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Exertion of Power or Division of Work: Managing Knowledge in a Cross-Border Automotive Supply Chain

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Abstract

The perception that large and powerful buyers – like multinational corporations (MNCs) – exert a heavy dominance over local or even transnational suppliers of goods and services has since long been a concern in theoretical and practical argumentation. The concern would even receive more attention if the supply chain crosses geographical and cultural borders, with dominant MNCs on the one end or the other. This "power perspective" (Cox, 2001) may serve well to examine exchange relationships; and it is undoubtedly worthwhile to study adversarial, collaborative and arm's length interactions between buyers and sellers. However, in today's vertical disintegration of production with networks between several tiers of suppliers, the focus should be directed towards quality and intensity of co-operation. With the overall objective being to reduce time and cost, the supply networks that have been established in, e.g., the automotive industry, will only fulfill their purpose through long-term collaborative approaches. This study explores if such a proposition is valid.

The field that was chosen for an empirical investigation is the relatively new supply network set up by German and French carmakers (Original Equipment Manufacturers, "OEMs") in the area surrounding Bratislava, the capital of Slovakia. The promoters are MNCs and local governments, and these "big players" dominate in that undertaking. Goods and services are procured, among others, from SMEs, locally and from neighboring areas. One such neighboring area is Vienna, where a number of automotive suppliers is headquartered; another one, about 100 miles away, is the Upper Styria automotive cluster. The paper explores how these linkages build and exchange specific knowledge across the border to enhance competitiveness of the overall supply chain. Knowledge, in this context, comprises practicalities related to the issues of order placement, order processing, communal product development, pricing, billing and delivery, as well as knowledge elaborated in complex collaboration propositions. Examining whether the underlying process-models are homogeneous, supplier- or client- or cluster-specific, and how communal projects are dealt with, can lead to determine if the handling of knowledge enhances the power position of one party or develops division of work. The situation which is researched is especially unique because it combines the high-tech OEMs in a country that just underwent the transition to a free economy with suppliers of goods from the long established industrial market environment of Austria, and furthermore because Slovakia is a "dual economy", with a well developed industrial production and a still less developed service industry. But it is from this service that the OEMs and their cross-border suppliers must draw additional providers for logistics, information technology, etc.

The organization of the paper is as follows:

An introductory overview is given on current issues and on previous research. Findings that address the management of knowledge across organizational borders are rather sparse, and even less research has been done on the issue of power-control in cross-organizational multi-lateral knowledge flows. Only recently, there are approaches which address impacts that go beyond the dyadic view (Christiaanse, van Diepen and Damsgaard, 2004), and their key question is whether multi-layered networks lead to new mechanisms of integration and governance. With regard to SME-participation, it has been argued that SMEs are just managed at arms-length by larger customers and consequently view supply chain management as a one-way-process (Quayle, 2003). These studies indicate that SMEs lack in effective adaptation from traditional adversarial relationships to the modern collaborative "e"-supply chain. Other studies are more positive: Even though SMEs may not often be in a position to dictate the direction and nature of such relationships, many of them are seeking to be more creative about the networks they form with customers and suppliers (Jenkins 2003).

The field study presented here is based on a questionnaire and interviews. The overall impression is that the supply-chain under consideration is not substantially impacted by a dominant party in day-to-day matters, but that the OEMs tend to overriding when it comes to extra-routine collaboration. It seems that high performance production clusters implanted in a transition economy have yet to develop mechanisms of better inter-firm knowledge management.

1. Ambiguities of "power" in inter-firm linkages

The phenomenon of power in economics has been researched over some decades by a wide range of scholars, from sociologists to econometricists and to antitrust jurists. Max Weber's classical definition of power as "the probability that one actor in a social relationship will be in a position to carry out his will despite resistance, regardless of the basis on which this probability rests" (Theory of Social & Economic Organization, New York,1947) can still handle the key issues, including the behavioral and structural concepts of bargaining schemas, organizational and capitalist authority relations etc. However, according to Stiglitz (1993), nowadays' "mainstream economists have not only found concepts like [...] power to be useless in explaining economic phenomena, but they worry about introducing such emotionally charged words into the analysis". This may have changed through the works on "contested exchange" of Bowles and Gintes (1999), and, on the level of microeconomics, through the renewed interest in "buyer power" as expressed by the recent European cases and inquiries in the retail industry, especially in the dealings between the manufacturers and the retailers of fast-moving consumer goods (e.g. Inderst and Wey, 2002).

For the purpose of this paper, the phenomenon of power must be approached from the viewpoint of conflicting interests: Any relation between two parties contains mutual as well as conflicting interests, and the division of tasks and the underlying arrangements and technologies are the object of continuous negotiation. The participants are often assumed to bend this negotiation in a way that favors their own specific interests and strengthens their positions: firms with powerful positions are inclined to exploit and preserve the present structure of a relationship or network, while firms with unfavorable dependencies have an interest to alter the structural conditions. This "resource dependence view" (Pfeffer and Salancik, 1978) would not withstand the fact that in many buyer/supplier relationships advantages can only be achieved through sharing of information and far-reaching integration of data, which often is synonymous to open book accounting (Monczka, Petersen, Handheld, and Ragatz, 1998). Thus, the „power" of a network will also depend on the strength of communication. On the other hand, volatility, disruption and opportunistic conduct will definitely occur in any firm's supply and demand environments, and coercion is required to maintain orderly linkages in such times (Vickery, Calantone and Droge, 1999). Here, the dominance of a resourceful partner will prove beneficial for all other parties (Brass and Burkhardt, 1993), and even though there may be an "interplay between change and stability" for some time Håkansson, and Johanson, 1998), all parties will become aware that if relationships are not stable enough, no one will take the risk of making further commitments. Therefore a certain degree of overall stability will always have to be attained.

The automotive industry is a good example to demonstrate that while powerful firms may try to exploit their network position, the less influential firms can put great effort into reducing their dependencies and to undermine the position of their exchange partners: There was the famous case of the supplier of door locks to Ford whose actions caused a severe standstill in 1998[1], and while one might think that this event would have terminated the relationship, the two parties still do business with each other today. A less conflicting way for one party to balance out asymmetrical dependence on another party is often sought in cooperating or merging with firms which control another part of the supply of the same resource. In so doing, the firms can act as a single coordinated unit in dealing with their more powerful exchange partners and hence mobilize what John Galbraith has called "countervailing power" in his famous 1952 book "American Capitalism" (Cook and Emerson, 1984).

Other than the resource-based perspective, the institutional and the negotiated-order perspectives arrive at stability and balancing of powers in inter-firm linkages through evolution rather than contest: Networks "are driven to incorporate the practices and procedures defined by prevailing rational concepts of organizational work ... increasing their legitimacy and survival prospects

[1] „Ford works resume production after three-day interruption": www.germnews.de/archive/dn/1998/06/17.html

independent of the immediate efficacy of the acquired practices and procedures" (Meyer and Rowan, 1991). The argument (corroborated by evidence in many supply chains) is that even a powerful organization will prefer homogeneity in a network over enforcing its own rules and regulations and thus turn to decoupling structural elements of control from day-to-day inter-firm activities (e.g. in collaborative forecasting, replenishment and order processing). Meyer and Rowan would call this the "logic of confidence and good faith" (Meyer and Rowan, 1991, p. 57), and even in networks where a – powerful – hub firm is needed to orchestrate linkage activities (which definitely produces some structural heterogeneity), the orchestrator and the peripheral actors will all follow the same code (Dhanaray, 2006). Likewise, a negotiated order is achieved when all parties accept the existence or the potential of interdependence as well as the need for communal investment and working rules. As time evolves, there will be continual permutations to this order (Strauss, 1993), but in the end there will always be common understanding. One other kind of "permutation" is out of the question at least in the automotive supply chain: Vertical integration seems not to be an issue, and, economically, disintegration is more advantageous. This is the chance for SMEs (Liker, and Choi, 2004).

