

**DIXIÈME RENCONTRE INTERNATIONALE DU GERPISA  
TENTH GERPISA INTERNATIONAL COLLOQUIUM**

La coordination des compétences et des connaissances dans l'industrie automobile  
Co-ordinating competencies and knowledge in the auto industry

6-8 Juin 2002 (*Palais du Luxembourg, 15, rue Vaugirard, 75006 Paris, France*)

**THE DEVELOPMENT OF GLOBAL SUPPLY CHAIN MANAGEMENT  
CAPABILITIES IN THE AUTOMOTIVE INDUSTRY:  
THE TRANSFER OF SUPPLY CHAIN PRACTICES IN THE PEOPLE'S  
REPUBLIC OF CHINA**

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## **INTRODUCTION**

Automotive firms are reaching a highly global dimension and are establishing international networks of suppliers. In order to achieve high efficiency levels and increasing quality of the final product automotive multinational enterprises (MNEs) have to devote resources to develop supply networks and to upgrade supply chain management capabilities in operational units worldwide. Therefore automotive MNEs are increasingly engaged in transferring their supply chain practices (SCP) across countries within their global network of subsidiaries and operational units.

There is evidence pointing out that the SPC transfer process is carried out, in both industrialized and emerging countries (Cusumano, Takeishi, 1991; Humphrey, Salerno, 1998); however, there are various international SPC transfer-related questions which need to be dealt with:

- do all SCP practices - in the areas of outsourcing, transactional patterns, quality control, technological and delivery cooperation - follow similar patterns in terms of
  - ✓ transfer attempts,
  - ✓ transfer timing and
  - ✓ local implementation at the recipient unit?;
- which factors influence the SPC transfer process?

A better understanding of this issue is needed in the light of the growing relevance of the management of local linkages by MNEs, especially in developing countries (UNCTAD, 2001). Moreover, it seems that specific theory-building efforts and in-depth empirical analysis on this subject are still limited. The main goal of this paper is to provide a mainly empirical contribution to the understanding of "international supply chain practices transfer" by

developing in-depth qualitative analysis on the SCP transfer outcomes and on the relevant factors shaping such process.

This paper reports preliminary results of empirical research on SCP transfer in the People's Republic of China (hereinafter China) by a major multinational automotive vehicle-maker - IVECO - which belongs to the FIAT Group<sup>1</sup>. The choice of examining the automotive sector in China is due to the relevance of the recent changes that have affected it and to the features of its economic system: China is a special and extreme case because of the combination of low technological level of the local automotive industry, the high involvement of institutional actors and the complexity of the local business environment. The potential internal market and the inadequacy of the local supply base are two basic determinants pushing multinational automotive firms to commit resources while setting up operations in China. Therefore the analysis of the degree of "embeddedness" of a multinational automotive company in China represents an interesting and stimulating case-study to investigate

- ✓ whether multinational automotive companies are undergoing a process of upgrading local supply chain management capabilities by transferring their SCP, even in a challenging environment as the Chinese market,
- ✓ which factors have an impact on such process.

The remainder of the paper is structured into five sections. The second section briefly points out the main empirical studies undertaken on the subject and those theoretical contributions which might provide some guidance for the analysis of empirical findings. The third section outlines the main methodological considerations. The fourth section reports and discusses the main empirical findings on IVECO's SCP transfer in its units in China. The fifth section points out the main theoretical implications of the empirical findings.

## INTERNATIONAL SCP TRANSFER AS A RESEARCH ISSUE: EMPIRICAL FINDINGS AND THEORETICAL IMPLICATIONS

The issue of international SCP transfer has been examined mainly in terms of empirical research. A few empirical studies point out that automotive MNEs are increasingly committed to introduce their SCP in their operations - especially in emerging markets - in order to standardize organizational procedures, efficiency levels, quality patterns and thus develop global flows of final products and components. Thus the supply network is increasingly monitored in terms of quality control and JIT delivery. Moreover there is emphasis on the involvement worldwide of "global suppliers" which become partner also in design and product development activities; this phenomenon is highly promoted by the adoption of modular product configurations which aim to increase final product variety. (Humphrey, Salerno, 1998; Balcer, Enrietti, 1998).

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<sup>1</sup> This paper represents a further development of previous work undertaken on supply chain management (Zagnoli, Pagano, 2001; Pagano, 2002). Alpha, Beta and Gamma are the code-names of supplier firms investigated in this paper. I wish to thank IVECO for providing the opportunity and support to develop this case-study. I wish to thank John Humphrey, Khalid Nadvi, Patrizia Zagnoli for the helpful discussions on the subject under examination. Usual disclaimers apply.

Such approach has been pursued by Japanese assemblers (Mishima, 1998; Adler *et al.*, 1998), which have highly promoted the transfer of their “supply network” (Martin *et al.*, 1995) by establishing extensive international partnerships with their home-country suppliers.

Such findings seem to support those theoretical contributions which emphasize the pursue of a “standardization” approach by MNEs. According to the “global firm” model pointed out by Bartlett and Ghoshal (1989), the international expansion is highly monitored and directed by the MNE’s head-quarters (HQ) and local subsidiaries and operational unit replicate the same organisational models and practices previously developed by the parent-company. Therefore in order to compete in international markets MNEs introduce common standards in terms of quality, cost-competitiveness, delivery service. Another contribution which seem to be supported by these findings is the argument put forward by Womack *et al.* (1990) that the “lean manufacturing model” would have had universal application in the light of its features and consequent benefits in terms of efficiency and innovation.

