Organizational competitiveness now lies in better mastery of a set of core competencies generated by the manipulation of resources stored in the organization’s reservoir of knowledge. These resources may be internal or located in commercial partner organizations. It therefore seemed natural to combine resource-based theories with integrated logistics and supply chain management practices to produce a preliminary model. Our reflections led us to the conclusion that supply chain integration could result in a convergence of resources towards a limited number of beneficiaries, to the detriment of others. To reduce the risk of cannibalization and dilution of core competencies, managers must make full use of the knowledge available to them. This means 1) identifying and locating the organization’s own knowledge, 2) targeting the knowledge that can be shared without risk of losing strategic know-how, 3) making it available as required, while ensuring that it is not given free of charge, and 4) locating information held by external partners that is needed to strengthen a competitive position.

According to Hamel (2000), the 21st century will be the century of sudden, intermittent changes forcing firms to introduce rapid innovations and transformations in order to survive. In light of this, researchers have worked on new paradigms to explain the sources of organizational competitiveness. In the last fifteen years, the resource-based view has been one such paradigm, and has occupied a significant place in the literature (Priem and Butler, 2001). Resource-based theory postulates that the competitive advantages of a firm lie in certain core competencies resulting from a combination of resources and knowledge. Achieving such a combination involves a process of organizational learning that few firms currently master in any depth.

So far, most studies of the resource-based view have concentrated on the development of competencies at the organizational level only. However, this approach is no longer a true reflection of reality, since competition is now exercised between enterprise networks rather than individual organizations (Christopher, 1998). The supply chain can be regarded as a natural network for firms, allowing resources to be merged in order to form competencies (Olavarrieta and Ellinger, 1997). Indeed, resource-based theories now admit that competencies can be fuelled by resources located outside the organization’s boundaries (Sanchez et Heene, 1997). Finas (2000) goes so far as to state that supply chain design is the ultimate core competency.

To help understand the integration of these two concepts, we suggest a model of resource deployment and competency development at the supply chain integration level. The model generates four research proposals, and its demonstration is divided into three sections. In the first section, we summarize the foundations of resource-based...
theory and organizational learning, and establish links with the concept of supply chain integration. In the second section, we present our model, based on four proposals, and clarify the dynamics between competency development and the supply chain. In the third and last section, we identify the managerial implications of the research, together with its impacts on the development of a vision inspired by the resource-based view in terms of minimizing one of the risks of full supply chain integration, namely the loss of strategic know-how.

Resource-Based Theory and Supply Chain Integration

The first section of this paper is divided into two parts. The first briefly describes the foundations of resource-based theory, while the second identifies links between this concept and supply chain integration.

The foundations of resource-based theory and competency development

The resource-based view is a research trend that examines links between an organization’s internal characteristics and its performance (Barney, 1991). The basic premise is that an organization is a blend of specialized resources that are deployed and combined to create competencies through which the organization can secure a privileged market position (Lado et al., 1992). Competencies fulfilling a need valued by consumers and giving the organization a competitive advantage that is difficult to copy are known as core competencies (Hamel, 1994; Reed and De Filippi, 1990).

The literature describes two main categories of resources (Durand, 1997). The first includes the organization's stand-alone assets, comprising physical objects and intangible elements (e.g., trade marks). Stand-alone assets can be acquired or sold without transfers of human resources or cognitive components. The second category comprises cognitive capabilities, including individual and collective knowledge, know-how and training, experience and judgment. Some authors break down resources based on a coding of the underlying knowledge (Zack, 1999; Sanchez, 1997); in such an approach, knowledge constitutes the smallest fraction of a resource.

Knowledge is described as explicit when it is encoded within resources such as equipment and products, or when it is stored in computer systems (Bohn, 1994), and as tacit when it is built into organizational routines and staff experience (Zack, 1999). This suggests the existence of a continuum between explicit and tacit knowledge, with certain assets requiring a strong tacit knowledge element to achieve their full potential; examples would be patents and trade marks. Nonaka and Konno (1998) support this when they state that knowledge creation is a spiralling process of interactions between explicit and tacit knowledge.