The chance for SMEs arises when one looks at the skills that are required for managing partnerships in supply chains. These competencies are opposed to the traditional purchasing skill-set of product knowledge, tactical negotiation, and brinkmanship, which were key to success for the traditional arms-length contractual arrangement model for buyer-supplier-relationships and which employees of large corporations still tend to develop. SMEs are in better position to enhance the partnership performance by effective teamwork, better use of information, enhancing social skills, interdependent planning, and problem solving (Blancero and Ellram, 1997; Cullen, Johnson and Sakano, 2000). In effect, SMEs and large enterprises will use similar supply chain management processes in the areas of demand management, order fulfillment, manufacturing flow management, product development and quality management, and returns management. While large firms will use their management processes to achieve multiple performance outcomes, SMEs will focus on performance requirements. The primary differences between large firms and SMEs are in the scope of information and product flows. Large firms have a much larger scope for these flows, through the complex relationship requirements within their supply chains, and they will tend to be timelier in exploiting available technologies, in contrast to SMEs (Lambert and Cooper, 2000). But it all comes to effective management of knowledge.

2. The contribution of knowledge management to improve inter-firm linkages

Knowledge management, having been looked at as the "next big thing" (Carr, 2004) in the late 1990s with lofty expectations for holistic approaches and perception, has evolved into a concept of highly pragmatic value within less than a decade: Today, "practical" knowledge management, adopted by the IT-industry to avoid the shortcomings of the old information management processes, provides a wide array of methods and techniques that strive to capture context, real-time data and interfaces within a company and from a company to its customers, its suppliers and competitors. This IT-support and the underlying disciplines of, e.g., data mining, statistical analysis and forecasting, and are no longer a novelty and the respective term „Business Intelligence" is no longer a catch phrase. They are becoming instrumental for organizations to remain competitive in their core businesses. Apart from the overall trend demonstrated through the continuous development of technical solutions offered by leading software producers, five issues can be identified which drive the evolution:

(1) Overcoming tacitness and complexity within and between corporations

Knowledge transfer within organizations has been found to be developing rapidly on the technological end, but it seems to be "sticky" on the motivational end and when it comes to tacitness and complexity - as opposed to explicit knowledge and codifiability (Sundaresan and Zhang, 2002). Information technologies can effectively alleviate this "stickiness" by process facilitation, conversion of tacit into explicit knowledge and functional enablement (Alavi and Leidner, 2001). The non-technological issue, however, is far more intricate: Process improvement

and enabling is not simply a matter of incremental changes and does not simply lend itself to automation and repetition (Rampersad, 2004), and thus all Business Intelligence endeavors must support and guide individuals in their various roles to fundamentally rethink their work patterns, their relationships and cognitive frameworks. This is the “soft side” of Business Intelligence, and it has yet to become a field of research and practical application (Mariotti and Delbridge, 2001).

(2) Extended enterprise and networks

Connecting firms with their partners and customers is shifting the focus of entrepreneurial knowledge management towards expanding this concept externally. In research, a typology of cross-organizational networks of information and knowledge flows has been developed. One concern is the locus of control on the processes that enable knowledge flow, a second concern refers to the tradability of the streams of knowledge that flow among organizational entities (Apostolou, Mentzas, Baraboutis and Papadopoulou, 2004). Four types of knowledge networks have been examined: "knowledge communities", "knowledge chains", "knowledge suppliers" and "knowledge markets" (Bell, Giordano and Putz 2002; Gilsing, 2006; Mentzas et al. 2006; Mellewigt, Hoetker and Weibel, 2006). Frameworks have been developed to evaluate the business models, roles, and processes of knowledge exchange and of knowledge trading platforms (Müller, Spiliopoulou, and Lenz, 2002), and multi-dimensional holistic approaches are envisaged by academics and practitioners encompassing all stages of collaboration (initiation, management, operational life and dissolution), all phases of extended products’ development (conception, design, prototyping), and all enterprise assets in any type of business network (people, IT-systems, processes and knowledge assets)[2]. “Keiretsu”-effects and the impact of business group affiliation on firm performance are now being explored from knowledge management and business intelligence perspectives (Sambharya and Banerji, 2006; Pollitte, Miller, and Yaprak, 2006), and the increasing practical interest in studying the business processes and information technology of inter-organizational relationships can be observed through the abundance of academic publications sponsored by the IT-industry.

(3) Involving third party services

One of the paradoxes of knowledge management is that, while it allows to improve and support complex business practices within a corporation, the necessary resources to implement this support are becoming increasingly scarce. This is the reason why it becomes less and less effective to perform some of the key business functions in-house. Whereas the use of third parties has long been practiced for non-core areas, a tendency has appeared in recent time to outsource tasks that had traditionally been considered to be strategic. These include, for instance, development work, technological research and even database marketing (McDonald, 2006). One option is to enter into alliances with peers, another option is to connect to service providers.

Whether cooperation takes place in a peer-to-peer network or with service providers, trust is considered to be a major issue. The abstract notion of “trust” as “an assumption or reliance an the part of A that if either A or B encounters a problem in the fulfillment of his implicit or explicit transactional obligations, B may be counted on to do what A would do if B's resources were at A's disposal” (Thorelli, 1986) comes to life when we consider modern instruments of collaboration: Working with a vendor managed inventory, for example, requires all the ingredients enumerated above (Siemeniuch and Sinclair, 2000), and often the implementation of collaborative IT is lagging behind the development and proposals of IT-service- firms due to deficiencies of trust (Monczka, Trent and Handfield, 1998, p. 85). There is progress, however: According to a study of PriceWaterhouseCoopers (PriceWaterhouseCoopers, 1999, p. 34), the following percentages of large US companies make specific data available to their business partners:

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[2] One such project, on a European scale, is the E4 STREP („Extended Enterprise management in Enlarged Europe Project)“ involving various universities, government agencies and IT developers. Cf.: www.biba.uni-bremen.de/projekte.html

Types of data made available	1998 (%)	Forecast 2001 (%)
Inventory and capacity	50	75
Demand history and forecasts	30	72
Order status	30	66
Project/product design/ specifications	34	54
Financial information	3	20

Recent surveys corroborate this progress (Robbins, 2006; Kampstra and Ashayeri, 2006), and so does the case studied in this paper.

When it comes to service providers, two thirds of those who use outsourcing reported in 1999 that they have achieved their goals, but still, the same report states that ten percent were very disappointed (Sturrock, 1999). In a similar report of 1998, relating to knowledge gains from outsourcing supply chain management activities, the most frequently cited benefit, apart from lower cost and improved operational efficiency, is access to expertise and market knowledge and data (Dornier et al., 1998). In logistics, at least, both accounts have been overruled and expanded through the massive incorporation of service providers: As of 2005, Third Party and Forth Party Logistics providers have been contracted by about 80 % of logistics executives in the U.S. ; significant use of such providers is reported from other regions, too, and implementing the technologies offered by them has become the dominant factor for competitiveness as perceived by logistics executives (2005 Third Party Logistics Report). Third Party Logistics - 3PL - is the management of logistic services beyond transportation, including, e.g., storage, transshipment, value added services as well as the use of subcontractors; Fourth Party Logistics - 4PL - is the integration of all companies involved along the supply chain through one service provider entrusted with the planning, steering and controlling of all logistics procedures including the flow of Information.

