Organizational Learning as a Foundation of Electronic Commerce in the Network Organization

Louis Raymond and Samir Blili

ABSTRACT: Models of organizational learning must be adapted to network enterprises, virtual enterprises, and other new organizational forms enabled by information technology. Since it is increasingly among these enterprises that e-commerce activity occurs, organizational learning is a requisite for reaping the benefits they offer and avoiding the pitfalls. A model was developed and validated based on a case study of 14 small and medium-sized manufacturing enterprises (SMEs) that belonged to a network of subcontracting firms for a large pivot-firm. In terms of network learning, the SMEs were classified either as advanced firms, intermediates, or beginners.

KEY WORDS AND PHRASES: Extended enterprise, network enterprise, organizational learning, small or medium-sized manufacturing enterprise, small business, subcontracting.

In an economy that has become global, no organization can succeed in isolation. New technologies enable sophisticated interfirm relationships, including business-to-business electronic commerce. In this context, the adoption of information technology (IT) by small and medium-sized enterprises (SMEs) has been an object of research for several years. Because these organizations have been studied in great detail, their characteristics can be taken into account when technological change occurs [5]. It is then possible to explain and predict the strategic impact on small business of such phenomena as electronic data interchange (EDI) and e-commerce [25].

The adoption of information technology, and especially of e-commerce applications, by SMEs poses a number of questions about the work methods employed by these organizations in the areas of production and management. Rethinking business processes and integrating new tools remains a challenge for most firms in this category. Because of the often-mitigated success of IT implementations, their owner-managers are obliged to raise the question of organizational learning, asking, that is, whether their managerial approach is appropriate for these major changes, and whether e-organization members are getting the training needed to implement IT.

Organizational learning takes place when an administrative or production unit acquires knowledge recognized to be useful to the organization [22]. More precisely, learning results from four processes [14]: acquisition of knowledge, diffusion (sharing) of information, interpretation (analysis) of information, and organizational memory (for future use of the knowledge).

Information technologies constitute major assets in a context of market globalization where large enterprises externalize more and more to lighten their structures and to profit from the flexibility of innovative SMEs [6]. New forms of organization, including the “network” or “extended” enterprise, imply new types of relationships between large and small firms. To be effective in this new situation, SMEs must fully integrate IT in their operations by reengineering their intraorganizational and interorganizational business processes [26]. The
quality of the integration varies from one enterprise to the next, as it does within a network of enterprises where, theoretically, a “rich” communication and synergy must develop between business partners. The more complex nature of the commercial cycle entails that e-commerce move from a purely transactional form (e.g., buying a standard product in an electronic catalog) to a “transactive” form [8] that requires richer content and greater interactivity (e.g., specifying the design of a made-to-order product in an electronic meeting).

As a result, problems arise related to the integration of information systems through business process reengineering (BPR) and e-commerce, that is, in the context of the networked subcontracting SME considered as a learning organization [18]. In particular, questions arise as to the nature and quality of the learning achieved in network enterprises, and the impact of organizational learning factors on the implementation of BPR and e-commerce [20]. These reflections lead to the following research questions: Are there many learning profiles and a form of collective learning in networked SMEs? Is it possible to obtain a valid typology from these profiles that can identify the stages of organizational learning in a network?

The model of organizational learning presented below will serve as a working basis for evaluating the quality of the changes made. The discussion will seek to ascertain whether collective learning of any type is present in efforts to integrate information technologies combined with BPR and e-commerce within networks of enterprises in a continuous learning mode.

**Theoretical Foundations**

The study described in this paper was conducted in the context of a network of enterprises in which one large “pivot-firm” acts as an order-giver to subcontracting SMEs that face the challenge of using BPR, e-commerce, and transorganizational technologies to increase the network’s competitiveness within a continuous learning system. Probst and Büchel define organizational learning as an extension or change in the system of values and knowledge, an increase in the capacity for problem-solving and action, and the changing of individuals’ common frame of reference within the organization [24].

In a network, organizational learning is “a dynamic process of interaction whose finality is to produce new knowledge and know-how in the development of a collective competitive advantage” [15]. As shown in Figure 1, collective or “meta-organizational” learning has four identifiable levers: qualifying learning, structuring information, circulating information (through e-commerce and transorganizational technologies), and competition/cooperation. Applying them promotes the diffusion of innovation and the creation of creative synergy within the network enterprise [16].