Given that competencies transcend resources and knowledge, and that they are a blend of assets and cognitive resources scattered throughout the organization (Helleloid and Simonin, 1994), it is natural to turn to the concept of organizational learning. Defined as a process of acquiring and disseminating information (Garavan, 1997), organizational learning involves four activities (Sanchez, 1997; Nevis et al., 1995; Helleloid and Simonin, 1994; Huber, 1991), namely acquisition, distribution, interpretation and storage of knowledge (Table 1). These four activities are closely linked. For example, knowledge acquisition depends on the location and identification of information – in other words, on the mapping carried out during storage (Huber, 1991). Similarly, distribution is influenced by interpretation, and interpretation by the categories used for storage.

In the knowledge creation process, Nonaka and Konno (1998) speak of the concept of "Ba", which they define as a shared space for an emerging relationship. This space can take several different forms. It fosters proximity between individuals where the knowledge exchanged is tacit, or where the individuals develop a series of codes or metaphors to make the knowledge more explicit and thus transferable to broader audiences within the organization. Leonard-Barton (1988) evoked similar notions when she proposed adaptations to the receiving space when implementing new technologies (explicit knowledge).

In such a context, if resources are to be developed and blended, there must be coordination mechanisms that can act as bridges, promoting deployment and helping build competencies. Although no consensus exists as to what form these mechanisms should take (Sanchez et al.,

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>CONTRIBUTION</th>
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<tbody>
<tr>
<td>Acquisition</td>
<td>Formal or informal means used by organizations and their members to acquire knowledge from inside or outside the organization: hiring of employees, hiring of consultants, benchmarking activities or the acquisition of technologies or other enterprises.</td>
</tr>
<tr>
<td>Distribution</td>
<td>Means used to disseminate information within the organization. The effectiveness of this activity depends on the ability of the organization's units to identify information relevant to the activities of other units.</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Process by which meaning is given to the information gathered, so that information of interest to the organization's other units can be targeted.</td>
</tr>
<tr>
<td>Storage</td>
<td>Reservoirs of information (procedures manuals, patents manuals, technology manuals, information systems, employees; storage must be organized in such a way that useful information is easy to locate.</td>
</tr>
</tbody>
</table>

1996), it is nevertheless possible to identify a certain number, including the organization’s structure and processes (Miller, 1990; Nonaka and Konno, 1998), information systems (Bohn, 1994), the type of communications and the existence of work or project teams (Clark and Wheelwright, 1993). It is through such mechanisms that organizational learning activities are brought into play to modify the qualitative and/or quantitative components of the competencies. As pointed out by Mascarenhas et al. (1998): “... while we know more about how to evaluate and identify core competencies, the dynamics of competencies are still not clear ...

We currently know that competency development involves two processes (Sanchez and Heene, 1997), namely building and leverage. Since resources and knowledge are now disseminated to partners more than ever before, we have enriched the processes involved to adapt them to the new environment. In our new model, competency development could involve four trajectories (Figure 1):

- **Competence building** through the acquisition of new knowledge/resources and the implementation of new coordination mechanisms;
- **Leverage** to help develop core competencies or double-loop learning, i.e. learning to learn;
- **Refining** of existing competencies through the acquisition of new knowledge/resources stimulating the development of core competencies;
- **Reproduction** of existing competencies through the implementation of new coordination mechanisms to enhance standardization and process integration.

Quadrant 1 involves the building of new competencies, generating qualitative and quantitative changes through the acquisition of new knowledge and the implementation of new coordination mechanisms to support mapping efforts at the information storage stage. In quadrant 2, the organization leverages its competencies. The process involves a qualitative change in the competencies, and requires intensive efforts to interpret information and knowledge. As a result, the competencies become increasingly difficult to reproduce, and gradually evolve into core competencies via double-loop learning. Quadrants 2 and 3 involve qualitative changes; in other words, the organization promotes the reproduction of competencies relating to new key processes (quadrant 2) through standardization of the required knowledge and implementation of new coordination mechanisms (more information distribution activities). The organization can also promote refining of certain key processes by acquiring new knowledge located inside or outside the organization, which is then incorporated into existing reservoirs (quadrant 3). By stimulating double-loop learning, reproduction and refining foster the creation of distinctive competencies that provide access to competitive benefits, which in turn allow the organization to stand apart from its competitors and make decisions related to outsourcing and vertical integration strategies. Refining helps strengthen existing competencies applicable to specific processes, thus creating a core of very high calibre competencies, while reproduction allows the organization to use those core competencies in other activities or processes to generate comparable benefits.