The need to collaborate more widely and more openly in manufacturing is a consequence of the widespread migration from manufacturing-based "push" logistics systems to "direct-placement" or "pull" networks (from the traditional "manufacture-to-supply" or "inventory-based" logistics models to "manufacture-to-order" or "replenishment-based" logistics models; cf.: Schönsleben, 2003). The „pull method of production“ essentially is collective „two-way-management“ which is far a more than mere feed-back as in the „push method“, and this extends in cascades from the executive level to the shop-floor (Johnsen et al., 2000). It is apparent that a context like this involves Business Intelligence systems and Business Intelligence technology.

(4) Knowledge networks across geographical borders

The cross-border dimension adds one main issue, i.e. cultural differences. On the other hand, cultural differences subsist in any network: The distance of business culture between, for instance, a large pharmaceutical firm in the U.K. and its national subcontractors may not be smaller than the distance of business culture between this firm and another large pharmaceutical firm in Japan. There are, however, additional obstacles for data exchange and technology implementation when geographical borders have to be crossed. Failures of inter-organizational supply chain management that stem from cultural barriers have been narrated for some high-tech ventures Macbeth and Ferguson, 1994), and “mapping the DNA” is reported to be a primordial prerequisite (Cox, Sanderson and Watson, 2000). On the “hard facts” end, serious inaccuracies of forecasts, insufficient skills, the lack of process equipment and technologies and inadequacies in transportation and telecommunication infrastructure have been quoted (Dornier et al., 1998, p. 224), and little progress has been noted over the years in some of these areas (Poirer, 2002; Pellegrini and Martini, 2005). By contrast, “soft” industries like accounting and legal services seem to have successfully mastered the barriers of large distance (Beaverstock, 2004). But there is no

way out of the dilemma, that "knowledge in Washington differs from knowledge in Kabul"[3], and even throughout the European Union, transnational infrastructures have yet to be converted into a robust base for efficient networking, an undertaking entreated, among others, by the *Inventing Europe Initiative* of the European Science Foundation[4].

(5) Promoting Specific Areas (CIM, CRM, CALS, SRM, SCM)

Studying knowledge management as well as devising IT tools to support it, is more comfortable and more effective when this refers to a specific area of business (Grieger, 2003; Apostolou, Sakkas and Mentzas, 1999), like Computer Integrated Manufacturing (CIM), Customer Relations Management (CRM), Computer-Aided Acquisition and Life-Cycle Support (CALS), Supplier Relations Management (SRM) and Supply Chain Management (SCM). On the other hand, one big feature of knowledge management is its holistic approach, and also, IT support which is directed to one area may very often concern others. So, seamless collaboration of, e.g. Supply Chain Management (SCM) is necessary with, e.g., Economic Resource Planning IT (ERP), and, vice versa, improvements in ERP will be much better attained if the theoretical reasoning behind ERP and operations research is combined with the processes and procedures of SCM logistics (Knolmayer, Mertens and Zeier, 2002, p. v).

One factor which favors area-specific knowledge management over company-wide endeavors, is that organizational learning can develop much easier where homogeneous professional skills contribute to creating a strong network identity. Expert production knowledge would be such a value, or specific R&D wisdom, as well as supply management. Also, across company borders, knowledge diffusion occurs more quickly in an environment where methods are established that (*1*) motivate members to participate and openly share valuable knowledge (while preventing undesirable spillovers to competitors), (*2*) prevent free riders, and (*3*) reduce costs associated with finding and accessing knowledge. One such case is Toyota, and, besides many other insights into Toyota's ability to effectively manage knowledge-sharing processes (e.g. Dyer and Hatch, 2006) a new study has provided evidence that suppliers do learn more quickly after participating in Toyota's knowledge-sharing network (Nobeoka, et al*,* 2000). Here, SCM logistics, has both strategic and procedural contents.

3. Knowledge management and industrial clusters

Clusters, i.e. geographic concentration of interconnected businesses, suppliers, and associated institutions, are generally considered to increase the productivity with which companies can compete, nationally and globally. They are often agglomerated around a focal business, sometime initiated by an MNC or another powerful player. Categories range from sectoral clusters (businesses operating together from within the same commercial sector e.g. marine in SE England and photonics in Birmingham, UK, horizontal clusters (interconnections at a sharing-of-resources level, particularly sharing of knowledge, and vertical clusters (between suppliers and their customers). From the perspective of a company that supplies goods or services to a sectoral or a horizontal cluster, the very existence of this cluster may help to reduce the knowledge perspectives required for acquiring or fulfilling orders (Deacon et. al, 2005). Notwithstanding these advantages, there are always tendencies to bar competitors from making full use of network achievements at least in sectoral clusters (Cooke, 2002; Caniëls and Romijn, 2005); on the physical side, collective transporting arrangements by members of a cluster very often are not accomplished (Naim et. al., 2006), and a study focusing on newly emerging industrial clusters in Germany demonstrates that process innovations and co-operation have a high share in the initial phase and tend to become restricted in later phases (Brenner, 2005). The same might apply to supplier parks in the automotive industry (Pfohl and Gareis, 2005).

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[3] „Why knowledge in Washington differs from knowledge in Kabul". International Symposium, Heidelberg, Klaus Tschira Foundation, Sept. 2002.

[4] http://www.nwo.nl/subsidiewijzer.nsf/pages/NWOA_6PLC4G

With regard to the Bratislava automotive cluster which will be presented in detail under section 5 of this paper, three consecutive surveys carried out between 1990 and 1998 for Slovak enterprises have shown that internal and external barriers to innovation remain strong even though some improvement has been achieved in managers' awareness of the importance to co-operate for innovation (Šestáková and Hekelová, 2003). Going even further, a recent Tilburg University review argues that sometimes clusters “inhibit rather than promote innovation” (Nooteboom, 2006), and the reasoning is that for ‘novel combinations’ a certain degree of diversity or “cognitive distance” is a crucial condition. Thus, when the skills are not much different as would occur in a sectoral cluster, familiarity might breed trust but it might also reduce learning potential. One rationale would be that “explorative learning” cannot prosper when each member of a cluster works in the same field, while “exploitative learning”, i.e. building and applying knowledge for e.g. process improvement, economies and cost cutting, thrives well in such an environment. This would not be contradictory to the Toyota experience (see above), because there the emphasis is on increasing efficiency with the long-term decisions already been made.

Generally, the long-term component of cluster decisions tends to be disregarded in the discussion of business interoperability (Legner and Wende, 2006). Design of the network would have to come first, then network planning, and network management would just be execution. Before attempting to homogenize IT, for instance, the capability to invest, the willingness to assume responsibilities, issues of intellectual property should be examined as well as the ability to quickly (and inexpensively) integrate a high number of processes and partners.

The level of business interoperability that must be attained will be different in different industries: In high-tech, the linkages between OEMs, contractors and component manufacturers are tightly integrated. Companies like Cisco or HP adhere to process standards and use collaboration platforms, which ease electronic collaboration within their value chain. In other areas, e.g. in facility management, the fragmentation and specialization within the value chain still needs progress. But any decision to join a cluster or a network (to add and to receive knowledge and to manage communal assets) should be based on a careful examination of the perspectives entailed (culture, relationship management, collaborative capacity etc.) and of the pertinent contingencies (strategic fit, long-term changes of organizational structure, industry environment). Using this contingency approach, a model or a checklist can be construed which helps to identify the appropriateness or non- appropriateness of joining a cluster or establishing a network relationship (Legner and Wende, 2006, p. 13 ; Simmie, 2006).

