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IT and Coordination Modes: The Case of the Garment Industry in France and US

The aim of this article is to illuminate the relations between information technologies (IT) and modes of coordination among firms. Does IT strengthen existing partnerships, accentuate market volatility or facilitate integration strategies? Up to what point do the institutional environment and organisational forms favour the diffusion of IT or not? What may be said about the role of IT in the reorganisation of a supply chain? Through a study of the garment industry we will try to throw light on these subjects, presenting here some preliminary results of our investigations. We first explain previous research and then show the interest of studying the garment industry as a supply chain comparing the two supply chains in France and the United States. The transaction cost perspective will help us to explore how IT affects relationships between companies. In this context, the diffusion of electronic networks should be a major stake in rationalising inter-firm coordination modes. But we will see that this stake remains imperfectly strengthened: complex and rich social networks in some crucial stages of the supply chain offer a significant explanation.

Introduction:

The aim of this paper is to illuminate the relations between information technologies (IT) and coordination modes among firms. This question does not imply a deterministic assumption - there is an interaction between IT and the transformations of coordination modes in economic activities - nor even a

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unidimensional vision of these transformations because, obviously, many other factors besides information technologies influence these transformations. This being given, deep changes in coordination modes go along with the diffusion of IT. It raises multiple questions. Do electronic networks reinforce existing partnerships? Do they facilitate instead purely commercial relations and lead to more competition, or do they lead to an increasing integration of the activities thus connected? But we also have to raise opposite questions: do existing coordination modes facilitate or on the contrary hinder the diffusion of electronic networks? Up to what point do the institutional environment and organisational forms favour the diffusion of IT or not? What may be said about the role of IT in the reorganisation of a supply chain? Of course, no exhaustive answers to those questions will be introduced here. It is through the study of a particularly rich supply chain - the textile garment and retailing industry - that we will try to advance on these subjects, presenting here some preliminary results of our investigations.

With this view, we first explain where those results come from. We then show the interest of studying the garment industry like a supply chain and compare the two supply chains in France and in the United States. The transaction cost perspective will help us to explore how IT affects relationships between companies. In this context, the diffusion of electronic networks should be a major stake in rationalising inter-firm coordination modes. But we will see that this stake remains imperfectly strengthened: complex and rich social networks in some crucial stages of the supply chain offer a significant explanation.

**Previous Study and Methods**

**Previous Results**

In mid 1996 and early 1997, two quantitative telephone surveys about IT use were completed, first in the United States and then in France. A sample of 250 firms in the U.S. and 256 firms in France were randomly drawn using commercial industry databases. The sample was stratified by industry and size, by selecting an equal number of small, medium and large firms (with size relative to each industry and a minimum size of 20 employees for inclusion in the sample) in the advertising, apparel, pharmaceuticals and magazine publishing industries. Firms that were producers were selected for inclusion in the study. The global results were presented in Steinfield et al (1998). The purpose was to measure and qualify which kind of transactions were supported by electronic networks. The survey focused on the way in which firms acquired key inputs from internal or external suppliers. In the garment industry, the four transactions studied were buying or acquiring: materials, trims, design and cutting services. More details about the research methodology and measurement strategy can be found in the previous paper. This quantitative study allows us to compare IT use for input transactions for the garment industry with the three other industries, both in France and in the U.S. The following table, extracted from this previous study, shows two interesting things: first, that IT use is generally lower in the
garment industry than in the three others, and second, that the main difference between France and US is the level of IT usage being much more developed in the U.S. than in France. These characteristics led us to conclude the previous study as follows: “Although French firms exhibit lower usage rates for electronic networks, relative usage for various applications is roughly similar to that in the United States across the four industries included in our study. The factors that influence electronic network use, and the possible effects on make vs. buy decisions, appear to be similar across the two country contexts” (Steinfield et al, 1998, p. 149).

Table 1: Proportion of Firms Reporting Use of the Internet for Various Purposes by Industry and Country (Steinfield et al, 1998, p. 138)

<table>
<thead>
<tr>
<th></th>
<th>Production processes</th>
<th>Email</th>
<th>Taking orders</th>
<th>Invoicing</th>
<th>Giving product information</th>
<th>Electronic funds transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising</td>
<td>.56</td>
<td>.70</td>
<td>.61</td>
<td>.81</td>
<td>.34</td>
<td>.77</td>
</tr>
<tr>
<td>Apparel</td>
<td>.23</td>
<td>.53</td>
<td>.21</td>
<td>.38</td>
<td>.32</td>
<td>.52</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>.24</td>
<td>.48</td>
<td>.32</td>
<td>.61</td>
<td>.22</td>
<td>.62</td>
</tr>
<tr>
<td>Publishing</td>
<td>.56</td>
<td>.74</td>
<td>.38</td>
<td>.72</td>
<td>.34</td>
<td>.59</td>
</tr>
</tbody>
</table>

Between country differences significant at p<.0001 level for all purposes
Between industry differences significant at p<0001 level for production, email, and product info., p<.01 for EFT.
Country by industry interaction not significant for any purpose

Methodology

To better understand the mechanisms leading (or not) to the adoption of IT and their role in coordination modes among firms, we chose to focus on an entire supply chain and study how transactions were managed, from the upstream to the downstream. We chose a traditional supply chain, less often studied as a place of IT penetration, to better evaluate the working tendencies in a common activity, a typically competitive supply chain, with segmented activities where coordination modes and interaction between firms should then be particularly interesting to explore: such was the case of the garment industry.