Argyris and Schön also focus on the organization as an entity and context for individual learning [2]. In their view, however, the leverage for action is located at the individual level. This is so because organization members must increase their capabilities for decision-making and effective action, and must acquire a clear vision of their role and responsibilities if the firm is to become a learning organization as a whole [21].
For Senge, an enterprise cannot learn unless its members modify their mental models so as to integrate the complexity of the organization’s functioning [28]. It is essential that the various actors identify their responsibility in the workings of the system. Since learning enterprises have a sustainable competitive advantage, it is appropriate to conceptualize the firm as a learning system [19]. Organizational learning is today a major strategic stake, one of the levers of empowerment [7].

Teamwork is required when the members of an organization tackle questions of knowledge and competency. Dialogue between team members is necessary to adequately define training needs: The goal is to be in a position to act relevantly and competitively, and to make sure that the new knowledge does not remain the domain of only a few specialists in the organization [16]. Extended to the network context, this means that organizational learning is a dynamic process of interaction aimed at producing new knowledge and know-how so as to develop a competitive advantage for the entire extended enterprise [15].

**Conceptual Framework**

In a context of globalization or increased competition, networked SMEs must transform themselves. As shown in Figure 2, a subcontracting SME within an extended enterprise is a learning system of new business processes and transorganizational technologies that can be analyzed on three dimensions: perception of the environment, transformation of the organization, and change mechanisms.
Opportunities and threats in the firm’s environment constitute major determinants of its strategic choices [3, 4, 23]. Reality is a social construct that requires a response. Continuous movement is proof of a universe in conflict, ever changing, in which one must respond through action and innovation [13]. The globalization of markets in the 1990s changed the economic situation. The disintegration of national economies, as opposed to transnational integration, started a revolution that may become permanent. The role of natural resources and infrastructures, as opposed to information, knowledge, and innovation, has decreased. National economies must be able to constantly adjust and adapt if they are to perform successfully [12].

As SMEs occupy an ever-larger place in the economy, they are directly affected by the new stakes. Given the systemic aspect of environmental realities, many elements have a determining effect on the development of these organizations. On one hand, SMEs do not have the resources of large firms, being more dependent on their immediate environment and the socioeconomic status of their region. Networking can be an interesting alternative—a new type of economy of scale is formulated in network terms, or in terms of virtual integration or added value [27]. On the other hand, SMEs are more flexible. Their capacity to adapt and be creative allows them to innovate and to diversify their activities, and they are able, as well, to reduce their production costs. When uncertainty is high, they can resort to technological scanning to remain up to date [17].

Consequently, small and medium-sized enterprises must “learn to learn” if they are to be effective. Given the increasing environmental pressures for change, the quality of organizational learning has become a major source of competitive advantage [24]. In principle, SMEs should benefit, through knowledge trans-
fers, from research streams on e-commerce, business process reengineering, interorganizational information systems, and transorganizational technologies (such as Xnet/Web technology) as well as organizational learning. These three approaches are closely related, for the restructuring of processes must be accompanied by retooling, and this implies the use of information technologies. Members of the organization must be involved if these changes are to be permanent and successful. Thus organizational learning acts as a foundation for change and nourishes it [12].

The conceptual framework presented in Figure 3 is based on Argyris and Schön’s model of organizational learning [2], as adapted by Probst and Büchel [24]. **Single-loop** learning is an organization’s reaction to transformations in its internal and external environment. Learning is motivated by a divergence between results obtained and organizational objectives. Procedures and actions are adapted within the existing frame of reference, although questions may be raised about the organization’s values and norms. The cognitive processes involved are more complex when the relation between the firm and its environment is transformed. In this form of reconstructive, or **double-loop**, learning, new priorities must be defined, including the possibility of restructuring dominant values and revising existing objectives and norms. In a network, it is possible to develop and foster a new frame of reference that encompasses the other two forms of learning. When a firm refers to its membership in the network in order to make decisions, the process has matured to the point where it transcends organizational boundaries, in that a form of **collective** learning has been achieved [11].