4. Managing supply chain knowledge

Subscribing to a supply network enables a firm to use a wide display of network information and systems, and it is also forced to feed a broad array of information and resources into that network. The purpose of linking to suppliers and customers inextricably throughout the entire value creation process can only be reached effectively and efficiently if the firm is capable to successfully form, nurture, and manage each and every partnership in the network. Supply chain partnerships are living systems which evolve progressively, and this evolvement is based on creation, exchange and deployment of knowledge. Typically, a company forming a partnership with its suppliers and/or customers forces a change in relationships, expectations, and job descriptions. The departments and functions in partnering companies need to work with each other in evaluating inventories, systems, processes, new technologies, training, work methodologies, equipment utilization, and a host of other opportunities. Supply chain partnerships are resource-intensive investments, which involve both financial and strategic risks, and which may shift during their lifecycles (Maheshwari, Kumar and Kumar, 2006).

4.1 Elements of supply chain knowledge

Building supply chain knowledge usually starts with building connectivity. Even large companies have all begun in the same way as small and medium enterprises: For a (non-methodical) start, an investment in some new technology such as e-mail and the Internet for handling orders is undertaken, stock management packages and manufacturing systems such as CAD and CAM are

deployed to locations beyond production proper, IT forecasting tools are put into use, web sites are set up for promotional and transactional purposes. In a more methodical phase which will follow those first attempts, the notion will take place that supply chain management affects almost all activities of all members of a supply chain, and with business relations crossing regional and national borders, the need for classification and categorization will arise. Depending on the "distance" from the company, tier 1, tier 2 up to "tier n" supplier are distinguished, and the flow and the content of information to the different tiers is defined differently. Know-how has to be developed to cope with the following strategic and operational issues (Knolmayer, Mertens and Zeier, 2002, p. 6):

Strategic	*Operational*
Strategies for product / process development Strategies for providing products / services Make or buy decisions Quality management	Internal quality assurance Intra-plant transport Intra-plant storage Determination of ordering quantities and lot sizes Optimization of schedules and sequences Intra-plant Information system for planning and controlling of orders
Development of a supply chain design Procurement and marketing strategies Supplier and customer management Distribution strategy Recycling strategy	Internet appearance Research about procurement and sales markets Evaluation and selection of suppliers Sales forecasts Control of the sales force
Strategic	*Operational*
Definition of a supply chain controlling system	
Supplier and customer structure policies Coordination of supply chain strategies with business partners Legal basis for supply chain partnerships Joint pursuit of improved business processes	Managing the organizational and system interfaces Definition of communication relationships with business partners, with special attention to IT

When the areas of knowledge have been defined, methods and tools will be developed and put to use, with the overall aim being to maximize the value to the customers to all partners in the supply chain by providing the required level of service at the lowest total cost. Excessively sophisticated management solutions should be avoided as they frequently add unwanted cost. Demand information and service requirements should be shared with minimum distortion, since the essence of the system is to synchronize supply and demand. This is critical to the service and cost objectives both in the medium term, to synchronize capacity with market plans, and in the short term, to drive the operational activities on the basis of end consumer demand.

4.2 Handling and applying supply chain knowledge

Supply chain management is by definition mainly a challenge of coordination: coordination of the flow of goods and information across intra- and inter-organizational boundaries. The quality of coordination highly depends on the visibility and transparency of all information needed, and this is where Business Intelligence Systems and IT enter the stage. They provide solutions which - just like logistic software in general - portray products, actors, and the status of orders, and support administration activities and accounting. Shared databases are integral parts of these supply chain management systems, as they provide network members with detailed and timely information. As mentioned before, supply chain management evolves progressively. Here, the notions of „technological artifacts" and „technologies-in-practice" pertain quite accurately (Günter and Grote, 2006): "A technological artifact exists as identifiable specific software, machine or gadget but does not influence activities of users *per se*" (Orlikowski, 2000, p. 408). Only if this technology is used regularly, actions of users are shaped through so-called technologies-in-practice. Similarly, the members of a supply network are shaped through engaging repeatedly in the system:

Whichever position a firm holds in a supply chain – efficiency competitor relying on cost advantages, dominant vendor through reputed brand image, innovator or strategic supplier, it has experienced or will experience a growth path with regard to supply chain knowledge: One (first) step would be to grow from (mere) efficiency to collaboration, i.e. from low cost to value-added. This is a switch from operational efficiencies to customer-sensitive creation capabilities; the transition allows firms to be more flexible in inter-organizational relationship building practices. Another step goes from efficiency to coordination, moving from a specific functional competency to becoming a priority supplier, a third track would lead from coordination to innovation through new product and service offerings: the firms strive to attain business process change through new strategic alliances with other firms, while redefining their core strategic focus. The „fast track" would be from efficiency to innovation. This path requires a radical transformation, with the firms simultaneously accomplishing an intra-business process transformation and achieving an inter-organizational position of power. Such a large transition places enormous strains on organizational resources in multiple fronts. Because the transition is so rapid and drastic, firms that adopt this path assume a high risk of corporate failure. However, it may be the most sensible option for a highly successful supplier, component manufacturer, service provider or distributor. A detailed study of these growth patterns is given by Hong and Jeong, 2006.

There is a common denominator to applying supply chain knowledge: With the key operational business process in supply chains being order management, and with many ERP-systems limiting this cross-functional process to activities within a company and not interfacing with external or foreign partners, the logic solution for collaborative order management is web services. Again, firms will generally start with „no-nonsense" applications and gradually proceed to more sophisticated systems (Alt, Gizanis and Österle, 2002). But whichever application system is chosen, the primordial decisions are about business structure (market segmentation, positioning, work-flows, product flows, revenue model) and identification of critical business processes. These structural decisions predetermine decisions about the "architecture" of software; they may include screenings of web services, and they will definitely include a conclusion about adopting (or not) a process standard: high-techs will opt for RosettaNet[5], carmakers might opt for VDA, ANX, or ENX[6], and others could choose non-industry-specific standards like the SCOR model or CPFR[7]. These have to be "personalized" to match the firm's individual business requirements, and only then the software solution can be selected and implemented. Generally, the e-collaboration infrastructure will be sixfold: It will encompass networking functions (e-planning, e-fulfillment, e-logistics, e-payment), workflow and communication patterns, content (syndication and evaluation of subject matter), composition (including systems to navigate in the data-warehouse), integration (involving classification, standardization, aggregation of data) and technical infrastructure.

The logic of networking in a supply chain web would suggest that all members adhere to a similar infrastructure, at least in the essence. Surprisingly, the status is very diverse in many networks according to a joint report by St. Gallen Business School (HSG) and IMG Information Management Group, Zurich (Koch, 2001). Our own field study for the Bratislava automotive cluster would confirm these findings.

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[5] RosettaNet is an independent, self-funded, non-profit consortium dedicated to the development and deployment of standard electronic business interfaces. See: http://www.rosettanet.org.

[6] VDA is the German carmakers' association (Verband der deutschen Automobilindustrie) standard, ENX and ANX are European Network eXchange (http://www.enx.de) and American Network eXchange (http://www.anx.com).

[7] SCOR is „Supply Chain Operation Reference" – the model developed by the Supply-Chain Council, a cross-industry group which develops, maintains, communicates, and supports SCOR as the standard process reference model for networking in supply-chain management systems (http://www.supply-chain.org); CPFR is Collaborative Planning, Forecasting and Replenishment, a business practice that combines guidelines and roadmaps for various collaborative scenarios, developed by the CPFR Committee. The committee stems from a 1995 initiative co-led by Wal-Mart and Benchmarking Partners, a Cambridge, Massachusetts software and strategy firm.

