Chapter IV

Interorganizational Knowledge Management: Some Perspectives for Knowledge Oriented Strategic Managment in Virtual Organizations

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New organizational approaches like Virtual Organizations have the potential to provide the flexibility and to reduce the complexity and risk of management necessary to survive in the actual economic environment. A crucial factor for gaining and sustaining competitive advantages in the current economic environment is knowledge. The management of knowledge has been extensively discussed during the past few years. However, there is still a considerable lack of research that addresses innovative ways of managing the transfer of knowledge, best-practices and competence between organizations. In order to partially overcome these conceptual deficiencies we introduce the concept of an Interorganizational Knowledge Management and discuss its implications on knowledge oriented strategic management in Virtual Organizations.

INTRODUCTION

Today's management is confronted with an ever increasing dynamics and complexity of the economic field (Ungson, Trudel 1999, pp. 60). This turbulent environment forces enterprises to generate new ideas and to transfer them into processes, structures and products at an increasing pace without having all necessary core competencies. This development leads to a significant rise in business risk. Modern co-operational and organizational forms like Virtual Organizations enable enterprises to lower complexity and risk as well as to

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increase flexibility and diversity of available resources simultaneously (Blecker 1999, pp. 1).

Knowledge and its interorganizational management become crucial factors for gaining and sustaining competitive advantages (Preiss, Goldman, & Nagel 1996, pp. 268). Therefore, interactions with other organizations for exchanging and acquiring knowledge become one of the focal points of management. Co-operations are often more powerful and successful, than traditional large enterprises. Empirical evidence to the increased importance of co-operations is provided from the International Motor Vehicle Program (IMVP) of the MIT from the automotive industry (e.g. Womack, Jones, & Roos 1990) as well as certain cases in the electronic field (e.g. De Meyer 1998). However, this discussion lacks a common terminology since different definitions are used to describe the same or similar aspects of modern organizations and cooperations (Blecker 1999, pp. 11; Kaluza/Blecker 1999a, pp. 267). Additionally, there are only gradual differences between these definitions, since almost all of them emphasize the co-operation of economical and/or legally independent companies for commonly achieving competitive advantages by concentrating on core competencies. In this paper we focus on the concept of the Virtual Organizations, which are currently of particular interest to Strategic Management and therefore intensively discussed in literature.

One of the major objectives of this paper consists of providing the theoretical background for explaining of the processes taking place within Virtual Organizations with respect to knowledge. Although this is a rather complex topic, we do not want to reduce our discussion to some pragmatic approaches for the sake of simplicity of manageability. Rather, this paper tries to thoroughly elaborate the concept of inter-organizational knowledge management by presenting its key contents. In the course of our investigation, we will examine how companies can obtain knowledge-based competitive advantages by participating in Virtual Organizations. Present research in this field concentrates on a knowledge-oriented management addressing questions regarding elements, characteristics, functions, and possible applications of organizational knowledge.

BACKGROUND

The Concept of Virtual Organizations

The economic literature is characterized by a variety of different meanings of Virtual Organizations (Blecker 1999, pp. 23). Most of them follow the common approach of defining the term Virtuality analogous to virtual memory management of modern computer systems (Mowshowitz 1997, p. 34). Therefore, Virtuality denotes a 'As-If-Reality' (Davidow, Malone 1992). This means, that an object has an effect and shows behavior without physically existing in reality (Martin 1996, p. 15).