Fifteen variables were used to identify the learning profiles of networked SMEs, grouped under the three dimensions of Argyris and Schön’s model. These comprise the organization’s **objectives** (governing variables that drive and guide actions), **actions**, and **results** (accomplishment of intended consequences). As indicated in Table 1, an initial choice of 10 variables was based on Bjørn-Andersen and Chatfield’s characterization of organizational learning as a “management methodology” of greater importance for e-commerce in terms of potential benefit and degree of organizational transformation, as compared to total quality management and business process reengineering [4]. Based on prior empirical studies of networked SMEs, five other variables were identified for their relevancy to organizational learning, including the two results variables (level of externalization and density of links with the network).

The first variable related to **objectives**, concerning the firm’s capacity to perceive forces and threats in the environment, allows the owner-manager to make better strategic choices. Given a more complex environment, more advanced learning is required [19]. If the SME adopts a defensive strategy, production and profitability become its “center of gravity,” whereas if an innovation-based strategy is chosen, the center moves toward diversification and competitiveness. Eventually, a network-based strategy moves the center of gravity toward shared knowledge and synergy [5, 24]. Another variable that influences behavior is the firm’s management approach or style. Here, learning is enhanced when the approach favors bidirectional (bottom-up) rather than unidirectional (top-down) relations [19, 24]. The same can be said when the focus is placed on managing immaterial rather than material resources—on information rather than physical flows [27]. Also, process management methods can be either
rigid or open to external and internal influences [24], while the SME’s learning model orients training activities from a technical/functional or an organizational/network perspective [1, 2].

A firm must react and transform itself to remain competitive. The first actions variable specifies the type of change realized: localized and imposed by management (top-down) or more global and emergent (bottom-up) [12, 26]. Determinants of change can originate in external pressures to increase the quality of the product, or can influence the whole value chain beyond the physical boundaries of the firm to increase the network’s performance [1, 19]. These changes imply greater levels of empowerment in the work organization, including autonomous work teams and networked virtual teams [6, 19]. Information technology enables organizational transformations. The levels of sophistication and integration of the SME’s information systems and the way it implements them are also indicative of the type of learning done [27]. For instance, an SME’s information systems can be intrafunctional only, be networked internally, or can allow for interenterprise links.

The results variables consider the level of externalization and the density of the links created by the use of information systems in the network. The first is seen as a strategic choice made by the owner-manager to increase the competitiveness of the SME, and eventually the network, through outsourcing and a focus on distinct competencies [5, 16]. The second is also an indicator of the type of learning achieved, indicating whether relationships have evolved from imposed transactional links toward denser links based on “richer” information exchanges, cooperation, diffusion of innovation, and trust within the network [6, 15].

As presented in Table 1, each variable is described in respect to three states that define the organizational learning profile of an enterprise. The typology thus defined is a parsimonious way of describing complex organizational forms and explaining consequent effects, such as organizational effectiveness [9].