The method used to gather information was a number of open interviews with the different kinds of actors in the industry, in each country, in 1997 and 1998: textile companies, manufacturers (independent companies, principals and subcontractors), retailers (specialised or not, large and smaller firms), CAD CAM\(^4\) suppliers, Software Companies, Standardisation Institutions, and so on... Some academics were also interviewed to get information about the most up to date

\(^4\) CAD CAM: Computer Aided Design and Computer Aided Manufacturing.

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thinking on the supply chain and its actors. The sample of business actors - respondents were high level executives - was built from different sources: commercial industry data bases, help from academics and employer's federations and choices made during business conventions.

The interviews dealt with the following areas: a precise definition of the characteristics and the changes in the company, the characterisation of relationships with its different partners (volume, frequency, time pressure, speed, liability of partners, distance, lasting and changes in the transactions, problems, and so on...) and a description of the IT use within the production process as well as with partners (electronic networks, CAD CAM tools...).

The federations were very helpful to get a better comprehension of the big picture in the whole industry, and to validate our interpretations of the trends going on in the supply chain.

The technology suppliers were also aware of the trends in the industry, in relation to the technology use. See Table 2, in the appendix, for more details on the interviews.

The results presented here are then built on these two sources: the quantitative survey on transactions and the qualitative investigation in the garment industry.

**The Supply Chain, a Richer Perspective.**

First, the supply chain can be defined as the sequence of technical operations transforming raw materials or a part-finished product into a finished product. A change in the technical realisation of one operation may affect the whole chain, and even alter the position which the actor, who has promoted the innovation, occupies in the market. The different stages of the supply chain are not homogeneous: for example, in the supply chain which interests us, the stages located upstream - textiles - involve a capital intensity higher than in the downstream stages, like the apparel industry, which remains a labour intensive user.

The supply chain is thus a relevant context to observe and study the diffusion of an innovation or a technology (Cf. Arena, de Bandt, Benzoni and Romani, 1988). It is within a supply chain that strategies of vertical integration may be analyzed and understood. Their objectives are generally the search for cost savings, the improvement of the supply's security at a key stage, or the reinforcement of competitive advantages. But, when the observed unit is either the firm itself, or the industry, it is not possible to highlight the dependency relationships which may exist between firms in different sectors, such as, for example, between Wal Mart (retailing) and Burlington (textile producer), with numerous companies located between the upstream and the downstream. It thus seems more suitable to choose the supply chain as a unit of observation, because it is a place of interdependencies. It allows us to better identify the transfer of activities, the changing positions of the various actors and strategic control of information and initiative along the textile chain of design, manufacturing, and retailing.
Results

The Garment Industry between Tradition, Evolution and Competition

A Quick View of Long Term Trends

A Segmented Supply Chain...

This supply chain has always been segmented. It represents one of the oldest economic activities being divided in different stages, strongly dependent on one another (Jaeger, 1982). It is also an activity which has always been at a high technological level for its time both in Europe and the United States (Hounshell, 1987): power looms, Jacquard looms which preceded data-processing machines, steam-powered machines, then sewing machines which impelled the existence of clothing as an autonomous activity in the textile branch. It is an activity which highlighted the interdependency between manufacturing and retailing very early: thus in the eighteenth century between merchants and the putting out system, in the nineteenth century when department stores, and the first mail order companies made their initial deals with the textile and apparel industries. Labour intensity has always been high (fashion, completion, constancy of recourse to new immigrants, in France as in the United States), and quality differentiation has always been crucial (for materials, cutting, or discriminating between fashion and basic products). The diversity of the products and the retailing channels, preoccupied by deadlines (fashion), has always created a sense of urgency (Scranton, 1996). If some powerful companies emerged here and there, ceaseless moves between the concentration and dispersion of manufacturers and between localization around the points of sale and off-shore sourcing mark this activity, as we can see in Scranton.

Characterised by the Fight between Routine and Innovation...

Thus, the explosion of manufacturing facilities and the articulation between stages (by more or less formalised agreements) seem to be an old characteristic of the supply chain. The balance of power favourable to retailing is not new either.