The development of competencies in the supply chain integration phases

Although resource-based research is still focused on the organization, Sanchez et Heene (1997) point out that competency-bearing resources are often located with outside partners, i.e. those within the supply chain. The supply chain can be defined as a network of interacting organizations whose goal is to deliver a product or service to an end user by incorporating and coordinating the activities associated with the movement of goods, from raw materials to delivery of the final product or service, through effective combinations of resources that help create value (adapted from Ellram, 1991 and Frayer and Monczka, 1997). This definition contains the premises by which the supply chain becomes a natural channel for resource (knowledge) deployment in a context where organizations interweave a growing percentage of their activities with those of outside firms (Christopher, 1998).

Indeed, as Fines (2000) pointed out, integration of trading partners can be a competency development mechanism. Inter-firm alliances are another form of skill acquisition to
strengthen competencies (Hamel, 1991). However, competency development through outside partners must be part of a well thought-out process. This means establishing conditions to promote not only exchanges of knowledge, but also the accumulation of knowledge by the receiving organization. Hamel (1991) regards inter-firm alliances as a kind of membrane giving access to people, facilities, documents and other forms of knowledge, a vision not dissimilar to the concept of Ba put forward by Nonaka and Konno (1998). Efforts such as these can be extremely productive for organizations; as Fines (2000) remarked, supply chain design can be the ultimate competency for firms that want to overtake their competitors.

According to Speakman et al. (1998), relations between partners are generally integrated gradually, in phases. In the initial phase, purchaser and supplier evolve in an open market where discussions focus on price and are based on an antagonistic vision of client-supplier relations (competition). At the other end of the scale, the full integration phase will be characterized by sustained cooperation between the two organizations, with joint planning, sharing of technology and so on. Between these extremes, the authors have identified two intermediary positions, namely cooperation and collaboration, characterized by long-term contracts and the use of new information and communications technologies. Each phase demands the introduction of specific supply chain integration mechanisms to enhance the coordination of resources held by the various partners (Table 2). A comparison with the mechanisms used to deploy the resources required for competency development reveals some significant similarities, supporting our suggestion that resources located outside the organization can in fact fuel competencies.

Competency development arises from the interweaving of knowledge and resources resulting from the implementation of these mechanisms, both within the organization and in supply chain partner organizations. Competencies can take a number of different forms (Table 3). We believe there is a theoretical void to be filled here, in order to understand how these competencies emerge and develop within each organization and between the partners in the supply chain.

### A Supply Chain Competency Development Model

To fill this void and summarize the above-mentioned observations, Figure 2 proposes a model describing the development of competencies in the different phases of supply chain integration. Boxes A and

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Activities</th>
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<tbody>
<tr>
<td>Market access</td>
<td>Forwarding and positioning of products on the market; brand development and management activities, sales and promotion, distribution and logistics, technical support.</td>
</tr>
<tr>
<td>Internal integration</td>
<td>Functional integration, standardization and simplification of tasks, responsibilities and processes, more flexible structures, mediator.</td>
</tr>
<tr>
<td>Supplier integration</td>
<td>Strategic alignment, operational merger (quality and time cycle management, just-in-time, stock management, financial links, supplier network management.</td>
</tr>
<tr>
<td>Functional and technological</td>
<td>Development of products and services with unique benefits of significance to clients, based on extensive mastery of a subject.</td>
</tr>
<tr>
<td>Performance measurement</td>
<td>Design of functional performance measures, activity-based costing and cost control, development of an integrated logistics log, financial impacts.</td>
</tr>
<tr>
<td>Relational</td>
<td>Definition of roles and leadership in the supply chain, sharing of information, sharing of risks and gains.</td>
</tr>
</tbody>
</table>

Source: Adapted from Bowersox et al., (1999) p.117.
B position the competencies of the various players. Box C presents the different stages of supply chain integration. Boxes D and E take up certain notions from the resource-based view, stipulating the nature of the coordination mechanisms used and the knowledge exchanged. The model also introduces a new variable, namely the level of dependency between the partners. We feel it is necessary to include the balance of power, since it is a core element in the purchaser-supplier relationship (Cox, 2001).

