual challenges of environment and technology.

To illustrate this relationship, we discuss two case studies of relationship innovation, consciously choosing seemingly standard product lines, textiles and steel, where market-based relationships should increasingly predominate. While it is conventional to look at leading edge industries to understand innovation, there is work that is consistent with this attempt to cast a wider net for innovation (Asheim and Gertler, 2005).

### Textiles

The history of the Japanese trading companies in textiles goes back to the 19<sup>th</sup> century, when trading companies connected the textile mills to Indian cotton sources and to final markets in Europe where they could harvest the gains from low cost wages. Scale economies and tight relationships with the low cost sources of intermediate products led to Japanese competitiveness well into the postwar period. Even simple combinations of low cost inputs from abroad with intermediate production in Japan eventually met this

same limit. By the end of the bubble era, low wages abroad, and relatively standardized products called into question the trading company value in these transactions relationships. Yet we see a trading company developing a new set of relationships in high-end fashion that enables it to continue to make profitable transactions via a fashion cluster connecting Italian designers, Chinese production and Japanese retailing units.

#### *Description of the New Transactional Relationship Cluster*

The value from textiles in the Japanese market comes from high fashion products, but with an understanding of the way to present it to the Japanese market. This requires different sizing, colors and even a distinct product mix. Since fashions change very quickly in Japan, it also requires identification of new potential designers; it also requires the ability to get the products made to high Japanese customer standards very quickly to get the value for any trends. This means the retailers have to be involved in that process as well. So there are a large number of players, and each of them has to make a commitment to the venture.

#### *Evidence of the Cluster Characteristics in Textiles*

##### Internal Relationships within the GTC

The rapid production of a varied mix of fashion products requires a large number of internal players. Units that are used to selling more standardized products need to be convinced there is value to selling these distinctive products to retailers. Financial commitments are needed for the designers in Italy, and for suppliers in China. Providers of the intermediate textile products need to be convinced that they can get very quick turn around from suppliers to be delivered to Chinese producers. All of these players need to

be identified and cultivated. They must be shown that it is profitable for them to be involved in this innovative type of textile business.

#### Importance of a Key Player

Without an understanding of the designer market in Italy, and without the ability to explain to those designers how to serve the Japanese market, this entire system has little chance of success. The one trading company that has been especially successful in this area has taken advantage of a long time trader in the Italian textile market. His extensive experience in presenting the Italian ideas of design to the Japanese market, and just as important, identifying the younger designers who will in the future generate profits of the trading cluster, is a necessary condition for this cluster to work. Others who have tried to duplicate the cluster have not been successful because of the lack of this key player. Yet the key player could not, on his own, make the system respond fast enough to gain a return on his insights. The other players in the cluster need to be involved.

#### Commitment

The long-term commitment to buying from China, and the commitment to work with the designers as their careers develop, make all the players more confident in the value of the cluster. The rapid response of Chinese partner manufacturers is necessary, and the ability of the GTC to provide on-going profitable business to that firm is essential to the rapid response.

#### GTC Resources

The trading company has the financial resources to bankroll the designer and the manufacturing unit, as well as the floor-planning of the retailers. The ability of the GTC to marshal necessary textile intermediates at short notice and of high quality makes the

Italian designer more confident of a successful launch. The connections to the specialty retailers, developed by this trading firm (or sometimes owned by them) also give confidence that the products will sell in Japan quickly and at good prices. This will give all players a good financial return for participating in the cluster.

#### GTC Information

The knowledge of individual markets and designers has already been mentioned. GTC has a sense for the overall Japanese markets through its retail contacts, and a sense for the tightness of the Chinese market through its various dealings in China. With this wider environmental knowledge, it can anticipate pinch points in the process from design to final sales to the Japanese market, and anticipate any changes that might occur. The GTC can also apply particular techniques to a wider range of products than a designer can anticipate. For example, they take a technology from a company ( for printing on curves) and apply it to a wider set of applications than that technology owner can imagine.

#### Proximity / Repeated Transactions

This GTC has had many successful transactions with up and coming designers in Italy. It is seen as being much closer to these designers than other traders, and thus any new designer wants to be part of the cluster. This reputation has been built up over many years, so this is a clear barrier to entry for any alternative player who wants to enter. In China, repeated deals with Chinese manufacturers lets the GTC pick those shops who are likely to meet the high end quality standards and who can do so on the tight timetables that fashion requires. From the Chinese firm viewpoint, these profitable deals, which have been done repeatedly, makes them confident that they will benefit from staying with this relationship cluster, even at the expense of some short term profit that they might

achieve with other uses of their manufacturing facilities. The retailers in Japan also have confidence in the cluster, since it has a track record of providing them with innovative products from new designers. They also know that the designs will be adjusted to the Japanese taste, without their direct contact with the designers. The cluster thus has value for them because of the repetitive dealings.

This trading relationship has been judged to be a main source of competitive advantage for the trading firm. It has worked to develop the characteristics of the trading cluster that match the expected criteria necessary for success.

#### Steel Trading Relationships

Steel has been a basic pillar of Japanese industrialization. Here too trading companies have found raw materials for the companies, often investing in mines and logistics, and sold products onto world markets. Within Japan, they have sold intermediate products between Japanese manufacturing firms as well. Increasingly, the firms have been involved in the final stages of processing as the product gets closer to the final user (steel processing centers). Yet, here as well, the price competition is very strong, and the scale economies allow large firms to deal directly with customers rather easily, reducing margins and allowing firms to deal directly with customers.