Other empirical studies (Cusumano and Takeishi, 1991), examining also the experience of automotive MNEs in China (Kiefer, 1998), point out that the local context - in terms of institutions, economic system, organisational and technical capabilities - highly affects international SCP transfer. Such findings seem to support those theoretical contributions highlighting that MNEs’ organisational and production patterns are highly embedded in the local environment (Vaccà, 1996; Boyer, 1998), thus leading to an “hybridization” process: “a multiplicity of transformations occur when one attempts to apply the same principles to spaces which are divergent in terms of natural resources, economic organisation, competencies and politics” (Boyer, 1998: 29). The different perspectives on MNEs’ organisational strategies and outcomes are effectively pointed out by Boisot and Child who highlight that “Western firms operating in China (...) face a choice between maintaining their norms of complexity reduction or adopting a strategy of complexity absorption which is more consistent with the Chinese culture” (1999: 237).

Other studies emphasize that the SCP transfer process is shaped by the organisational capabilities and resources detained by the transplant firms (Florida and Kenney, 2000). These findings highlight the possible contributions of organisational learning (Argyris, Schon, 1978) and knowledge management theories (Nonaka, Takeuchi, 1995; Coombs and Hull, 1998) to the analysis of SCP transfer. Various authors point out the relevant role of the nature of knowledge inside the firm (tacit/codified) and of knowledge management tools and human resources practices implemented by MNEs to coordinate, monitor and manage their global network of operational units (Kilduff, 1992; Gupta and Govinderajan, 2000).

## METHODOLOGICAL CONSIDERATIONS

This paper is based on various methodological considerations. First, the case-study analysis is based on comparative approach. The comparison is developed between SCP introduced and implemented in the home-country operational units (mainly the HQ and the

light vehicles plant in Suzzara) and in the Chinese operations (the IVECO Representative Office and Naveco - the IVECO-invested joint-venture - located in Nanjing). Therefore SCP are “mapped” in those locations where they have been introduced and implemented; such methodology helps to better understand - using Babson’s terminology - both “what was not transferred” and “what was transferred” (1998: 163-165). The choice of examining China as a “recipient context” implies that the comparison is developed between IVECO’s wholly-owned operations in Italy and partially-owned operations in China; the reason is that foreign vehicle-makers have not been allowed yet to control more than 50% of their operations in China and therefore have been forced to find a local partner. This means that the examination of the SCP transfer takes into account differences between operations in Italy and China in terms of proprietary configuration. However, the main focus of the analysis is the behaviour of IVECO within the “hybrid” proprietary/organisational configuration of the Chinese operations.

Second, the empirical analysis reported in this paper concerns SCP related to a single component. This approach allows for having an in-depth insight over the main dynamics concerning supply chain strategies and management and for a tight comparison between SCP implemented in Italy and China. The selected component has been defined by IVECO managers as a “critical component” for its relevance in terms of vehicle configuration and performance for the customer. The component has been outsourced locally in both Italy and China.

Third, the collection of data and their analysis is based on a longitudinal approach. Therefore the analysis aims to describe the evolution over time of SCP in Italy and China, following Adler’s approach of “contrasting initial configuration with its subsequent evolution” in the analysis of the Nummi case (Adler *et al.*, 1998). This research strategy helps to point out if, when and how supply chain management “trajectories” have been in more close interaction, and to highlight relevant factors shaping the transfer process.

Fourth, the collection of data concerned the main functional areas/departments/units involved in SCP management (such as Purchasing, Production, Quality, Logistics, Product Development), thus allowing to investigate whether the various areas of supply chain management follow distinct patterns and/or are affected by distinct factors. Field-work interviews and activities have been carried out in Italy and China between 1999 and 2001.

## **IVECO’S DEVELOPMENT OF SUPPLY NETWORKS IN ITALY AND CHINA: THE CASE OF COMPONENT A**

This section develops the analysis of a specific component - component A - which is deemed as highly complex and critical by IVECO managers; this input has been supplied locally in both Italy and China and has been embodied in the Daily range. The first paragraph outlines the evolution of SCP (supply chain practices) in Italy concerning component A. The second paragraph instead examines the emerging SCP patterns in China. The third paragraph analyses the main empirical findings.

## Evolution of component a supply in italy

Component A is deemed as a critical component by IVECO managers, in the light of its functions, technological configuration and position in the technical structure of the vehicle. Alpha - an automotive company belonging to a major European group - started supplying component A to IVECO in 1985. Between 1985 and 1993 Alpha has been the exclusive supplier of component A. The product was configured as a single "raw" component to be assembled by IVECO inside its plant in Suzzara together with all the other components. Event though the single sourcing framework implied close IVECO dependence on Alpha, the relationship developed mainly as a market one, especially in terms of both firm's approach to the component A supply cooperation. In fact the length of contracts has had a one year duration over this period. However more strict cooperation was in the area of delivery: Alpha has been supplying component A lots on a daily basis in order to allow IVECO to implement the procedure "flusso teso" ("tight flow"). The management of the technological dimension was completely controlled by IVECO; during that period Alpha has not been involved in design cooperation with IVECO, which used to provide drawings and specifics that the supplier firm was to follow strictly in its production activities of component A.