4.3 Particularities of automotive supply chain knowledge

Supply chain management models have become industry-specific in recent years: Retail has pioneered vendor-managed inventory and efficient consumer response, electronics supply chains have been re-designed to support build-to-order product manufacturing, and vehicle manufacturers have witnessed the advent and maturation of sequenced supply from first-tier to next-tier and next tier suppliers as well as from adjacent supplier parks. Material and cargo movements are being tracked using global positioning systems and Third and Fourth Party logistics providers are co-ordinating the inter-modal transportation of goods. In the automotive industry this concurs with ever changing manufacturing and contracting methods, from platforms, modularization and localization (i.e. collaborating with suppliers abroad in developing the local level of foreign subsidiaries and partners[8]), to „peak-shaving“ (using technologies that allow to secure resource consumption at the lowest possible rate) and to „pay as painted“ and „pay as built“, to name just a few. Further, each new model introduction may result in a *reduction* of up to 30 % in the number of components, which draws immense implications for the vendors of components and the supply network (Global Production Networks in Europe and East Asia, 2003). So, managing a supply chain capable of dealing with these requirements is as important as having accurate product definition and quick-customization response capabilities. The support of robust IT applications and web services is indispensable, whether holistic or modular (Kim, C. Sohn, Roemer and Yassine 2006), but the logistics managers must first define all particulars of information content:

The typical supplier has to work with a large number of original equipment manufacturers (OEMs) following mostly individual work logics while dealing with hundreds of vendors. Vehicle variance is infinite and the total number of parts orders is in the ten-thousands. The tasks required must support procurement during product development (product definition and concept development) and full volume production. For a first-tier supplier (FTS), procurement tasks related to product development stages will include the (early) identification of qualified subcontractors, detecting state-of-the-art technologies, detecting innovations on the market, basic considerations concerning vendor networks, qualification of subcontractors, leadership in "make or buy" decisions, procurement of prototype parts (Volpato, 2004). For the volume production stage, the FTS must assure that cost targets are met, must provide simultaneous engineering teams, monitor the vendor networks and the maturity of purchased parts. So there’s more to knowledge management here than just data transfer, and while high-level information logistics is imperative, the logistics manager must as well be in a position to offer alternatives when one element in the chain would fail and fall loose. For this he must have pre-set alternatives – another part of the knowledge kit (Druml, 2006).

A new issue in supply chain management of the automotive industry other is reverse logistics. US- and EU-regulation enhances producer responsibility for several branches of industry. This makes OEMs (of automobiles as well as, e.g., of household appliances) formally responsible for the set-up of a take-back and recovery system for products discarded by the last user. Next to legislation, consumers' demand for clean manufacturing and recycling is increasing, and consumers expect to be able to trade in an old product when they buy a new one (Simpson, Power, and Samson, 2007). Another reason is cost. A well managed reverse logistics program can provide important cost savings in procurement, disposal, inventory carrying and transportation. Reverse processes will encompass collection, inspection / separation, re-processing and, eventually, disposal or re-distribution. Some type of forerunner was the handling of rejected material which had to be reverted, and “closed loop logistics” would simultaneously optimize the forward and reverse network (Jayaraman, Guide, Jr., and Srivastava, 1999). Again, service providers are entrusted with the task, and in some cases they combine this with the distribution of workshop equipment, tools, engines and packaging material.

[8] Partnering also includes co-operation with engineering schools as, e.g., the International Motor Vehicle Program (IMVP) at the Massachusetts Institute of Technology, http://imvp.mit.edu.

5. The evidence from the Bratislava Regional Automotive Manufacturing Cluster

5.1 The magnitude

The economic development in Slovakia is conditioned by two factors. One is the historic fact that in 1993 Slovakia re-emerged after more than 1000 years of subsistence in someone else's shadow, and started creating its own image from the scratch. The other is the abrupt change in the socio-political paradigm. The result was heavy restructuring of Slovakia's industrial complex with a prominent emphasis on the car industry, which today is the country's main source of revenue. This was done with the help of leading European and Asian car constructors, and it is here that knowledge management first came into the picture. A second „wave" is connected to the agglomeration of components suppliers in the areas of Bratislava, Trnava, and Zilina, forming the largest automotive manufacturing cluster in central and eastern Europe:

As of 2007, the activities of Volkswagen/Porsche dating from as early as 1992 with an annual turnout of 300 000 cars will be complemented by PSA Peugeot Citroen planning to initially produce 310 000 cars in this year (possibly up to 680 000 cars annually) and by KIA Motors starting to build its first European plant for 380 000 cars. The network of domestic suppliers and foreign system suppliers based in or distributing into Slovakia totals more than 260 firms, with the top ten including the leading parts producers of the industry. The benefits of Slovakia's location also includes its proximity to auto plants in other countries, and to the two Austrian components producer clusters located in the region of Vienna (60 kilometers away) and Upper Styria (less than 100 kilometers away. Some Slovak tier 1 suppliers provide just-in-time shipping, not only to plants located in Slovakia, but also to manufacturing facilities in neighboring countries. This produces cluster-to-cluster relations which are one feature of this field study.

5.2 Questions, hypotheses and findings

The characteristics of the Bratislava automotive cluster would suggest that there is an intense exchange and transfer of supply chain management knowledge between OEMs and suppliers, local and foreign alike (Moffat and Archer, 2004). On the local part, the need to secure steady high-quality procurement would have had lead the OEMs to develop skills in their local supply base and to induce linkages of learning (Okada, 2004), and on the foreign part, the suppliers competing to be selected for furnishing components to the new transplants would have intensified their capabilities to optimize supply chain networking. This would also have been connected to the establishment of new components producers' subsidiaries in the area and with building the knowledge base of such transplants (Rodziewicz, 2002; Männik and von Tunzelmann, 2006). On the other hand, with the dominant partner in these relationships being the OEMs, a strong hypothesis would be that they force suppliers to adopt their process standards (5.2.1). This hypothesis is intertwined with the foregoing ones which regard the intensity of linkage processes usage (5.2.2) and of projects to develop skills and knowledge (5.2.3).

From the cross-cultural management perspective, one would suggest that there are barriers which hamper knowledge linkages (Riege, 2007), especially when looking at small and medium enterprises which tend to overprotect their intellectual property (Toom, et. al, 2006) and have not yet become accustomed with "e-culture" (Dragojevic et al., 2003). Proving this hypothesis would also have to include an investigation into the reasons for those obstacles (5.2.4). One last hypothesis for the field study was that the very existence of two auto- components supplier clusters in the Vienna region and in Upper Styria with close links to the new OEM transplants would produce cluster-to cluster-relationships of a special nature (5.2.5).