However, the literature on Virtual Organization is characterized by heterogeneous definitions and concepts. For instance, Davidow and Malone (1992) define Virtuality as the key factor to successful management in the 21st century but fail to develop a theoretically consistent concept. A concretizing of the construct or even a definition of the Virtual Organization, which goes beyond general descriptions, is completely missing. Rather, the authors only recite well-known management concepts like Just-in-Time, Lean Production, and Total Quality Management as features and/or approaches to the implementation of

Virtual Organizations. Additionally, it is still not obvious whether a Virtual Organization represents a private firm or a cooperative, enterprise-spreading concept. Byrne, Brandt, & Port (1993, p. 36) define Virtual Organizations as "a temporary network of companies that come together quickly to exploit fast-changing opportunities. In a Virtual Corporation, companies can share costs, skills, and access to global markets, with each partner contributing what it is best at." This definition is extended by the authors later to: "a temporary network of independent companies - suppliers, customers, even erstwhile rivals - linked by information technology to share costs, skills, and another's markets." The essence of this definition is that it views Virtual Organizations as a temporary network of enterprises (e.g. New, Mitropoulos 1995). The companies involved make common use of their resources, share resulting costs, and try to generate common competitive advantages. Based on the large pool of individual core competencies present in a Virtual Organization it becomes a "best of everything" enterprise.

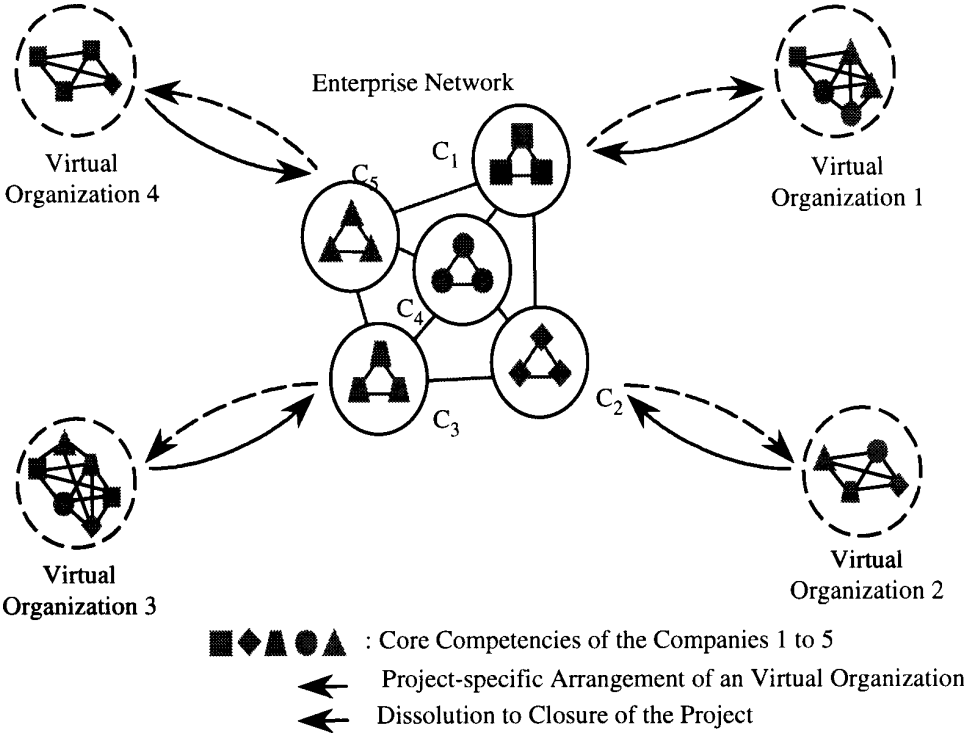
Despite the large number of publications, neither a common understanding nor consistent concepts of Virtual Organizations exist. Rather, a literature analysis reveals a substantial uncertainty in dealing with Virtual Organizations. This is mainly based on the missing of traditional organizational characteristics like exactly defined property rights and organizational boundaries. In order to make the concept of Virtual Organization more operational Blecker (1999, p. 30) creates a synopsis of the definitions and descriptions being available in the international literature. This synopsis yields a subscription of Virtual Organizations based on the following characteristics:

- intended temporary cooperation of
- legally and economically independent companies, which
- participants concentrate on their core competencies as well as the temporally limited and order-related bundling of these core competencies,
- reciprocal supplement of the actors during the production process,
- mutual agreement on targets,
- high reciprocal trust,
- high value of customer orientation,
- no centralized and/or formalized organizational structure,
- real structures of the Virtual Organization and its participants are only limited observable by the market partners,
- intensive application of modern information and communication technologies, and
- individualized products.