The IVECO-Alpha relationship patterns started to change around 1993. At that time IVECO was considering the development and launch of the new Daily model, and the technological configuration of the vehicle was to be highly modernized and improved. Therefore since 1993 Alpha has been gradually involved in cooperating with IVECO in order to design and develop a new configuration of component A. In 1995 IVECO officially started the activities of the S-2000 project, whose aim was to undertake a deep renewal of the Daily range following these basic principles:

- modularization of components;
- establishment of co-design partnerships with suppliers;
- adoption of the platform approach.

Alpha was chosen to become a full partner in the new project because of IVECO positive assessment of its technological expertise and past performance as IVECO supplier of component A. In fact co-design capabilities within the S-2000 project have become one of the main criteria to select IVECO suppliers, together with quality, level of service, price competitiveness and financial stability. Such criteria were already informally implemented by IVECO units, but the S-2000 project has provided the opportunity to fully codify and diffuse them inside the firm. In the case of module A supply the "Light Vehicles" Business Unit has been in charge of supplier selection and final evaluation, while the Suzzara plant managed negotiations and the whole implementation of the supply agreement afterwards.

Within the new supply framework IVECO strengthened its "contractual dependence" with its component A supplier: Alpha remained the exclusive supplier and the length of the contract has been increased over five years duration, which is a superior limit to the new contract range introduced for S-2000 project partner suppliers (3-5 years).

In return for the guarantee of these supply conditions IVECO required Alpha to become a full partner in terms of technological cooperation, production organisation and delivery practices<sup>2</sup>. Within the S-2000 project IVECO aimed to develop extensive modularization in terms of product configuration. Such new product philosophy had two main implications. The first one has been the need to set up component teams within the S-2000 Platform where all the technical and organizational competencies - including those of supply partners - were available and adequately integrated in order to guarantee the best performance for all subsystems. The sharing of knowledge and information was deemed crucial for implementing effective and efficient co-design activities. The development of co-design activities for module A - previously component A - with the involvement of Alpha as a module supplier has therefore implied for IVECO the need to undertake new organizational procedures. At the beginning Alpha was due to undertake and coordinate both design and production activities of module A, thus allowing IVECO to focus on other projects. However during the implementation of the co-design activities both IVECO and other subsystem suppliers had to be directly involved to overcome design problems. IVECO allocated dedicated human resources to manage design development for each subsystem; the same approach was pursued by Alpha which had a Resident Engineer in Torino for developing design interaction with IVECO and other second-tier suppliers.

The second main implication has been the attempt to foster production integration between IVECO and its partner through the implementation of the “colocation approach”. The development of Alpha’s colocation in Suzzara plant followed similar patterns when compared to co-design cooperation. Alpha had to set up a completely IVECO-dedicated assembly unit inside the Suzzara plant and undertook substantial investments in terms of equipment and personnel training. On its side IVECO started the development of innovative procedures which conferred Alpha a higher degree of responsibility in managing material flows, also because the control of the component A warehouse was shifted to Alpha. Firstly, Alpha was put in charge of assembling parts and components previously assembled by IVECO units within the plant; secondly, IVECO involved Alpha in the implementation of the “goccia-goccia system” (“drop after drop system”), a delivery procedure based on three hours deliveries on production lines which was due to replace the daily supply from off-site. In order to make more efficient information flows concerning material procurement, Alpha has been allowed access to the information system (so-called IMIS system) for material planning and to specific parts of the Purchasing information system. However, even though Alpha was responsible of the management of the whole module supply and delivery, IVECO often had to be involved in problem-solving activities with second-tier suppliers for ensuring compliance with delivery schedules.

The new bilateral relationship has required the setting up of appropriate organisational mechanisms. In addition to the team involved in the S-2000 Platform, at the Suzzara Plant a Working Group composed by IVECO and Alpha managers and technicians has been created in order to monitor the evolution of the partnership, with high emphasis on quality levels and cost reduction. It should be highlighted that the new relationship between IVECO and Alpha,

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<sup>2</sup> This paper focuses mainly on the evolution of IVECO’s capabilities (as the buyer firm). For a detailed analysis of Alpha’s upgrading process of technical and organisational capabilities see Zagnoli and Pagano (2001).

which could be viewed as partnership, is still in the making in terms of IVECO's personnel perception. While some technicians view the Alpha unit almost as a plant internal unit, other IVECO technicians still consider Alpha as an "external supplier", and this "image" still shapes their behavior towards Alpha. However a very diffused perception is that the partnership between IVECO and Alpha is a long-term one, whose end would be very costly and difficult to manage.