Figure 3. Organizational Learning in Networked SMEs
<table>
<thead>
<tr>
<th>Variables</th>
<th>Single-loop</th>
<th>Double-loop</th>
<th>Collective learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision of the environment [19]</td>
<td>stable context, little change in the environment</td>
<td>some change in the environment</td>
<td>complex and much change in the environment</td>
</tr>
<tr>
<td>Center of gravity [24]</td>
<td>production, product quality, profitability</td>
<td>competitiveness, product diversification</td>
<td>synergy, loyalty, shared knowledge</td>
</tr>
<tr>
<td>Competitive strategy [4, 5]</td>
<td>defensive, pull-back, concentration</td>
<td>innovation, quality, R&amp;D</td>
<td>sharing and cooperation</td>
</tr>
<tr>
<td>Management approach [4, 19, 24]</td>
<td>top-down</td>
<td>top-down/ bottom-up</td>
<td>bottom-up</td>
</tr>
<tr>
<td>Focus [4, 27]</td>
<td>physical flows</td>
<td>physical and informational flows</td>
<td>management of immaterial resources</td>
</tr>
<tr>
<td>Process management method [4, 24]</td>
<td>workflow study and other industrial engineering techniques</td>
<td>benchmarking and consultation of managers and team leaders</td>
<td>transparency and consultation of social partners</td>
</tr>
<tr>
<td>Learning model [1, 2, 4]</td>
<td>technological learning (use of new tools)</td>
<td>technological and organizational learning (adaptation of managerial functions)</td>
<td>collective business learning with the network and other business partners</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature of change [4, 12, 26]</td>
<td>radical, decided by top management, localized</td>
<td>self-produced, extended; internal reengineering</td>
<td>social, emergent, sophisticated</td>
</tr>
<tr>
<td>Determinants of change [1, 19]</td>
<td>increase the product's quality</td>
<td>participative, internal search for opportunities</td>
<td>participative, revision of processes with firms in the network</td>
</tr>
<tr>
<td>Work organization [4, 6, 19]</td>
<td>beginning empowerment</td>
<td>empowerment (multidisciplinary teams)</td>
<td>virtual teams in the network</td>
</tr>
<tr>
<td>IS application areas [4, 27]</td>
<td>production, fabrication, automation (external demands)</td>
<td>sophisticated operations, suppliers and clients (voluntary participation)</td>
<td>in all areas (partnership)</td>
</tr>
<tr>
<td>IS integration level [4, 27]</td>
<td>intra-functional (no internal network)</td>
<td>intra-organizational and inter-functional (internal network)</td>
<td>inter-organizational and sophisticated (EDI, EC)</td>
</tr>
<tr>
<td>Type of IS implementation [4, 27]</td>
<td>occasional and informal information and consultation</td>
<td>gradual; regular consultation of internal units</td>
<td>gradual; negotiation with external partners</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalization/ internalization [5, 16, 27]</td>
<td>low level of outsourcing, cost control (related to the lack of equipment)</td>
<td>higher level of outsourcing in relation with the firm's strategy</td>
<td>high level of outsourcing in relation to the network's strategy</td>
</tr>
<tr>
<td>Density of links with the network [6, 15, 27]</td>
<td>transactional links (minimal and imposed)</td>
<td>dense links in view of innovation; adaptation to the market</td>
<td>denser links (cooperation and partnership); network structuring information</td>
</tr>
</tbody>
</table>

Table 1. Research Variables of Organizational Learning in Networked SMEs.
Methodology

This study was done in the context of a university research chair sponsored by a large manufacturing enterprise (pivot-firm) and its first-level subcontractors (SMEs). The commercial cycle that links a subcontractor to a pivot-firm is quite complex, typically including nine phases: exposition and promotion (of the SME’s production capability and know-how), information exchange (on the product to be manufactured), negotiation (price, quality, delivery), design of the product, contract, order execution, expediting, settlement, implementation of the product (within the pivot-firm’s production process), and after-sales service. The objective was to develop and implement new trans-organizational technologies in networked SMEs, within a research program whose goal is to develop a synergistic model of an “extended” or “shared” enterprise [16].

Given the present state of knowledge, a qualitative and exploratory research approach was used. The case study method is well suited to situations where theoretical propositions are few and field experience is limited [10]. A multiple-site case study allows one to understand the context and evolution of each firm. Because of the complexity of the phenomena, a certain level of imprecision and uncertainty is tolerable in conjunction with the exigencies of clarity and parsimony.

The subcontracting SMEs were chosen on the basis of criteria established by the pivot-firm in a previous study [27]. They have been members of the chair for the last three or four years, save for three that joined the network more recently. Thus the chair represents a locus in which a form of collective learning might emerge. Fourteen subcontracting SMEs in the manufacturing sector, employing anywhere from 80 to 400 workers each, participated in the study.

Data were collected by interviewing the owner-manager or CEO of each firm. The interviews were conducted with the help of an analytical grid describing various types of organizational learning corresponding to the research model (see Table 1). The descriptions of the learning situations were written in such a way as to measure the firm’s learning level for each of the 15 variables in the model. Taking account of the owner-manager’s responses and comments, the description that best corresponded to the firm was selected.

Audio recordings of the interviews and notes taken after visits to the plants were subjected to content analysis. Following this, a synthetic record was prepared for each firm to codify the data and eventually identify the emerging questions. The most relevant comments of the interviewees were noted, and scores were given on a scale of 1 to 5. For each of the 15 variables, if the response corresponded to the situation proposed for single-loop learning, a score of 1 was attributed to the variable. A score of 3 or 5 was attributed to a variable when double-loop or collective learning was the case. A score of 2 or 4 was attributed for intermediate situations.