Additionally, Blecker (1999, pp. 31) emphasizes that Virtual Organizations cannot be examined in an isolated way but need to be considered as a temporary, project-specific form of a network of enterprises. In Virtual Organizations the temporary and spatial deployment is achieved by building an enterprise-spreading network based on modern information and communication technologies. Without a network, the search for partners, negotiations regarding the entry of potential partners, the structure of trust as the major instrument of coordination and control in order to create a Virtual Organization would last too long. Furthermore, the outcome of these processes would be highly uncertain.

However, a Virtual Organization is only an appropriate organizational concept, if it can be created quickly and without complications. Therefore, potential participants need to dispose of a variety of different relationships to other companies prior to joining the Virtual

Figure 1: The Concept of the Enterprise without Boundaries
Source: Blecker (1999, p. 34)



Organization. These relationships are then bundled. Following the definition of Sydow (1992, p. 79), Blecker (1999) considers this bundle of complex-reciprocal and rather cooperative than competitive relations as a network of enterprises (Thorelli 1986, Jarillo 1988 & 1993, Miwa 1993). A combination of Virtual Organizations and network of enterprises leads to a concept we would like to call "enterprise without boundaries". As shown in Fig. 1 the enterprise without boundaries is defined as "...a co-operation of legal and economically independent enterprises, which try to achieve competitive advantages together. The cooperative and competitive relations between the enterprises involved form a network, which participants concentrate on their core competencies. On this basis the individual core competencies are temporally linked in market- and projectoriented Virtual Organizations with the help of modern information and communication technologies" (Blecker 1999, p. 33).

The Resource-Based View of Strategic Management and the Role of Knowledge

Both, the depicted concept of the enterprise without boundaries and our understanding of Virtual Organizations emphasize the special importance of knowledge and its interorganizational transfer for gaining and sustaining competitive advantages. This importance can be explained by applying the Resource-Based View of Strategic Management (Blecker 1999, pp. 191, Kaluza/Blecker 1999b, pp. 24).

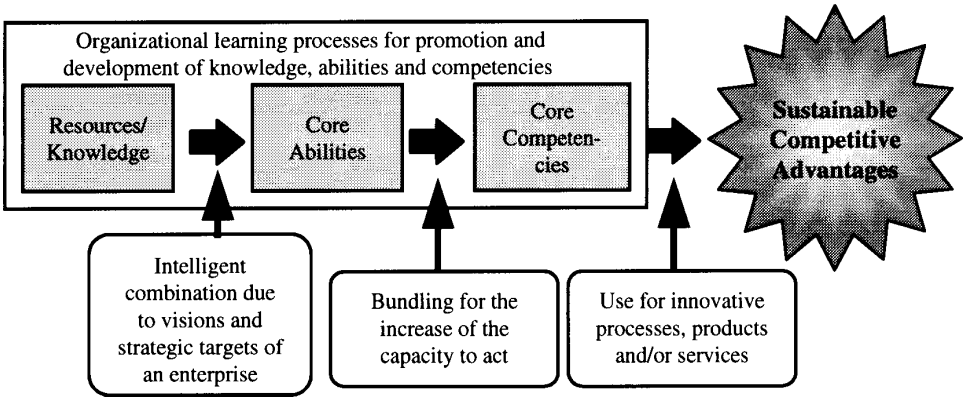
From a resource-based view competitive advantages are based primarily on a different quantity and nature of resources companies are equipped with. Additionally, according to the Resource-Based View companies use their available resources differently from case to case. Due to large deficiencies of factor markets a uniqueness of the enterprises results from this asymmetrical resource allocation. Companies may use their individual resources to generate a variety of different processes and products and, hence, achieve competitive advantages (e.g. Wernerfelt, Montgomery 1998, pp. 246; Montgomery 1992, p. 6, Peteraf 1993, pp. 180, Ring 1996, p. 12, Collis 1996, pp. 154).