**Table 1.- Evolution of supply chain practices concerning component A in Italy**

| Supply chain category          | Supply chain practice in Italy   |
|--------------------------------|--|
| Make/Buy                       | Local sourcing   |
| Product configuration          | Shift from supply of "raw" component to supply of a module   |
| Supplier selection criteria    | Increasing emphasis on quality, level of service, product development capabilities, price competitiveness and financial stability  |
| Production organisation        | Shift from production in Northern Italy to colocation in Suzzara   |
| Tiering of suppliers           | Within the S-2000 project the supplier is increasingly responsible of managing second-tier suppliers and monitor their performance |
| Product development            | Shift from no supplier involvement to the development of co-design partnership for module A  |
| Number of suppliers            | Single sourcing since 1985   |
| Length of contracts            | Shift from one year contract to long-term contract (more than five years)  |
| Delivery                       | Shift from daily delivery to implementation of the "drop-after-drop system" with IT integration                                    |
| Quality control                | Increasing supplier full responsibility for components/modules quality   |
| Main organisational mechanisms | Supplier involvement in the S-2000 platform and establishment of a Working Group on module A                                       |

### **Evolution of component a's supply to Naveco (china)**

In 1986 IVECO and Yuejin Motors Corporation (YMC) started an industrial cooperation: IVECO allowed YMC to produce light vehicles under license and set up an extensive training program - in cooperation with the Italian Foreign Ministry - to be implemented over two years for about 400 YMC employees. Such transfer of technical and organisational knowledge focused mainly in the area of production. Within this agreement IVECO was to supply CKD kits to YMC, which was in total control of the supply network. In this phase the component A was supplied to Naveco by Alpha as a CKD supply to be sent from IVECO units in Italy.

Therefore between 1986 and 1996 IVECO has been a component supplier for YMC; its main objectives were to develop a trading cooperation and acquire over time increasing knowledge about the business environment and market evolution patterns. The management of this relationship has been mainly implemented by the IVECO Representative Office in Nanjing, whose role was also to provide technical assistance to YMC. During this period YMC developed its supply chain network which was based on double sourcing principle.

After 1992 IVECO displayed more interest in expanding its presence in China. The overall international strategy was to set up production poles in emerging markets, with major

investments and transfer of know-how. In 1995 IVECO and YMC have signed the agreement to set up Naveco, a 50/50 joint-venture based in Nanjing which started operations in January 1996. Naveco was not a greenfield operation because it largely involved facilities, equipment and personnel transferred from YMC to the new venture<sup>3</sup>.

The vehicle produced in China since 1996 is a combination of Daily Model Year 1989 and Daily Model Year 1996, with a high number of local modifications due to the characteristics of the local market and to the technical capabilities of Chinese suppliers, given that Naveco has often had to adapt the choice of the components' technical features to the locally available supplies. Also the vehicle configuration and variety show remarkable differences when compared to models produced in Italy: Naveco produces a maximum of 100 Daily variants, and the range is almost entirely concentrated on the Bus version, which has been highly requested and appreciated in China, while in Europe it has always represented a marginal share of total production.

With regard to supply chain management, negotiations determined that the IVECO-appointed managers as Vice General Manager of Industrial Operations and as Vice General Manager of Engineering would have had the overall responsibility of production/purchasing activities and of the engineering/quality areas respectively (see Figure 1). A YMC-appointed manager would have the control of the Purchasing Department - under the control and supervision of the Vice General Manager of Industrial Operations. In terms of suppliers management, it was agreed that IVECO and YMC were to be responsible of managing "internal suppliers", while Naveco was to manage "third suppliers"<sup>4</sup>.

At the beginning of the cooperation between IVECO and YMC CKD kits represented about 95% of the total inputs in value. After setting up the joint-venture in 1996 both partners pursued an increased local content level in order to meet local content rules and also to reduce costs which were very high because of imported components. Therefore IVECO changed its policy toward Naveco by reducing overtime the CKD supplies and supporting the increase in the level of local content. Such a shift of supply policy has meant not only involving local "external" suppliers but also increasing the value of supply by YMC: about 50% of components in value in 1999 was supplied by YMC. The growing externalization of input supply caused 2001 imports level to be reduced to about 15% of the total input costs, with YMC providing 30% of inputs and local third suppliers providing 55% of total inputs.