As can be seen from the questionnaire reproduced in the Annex, responses referring to the five hypotheses were to be gleaned from the answers. The questionnaire's primordial objective was to prepare a benchmark study amongst the automotive suppliers for logistics procedures. The research objective came second, but, from the start the scope of the questionnaires was designed to comprehend the scientific issues as well. Answers to all questions were only given by the larger

components producers; still, almost all of the smaller firms covered the issues of dominant behavior of OEMs in routine matters as well as in specific projects. This seems to be inherent in surveys which aim at determining manufacturing or supply chain management performance. An example is the “High Performance Manufacturing Project” (HPM Project) carried out for the International Journal of Operations & Production Management in two rounds 1997 and 2004 (Flynn, et al., 1997; Hammer, 2006): Out of the roughly 180 participants from six countries, one third were automotive suppliers (approximately 10 respondents per country), but almost all of them placed themselves in the position of “dominant players”. In our own study, which only covered one country, the respondents’ position within their supply chain may also be characterized as “strong”, and all of them are SME 2nd tier suppliers. Nevertheless, convincing conclusions can be drawn from our survey for each of the hypotheses as specified below:

5.2.1 Dominance of producer standards: exertion of power?

5.2.1.1 Market dominance and buyer power: power regimes in supply chains

Historically, a firm's market dominance, measured by its share of industry sales (as the "industry" is defined for the particular case), has been an important surrogate for the firm's market power. Measuring market power is an ongoing subject of antitrust issues dealt with by academics, trade commission officers, court consultants and cartel specialists all over the world. Here, a broad array of methods is at hand to measure market power (a comprehensive overview is given by Slottje [2002]). On the supply side, the interest in “buyer power” was not exuberant for some time even though this phenomenon, as manifested in the power exercised by big meat packers over their suppliers, motivated the enactment of the Sherman Antitrust Act as early as in 1890. Buyer power was highlighted in the early 1980s when Jose Ignacio Lopez de Arriortua, head of purchasing for General Motors earned an infamous reputation for cost cutting through putting an extreme pressure on suppliers and, later on, for becoming accused of stealing secrets from General Motors when he left his post to take a senior position at Volkswagen.

Research on buyer power was strengthened in 1992 by the formation of the Birmingham Business School’s Centre for Business Strategy and Procurement with the main contributor being Andrew Cox (Cox 2000). Cox has identified four basic relationship management choices. These depend on two dimensions: (1) the power condition of the relationship, or, as Cox calls it, the degree of value appropriation, i.e. adversarial or non-adversarial, and (2) the relationship style, either arm's length or collaborative (Cox, 2004). It may well be stated that a perfectly equal, interdependent power situation is rare and that there is at least a tendency towards one side being more dominant than the other. Hence, the implication would be that when it comes to knowledge sharing, the dominant party is not eager to relinquish its position. But neither would the less dominant party want to become even more vulnerable. Exchange of information is a major constitutive source of power in supply chains. Thus, in an adversarial collaborative relationship, the dominant partner would still build extensive operational linkages, but he would aim to maximize the appropriation of value by forcing his partner to conform to his own modes of operation.

5.2.1.2 Adversarial collaborative relationships: an unfounded hypothesis

The non-adversarial way of engaging in a relationship that requires an intensive exchange of knowledge and data is pursued by mutual adaptations of the systems and processes employed for that exchange. The adversarial way would be that suppliers adopt their (dominant) customers’ process standards even if they are involved in multiple supply chains (Thompson, 2000). This is a competitive issue, and we expected the survey to prove this assumption. Surprisingly, the major portion of the answers were directed towards an industry standard (the German VDA-standard and the UK-based *Odette* standard); however, *none* of the respondents claimed that it was adhered to or planning to adhere to the (neutral) Automotive Network Exchange (ANX), a US-based extranet information standard, nor to its counterpart, the European Network Exchange (ENX). One reason may be that the industry standards already provide solutions that cope with asymmetric information (Taylor, and Holweg, 2002; Swaminathan, and Tayur, 2003), and negative side effects can be mitigated by sharing information selectively (Liker and Choi, 2004). The survey did not find any indication that the designs of the supplier-customer-relation were biased towards unilateral benefits

for the dominant partner (Cf. Cox, 1999). By contrast, the findings indicate that the position of the supplier in the supply chain has a positive impact on supplier development activities and that there is also an interaction effect (von Corswant, Wynstra and Wetzels, 2003).

5.2.2 Intensity of supplier-producer knowledge exchange: division of labor

The intensity of knowledge exchange and knowledge transfer with regard to supply chain management issues can be measured from the degree of permanent linkages between OEMs and suppliers: Our survey listed nineteen topics ranging from order entry management, confirmation of forecast data and multi-tier prognostication to automatic order changes and vendor managed inventory (see section 2.3 of the questionnaire), and the average response was that *ten* were in use; the lowest degree reported was *four* and the highest degree was *fourteen*. However, in all cases the response was that access to highly sensitive information like capacity utilization and order status is not granted, and the respondents stated that there was no difference whether their customers were located in the Bratislava automotive cluster or elsewhere.

A second indicator to test differences in knowledge exchange formats would be the degree in which sensitive supply chain activities are outsourced to third or fourth party logistics providers. All respondents stated that they do not employ such service providers for their Bratislava activities (and only one is planning to do this in the future), while they do use services of that kind for other customer locations. This coincides with other reports on network alignment in the central and Eastern European countries "(CEECs"), stating that local capabilities have not yet reached the necessary standard (Ernst and Kim, 2002).

5.2.3 Transfer of knowledge: preparing collaboration

Collaboration in the automotive supply chain usually starts with projects, and any project would be a vehicle to diffuse this industry's knowledge base. This, together with the industry's high levels of connectivity, would suggest that suppliers and producers in the Bratislava automotive cluster engage in multiple mutual projects, and that more such projects are undertaken here than in a region which has a longer history of high-performance-manufacturing. The result of our survey does not corroborate any such notion: By contrast, all respondents state that their engagement in mutual projects is lower in the Bratislava automotive cluster than in other regions. So they obviously use other means to transfer both codified and tacit knowledge, like training sessions, seminars and coaching. These findings coincide with a number of conclusions inferred from various studies on network alignment in central and eastern Europe: It was found that market-driven knowledge transfers as, e.g., in the food or in the textile industries, were more susceptible to networking formats than technology-driven knowledge transfers (McGowan, F., S. Radosevic and N. von Tunzelmann (eds.), 2004, 249). On a larger scale, the European Community Innovation Survey conducted by the European Commission's Enterprise Directorate, has also shown that rather than local co-operation arrangements, the collaboration between leading suppliers and their customers tends to be higher even when conducted across borders (Simmie, 2006).

5.2.4 Cultural barriers: obstacles to co-operation

Inter-firm co-operation across borders needs government support if there are institutional and cultural barriers which often stem from a country's history and from its stage of economic development. Undoubtedly, barriers of this kind exist in the CEE countries. A good example for an effective government initiative is the Hungarian Integrator program launched in August 1999. Its objective is to improve SME's innovative capabilities and competitiveness and to promote their networking activities, especially those aimed at conducing technological development projects[9]. Similarly, Slovakia's new program "Promotion of Innovation and encouragement of SME Participation" gives SMEs the opportunity to be involved in the development and implementation of

[9] European Commission, Directory of Measures in Favour of Entrepreneurship and Competitiveness in Candidate Countries. http://ec.europa.eu/enterprise/enterprise_policy /enlargement/cc-best_directory/research/hungary.htm

progressive innovation technologies[10]. Additionally, special government support has been given for the Slovak automotive industry on the Slovakian national and regional levels. Notwithstanding the great achievements reached through these initiatives, our survey shows that there are still gaps between expected outcome and perceived situations: All respondents claim that projects involving Slovakian partners are less effectual when compared to projects in other locations, and the reasons they give are ranging from lack of trust and of willingness to cooperate, insufficient power of decision-making up to lack of motivation and application skills. However, the technical abilities of the Slovak partners are deemed to be on par with their foreign colleagues.

One factor that must be taken into account is that SMEs in transition countries tend to over-react when it comes to intellectual property (Nolan, 2002); thus, providing (constant) data access for a supply chain network is often viewed at with wariness, and it seems that the SMEs have yet to find their role in this environment (Migliori , 2006). If they do not, the consequence might be relocation (which was reported by one of the respondents). Excessive cultural barriers have been one reason, among others, for relocations out of the CEECs in other industries, e.g. in the electronics industry (Radosevic, 2004, p. 121).