Results

Descriptive results were assembled in the form of synthetic tables for each enterprise. The 15 variables included in the research model are shown in these
tables, as well as the important elements that came out of the interviews. An example of the results obtained from the content analysis of the case data is shown in the Appendix. The learning profile of each firm was then presented in graphical form and codified on a predetermined scale. Firms were regrouped on the basis of similarities identified during the codification of the data. After an examination of each firm’s profile, three groups were identified on the basis of their learning behavior. This first grouping was done by judgment.

As presented in Table 2, two SMEs (L and N) possess attributes that place them, on average, in an advanced learning profile. They were designated the advanced firms (a). Their management approach is bottom-up. In both firms, the owner-managers see their employees as partners, and have brought about a strong sense of belonging by involving them in various ways, either by training them so that they can participate in decision-making or by keeping them informed so that they can propose changes.

In the four firms (B, D, F, and K) that were designated beginners (b), change occurs in a top-down fashion. Information flows circulate only from top to bottom, and change is solely initiated by top management. This denotes the presence of single-loop learning. As variants between these two extremes, the eight intermediate firms (i) have both a top-down and a bottom-up management approach, indicating double-loop learning for that variable. As to another variable, IS application sectors, the advanced firms have not yet gone beyond sophisticated operational systems but are examining the advantages of systems that allow for closer relationships with business partners. This explains why their score places them at the double-loop rather than at the collective-learning stage. The same is true for another variable, density of links, as no firm has achieved a high level of cooperation within the network, integrated interorganizational systems not yet being available.

Table 2 summarizes the positions of the three groups of firms by situating them on each of the 15 variables of the learning model. The results of a cluster analysis add a quantitative dimension to the qualitative results. Hierarchical clustering was used (average Euclidean distance method), with the scores attributed to each variable as ordinal measures. The results presented in Figure 4 illustrate the groupings obtained on the basis of the 15 variables in the research model. The groupings are similar to the ones made by judgment. As can be seen in the dendogram, a three-cluster solution is appropriate, in which firms B, F, D, and K form one group, and firms N and L, having learned in a more advanced fashion, form another. The other eight enterprises are not sufficiently different from one another to be redivided in a significant way. The validity of grouping the variables on three underlying dimensions was confirmed by calculating Kendall’s W coefficient (for the objectives variables, W = 0.48, p = .000; actions, W = 0.19, p = .020; results, W = 0.36, p = .025). A summary portrait of each group of firms is given below.

**Group I: The Advanced Firms**

The two firms in group I are small and medium-sized enterprises evolving in a relatively turbulent environment and always looking for new opportunities. To remain competitive, they innovate and look for new methods to achieve greater
efficiency. They are more and more preoccupied by the effectiveness of the operations that link them to the other subcontractors in the network. Their managerial approach uses discussion groups and exchanges at every level of the firm. Their training activities have objectives that go beyond technological learning.

Changes tend to be integrated globally and are often determined internally. Other firms in the network are beginning to play a role in bringing about changes. The employee’s level of responsibility is increasing, and autonomous project teams are currently active. Information systems are integrated internally, and applications are more and more sophisticated. At enterprise N, the need for greater integration with other firms is clearly expressed. The rate of externalization is increasing and is perceived as an advantage in developing strategic competencies. Links are denser, but interorganizational information systems are not developed enough to really strengthen communications with business partners.

**Group II: The Intermediate Firms**

The eight firms in group II are intermediate in the sense that they have rethought certain objectives and are in a position to make significant changes. There is still some incoherence in their mode of functioning, however, and little
concern for the collective. These firms want to be more competitive. The growth of their research and development activities demonstrates their intent to innovate and diversify. Their managerial approach gradually favors bidirectional communications and places more emphasis on information flows. Information search is done both through external contacts and employee consultations. Training objectives remain centered on acquiring technical knowledge.

Three of the SMEs in group II have significantly changed their work organization and better integrated IS within their operations. All eight of these firms show an interest in using sophisticated operational systems and are conscious of the importance of an internal network. Various methods of IS implementation have been adopted, but consultation is becoming more and more important. Innovation contributes to strengthening interfirm links, especially through the exchange of drawings.

**Group III: The Beginner Firms**

The four firms in group III differ from the others in that their environment is not changing as much and their activities are relatively more stable. They follow a strategy of preserving their customer base in order to increase profits. Although their managerial approach favors top-down relations, they are attempting to modify this by listening to their employees. One of these firms has consulted its employees quite extensively with regard to the establishment of a new plant.