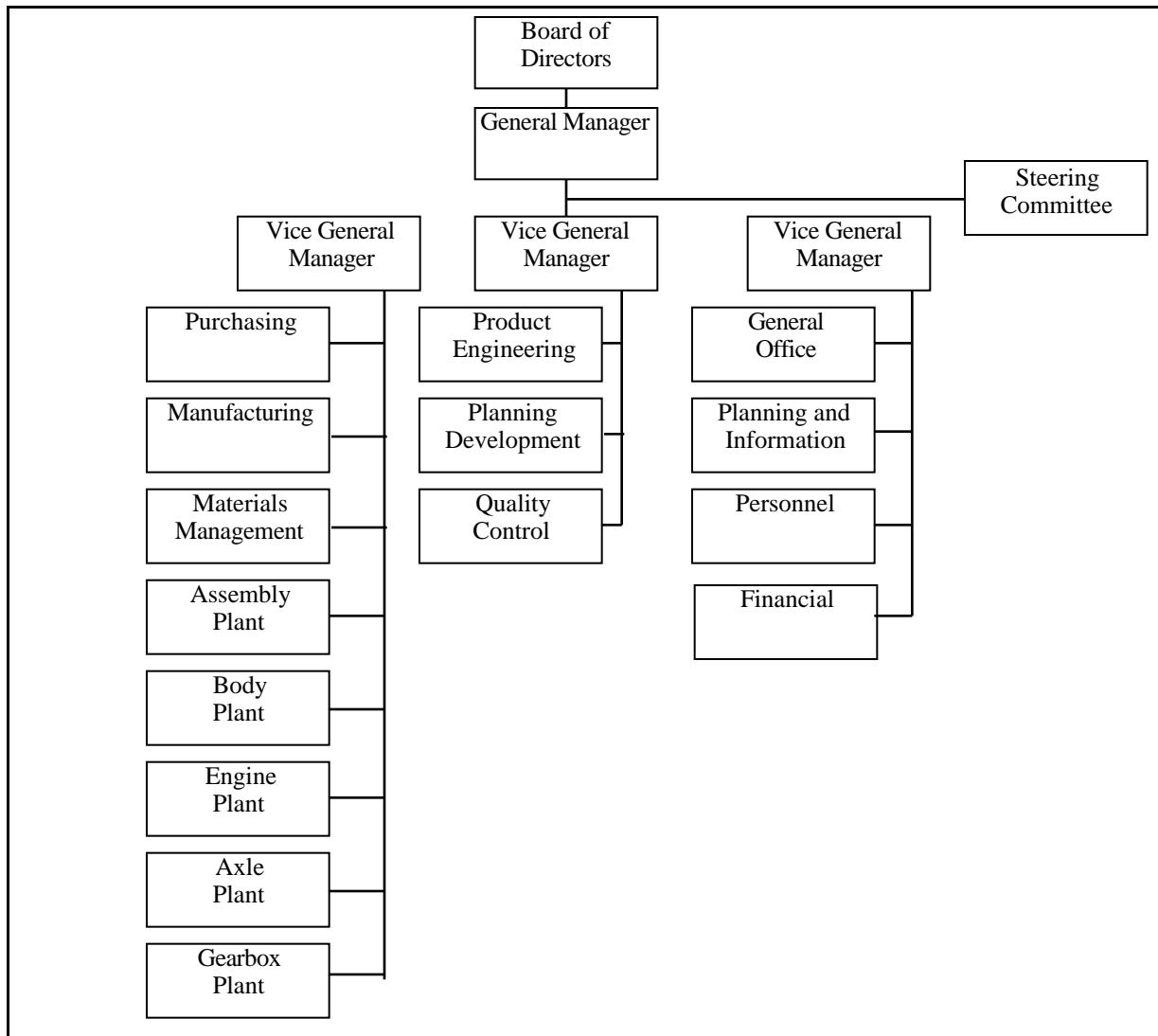
Within this new scenario IVECO managers recognised the need to introduce in Naveco SCP in line with IVECO standards. This is because the overall IVECO long term strategy for its operations in China was to export components and vehicles to Europe and emerging markets, and therefore costs and quality standards had to be adequate to make the vehicle internationally competitive.

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<sup>3</sup> According to Chinese foreign investment law foreign vehicle makers were not allowed to set up wholly owned enterprises in China and could not have the majority of equity joint-ventures.

<sup>4</sup> "Third suppliers" material is divided into the following six categories: complete units, electrical components, non-metal components, engine components, chemical products, metal-pressing.

Figure 1.- Naveco organizational structure



Source: Naveco

Both IVECO and YMC realized that importing component A from Italy was too expensive because of transportation costs and too difficult to manage due to transportation hurdles. Another reason for promoting the local supply of component A was the degree of complexity of managing imports of CKD: Naveco has to involve YMC Import/Corporation for the purchase of CKD kits and to interact with Chinese authorities for complying with all import regulations.

Therefore market research and suppliers evaluation activities started in the second half of 1998. IVECO and YMC considered over time two main options for the “localization” of the production of component A:

1. Alpha's involvement within a “follow sourcing” scenario in cooperation with local Chinese suppliers (e.g. a joint-venture);
2. the involvement of local Chinese suppliers to be supported in their upgrading effort.

While IVECO was highly concerned with the technological and quality aspects, YMC - appointed managers were very focused on price competitiveness. One factor that shaped the selection process has been the difficulty in obtaining and processing information by Chinese suppliers, which often follow different business and accounting standards. Negotiations involving IVECO, YMC and Naveco managers and engineers lead to pursue the latter option and to select Beta, a Chinese supplier which won the competition against Gamma (another Chinese supplier). During the selection and evaluation process various IVECO managers (from the Strategy and Development Division and from Purchasing Suppliers Quality at the IVECO HQ in Torino) and IVECO-appointed managers in Naveco visited both Beta and Gamma. Some of the Chinese managers were impressed by Gamma's advanced technology, while other Chinese and Italian managers were confident that Beta had better technological know-how and experience. IVECO's efforts lead to select Beta, which was positively evaluated in terms of logistics, product development and production process capabilities and price competitiveness. Beta is a diversified company located in Suzhou - close to Naveco's plant in Nanjing - which already supplied other plastic components to Naveco and had also other important international customers such as the Japanese company Isuzu and the European firm Philips. It seems that Beta could be classified as an "independent" supplier in terms of possible proprietary or institutional linkages with YMC.