We define resources as the companies' specific material and immaterial goods, systems, and processes. These resources are usually divided into the following four categories: physical or tangible resources, intangible resources, financial resources, and organizational resources (e.g. Barney 1991, pp. 101; Nanda 1996, pp. 103). The availability of resources does not necessarily lead to a competitive advantage of the respected company. Therefore, the Resource-Based View examines the basic conditions under which resources generate supranormal rates of return: small or no wearability, transferability of resources needs to be limited, limited imitability, reduced substitution (e.g. Barney 1991, pp. 196, Grant 1991a, pp. 123; Grant 1991b, pp. 111). These four requirements of the Resource-Based View are met by knowledge, since knowledge is weaved in the fabric of the organization. Therefore, knowledge may be regarded as special resource, which enables a company to achieve competitive advantages and supranormal rats of return. This conceptual context is shown by Fig. 2.

Recent research in this area focuses on developing sustaining and protecting intangible resources such as knowledge, abilities, and core competencies. Especially Badaracco (1991, pp. 1) considers the potentials for future strategic success in the development, improvement, the protection and the renewal of the companies specific know-how base. A "knowledge-driven competition" becomes the challenge of the future. This requires strategic management to increasingly focus on factors like personnel and organization, which have been neglected so far.

Following the Resource-Based View the major function of a company participating in a Virtual Organization consists of adjusting the current resources configuration with the

Figure 2 : A Resource-Based View of Knowledge
Source: Rühli (1994), p. 43; Hillig (1997), p. 94



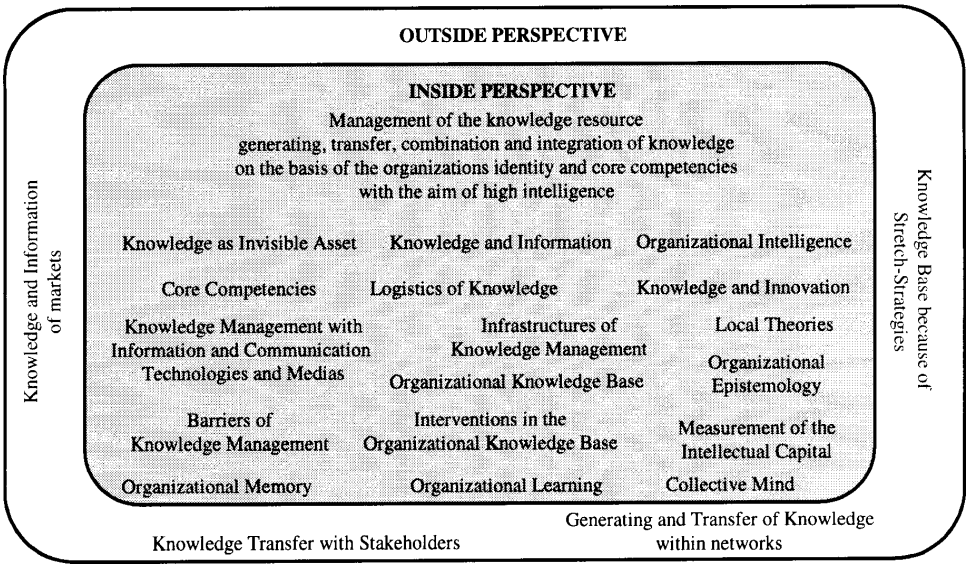
competitive strategies and of developing these resources according to strategic considerations. Since an individual enterprise has only a limited number of core competencies, it is frequently dependent on the technical, individual and organizational knowledge of its partners.