Mechanisms supporting both supply chain integration and competency development form the crux of what we have called the Learning Logistics Organization. Resources and knowledge, circulating between the partners, fuel the learning process and allow for the development of logistics meta-competencies.

Based on the structural arrangement of the variables, we suggest a series of proposals that will be the subject of in-depth research in the coming months. For example, competencies arise from a combination and arrangement of knowledge and are created from a summary of two parallel activities, namely the implementation of supply chain integration mechanisms and the development of knowledge (organizational learning activities). According to our interpretation of the phenomenon, supply chain integration is associated with greater mastery of the competencies by both the supplier and the order-giver (P1).

Exchanges of knowledge between partners in the supply chain ultimately appear to promote competency development, leading to three potential scenarios:

1. A single beneficiary: convergence of resources towards one linchpin firm that will be the main beneficiary of the learning and competency development process;
2. Mutual reinforcement: joint development of competencies by all firms in the chain (joint development leading to reinforcement of the competencies mastered by the firm at the initial stage);
3. Competency development at chain level: construction of meta-competencies at chain level, transcending the individual organizations.

One notable expression of integration is an increase in the number of coordination mechanisms between the partners (Spekman et al, 1998; Ellram and Hendrick, 1995) – for example, direct links between information systems, more frequent communications, document exchanges, telephone discussions, formation of project teams, person-to-person meetings, etc. This leads us to propose that supply chain integration is associated with an increase in the number of coordination mechanisms and more frequent exchanges between the organizations (P2).

We also believe supply chain integration causes a shift in the type of knowledge exchanged. For example, in the initial integration phase exchanges tend to be limited to tangible, structured resources (finished product), whereas in later phases they involve a much broader range of information relating to the planning, development or improvement of products or processes. This position is based on the premise that integration is designed to achieve better cooperation and hence more efficient coordina-

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**Figure 2 - Model of Competency Development in the Context of Supply Chain Integration**

- **Coordination Mechanisms**
  - Channels (computers, mail, telephone, personal)
  - Simplification of processes
  - Coordination of work
  - Frequency

- **Exchanges of Knowledge**
  - Tangible knowledge (products, components, technologies, etc.)
  - Intangible knowledge (know-how, training, expertise, etc.)

- **Level of Integration**
  - Competition
  - Cooperation
  - Collaboration
  - Integration

- **Level of Dependency**
  - Purchase volume
  - Threat of integration
  - Product specificity
  - Technological dependency
  - Transfer costs

- **Supplier’s Competencies**

- **Order-Giver’s Competencies**

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tion of material flows between the partners (Spekman et al., 1998). Accordingly, supply chain integration appears to be reflected by exchanges of more tacit information between the organizations (P3).

Lastly, the power structure within the chain has an impact on its form (Cox, 2001). It can sometimes work in favour of one of the partners, according to the level of dependency. For example, a dominant player can limit the flow of information towards a partner organization, thus becoming the main beneficiary of competency development using the partner’s resources. A supplier’s lack of negotiating power with its client can be explained by a number of factors (Porter, 1980), including the volume of purchases as a percentage of total turnover, the threat of integration, and low transfer costs. On the other hand, Hamel (1991) points out that an organization in a seemingly weak position can generate negotiating power by preserving its technological advances over its partner. Accordingly, we believe level of dependency is a moderating variable, since it can allow one partner to obtain more at the expense of another, whose competencies would stagnate as a result. It is from these conclusions that we draw our last research proposal, to the effect that an increase in the level of dependency of one partner on another is usually associated with a reduction in the development of the dependent partner’s competencies (P4).