Naveco's Engineering - whose role has shifted from dealing mainly with the production process to working on the development of the local supply base - gave drawings and specifics to Beta to set up the necessary equipment and production process. In April 2000 Beta started to supply component A to Naveco. The component A has been classified by Naveco standards (which are the same as IVECO's) as a "Class A" component in the light of its relevance and importance for product configuration. Moreover, in the case of component A Naveco does not follow the general - but not compulsory - rule to have two suppliers for "Class A" components, while it follows the one-year contract rule implemented by Naveco with regard to contract length. Naveco's approach to local sourcing - which is supported by IVECO-appointed managers - is to have more alternative options in terms of supply sources and more contractual flexibility because price and quality levels available in the local market are subject to fast change, both because of the uncertain level of Chinese suppliers' capabilities and of the growing availability of foreign-invested automotive suppliers.

After the start of the supply to Naveco, the management of the supply relationship with Beta has been under Naveco control, without further involvement by IVECO HQ. In terms of product variety the component A supplied by Beta has less variants when compared to Alpha in Italy. Beta is responsible for the supply of some of the components - with the exclusion of the most sophisticated and complex ones - to be assembled with component A. Its supplies are delivered according to production requests (once or twice a week) and are subject to sample control when entering the Naveco assembly plant. Communications between Naveco and Beta are implemented also through electronic mail. According to IVECO-appointed managers it seems that Beta supplies have been adequate in terms of technological level, quality and price. Beta's top management has earned a good reputation among Naveco managers also because of its business-oriented approach in line with Western business behaviour. The supply of the component A for the current Daily is scheduled to last until

2004. In the words of an IVECO-appointed manager, “component A has become a laboratory” for the implementation of innovative organisational solutions in Naveco. The management of component A supply is important because it represents a situation where IVECO managers had an opportunity to implement SCP more in line with IVECO and Western standards. In terms of supply network development and composition in 1996 Naveco inherited the supply network already set up by YMC, with a large percentage of components produced internally by the Chinese partner. Therefore IVECO managers had to start a very challenging effort to win the support by the Chinese partner and the YMC-appointed managers along two dimensions.

Firstly, Naveco was to open the supply network to new capable suppliers, particularly to foreign-invested automotive firms which have been increasingly involved in the Chinese industrial system. Such “opening” approach by IVECO-appointed personnel has become stronger also because of the opportunities and changes in the market and industrial structures that will follow China’s full access to the World Trade Organisation.

Secondly, Naveco was to make substantial progress in implementing SCP in line with IVECO standards. Language and cultural barriers represent important factors which have shaped such transfer of knowledge and practices. On one side Chinese managers and technicians were not used to Western business practices, on the other side IVECO managers were not able to communicate directly with their Chinese collaborators for daily operations. Such transfer of knowledge has been implemented mainly through tacit - rather than codified - knowledge transfer by IVECO expatriates over the years (especially in the area of quality evaluation and logistics). The effort by IVECO in upgrading the SCP capabilities in Naveco has been shaped by the evolution of IVECO’s involvement in industrial operations. Before the establishment of the joint-venture in 1996 the local IVECO Representative Office was in charge of technical assistance to Naveco, that is the transfer of organisational knowledge in the areas of purchasing and materials management and the support for the management of CKD imports. After 1996 IVECO managers have been in charge of industrial operations and engineering and in 1999 the IVECO manager in charge of technical assistance at the IVECO Representative Office has been posted in Naveco to strengthen the area of Logistics and Materials Management.

Over the last few years the Chinese market for commercial vehicles has grown both under a qualitative (increasing sophistication of user needs) and quantitative dimension (about 700.000 units sold in the truck market in 2001). In the light of the changing features of the Chinese market both IVECO and YMC started to discuss about possible innovations to be implemented in terms of product strategy. Within the S-2000 project the product strategy did not have a truly global dimension: the new vehicle had a distinct “European identity” and there was no significant effort in developing specific models/versions for emerging markets. Therefore in 1999 IVECO and YMC started negotiations over the product strategy to be pursued for the Chinese market. At the beginning YMC displayed a strong interest for introducing the S-2000 Daily in order to face an increasingly competitive local market. IVECO instead considered the S-2000 model not adequate for the Chinese market for being too sophisticated and for lacking a bus version. However both partners agreed on the need to work

together to renew the “Chinese” range of the Daily. In order to achieve this objective a joint IVECO-Naveco organisational platform has been created to merge efforts, competencies and to foster information flows. Such organisational mechanisms represented completely new practices for Chinese managers, who had limited experience of flat and horizontal organisations, given the high emphasis in Chinese firms on hierarchy and vertical structures.

Within the platform for the renewal of the Chinese Daily decisions had to be taken to select the component A supplier/suppliers. Component A would not be supplied as a whole module, as in the case of Alpha within the S-2000 project in Italy. During Summer 2001 the alternative options suggested for evaluation by the Platform were:

- to transfer the approach developed with Alpha (having one supplier both producer and codesigner);
- to launch an international bid for selecting the design provider and then open the selection for the producer.

In this phase it seems that YMC wished to be more involved in the management of technological dimensions of the vehicle, including design activities and evaluation of external providers of design solutions. IVECO recognised such interest as an important step for further commitment by the Chinese partner in the management of the joint-venture, however it highlighted - in line with previous agreements between the two partners - the importance of keeping IVECO's full control of the product strategy and configuration.