It is therefore appropriate, to temporarily use further knowledge and further core competencies in co-operations like Virtual Organizations or even acquire them by means of mutual learning processes (Blecker 1999, pp. 226). Under certain circumstances, the level of process integration among companies involved becomes very strong, leading to a network of processes and/or knowledge. This network executes processes together and/or generates, gathers and uses knowledge in common. Interorganizational transfer processes and management concepts for explicit and tacit knowledge are necessary and relevant for the success of a Virtual Organization and its participants.

BASICS OF "KNOWLEDGE-MANAGEMENT"- A NEW PARADIGM OF STRATEGIC MANAGEMENT... ?!

In economical research and business practice new concepts for competing successfully in today's economic environment have emerged during the past few years. On the one hand, there was a development of heterarchic and adhocratic organizational concepts leading to increased flexibility and a higher degree of intra- and interorganizational decentralization. On the other hand, managerial concepts such as Lean Management and Business Process Reengineering were introduced, in order to increase organizational efficiency. However, due to the intensive efforts towards downsizing they often lead to a reduction of redundancy and, thus, a loss at Organizational Slack (Cyert/March 1963, pp.

Figure 3: Dichotomy of the Internal and External Perspective of Knowledge
Source: Neumann (1999a), p. 34



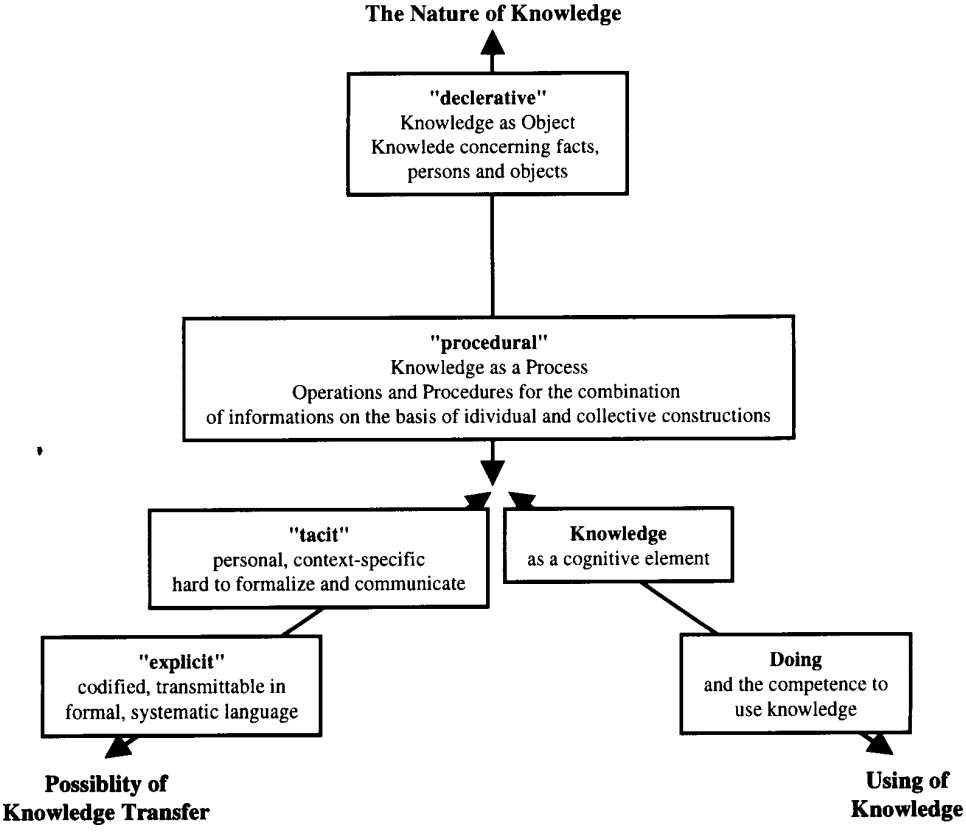
36). Additionally, a large part of company-specific knowledge was uncritically diminished. Thus, not only the waste of resources was reduced, but also the companies' flexibility and efficiency was significantly lowered. Especially, the concept of organizational learning emphasizes the notion that the institutionalizing of learning by means of collective reflection and change processes becomes a critical success factor (e.g. Rheinhardt 1994). For instance, in a Virtual Organization and also in the Enterprise without Boundaries knowledge can be acquired and used in common which leads to the development of a new Cooperative Slack (Blecker 1999, pp. 136). In analogy to the Organizational Slack we define Cooperative Slack as all resources within a Virtual Organization that are at the disposal of every partner but not utilized in the respective period. Based on this new form of slack companies can reduce their Organizational Slack by simultaneously increasing the flexibility. A major obstacle for the realization of this effect is the missing of a theoretically founded and practically usable concept of a "learning enterprise". Thus, the respective reorientation of management did not take place. Current research focuses on two major point of interest: the starting point and the result of learning processes.