But it is a supply chain in which product innovation is a condition of survival: it is the differentiation by brands and fashion which draws purchasers towards clothing, and creation cannot be strictly defined by the consumers, if so, all products would be similar, and that would put the whole supply chain in danger. Moreover, the supply chain organisation allows for the continuous arrival of innovative newcomers. Clothing is thus a competitive supply chain, but with an often unequal fight between two tendencies: routine versus innovation.

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5 cf “Doléances des Maîtres- Ouvriers fabricants en étoffes d'or, d'argent et de soie de la ville de Lyon, adressées au Roi et à la Nation assemblée”, 1790.
The Supply Chains in France and in the United States today.

Graphs 1 and 2 describe the general organisation of the garment industry and IT use, in France and in the United States, that results from our observations.

GRAPH 1 : IT USE IN FRANCE

Similar Trends:

In France as well as in the U.S., the main segmentations of the supply chains are alike: textile industry, manufacturers and retailers. And in both contexts, these two supply chains face the same problem: the slowing of demand for clothing. Price competition has strengthened, leading to a search for lower cost products, off-shore manufacturing and greater imports from low wages countries.

Another fundamental characteristic of the supply chain is common: it is market driven. At this point in time the newly concentrated segment of retailers has reversed the existing balance of powers. Thus, the largest retailers had the money to invest in information systems, whereas manufacturers were hard put to modernize their production apparatus. On the other hand, the place of creation is also changing. It is thus a question of simplifying models so as to reduce costs and risks of unsold goods or sales, and ceaselessly creating new collections in order to stick more closely to the market. The decisions of consumers, and thus the information which retailers feed back, have more and more effect on the manufacturer's decisions.
Moreover, in the two countries, there are Garment Centres, in Paris and Marseilles for France, and in New York and Los Angeles in the United States. This concerns a group of firms with informal relationships in an area. The relational and geographical proximity make these places “industrial districts”. This concerns both groups of actors from the whole supply chain (fabric and trim, salesmen, manufacturers, wholesalers) and a great number of actors having the same activity, which allows a potential buyer to be informed of the different offers. Garment Centres are a type of organisation allowing for “flexible specialisation”. Very significant and effective informal relationships between partners can compete here with the expected advantages of IT: powerful and effective social networks pre-exist electronic networks. Some characteristics concerning the penetration of information technologies follow along: IT diffusion follows close configurations in both countries, it is not yet generalised or homogeneous, IT development is fast in large retail companies, as well as in textiles, but the other part of the supply chains are much less computerised.

But which also Diverge:

The American supply chain is built around two powerful poles that are the retailers, and the textile industry. The American retailing sector is far more concentrated than in France. In France, independent retailers represent 34 % of garment retailing, generally small quarter shops of less than five employees. In the United States, there are no independent retailers: almost 80 % of clothing retailing stems from large firms, organised and computerised, as the next table shows:

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Table 3: Share by Type of Retailing (1996).

<table>
<thead>
<tr>
<th>Retailers</th>
<th>United States (AAMA American Apparel Manufacturers Association)</th>
<th>France (INSEE Résultats: “Les réseaux de commercialisation dans l’habillement”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Stores</td>
<td>22.8 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Discounters</td>
<td>20.4 %</td>
<td>n.c.</td>
</tr>
<tr>
<td>Hypermarkets and supermarkets</td>
<td>n.c.(^6)</td>
<td>14 %</td>
</tr>
<tr>
<td>Sears/Wards/Penneys</td>
<td>17.8 %</td>
<td>n.c.</td>
</tr>
<tr>
<td>Specialty Chain Stores</td>
<td>18.1 %</td>
<td>33 %</td>
</tr>
<tr>
<td>Direct Mail</td>
<td>5.8 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Independent retailers</td>
<td>n.c.</td>
<td>34 %</td>
</tr>
<tr>
<td>Factory Outlet</td>
<td>3.7 %</td>
<td>n.c.</td>
</tr>
<tr>
<td>Others</td>
<td>11.4 %</td>
<td>4 %</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

In France, hypermarkets were the first to order their grocery products by EDI. They then decided to generalise the system to all their products, especially to clothing. They first implemented proprietary systems, putting pressure on their clothing suppliers to be connected. But the manufacturers refused to choose these technologies. In the United States, retailers have had the same role, with more impact on the supply chain: more powerful, more concentrated, and especially opening up a larger market. As well, textile firms also joined in, because it was a way to better respond to a fluctuating and declining demand, to relocate the manufacturing by supporting the Quick Response strategy, and thus to protect themselves from Asian competition. More than in France, the American textile industry is concentrated and capital-intensive. American manufacturers have therefore been influenced both by the textile industry and by retailers. The French supply chain has some powerful actors for computerisation - essentially the large retailers - but they don't have the same training effect on the supply chain, missing a strong relay towards the upstream. French textile companies are indeed concentrated, equally geographically clustered, but of far smaller sizes than the American giants, because they face a smaller market.