It seems apparent that IVECO management has developed a learning process with regard to supply chain management in China after this first experience with Naveco. In fact IVECO has been implementing a “greenfield approach” within the activities of the platform for the new joint-venture with Chanyang Bus Company for the production of buses in China. In fact IVECO and Chanyang are evaluating together the composition of the supply network. The main organisational innovations are:

- assignment of an IVECO expatriate as Purchasing Manager together with a Chinese partner-appointed manager (co-management of the Purchasing Department);
- full integration of the new joint-venture within IVECO IT systems;
- supply chain reporting systems fully in line with IVECO procedures and standards.

## **Discussion of main findings**

The analysis of the development of the local supply of component A in China by Naveco has shown that IVECO attempted to transfer some of its supply chain methodologies and practices.

Table 2 shows the main findings with regard to the transfer of SCP by IVECO in Naveco within the framework of the supply of component A. In terms of final outcomes it seems clear that the transfer process has concerned mainly dimensions more related to supply chain decision-making (make or buy, supplier selection criteria) and in those areas more linked to the production phase (delivery/logistics, quality control).

**Table 2.- SCP for component/module A in Italy and China**  
**- synthesis of preliminary findings**

| Supply chain category     | Supply chain practice in Italy   | Transfer attempt | Transfer timing | Supply chain practice in Naveco  |
|---------------------------|--|------------------|-----------------|--|
| Make/Buy                  | Local sourcing   | Yes              | 1998            | Shift from importing to local sourcing   |
| Product configuration     | Shift from supply of "raw" component to supply of a module   | No               | -               | Supply of "raw" component  |
| Supplier select. criteria | Increasing emphasis on quality, level of service, product development capabilities, price competitiveness and financial stability  | Yes              | 1998/99         | Increasing emphasis on quality, product development capabilities, price competitiveness          |
| Production organisation   | Shift from production in Northern Italy to colocation in Suzzara   | No               | -               | Production not far from the plant  |
| Tiering of suppliers      | Within the S-2000 project the supplier is increasingly responsible of managing second-tier suppliers and monitor their performance | No               | -               | Naveco manages relations with all component A-related suppliers                                  |
| Product develop.          | Shift from no supplier involvement to the development of co-design partnership for module A  | No               | -               | No involvement in product development  |
| Number of suppliers       | Single sourcing since 1985   | -                | 1999            | Single sourcing since 1999   |
| Length of contracts       | Shift from one year contract to long-term contract (more than five years)  | No               | -               | One year contract  |
| Delivery                  | Shift from daily delivery to implementation of the "drop-after-drop system" with IT integration                                    | Partial          | -               | Flexible (once/twice per week) delivery and adoption of electronic mail for information exchange |
| Quality control           | Increasing supplier full responsibility for components/modules quality   | Partial          | -               | Sample controls in acceptance  |
| Main Organ. mechanisms    | Supplier involvement in the S-2000 platform and establishment of a Working Group on module A                                       | Partial          | 2000/01         | Setting up of a n IVECO/Naveco/YMC platform dealing with supplier selection                      |

In terms of timing it seems that IVECO has attempted to exploit the selections (in 1998/1999 and in 2001) of component A suppliers to implement some of SCP already implemented in Italy, such as local sourcing, supplier selection criteria more in line with IVECO standards, organisational platforms for vehicle range renewal.

Other practices, mainly those related to production organisation, length of contracts, tiering of suppliers, involvement in product development, have not been implemented within the evolution of component A supply to Naveco. It seems that those practices which imply

higher interdependence between buyer and supplier - with the exception of single sourcing - have not been developed yet.

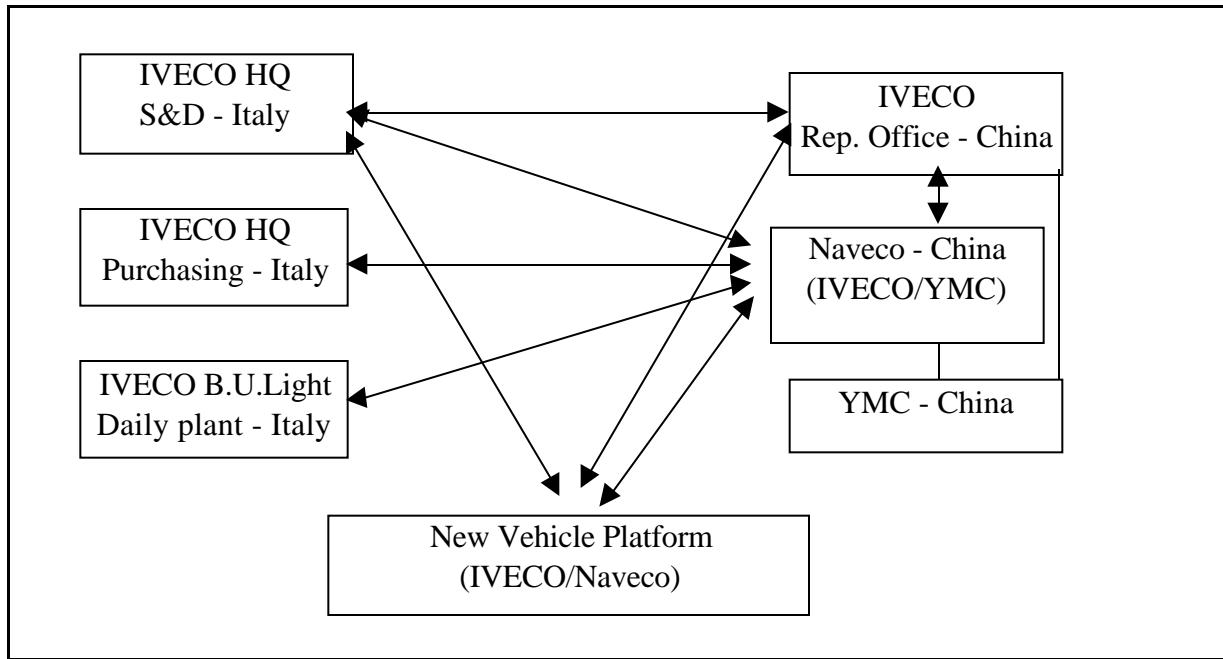
It could be argued that the explanation of such patterns is related to two sets of factors. The first one is represented by the specific nature of the local institutional and economic context. The local institutional setting has shaped IVECO entry strategy (therefore the need to set up a joint-venture) and its effort in developing the local supply network (e.g. the local content requirements).