In the current discourse regarding the management of knowledge two dichotomic perspectives have emerged: an internal perspective and an external perspective. During the last few years the research in this field has emphasized on the internal perspective. According to this perspective, knowledge is discussed as important strategic resource, core competence or a source for innovations. It views knowledge as a value generating factor and a starting point for organizational learning processes. In contrast, the external perspective discusses the relationship between the enterprises and the economic environment or the Stakeholder, e.g. Knowledge-Stakeholder and partners. This analysis concentrates on interorganizational knowledge-transfer and knowledge-use processes. Figure 3 shows selected elements of the internal and external perspective.

However, a clear distinction between these two perspectives is still missing in literature. Additionally, based on this different frameworks a heterogeneous understanding of the term "knowledge" has evolved (Neumann 1999a, p. 53). The resulting uncertainty in using the term knowledge is magnified by the interdisciplinary character of this research field leading to a large variety of attribute-oriented definitions (Neumann 1999a, pp. 62). Therefore, it is appropriate to aggregate the different views of the term knowledge represented in literature. For this purpose three distinct criteria need to be differentiated: the nature of knowledge, the availability of knowledge and the usability of knowledge (Neumann 1999a, p. 66). Each criteria shows two dichotomic features, that need to be distinguished. For instance, knowledge can be of an declarative or procedural nature. In terms of availability the two possible distinctions are explicit and tacit knowledge. Finally, regarding the usability of knowledge the two possible perspectives are knowledge as a cognitive item and the conversion of knowledge. Figure 4 shows the resulting typology of knowledge.

In a discussion of knowledge management in Virtual Organizations or the Enterprise without Boundaries all the three dimensions of the typology presented above are addressed. For the discussion of an interorganizational knowledge management in a first step the tacit or explicit individual and organizational knowledge must be analyzed. In a second step, the required object and process-oriented knowledge needs to be transferred between the enterprises involved. This knowledge-transfer distinguishes intraorganizational knowledge management from interorganizational knowledge management. The major duty of

Figure 4: The Dimensions of Knowledge
Source: Neumann (1999a), p. 78



interorganizational knowledge management consists of initiating and managing processes of knowledge generation, interorganizational knowledge flow, and a common usage of knowledge. For this purpose, conditions facilitating interorganizational knowledge management need to be created, e.g. procedures for managing conflicts within the cooperation, trust and a common language.

These aspects of interorganizational knowledge management are crucial since cooperative generation and usage of knowledge is very important for the strategic success of a Virtual Organization. However, only the explicit knowledge can be transferred and used in Virtual Organizations. Since the exchange of tacit knowledge already encounters substantial barriers within a single organization its interchange within a network is widely considered as being impossible. Additionally, missing common targets, significant differences in corporate culture, competition among partners, missing rules of co-operation, inadequate co-ordination, and opportunistic behavior render the implementation of Virtual Organizations more difficult and restrict the interorganizational usage of knowledge.