5.2.5 Cluster-to cluster-relationships

Our study did not produce any evidence of distinctive cluster-to cluster-relationships between the suppliers centered in the Vienna and the Upper-Styria region and the OEMs in the Bratislava area. Perhaps the focus of the OEMs is mainly on their direct local environment, and it would seem that the various governmental supports favor such preferences. On the other hand, when one follows the practitioners' perspective of clusters, i.e. that the main goal of regional industry-led cooperation is to enhance the competitiveness of their industries in their regions over other regions, one cannot expect close ties on the level of cluster to cluster (Enright,2001). There seems to be one industry in which this is different: Of the twenty or more *optics cluster* regions in the world, there are several strong cross-national cluster-to-cluster economic ties (Lerch, Sydow, and Provan, 2006), and the main impetus comes from Canada where four developed optics clusters are working together in a national-level plan which includes developing global partnerships outside of their country. By contrast, another Canadian example, the AutoAero Cluster of Mississauga, Ontario, involving the second largest automotive consortium in North America, is mainly focusing "inward", and this is partly due to heavy, but somehow conditional, support from provincial and federal governments.

With regard to the Upper-Styria automotive cluster, it has been shown that efforts have been made to overcome what was deemed to be one of the a weaknesses oft that particular agglomeration, namely information shortage, knowledge barriers between the members of the cluster, too few contacts to research institutions and the lack of a common telecommunication network (Steiner, Hartmann, 1998). Otherwise, it has been shown that the transportation preferences of the cluster members have converged because of extended learning and communication processes Maier, Bergman, 2000). But knowledge transfer and organizational learning were confined to remain within the borders of this cluster, like in many other situations where transfer and sharing of knowledge revolves around one specific geographical center (Simmie, 2003; Peeters, Limere, 2003).

5.3.5 Recapitulation

The overall impression from the field study is that the supply-chain management in question is substantially impacted by the cross-border dimension when it comes to extra-routine collaboration (practicalities of order processing and delivery do not seem to be concerned), and that when high performance production clusters are implanted in a transition economy they have yet to develop mechanisms of inter-firm knowledge management – even when the focal firms are high-class MNCs. To illustrate this, the average of the participants' responses to the questionnaire's section on knowledge transfer are transcribed below:

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[10] United Nations Economic Commission for Europe (UNECE): Best Practice in Business Incubation, http://www.unece.org/indust/sme/ace.htm

When comparing with partners in other locations, is supply chain knowledge exchange with partners in Slov less effective due to	Yes (%)
- deficiencies in planning systems?	70
- technical problems in data management?	0
- lack of trust?	50
- lack of willingness to cooperate?	50
- low level of expertise?	10
- insufficient decision-making power?	40
- misuse of sensitive information?	0
- unwillingness to accept industry standards?	0

When transferring supply chain management knowledge to Slovak partners, are there more risks involved than in projects with other p	Yes (%)
- passing of information to competitors?	0
- passing of information to customers?	100
- non-validation of data?	40
- excessive cost of data security?	20
- conflict of interest e.g. with service providers?	0
- quality problems?	0
- loss of core competencies?	0

When engaging in joint (supply chain management) projects with partners in Slovakia, is more effort required than in projects with other partners for	Yes (%)
- coordination (project mgmt., committees, etc.)?	80
- workflow organization and synchronization?	40
- communication (meetings, mailings, etc.)?	50
- standardization (rules, job descriptions, etc.)?	70
- - documentating project status and variance?	10

When exchanging knowledge with partners in Slovakia, would it be desirable to improve	Yes (%)
- the motivation of personnel?	100
- participation in decision-making?	20
- the level of expertise?	40
- practical application of theory?	70
- commitment of line- and of top-management?	70

All other responses, as exposed above (4.3.1 through 4.3.5), are either very uniform (e.g. regarding the non-existence of power-pressure by the OEMs and the absence of private network adherences) or they show a higher degree of variability - most probably because of company specifity (as with the degree of supplier-producer knowledge exchange). One reason for this may be that answers were only given by the larger first tier- and second tier-suppliers, and this, in turn, may be explained by the fact that the questionnaire is relatively ambitious. On the other hand, a less highly aspiring list of questions would not have met the expectations. An example for a more general enquiry is the EMSA study sponsored by the BMW group[11], but this study does not address cross-border issues. An overview of related studies, though even more generalized, was given at the Fourth Worldwide Symposium in Purchasing & Supply Chain Management in San Diego, California, April 2006 (Wagner and Bode, 2006).

5.4. Implications for further research

Since supply chain relations are always pointed in two directions this study will be complemented by involving the suppliers of automotive parts vendors. The most promising way will probably be to poise the question how the strong ties between OEMs and automotive suppliers affect the relationships between these and their own purveyors. These “trilateral” interactions are presently examined, from a broader angle, by the OECD’s “Trilog-Project” (http://www.cemt.org/pub/pubpdf/JTRC/02LogisticsE.pdf), initiated in 1996 to stimulate multimodal management, freight transport logistics and associated policy challenges. Even though the project’s emphasis is on transport, it encompasses the other elements of supply chain management, too, and one special focus is laid on the automotive suppliers’ contribution to vertical disintegration of production. Research that adds field evidence is encouraged through the Trilog project.

6. Conclusion

Exchanging supply chain management knowledge yields opportunities for both the vendors and the customers in the automotive industry. The main opportunity is brought about by better planning

[11] http://www.pim.uni-due.de/fileadmin/Projekte/Kurzbericht_Projekt_ESMA.pdf

and co-ordination possibilities. This increases consolidation and relative competitiveness for all parties irrespective of their magnitude and of their power position. In a cross-border setting involving regions of different developmental stage, the biggest threat to fully exploiting the opportunities are lack of trust and of willingness to cooperate, insufficient capacity of decision-making and lack of motivation and application skills. The Bratislava automotive cluster has yet to develop into a business environment which would allow advanced forms of organization like supply networks and fourth party service providing to attain higher levels of efficiency and effectiveness.

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8. Annex: The questionnaire *(The Questionnaire was sent out in German; this is a translation)*

A. EXPLANATORY NOTE:

The inquiry is directed at the status and foreseeable development of organizational structures to handle supply and related information for deliveries to the automotive industry in general and to the Bratislava Automotive Cluster in particular. Product program, volume and sales figures, or other indicators, which are specific to your company's business, will not be asked for.

The investigation is aiming at the following:

(a) Verification of theoretical findings regarding „Collaborative Order Management" and „Inter-organizational Knowledge Transfer", comparison with similar studies for US-based automotive suppliers with deliveries to Mexico and related European studies. The results will be presented in a workshop of the European Institute for Advanced Studies in Management (www.eism.be) in Istanbul end of September 2007. All participating companies will receive a copy.
(b) Indications on market penetration and implementation status of software for collaborative order management.
(c) Preparation of a comparative study, which will include inquiries of customers and other supply chain partners in the Bratislava industrial cluster.
(d) Complementing the efforts of ENX and ANX to deploy communication networks for the European automotive industry.

The Questionnaire is made up in four sections:

(1) Questions regarding sand exchange of information ("Business architecture")
(2) Questions regarding order and inventory management („Process architecture")
(3) Questions regarding IT-support („Software-architecture")
(4) Questions regarding the types and execution of knowledge transfers („Knowledge-management -architecture ")

The Answers should be „YES" or "NO"; if no answer is give, the question is deemed to be "NOT APPLICABLE".

B. QUESTIONS

SECTION 1: BUSINESS ARCHITECTURE

1.1 What is the role of your company within the automotive supply chain (regarding your strategically most important products)?