The low - even though increasing - degree of differentiation and opening of the commercial vehicles' market combined with the local preferences for bus version of the Daily explain the features of the product configuration, which implies limited variety in terms of supply patterns. The low technological and organisational level of local suppliers explains partially Naveco's partial "arm's length approach" in terms of transactional dependence.

The second set of factors relates to the firm's level. It seems that IVECO has followed a "diffused" approach to SCP transfer in Naveco rather than an integrated approach. IVECO has not implemented a major supply chain development program after its direct entry in the automotive industry in China; the Italian firm instead has pursued a gradual and "diffused" approach attempting to implement SCP more in line with IVECO and international standards by focusing on specific projects such as Component A supply and introducing new practices within each functional areas, such as logistics, quality control.

Such gradual transfer of SCP has been implemented mainly through the activities of IVECO expatriate managers and technicians which have interacted on a daily basis with Chinese personnel, therefore transferring supply chain management knowledge mainly with a tacit dimension. The results of the transmission of knowledge in the area of SPC management have been shaped also by the degree of absorptive capacity of Chinese managers and technicians, which had to get use to new practices and methodologies. Such knowledge transfer activities have been highly embedded within the organisational setting, which has influenced the component A supply decision-making process and management (Figure 2). The Naveco proprietary configuration has meant that both IVECO and YMC had to develop cooperative behaviour and increasing trust in order to make decisions about component A supply network in China. Such organisational complexity is well represented by the supplier selection process. In the case of module A supply the Business Unit light has been in charge of selection and final evaluation, while the Suzzara plant has managed negotiations and implementation of the agreement. In the case of component A supply in China, instead, interactions have been developed among IVECO HQ in Italy, Naveco and YMC for selecting, negotiating and evaluating potential suppliers.

**Figure 2.- Network of main actors and interactions on the buyer's side dealing with the supply of component A**



## FINAL REMARKS

Under a theoretical dimension, these preliminary findings seem to suggest that transferring SCP in other countries, particularly in emerging markets, is highly shaped by differences in the local context in terms of institutional system, market evolution and availability of technical and organisational competencies, as the “hybridization” perspective would argue (Boyer, 1998; Vaccà, 1996).

Findings point out also the relevance of product configuration, especially in terms of variety, which has an impact on organisational strategies and practices. The lower complexity of the Chinese version of the Daily when compared to the “European” Daily implies differences in the organisational patterns and therefore on SCP introduced and implemented in China’s operations. In fact the renewal of product configuration meant relevant organisational changes and a “parallel” upgrading of the role of Naveco in IVECO’s international network, showing some features of the “contributor factory” (Ferdows, 1997).

Lastly, the empirical analysis point out the importance of the transfer process, in terms of the nature of knowledge, transfer channels and timing of introduction of various SCP, and of the organisational setting, particularly in terms of degree of control over local operations. IVECO’s effort in transferring SCP has been a highly path-dependent process, mainly with respect to the organisational setting and to the learning process about SCP management in a complex environment. Therefore the SCP transfer process seems to be dependent not only on local context differences but also on the MNE’s strategy and organisational capabilities (Florida, Kenney, 2000). Quite interestingly, the learning process

seems to promote a higher degree of “standardization” of SCP practices, as IVECO’s management of the new joint-venture concerning bus-production shows.

Therefore it could be argued that the literature on organisational learning and knowledge management (Nonaka, Takeuchi, 1995; Argyris, Schon, 1978 ) on one side and on MNEs’ organisational setting for knowledge flows (Kilduff, 1992; Gupta and Govinderajan, 2000) are capable of providing conceptual insights highly useful to examine the issue of SCP international transfer.

The examination of IVECO’s transfer of SCP in its Chinese operations represents a further example of the opportunities and risks that “local” firms - as potential suppliers - in emerging markets could face, as shown in other works (Humphrey and Salerno, 1998; Barnes and Kaplinsky, 1998). The Chinese supplier Beta has been involved in Naveco’s local supply network in the light of its recognised capabilities; however changing product requirements put in danger its position and forced Beta to compete with not only other local suppliers but with foreign firms as well. The growing opening of markets - that also China will undertake in the next few years in the light of the WTO accession - might have a negative impact not only on highly inefficient local firms but also on the growth path - in terms of organisational and technological capabilities - of local innovative and ambitious firms.

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