The main preoccupation of these SMEs is focused on physical flows, aiming for greater productivity. Training objectives are oriented toward technological competencies. Changes, whether localized or extended, usually originate from

---

**Figure 4. Hierarchical Cluster Analysis of the Networked SMEs**

![Figure 4](image-url)
top management. Notwithstanding a tendency to continue the execution of repetitive tasks, two firms have begun to assign responsibility to employees in their work organization. IS application sectors are gradually diversifying, and their integration is slowly evolving to go beyond the intrafunctional. The level of outsourcing is determined by the firm’s need to control operations or by a lack of equipment. Interfirm relationships remain solely at the transactional level.

Conclusion

This study was intended to verify the possibility of identifying levels of organizational learning, and especially the beginnings of collective learning for subcontracting SMEs belonging to a network. Based on an extension of Argyris and Schön’s model of new organizational forms, business processes, and technologies, a multiple-site case study of 14 small and medium-sized firms in partnership with a large pivot-firm was used to empirically identify three basic levels of learning—beginners (four firms), intermediates (eight firms), and advanced (two firms)—showing forms of collective learning in terms of their network objectives, actions, and results.

The initial validation of the operational model of collective learning, albeit bound by the limits of the case study research method, has provided deeper knowledge about the evolving behaviors of firms as they become learning organizations. These limits pertain mainly to the level of generalization, for building theory from a relatively small number of cases entails describing phenomena that can be quite specific or idiosyncratic. The results of this study nonetheless provide indications on what orientation to adopt in order to make progress toward collective learning in networked SMEs. For instance, owner-managers would be well advised to adopt a managerial approach in which employees are encouraged to initiate change. They should also strive for integrated information systems that favor greater responsibility within work teams and denser links between business units and partners. This diagnostic allows the CEO to identify the firm’s strengths and weaknesses, and to compare it with other firms in the network, thus acting as a stimulus for future changes.

As business enters the twenty-first century, a firm’s capacity to learn is an undeniable competitive advantage. Now more than ever, the notion of organizational learning is the focus of researchers’ and managers’ attention. Change is more likely to succeed when business process engineering and electronic commerce, enabled by sophisticated information systems, are implemented by organizations that possess sufficient learning capabilities. Thus information technologies play an increasingly important role in the evolution of networked SMEs. Greater informational capacity allows these firms to transcend organizational boundaries by creating privileged relationships with business partners. Given their learning potential, they are able to react to the strong pressures emanating from an ever more complex environment. Further research is needed, however, to identify the specific organizational learning factors that determine the successful implementation and use of e-commerce applications in the network enterprise.
Appendix: Sample Learning Profile