#### *Description of the New Transactional Relationship Cluster*

Yet as the system to sell oil field pipes to a Norwegian firm show, trading firms can take advantage of a transactions cluster to create significant value for the various players in the channel, and thus remain an important player in what would seem to be a standardized market.



Oil exploration is an uncertain business, and a firm does not know exactly what pipe it wants until the last minute. It then wants it quickly, since without pipe, an expensive drilling rig they rent sits idle. Yet the pipe must move from the source in Asia, through various processing points where the pipe is cut to size and made ready to attach at the appropriate point at the rig. To serve this uncertain market, firms carry significant inventory at all the stages. Even so, slow response to demand often results in loss of value and significant drilling delays.

With price pressures, a trading company was in danger of losing significant business in Norway. It responded by creating a network that exchanged information between all the players in the production process, scattered through Europe, along with its Japanese suppliers. To do so, it had to get all the players to provide information into a newly created information system. At the time, the Internet was not widely used, so it had to persuade all the players that it could keep the information secure. With the venture, it enabled all the players to deal with the uncertainty of the oil company's demands. In fact, it was able to let the various players forecast more effectively the demand from the oil firm customer.

#### *Evidence of the Cluster Characteristics in Steel*

##### Internal Relationships within the GTC

The trading company needed to get support for the system from the information technology group and the accounting group. These two groups were struggling to find ways to deal with information exchange and performance assessment. If this innovative network were to succeed, it would be useful in finding ways to assess other innovative but complex transactional relationships. For the IT group, the effective use of the

internet for information exchange was a key challenge at the time, so that drew them into the network. The various international offices of the GTC needed to be persuaded that the more effective integration of the flow of pipe would make their jobs easier, but also allow them to get closer to their own customers. The Norway office was especially important here, since they needed to be the contact with the final customer.

#### Importance of a Key Player

The key player was the Japanese co-manager of the Norway office. To carry out this innovation, he needed to have the confidence of accounting and of IT in the Tokyo office, and of the Norwegian office local manager. He had wide experience that touched all of these bases. Having worked a stint in accounting, and helped design and execute systems to monitor foreign sales early in his career, he knew the value of a clear system to account for value added in a complex chain like oil field pipe. His ties within the organization happened to include a key manager in IT at the time, who helped him sell the idea of using the internet for information exchange. He knew from years of working abroad how important the local contact points with customers can be, and how a local manager can contribute to those exchanges. He thus had the confidence to give a central role to his local Norwegian manager in getting buy-in from the local partners.

#### Commitments Benefit Internal Players

As mentioned earlier, many elements of the GTC got a benefit from the cluster.

Forecasting became possible as the system gave increasing months of experience in handling the flow of pipe through the system. This made all GTC units more confident they could service their local customers in the channel. IT learned about the Internet-based information exchange.

## GTC Resources

The development of the information system was a very engineering intensive operation, and took a substantial capital expenditure as well. GTC had the financial resources to make that commitment. When things got tight at key points, the key manager could call on the resources of the GTC home office to get the process back on track. No other player in the system could make the commitment to a system that in the end would benefit all members in the cluster.

## GTC Information

In this cluster, it is the management of the information that is key to the innovation. Everyone in the cluster would benefit from a system that shows where every pipe is located, and what has been done to prepare it for the final use in Norway. Even if someone were to marshal the engineering and the financial capital to put together this system, they would still have to convince all the players to put information into the system. GTC has much of this information, though it is scattered throughout its organization. Yet it has the strongest incentive to pull the system together. Since it sees the entire transactions relationship, it can imagine what information could be valuable to each partner. The system has information that might be inappropriate to give to all participants. The GTC, who is involved in all the transactions, and whose profit at all stages makes it sensitive to the smooth operation of the cluster, is the most likely candidate to be tasked with the gathering and dissemination of the information in the cluster. Their experience with all the players will help them in the difficult negotiations to decide who gets to see what elements of the information system.

## Proximity / Repeated Transactions

The trading company has had dealings with all the players over the years, but not with the same degree of innovation. Yet that previous experience allows for the dialog that can lead to the more intense, information-based interaction in this new venture. The contract with the oil exploration firm in Norway gives all the players the confidence that there will be the repeated transactions necessary to get the profits from the commitment to the innovation. There is substantial potential to expand the uses of the information system, so even the innovation itself can generate new opportunities or reduce the damages from unexpected changes in demand. The system is already being used by all players to forecast demand and to follow the flow of product through the channel.

In the steel pipe case, we find that additional information, rather than moving all parties to arms length transactions, allows the players to take an innovative approach to serving a challenging customer. Yet it did not happen in all trading companies. Only when combined with the innovator's idea and organizational patience was a firm able to create this transactions structure.

### Conclusion

Analysis of entrepreneurship in Asia may require an understanding of the environmental surroundings of the innovation. In societies where there is less dependence on the independent market for ideas and where products are often sold bundled with existing products, research on these organizational and relational aspects of innovation can have substantial value.

The current case study research has its limitations, since it is hard to know if the ventures are exceptions that prove the rule. Firms are likely to be willing to 'show off' their limited successes, and not discuss the times when the clusters are not working well.

Conversely, when these ventures have significant competitive value, firms may not want to share the insights with researchers. Significantly, in each of these case studies, the individual managers felt that the effort necessary on the part of another manager to organize the cluster was sufficient barrier to entry so that they were willing to share the information with researchers.

Yet if we believe that relationships are an important part of the innovation system in the Asian context, researchers will have to accept this challenge and work with smaller data sets and smaller sets of case studies than are ideal. The cost of ignoring these elements in the innovation systems seems too high to not make the effort.

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