Implications for Managers

So far, our demonstration has been based on a certain number of theoretical foundations. Given the very small number of scientific developments related to the concepts under study, we believe leading-edge research in the field would produce some significant advances. The results would also have major implications for decision-makers involved in supply chain management, a process that can present considerable dangers to firms if they have not grasped the complexity and dynamics of the integration process. Managers must understand that integration is not an end in itself. If the firms are involved in several supply chains, they will not necessarily reap sufficient benefits to compensate for the investments required, which can be significant.

A priori, managers need to accept that supply chain integration is not a spontaneous process. Fynes et al. (1998) and Lincoln et al. (1998) show that logistics relationships between suppliers and order-givers progress through a range of intermediate phases before becoming fully integrated. To succeed with integration, it is important that organizations do not attempt to develop all their competencies at the same time. According to Hayes et al. (1996), managers should aim instead for mastery of certain competencies that will then become springboards for the development of new or meta-competencies. Table 4 proposes a sequence at three different relationship levels. The sequence supports the notion that competency development efforts need to be focused, and that each firm must first master its own internal competencies. If it then wishes to forge a closer relationship with its suppliers, it can focus on the development of skills that will allow it to acquire information and knowledge from, and distribute them to, its logistics partners.

If competencies are to be developed, the knowledge shared must be of strategic value. A firm may be reluctant to develop a closer relationship with certain supply chain partners because of concerns that strategic knowledge will lose its value once circulated. In addition, sharing of knowledge can involve other types of risks, such as the loss of strategic know-how, the development or enrichment of poorly targeted competencies designed specifically to meet the needs of certain outside partners (often the order-giver), and so on. Some practices allow partners to be integrated more successfully. They include (Krause et Ellram, 1997) formal evaluation, feedback of evaluation results to suppliers, supplier certification, visits to suppliers’ premises by the order-giver, visits to the order-giver’s premises by suppliers, training of the supplier’s staff, joint investments and so on. However, most of these mechanisms are unidirectional (from the order-giver to the supplier), whereas in reality competency development can take many different paths.

As new competencies are created, the partners will need more sophisticated coordination mechanisms, and this also involves transfers of cost as the supply chain is integrated. In the initial integration phase, transaction costs are divided according to negotiating power, level of influence within the chain and the market access competencies of each partner. At the time of integration, networking costs are generated by the implementation and annexation of various mechanisms by the partners. It is therefore vital to identify the cooperative gains (synergy, externalities) and the players that gain the most (in both tangible and intangible terms), so that costs can be divided fairly. Ultimately, competencies will become public property within the supply chain. The partners must therefore ensure that they are sufficient in terms of both quantity and
quality, and that no single organization pays directly for them.

Conclusion

More than ever before, organizations must be able to react quickly if they are to be effective, by changing their strategy outline to strengthen or at least preserve their core benefits. Their ability to do this depends on competencies developed by blending different resources, both internal and external. The need to deploy resources obtained outside organizational boundaries highlights the importance of better supply chain integration. With the notion of competency, the supply chain is gradually transformed into a medium through which the knowledge required to build competencies can be exchanged.

Firms choosing this strategy embark on a deployment process that involves an exchange of tangible resources (explicit knowledge) and the development of market access, functional and technological competencies linking information flows to material flows. As integration progresses, it involves exchanges of tacit knowledge related to integration management and organizational routines (relational competencies, internal integration competencies and supplier integration competencies) and to the sophistication of the coordination mechanisms linking resources with knowledge. We have called this phenomenon the Learning Logistics Organization.

If an organization is to exploit all the potential benefits of such a strategy to the full, it must identify the knowledge making up the strategy (Hamel, 1994) and distinguishing it from the strategies of its partners and competitors. Information storage is therefore of crucial importance, since it will allow the organization’s knowledge to be mapped, made available to partners or simply protected from free distribution. As it builds its reservoirs of knowledge, the organization has a unique opportunity to assess the strategic nature of that knowledge, identify any missing knowledge needed to develop competencies, and design mechanisms to protect knowledge it considers to be of strategic value.

Although this research has contributed to our understanding of how competencies are developed and enriched in the supply chain integration process (the Learning Logistics Organization phenomenon), many questions have yet to be answered and offer some interesting avenues for future research.

References