In the short-term form of Virtual Organizations only the outcome of production processes rather than knowledge is shared. However, in the long-term form a common usage

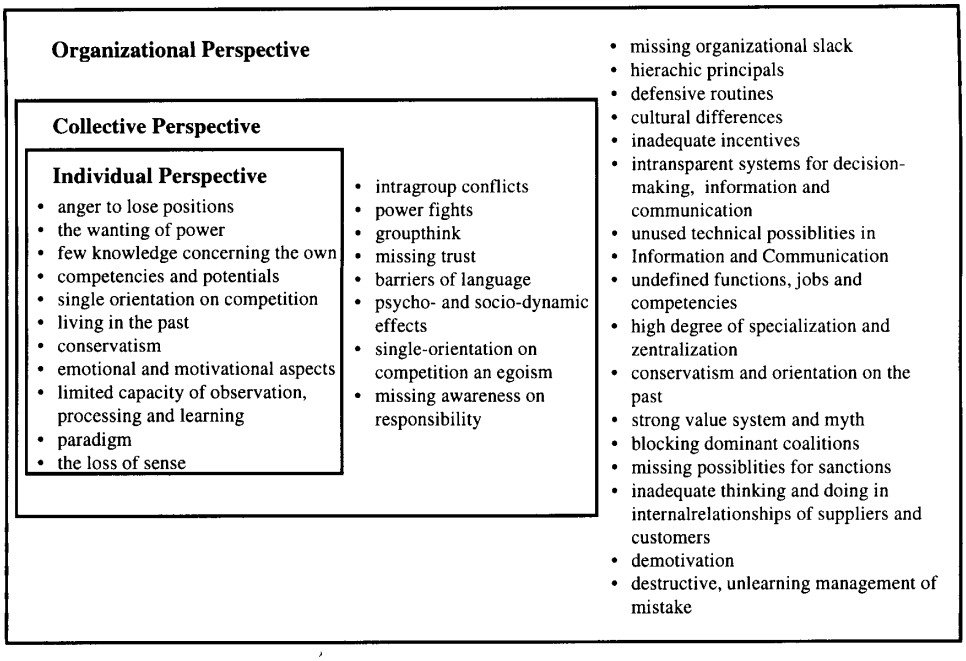
of knowledge is an integral part of a Virtual Organization. Therefore, the participants need to develop an "Interorganizational Knowledge Management" that addresses the functions discussed. With an Interorganizational Knowledge Management companies can gain and sustain competitive advantages by participating in Virtual Organizations. Interorganizational Knowledge Management becomes a new paradigm of Strategic Management.

INTERORGANIZATIONAL KNOWLEDGE MANAGEMENT

The Concept of Interorganizational Knowledge Management

In practice, there are many examples for different approaches of knowledge management already in place, e.g. 3M, Sony, Skandia ASF, Matsushita, Ford, Arthur Anderson, Mercedes, and BMW. However, these approaches are often only technical solutions for storage and exchange of individual knowledge by means of information and communication technologies (e.g. Wilson/Snyder 1999, Hansen, Nohria, & Tierney, 1999). Additionally, even in case of integrative approaches, e.g. by the Geneva Knowledge Group (Probst, Buechel, & Raub 1998), significant malfunctions in generating knowledge may occur. This malfunctions mainly derive from counter-productive contextual conditions of the organization like stare department boundaries, unclear competencies, problems of coordination, missing incentives, and a culture of distrust (Fig. 5).