Enterprise N belongs to a holding but is totally autonomous in regard to management. It is run by a CEO and a management team, and has 250 employees, including six in research and development, and 24 in the services sector. Making fiberglass hulls for the recreational vehicle industry is one of its most important activities. The pivot-firm is one of its four major clients.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Single-loop</th>
<th>Double-loop</th>
<th>Collective learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision of the environment</td>
<td>The firm is in a very competitive situation due to the new global competition. The environment is evolving as technological changes force the firm to adapt if it wants to remain competitive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center of gravity</td>
<td>Its interest in research and development allows it to obtain new knowledge. The firm’s strength is its ability to involve its personnel. Thus it can achieve a high level of quality in its production.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive strategy</td>
<td>The CEO summarizes his strategy as consisting of sharing and cooperation with a view to satisfying the client. A plan is being implemented to work more closely with suppliers and create synergy to this effect. “Problems that had never been solved before were solved through the partnership with the suppliers.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial approach</td>
<td>Since the arrival of the new CEO about a year ago, many participative management practices have been put in place. At a monthly meeting of employees (one for each workshift), the CEO provides information on such subjects as the firm’s financial situation, competitors, clients, and projects. A system of corrective and preventive actions allows employees to make suggestions to increase process efficiency and effectiveness; management must respond within 10 days and provide the necessary explanations. The use of information technology provides regular indicators of production ratios, production quality, and product-defect rates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus</td>
<td>The firm’s growth rate (46 percent in 1996) is due for the most part to the quality and density of its information flows. These extend beyond the physical boundaries of the organization, given its strategic choices oriented toward sharing and cooperation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process management method</td>
<td>Process management is done with outside help in a proportion of 50 percent. The CEO tries to find out what is happening in other industries and apply their solutions if possible. “But one must never do anything without the involvement of people inside the organization, through a project manager or other means.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning model</td>
<td>Learning goes beyond the strictly technological. The firm’s personnel were given general training on the implications of reengineering, robotics, and computerization. Part of this training centered on learning related to the new technologies. Forty individuals took courses that enabled them, in turn, to train the other employees on their workstations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>Single-loop</td>
<td>Double-loop</td>
<td>Collective learning</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Nature of change</td>
<td>Changes are generally global; if a change is more localized, it is always envisioned within a whole. Process revision on a production line involves a group of employees, including operators, service personnel, and an external resource. They work together intensively for eight days to reduce setup times while maintaining quality. This has also been done with another firm in the network to increase the quality of the customer's product; the supplier was involved. &quot;Within a week, the problem was resolved together.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determinants of change</td>
<td>&quot;Corrective and preventive actions are what moves things most. The operators are the best persons to know how to bring about improvements. It is worth listening to them.&quot; Following an operator's suggestion, machines were grouped differently in order to solve a space problem.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work organization</td>
<td>Hierarchical levels will be diminished even more. The current production cycle is long, and employees cannot see its end. The rotation schedule allows them to understand the whole and be conscious of each work unit. With the self-managed work cells that will be implemented in the next few months, they will be much more involved and responsible. The coordinator, at present responsible for production planning, will be available when needed. The firm has begun to create virtual teams with the pivot-firm. Line employees and managers from the two firms have met to study starting the production of new models.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS application areas</td>
<td>IS are more and more sophisticated; they focus both on cost reductions and business process reengineering. The firm has many projects that will allow it to manage client inventories and involve suppliers in this integration. &quot;Our clients will not have to tell us when to produce, and our suppliers will not have to ask when we need materials.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS integration level</td>
<td>IS have been networked internally since last year; this facilitates communication with the outside. Initially, pressures came from clients and a certain obligation was perceived. Now the firm goes beyond and proposes ideas to clients and suppliers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of IS implementation</td>
<td>&quot;We negotiate to arrive at an agreement, as much for the implementation of new technologies as for other changes. Collaboration with unions provides harmonious labor relations, notwithstanding past difficulties.&quot; There are frequent consultations and negotiations with external partners.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>The CEO puts the emphasis on the firm's strategic competencies. Since last year, many activities have been outsourced. IS facilitate the externalization of production and coordination of subcontractors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density of links</td>
<td>&quot;With IS, one must not cut human links with organizations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Computer links with the clients' inventory do not solve everything... Relations are better, but not through these systems. They are not developed enough for the moment.

Other

Research chair's contribution

"The only thing that the research chair has not yet done is to bring competitors in the network closer together."

Other comments

"The ultimate objective of participative management is to implement self-managed production: production cells instead of production lines, with the support of coordinators who manage people in a decentralized manner." The CEO's strategy is to toss out ideas and let them simmer. "When I emit ideas, it is because I have a plan of action. You cannot toss out ideas and do nothing afterward."

REFERENCES


LOUIS RAYMOND (louis_raymond@uqtr.uquebec.ca) is professor of information systems at the University of Quebec at Trois-Rivières, Canada, and a member of the Research Institute for Small and Medium-Sized Enterprises. His teaching and research center on the management of IT and electronic commerce in the specific context of small businesses and network enterprises. His work has been published in the *MIS Quarterly, the Journal of Management Information Systems, Decision Support Systems, the European Journal of Information Systems, Data Base, the Journal of Organizational Computing and Electronic Commerce, and the International Conference on Information Systems.*
SAMIR BLILI (samir_blili@uqtr.uquebec.ca) is an associate professor of information systems and international commerce at the University of Quebec at Trois-Rivières. He is also an international expert on information technologies strategies and governance for several international and national organizations, governments, and enterprises. His teaching and research center on the competitive use of information systems and e-commerce, in the context of international commerce and new organizational forms. His work has been published in Information and Management, International Journal of Information Management, Journal of End User Computing, European Journal of Purchasing and Supply Management, and several international proceedings.