Thus, more than the evolution and the configuration of the whole supply chain, it is first of all the size of markets, and therefore the power and the concentration of American retailers and textile firms, that mainly differentiate the two countries.

\(^6\) n.c.: not classified. Some categories are difficult to compare: Independent retailers are not distinguished in the U.S. and Hypermarkets in France sell everything, including food, beverage and so on... Discounters and Factory Outlet do exist in France but are not important enough yet, so they are mixed with “others”.
Searching for Competitive Advantages: A Push to use Information Technologies?

Information systems technology lies everywhere in the value chains because each activity generates and uses information. Processing orders, managing relationships with suppliers, planning the tasks of after sales staff, all of these require information systems. Coordination and optimisation of connections require exchanges through the value chain. Information technology thus creates new values and may allow some players in the industrial system chain to differentiate themselves from others, having then a competitive advantage for some time. The problem is to reorder, using electronic means (EDI), only and just the products with the highest demand. This implies the “real time” availability of detailed information about sales, and also new types of relationships with suppliers: Retailers then attempt to compel suppliers to reorganise and implement adequate technology. They have the strongest interest in implementing or developing electronic data exchange, either better to know the demand by building data bases on customers, or to accelerate the availability of goods in stores by being electronically connected to their suppliers, allowing then Just in Time Delivery. When they succeed in doing that, it generates a sharing of the benefits of the added value for the entire supply chain, albeit clearly in favour of retailers.

But the conditions to create a competitive advantage in the long term are limited (Bernasconi, 1996). According to Porter and Millar’s (1985) analysis, and Bakos and Tracy’s (1986), Bernasconi noticed that one has to “recognise that prevention of imitations is weakened because the rapid changes in information technology continually favour the efficiency/price ratio”. Then, if IT is obviously a strategic weapon at one moment, the conquest of durable competitive advantages through its use is much less obvious.

However, this winning strategy giving the retailers an advantage over the manufacturers has not brought production concentration up to now. Moreover, if partnerships between retailing and manufacturing are multiplying (and often with the implementation of computer networks and JIT), these connections do not lead to the integration of the different manufacturing stages. On the contrary, segmentation of the supply chain increases even more, making coordination problems among organisations especially acute. Are computer networks able to contribute to solving these problems?

Electronic Networks in the Garment Industry: A Challenge.

Coordination problems among various segments of the supply chain have existed for a long time, and successive pragmatic solutions have never led to an integration movement nor to a general rationalisation of the transactions throughout this supply chain. One could think that emerging IT, and especially electronic networks, would create the opportunity for one or another element of the supply chain to implement some new sources of efficiency through faster and more reliable transactions. If some attempts to this effect have indeed been
made, they have failed to reach the point at which coordination modes and the
general structure of the supply chain would have to be changed.

Why don’t computer networks become an obvious opportunity to better
manage transactions and a better way to coordinate here? To what extent could
Williamson’s Transaction Cost Theory, which emphasises coordination problems,
gives us a better understanding of these questions?

Using the conceptual apparatus of New Institutional Economics (NIE), our
steps will be to show here that coordination problems in this segmented but
competitive supply chain are especially tricky. When computer networks are
implemented they indeed reduce transaction costs, but they neither increased
direct market presence, nor hierarchical structure. Rather this leads to a new
segmentation of the supply chain. Electronic networks are not pervasive here, in
spite of the benefits they could bring. Our hypothesis is that none of the players
have singularly, at this time, the resources and/or power to reduce the
transaction costs, even if retailers are yet able to weigh heavily on producers.

**Coordination in the Apparel Industry and the Limited Help of Electronic
Networks.**

For the NIE, coordination is how the economic agents will make compatible
decisions, especially about their transactions. Three coordination modes are
generally distinguished: market, hierarchy and partnership, to which are
associated three control mechanisms: price, authority and trust.

The clothing supply chain presents itself as a set of activities where the three
coordination modes are used, and if they move between operations, this move
doesn’t automatically involve the obvious domination of one of those modes. In
this segmented supply chain, firms of very different sizes operate with numerous
and different kinds of links, going from pure competition to quasi-integration,
through more or less formal subcontracting. This happens in the “middle” of the
supply chain (ready-to-wear clothing), as well as in the upstream (textile
industries) and in the downstream (retailing): the Benetton corporation uses all
the types of organisational links (cf. Negri, 1993). The issue is then that
upstream, middle and downstream have no defined borders: their respective
borderlines are mobile. Graph 3 sums up the main stages of this supply chain:
fabric, design, cutting, sewing, retailing and customisation.

We have thus to explore further coordination modes in the garment supply
chain and ask where this variability of coordination modes and organisation
forms come from, and if it is possible to look for a change towards more
formalised transactions allowing for increased use of computer networks.