	GENERALLY		BRATISLAVA CLUSTER	
1st tier (systems supplier)	today	2010	today	2010
2nd tier (modules supplier)	today	2010	today	2010
3rd tier (components supplier)	today	2010	today	2010
4th tier (parts supplier)	today	2010	today	2010
5th tier (materials supplier)	today	2010	today	2010
6th tier or higher	today	2010	today	2010

1.2 Does your company possess an independent location in Slovakia (plant, affiliate, joint venture) and are the customers which you serve from there located

- within Slovakia	today	2010
- without Slovakia	today	2010
- within and without Slovakia	today	2010

1.3 Which of the following supply chain management activities do you outsource?

	GENERALLY		BRATISLAVA CLUSTER	
Transport/goods handling/storage	today	2010	today	2010
Container management	today	2010	today	2010
Inventory-management	today	2010	today	2010
Order management (full)	today	2010	today	2010
Order management (partially)	today	2010	today	2010
Network design and management	today	2010	today	2010

1.4 Do you contract systems providers like 3PL- or 4PL-providers, which manage (almost) all logistics processes for your company? Today 2010 today 2010

1.5 Does your company engage in joint projects with customers for product- or process development? today 2010 today 2010

1.6 Do you exchange complex data sets with third parties on products or processes that go beyond inventory and order management? today 2010 today 2010

SECTION 2: PROCESS-ARCHITECTURE

2.1 In inventory and order management, have you standardized duties and responsibilities for your company and your clients and for collaborative documenting in

	GENERALLY		BRATISLAVA CLUSTER	
... acquisition of orders ?	today	2010	today	2010
... order entry?	today	2010	today	2010
... reservation of materials?	today	2010	today	2010
... shipment?	today	2010	today	2010
... confirmation/invoicing?	today	2010	today	2010

2.2 Do you routinely exchange data with your customers on the status of orders regarding

... progress of preparation?	today	2010	today	2010
... reservation of materials?	today	2010	today	2010
... dates of delivery?	today	2010	today	2010
... quality control?	today	2010	today	2010

2.3 Which of the following do you employ in order to update information received from / transmitted to your customers:

	GENERALLY		BRATISLAVA CLUSTER	
Verification of customer forecasts?	today	2010	today	2010
Routine forecast confirmation?	today	2010	today	2010
Long-term delivery planning?	today	2010	today	2010
Demand information forwarding („Multi-Tier Collaboration“)?	today	2010	today	2010
Production capacity information?	today	2010	today	2010
Reserved capacity information?	today	2010	today	2010
Plant utilization requirement?	today	2010	today	2010
Confirmation of priority status?	today	2010	today	2010
Reservation of capacity?	today	2010	today	2010
Debottlenecking?	today	2010	today	2010
Order consistency checks?	today	2010	today	2010
Delivery data confirmation?	today	2010	today	2010
Order status retrieval?	today	2010	today	2010
Order change management?	today	2010	today	2010
Inventory management including delivery scheduling?	today	2010	today	2010
Vendor Managed Inventory?	today	2010	today	2010
Supplier-Kanban?	today	2010	today	2010
Just in Time / Just in Sequence?	today	2010	today	2010
Early info on deviations from plan?	today	2010	today	2010

2.4 Do you employ standards or specific procedures developed by ...

... your company?	today	2010	today	2010	
... your customers?	today	2010	today	2010	
(and does this imply parallel handling of various different order management systems?)	(today	2010	today	2010	)
... an industry association					
- of automotive suppliers?	today	2010	today	2010	
- of OEMs?	today	2010	today	2010	
...client/supplier-networks?	today	2010	today	2010	

SECTION 3: IT-SUPPORT AND SOFTWARE-ARCHITECTURE*

3.1 Will outsourcing of IT-systems grow for logistics applications and thus increase support by

	GENERALLY		CLUSTER BRATISLAVA	
... IT-providers?	yes	no	yes	no
... OEMs?	yes	no	yes	no
... 3PL or 4PL service providers?	yes	no	yes	no
... an industry network like e.g. ENX?	yes	no	yes	no

3.2 Do you employ the information technologies of

- Materials Requirements Planning?	today	2010	today	2010
- Manufacturing Resource Planning?	today	2010	today	2010
- Enterprise Resource Planning (ERP)?	today	2010	today	2010
- Distributed Resource Planning (DRP)?	today	2010	today	2010
- Advanced Planning & Scheduling (APS)?	today	2010	today	2010
- Customer/Supplier-Relation Management (CRM or SRM)?	today	2010	today	2010

3.3 Do you synchronize customer and supplier data with your own data (products/articles, inventory, workflow documents) through

- an inter-organizational ERP-system	today	2010	today	2010
- matching of data handling systems by, e.g., XML or EAI	today	2010	today	2010
- specific collaborative infrastructures, e.g. OML (Order Management Layering)	today	2010	today	2010

3.4 Do you transfer/receive customer and supplier information via

- paper/fax?	today	2010	today	2010
- telephone/e-mail?	today	2010	today	2010
- FTP?	today	2010	today	2010
- Internet-applications?	today	2010	today	2010

3.5 What is your communications standard?

- ODETTE	today	2010	today	2010
- VDA	today	2010	today	2010
- ANSIX 12	today	2010	today	2010
- EDIFACT Subset	today	2010	today	2010

3.6 Do you participate in a (Virtual) Private Network like ANX (Automotive Network Exchange) or ENX (European Network Exchange)? today 2010

3.7 Do you expect, that the following will <u>improve</u> through joining a Private Network:

- Customer satisfaction?	yes	no
- Delivery service?	yes	no
- Accuracy of planning?	yes	no
- Process quality ?	yes	no
- Handling cost ?	yes	no
- Inventory level?	yes	no
- Capacity utilization?	yes	no
- Complexity?	yes	no
- Process time?	yes	no
- Delivery time?	yes	no
- Transparency?	yes	no

* **IN THIS SECTION, PLEASE CHECK THE BOXES FOR "BRATISLAVA CLUSTER" ONLY IF YOUR BRATISLAVA LOCATION EMPLOYS INDEPENDENT IT-SYSTEMS**

SECTION 4: TYPES AND MEANS OF KNOWLEDGE TRANSFER

4.1 When comparing with partners in other locations, is supply chain knowledge exchange with partners in Slovakia less effective due to

- deficiencies in planning systems?	yes	no
- technical problems in data management?	yes	no
- lack of trust?	yes	no
- lack of willingness to cooperate?	yes	no
- low level of expertise?	yes	no
- insufficient decision-making power?	yes	no
- misuse of sensitive information?	yes	no
- unwillingness to accept standards?	yes	no

4.2 When exchanging supply chain knowledge with partners in Slovakia, would it be desirable to improve

- the motivation of personnel?	yes	no
- participation in decision-making?	yes	no
- the level of expertise?	yes	no
- practical application of theory?	yes	no
- commitment of line- and of top-management?	yes	no

4.3 When engaging in joint (supply chain management) projects with partners in Slovakia, is more effort required than in projects with other partners for

- coordination (project management, committees, etc.)?	yes	no
- workflow organization and synchronization?	yes	no
- communication (meetings, mailings, etc.)?	yes	no
- standardization (rules, job descriptions, etc.)?	yes	no
- documenting project status and variance?	yes	no

4.4 When transferring (supply chain management) knowledge to Slovak partners, are there more risks involved than in projects with other partners, from

- passing of information to competitors?	yes	no
- passing of information to customers?	yes	no
- non-validation of data?	yes	no
- excessive cost of data security?	yes	no
- conflict of interest e.g. with service providers?	yes	no
- quality problems?	yes	no
- loss of core competencies?	yes	no

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