**Transactions in the Supply Chain**

Between Textile and Manufacturing Companies

Textile firms specialise in materials (wool, cotton, synthetics, and so on...) and
in jobs (mills, weaving, dying, trim...). In the U.S., as well as in France, this part of
the chain is now entirely integrated and mechanised. Textile firms have many
other customers than the garment industry (in France, the garment industry buys only 40% of DMC output). Car manufacturers, furniture/upholstery industry, home textiles are much larger channels. Consequently, although better management of the transactions with the garment industry is important, the textile industry doesn't feel a compelling need to over-control this channel whose demand ever fluctuates and emanates from a multitude of designers of various sizes. On the other hand, the ready-to-wear industry is torn between two types of contradictory needs, brought about by intense competition: the need to diversify their suppliers because of the diversity of their products and services, and the opposite need, to reinforce their ties with some main suppliers able to follow the very fast changes of fashion and cooperate with the design of the next lines, or at least fabrics and threads.

Coordination among these partners mixes competitive and partnership relationships. None of these parties have the resources, power or interest to integrate the other. Even when transactions involve specific assets - for example, a fabric specially designed for a brand - this specificity is quite short-lived: the time of the garment life-cycle, which is often only a few weeks. Then, the normalisation of partnership ties exists but never encompasses the entire suppliers’ realm nor the entire textile industry’s clientèle.

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Transactions within the Ready-to-Wear Industry.

Traditionally, two types of segmentations among producers could be noticed: the first one, among the different stages: design, cutting services, sewing, the second one, among products: fashion or basic garment types. The design firms surround themselves with a constellation of subcontracting firms. Recently, the segmentation among products (types of garments) becomes finer and the segmentation among stages of production process becomes unstable: see graph 4.

Since the transactions during the different stages of the production process require faster and more reliable coordination, several ways are used to manage them:

- When transactions of high volumes of goods are frequent, then standardisation may occur and electronic networks such as proprietary EDI networks may be used among regular partners: pressures to integrate or quasi-integrate exist. This trend concerns only long-standing product lines and basic garments, produced in great volumes.
- When transactions concern short life lines, then the partnership relationship increases, building trust with mutual commitments and affecting reputation (see Lorenz, 1994). Formal contracting is not excluded, but specificity from one order to the other makes it difficult to standardise the transactions: pressures to integrate are weak, specialisation of producers warrants their flexibility.
- Finally, a large part of the transactions involves informal arrangements, where a credible threat of turning to competitors in case of default on delivery schedules or quality takes place. Those informal arrangements play a key role in the control of the coordination modes.

Transactions between Manufacturers and Retailers.

What is now critically changing here is the relationship between marketing and distribution. Here again no simple structure appears. Some retailers also become designers and they develop private labels, some designers build their own distribution channel, and the retailing activity has diversified. Manufacturers now need to deliver labelled goods with standardised bar-codes. Moreover, they have to accelerate their shipments and deliver smaller quantities. The sanction is to be removed from the Approved Suppliers List. This sanction applies to large and small suppliers alike. Only suppliers with a very attractive brand at the moment may negotiate better terms and be less strictly sanctioned. These pressures and their limits show that the fluctuating demand requires very tight coordination between designers and marketing. The trend is thus for well-known brands to have their own trade channel (which is not the only channel for their entire sales), to collect data from consumers. On the other hand, large specialised retailers launch their own brands (which are not their only suppliers) to get advantages from their knowledge of the market (graph 4).
Computer networks between retailers and manufacturers are then far less widespread than in other supply chains (such as publishing or pharmaceutical products, cf. Caby & Jaeger, 1997). The implemented networks are often internal (when design, manufacturing and retail are integrated), and a few are external, implemented between large retailers with a few main suppliers. Then there are EDI proprietary networks, often prompted by distribution needs, with two main functions: automation of follow up orders with suppliers, to move forward to Just In Time stocking and processing sales information, allowing far better demand monitoring and forecasting, well targeted marketing and distribution channels diversification.

The networks have definite effects on transaction costs: increased reliability and control, reduced uncertainty. Under these conditions, it is worth asking why they are not widespread in this supply chain where quick information needs are strong and persistent and where segmentation leads to multiple, complex and constantly ongoing transactions.

**A Low Level of Computer Network Use**

The previous quantitative survey about upstream transactions, in France and in the U.S. (see Steinfield et al., 1998) showed that in both countries, transactions on materials and accessories were generally external and practically never carried on computer networks, at the opposite of garment design and cutting services which were almost always internal transactions (or between a main firm and

Co = Subcontractors
subsidiaries), and more often carried on computer networks. Of course, the nature of those transactions matters: materials and accessories are easily monitored products whose transactions do not involve specific assets and are rather standardised. The client can easily control volume, quality and price negotiation, unlike garment design and cutting services. These are far more complex services, tricky to monitor and the firm has to control them carefully: assets are specific most of the time.

Thus, we have the paradoxical following situation: in this segmented supply chain, coordination problems are complex and hard to manage, transaction costs for a lot of transactions could be reduced if electronic networks were used in inter-firm relationships. Electronic networks, however, only develop inside hierarchies: if a few inter-firm networks do exist between some quasi integrated partners and more often, inside integrated companies, starting from retailers (Kiabi, Promod) or from manufacturers (Weinberg, Benetton, Levi’s), there are no open networks which could rationalise transactions and reduce coordination costs for the entire business, despite the necessity of tight and fast coordination among segments.

Three types of reasons may explain this situation:

- Difficulties in coding the products. Here we follow Pascal Petit (1996). He explains that “using IT is easier when information is easy to code and customer networks are stable”. Obviously these conditions are not fulfilled here most of the time. Especially, for fashion garments, produced in short lines and with very short life cycles. The big challenge for fashion garments is that information is too diversified and short lived.

- Difficulties in standardising transactions. As D. Foray points out (1993), EDI network’s diffusion “will basically depend on the future user's ability to create and diffuse standardised languages”. This standardisation may result from arrangements between partners already linked with close relations. Physical networks are not sufficient to complete transactions: economic interactions via computer networks require rules on data formatting, linkage and communication protocols, directions for use, warranties on security of transactions, addressing methods, and so on. Institutions ad hoc are therefore necessary. These institutions help to create common languages and rules, and eventually monitor that rules are followed. But standardisation in the garment supply chain encounters at least three obstacles: competition between national and international standards, competition between producers and retailers standards and rigidity of product nomenclatures unsuitable for diversified and short-lived products.

7 The American concentration made the question of message standardisation simpler, and the different actors created committees where these questions were debated and ruled. In France, message standardisation has been set up gradually, the main problem is the existence of two competitive institutions: Gencod (created by retailers and manufacturers of all sectors) that has benefited from the hypermarkets power, and Editex (textile apparel profession only).
Uncertainty of demand. From Malone's point of view (1987), the diffusion of computer networks depends on the frequency, volume and simplicity of transactions. However, transactions on fashion garments have none of these attributes. Finally, it is the ambiguous rationality of buying a fashion garment that could be at the root of the complex structure in this industrial system. Buying patterns introduce extreme uncertainty in the business and the players have to reorganise in order to be more flexible and reactive. To reach this flexibility, partners relentlessly search for compromises between economic constraints and future changes in consumer's tastes. Opposing this shifting demand, the reactivity of the offer can be built by establishing in its midst new ties for which economy is no longer the only measure.

**Trust in the Coordination: IT and Social Ties.**

Relationships among firms are not set up only to search for lower transaction costs. Especially in the garment industry, informal ties among firms make the specificity of models such as Le Sentier in Paris, the Garment Centre in New York, or Modène and some northern regions of Italy. One can notice that products concerned by this type of organisation are mostly women's fashion garments.

**Firms Linked by Geographical Ties: Industrial Districts.**

Piore and Sabel (1984) made a detailed analysis about solidarity surrounding geographical axes in their works on industrial districts. Industrial districts are groups of small firms, such as one can observe in the textile or garment industry.

To illustrate the notion of an industrial district, Piore and Sabel quote the example of the textile district of Prato (in central Italy). According to them, the industrial district has the following characteristics: Job certainty is controlled through work sharing, rather than seniority, firms' entries and exits are easy and constant, employees and management are both concerned with informal resolution of disputes, work is collaborative, and the community is an essential entity. Many people go back and forth between the role of employee and manager, a great part of the production is done by subcontractors and as fashion changes very often, it implies a great flexibility of the different actors.

Le Sentier in Paris has all these characteristics and the main French garment companies deal with Le Sentier, especially for replenishment, because they know that they can order and receive the products very quickly, and that conditions will be respected. The Garment Centre of New York is similar to the Parisian Sentier, as Uzzi (1997) shows.

**Economic Action is Embedded in Social Relations.**

There are others axes of solidarity for business groups. Criticizing the transaction cost theory, Granovetttter (1985) points out that choices between market and hierarchy are made not only to reduce transaction costs, but are also linked with the quality of social relationships among partners. The tendency for someone to resort to either one of the coordination modes varies according to
the quality of relations that he has with his partners, inside or outside the firm. Thinking about business groups, and no longer about individuals, he then shows that inter-firms networks are built according to similar types of logic (Granovetter, 1995). They are not only driven by an economic interest - lowering transaction costs for instance - but they also integrate other factors such as trust. As for economic relationships among persons, embedded in social ties, he shows that relationships among firms are also embedded in informal ties.

The ‘moral economy’ of these groups is an important feature: mutual trust is characteristic of business groups and distinguishes them from any other type of association. Trust, in the case of business groups in the clothing industry, exists mostly because there is a reputation effect. The different actors within these business groups know that they will work together again in the future, so they should show no opportunistnic behaviour that would rule them out of the system.

Refining the concept of “embeddedness” from Granovetter, Uzzi (1997) makes it operational by applying it to the clothing industry in New York. He shows that three axes characterise the embeddedness of economic action in social relations: Trust is a governance structure for socially integrated relationships, as it allows one to face uncertainty in better position because it strengthens the efficiency of professional relationships. The second axis, fine-grained information transfer, is more than a matter of asset-specificity, know-how or reducing information asymmetry between parties, because the social relationship imbues information with veracity and meaning beyond its face value. The third axis is joint problem-solving arrangements: this step induces a more rapid and efficient result than an automatic reply from actors dealing in a purely formal framework, threatened with contractual rupture when incidents arise.

This view can help in identifying informal ties (other than region) in the apparel supply chain. In the Parisian Sentier for example, religious and ethnic bonds are particularly powerful (cf. Negri 1993). Manufacturers in the Parisian Sentier have always been Jewish, but have recently been joined by a contingent of Chinese. As for the Jewish part of the Sentier, it has scattered in other regions of the world, such as the Garment Centre of New York or of Los Angeles (Guess, Bisou Bisou, and BCBG), or also in La Guenille in Montreal. As for the Chinese, they are reputed to have preferential ties with China for fabric or trim sourcing. It is the mobility of these peoples that has enabled a propagation movement. In these communities, there is a great deal of internal solidarity, which creates invisible but hard links. These bonds establish trust and mutual adjustments (that are not exempt from threats, notably exclusion), which are essential to the rapidity and the diversity of transactions.

These phenomena reinforce the hypothesis of an ancestral but nevertheless vivacious local culture, based on family ties, on know-how in manufacturing and commercial transactions. Ties that survive despite constraints inciting them to relocate their manufacturing.

**Electronic Networks and Social Ties.**

In this context, even more than for the whole supply chain, we can wonder...
about the scarcity of electronic networks. Would they not find here a quasi
natural logic to implement, considering these interest communities? A number of
elements have to be taken into account here. On the one hand, for the Garment
Centres as for the rest of the industry, the United States and France are not at
the same level of equipment. Thus the Garment Centre of New York is the object
of strong pressures to computerise from federations better organised than in
France. It is presented as a factor of differentiation. On the other hand,
relationships within Garment Centres are different from those with the outside.
Inside these groups, relationships are very informal, so they do not support
computerisation. But, with the community outside, relationships are more formal,
and there could be more electronic networks.

The lower level of computerisation of these communities compared with the
whole industry can be explained by the following reasons:

A first category of explanation comes from the existence of the critical size for
a firm to computerise. According to the study of Antonelli and Marchionatti
(1998) in the Italian cotton industry, the typical structure of Italian firms was
functional in terms of past performance, but is unable and inadequate to support
the diffusion of complex technology. Only large managerial organisations are able
to bear the costs of the complex organisational changes necessary to exploit new
information technologies’ huge scope for productivity improvements, and
Garment Centres are essentially groups of small firms.

A wider explanation resumes Granovetter’s argument (1995) concerning trust.
Social relationships ensure a sufficiently efficient coordination between actors
that prefer direct relationships to electronic relationships, which are less reliable,
more rigid and especially, whose anonymity no longer enables the creation of the
necessary trust for their transactions. Trust (and devices of control that go with it,
for example the threat of being excluded) plays a crucial role in the hyper
reactivity of Garment Centres (Uzzi, 1997): orders often have to be delivered
within 48 hours or perhaps 24 hours. Under these constraints, it would be very
expensive to select the best manufacturer on an anonymous market in which
nobody would be sure that the partner would uphold his commitments.

Moreover, manufacturers in the garment industry, and particularly those who
belong to groups, fear indeed that an electronic network such as EDI, initialised
by some great retailers could be detrimental to their concern. According to them,
this use would indeed allow retailers to enter in the heart of the productive
system and to become aware of fine structures of product costs. It would then be
easy for them to reconstitute margins and afterwards to strengthen ever more
their pressure on suppliers. Thus the pre-existence of trust relationships inside
the same stage of the supply chain (manufacturers here), and on the contrary, of
distrust with actors of other stages (manufacturers/retailers), may play on the
diffusion of electronic networks.

Discussion.

This paper has tried to point out the interest in mobilising different conceptual
approaches to better pinpoint the complexity of the garment supply chain.

Several dimensions characterise this complexity:

- The most structural dimension rests on the construction of the supply chain itself, composed of three great industries: textiles, clothing and retailing. They follow different types of logic, sometimes supplementary, sometimes opposite.
- In dynamic terms, deep transformations affect the functioning of the supply, manufacturing and selling.
- The inversion of value creation mechanisms is made visible by a clear orientation from downstream to upstream. This induces power struggles among actors who evolved largely during the last decades.
- The shifting final demand strengthens this tendency by emphasising competitive pressures exerted at all levels of the supply chain which are enlarged with offshore sourcing for some companies.
- The question of the role of information technologies in this context strengthens complexity by introducing a new dimension generating deep changes. It invites one to identify how these transformations operate: use of IT enlarges the role of some actors and strengthens their power; it also contributes to rebuilding the processes of value creation by changing frontiers of organisations and making them fuzzier.
- The comparative analysis of the evolution of this industry in two different contexts, the United States and France, enables us to dissociate inherent structural trends of the supply chain itself from contingent institutional factors which induce differentiated replies to a similar problem.

The construction of an analysis able to integrate this multiplicity of factors and effects becomes arduous. It invites us to resort to economic, managerial and sociological patterns so as to clear up the great ideas facilitating the comprehension of coordination modes in the supply chain and their links with IT diffusion. The different approaches listed in this paper then enable us to propose the following assumptions about the difficult IT diffusion in the supply chain:

H1: The first one rests on the hypothesis that the strategic aim of actors in this supply chain largely outweighed the transactions rationalisation stake (Kubicek, 1993, B, 1996). The transparency and the rapidity of transactions, the access of all professions to networks normalising information comes in conflict with innovation constraints (fashion) involving confidentiality and selection among partners of segmented operations. From this viewpoint, the retailers' strategies offer an indication: the large retailers use mostly, and especially in the United States, proprietary EDI networks. Until now, as this is a winning strategy, they have had no incentive to change and they are not in a hurry to support diffusion of open and universal networks, as competition is hard among these large companies.

H2: The second one is linked to the multiplicity of coordination modes in the supply chain and to its segmentation, which slows pressures of integration
between retailing and manufacturing on the one hand, and among manufacturers on the other hand. No actor is then able to propose new contractual arrangements or consensus institutions to homogenize coordination modes and impose a common language able to sustain the development of extended electronic networks.

H3: The third one rests on a new exploration of coordination modes in the supply chain: according to Granovetter’s assumption, it seems that social relationships in this supply chain have both importance and greater efficiency than is supposed in a purely economic vision of transactions efficiency. The variety of existing modes of coordination proves to be as effective, and even more so, than the formalisation of a unique pattern, based on integration or formalised partnerships via electronic networks.

H4: The fourth one is more related to managerial implications of the Internet retailing: at the level of a firm within that supply chain, using these new information technologies like the Internet might either reinforce the power of traditional actors or promote the arrival of newcomers. One could imagine that the core business of the Internet service providers like Yahoo is to get the biggest profit of data mining by reselling very targeted information to apparel suppliers, depending on the product they sell and the customers they have. By using the Internet as a new way to communicate personally with anybody, wherever could it be, it gives the real tool to delete frontiers. In that way, seamless services, transforming consumer needs or desires in real products or services without any human intervention in the production and selling process could not be just a dream but a reality in some years.

On the contrary, considering that the Internet might become the unique information and communication channel at the moment is an utopia carefully driven by firms involved in the Internet development. Different studies (Globerman, 1998) begin to show that for the time being, products that take a real profit of the Internet are mainly information products or services which still target early adopters called the E generation (Caby, Jaeger, 1998).

Due to the speed (or slowness) of new communication technologies appropriation by end users, it would be an error for most of the apparel firms to think they can purely replace their old distribution and communication channel by this new one. On the contrary, one counter intuitive result of these studies shows that because he has no way to trust a seller through the internet, a buyer will prefer ordering a product from a well known brand rather than trusting an unknown one.

It is interesting to point out that the emergence of electronic markets in the garment industry does not offer obvious advantages for the moment. Indeed, electronic commerce makes traditional retailing circuits unstable by allowing newcomers to bypass them and make direct sales: there is a door open to newcomers. But the large retailers understood this very fast and quickly promoted their catalogues on these new networks.

These assumptions remain to be expanded by a more thorough analysis of this supply chain. The key questions which arise are then: Will the current
tendencies - globalisation of the activity and partly offshore sourcing - be consolidated in the future? Will demand continue to be the driving element of this supply chain? Will its deeply unstable and uncertainty generating character survive, or will the efforts of actors to standardise the behaviour of the consumer and thus to decrease the factors of risk succeed? How will IT evolve from these points of view? Will their effects remain located at some stages of the value creation process or will they diffuse throughout the whole process? Will the technological developments such as the emergence of open networks like the Internet contribute to new transformations? It is up to future studies to develop these aspects by using the first elements exposed here.

References

l’information et de la communication", Reseaux No. 91, p 95-117.


Appendix

Table 2: Summary of Qualitative Interviews

<table>
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<td><strong>TOTAL (100)</strong></td>
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<td><strong>41</strong></td>
</tr>
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* The Information Systems mentioned here concern both French and US companies with international activities, the interviews took place in France for practical reasons.

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