Figure 5: Obstacles to a successful use of Knowledge in Virtual Organizations
Source: Neumann (1999a), p. 28



Particularly, approaches of knowledge management based on the "ecology of knowledge" (Kirsch 1996, pp. 97), stress the notion of creating conditions that favor the generation of knowledge. Also the model of "organizational knowledge order" (Neumann 1999a, p. 156) emphasis this notion. This model contributes to the development of a knowledge-based organizational theory and describes "knowledge-oriented management" in detail. Based on system-theoretical as well as structuration-theoretical approaches (Giddens 1984) it shows the way of acquiring, generating, integrating and using knowledge in organizations by self-referential and recursive operation and reproduction processes. Simultaneously, these processes are an expression of an "Organizational Epistemology" (Krogh, Roos 1995; Krogh, Roos, & Slocum 1994). The Epistemology describes, how organizations gather perceptions and knowledge regarding their identity and their environment. Additionally, existing paradigms, local theories, and established knowledge represent the essential constructive components.

The questions of perception, interpretation and internal processing of knowledge can be primarily attributed to the emergence of differences in the relationship between the system and its environment. For this reason, the theory of self-referential systems provides valuable aspects for the discussion of knowledge in Virtual Organizations. According to the theory of self-referential systems, organizations are simultaneously open and closed in their relations to the environment. They are open regarding an energetic exchange with the environment and the accommodation of data. However, they are closed regarding the internal allocation and transformation of information into knowledge. Events taking place in the environment may trigger organizational learning processes. However, this mainly depends on self-imposed criteria and rules. Therefore, knowledge derives from the integration of information into a context of relevance. The relevant criteria can be inferred from the experiences that were important for the survival and the reproduction of the organization in the past. An organization's reaction to external knowledge is determined by its institutionalized control system, business processes and standardized procedures, which self consist of individual knowledge.

The theory of self-referential systems suffers from a lack of acceptance in the field of economic research. This is mainly due to its biological roots, a high degree of abstraction, and a sociologically dominated language. Nevertheless, this theory supplies valuable epistemological explanations for many economic problems. For instance, questions like how organizations obtain knowledge, what effects it has within the organization, and why a high probability of refusing of new knowledge exists, are addressed by the theory of self-referential systems.

The phenomenon of self-referential systems can be verified by many real situations of organizations. For instance, enterprises often turn into problems threatening their existence because they fail to notice warning signals from the environment or misinterpret them in a way, so that they fit into the self-interpretation of the organization. Critical signals are frequently displaced consciously or unconsciously, because they do not comply to any patterns of reference of the system. This destructive effect of an operational closeness is also discussed by the crisis research (Hedberg 1981), the research of organizational pathologies (e.g. Sorg 1982), and in the course of phenomenological descriptions of defensive learning routines (Argyris 1993, pp. 179).

However, the organizational order of knowledge is determined not only by the Epistemology of the organization, but also by available resources and structures of an

enterprise. These elements are constantly reproduced by a process of interpretation, combination, sense giving and action of the levels of recursion individual, collective and organization. Regarding their actions, all participants of a Virtual Organization refer to structures in the sense of rules and resources. Additionally, Virtual Organizations simultaneously reproduce these structures by their behavior. Thus, the duality or recursiveness of structures is emphasized. According to the structuration-theoretical approach of Giddens (1984) structures of knowledge and organizations are both condition and consequence of interactions (Ortmann, Sydow, & Windeler 1997, pp. 315). Organizations select, combine, and arrange their available internal knowledge as well as the potential usable external knowledge according to self-imposed criteria. These criteria derive from the specific identity of the organization or the intersubjectively developed paradigm of "dominant coalitions". External knowledge can only be integrated into the system, if it is compatible to existing knowledge and, hence, does not lead to irritations of the members of a Virtual Organization.

Knowledge produces the definitions of reality and the meaning of reality valid for the system. Therefore, it leads to a preservation and acknowledgement of order. The emergence of knowledge can be viewed as a process of transforming events observed into knowledge within the system (Willke 1996, p. 265). Thus, knowledge is developed by a context-based linking of information that is considered as relevant by the system. However, what is

Figure 6: Structure of the Knowledge Base of Companies
Source: Neumann (1999a), p. 74

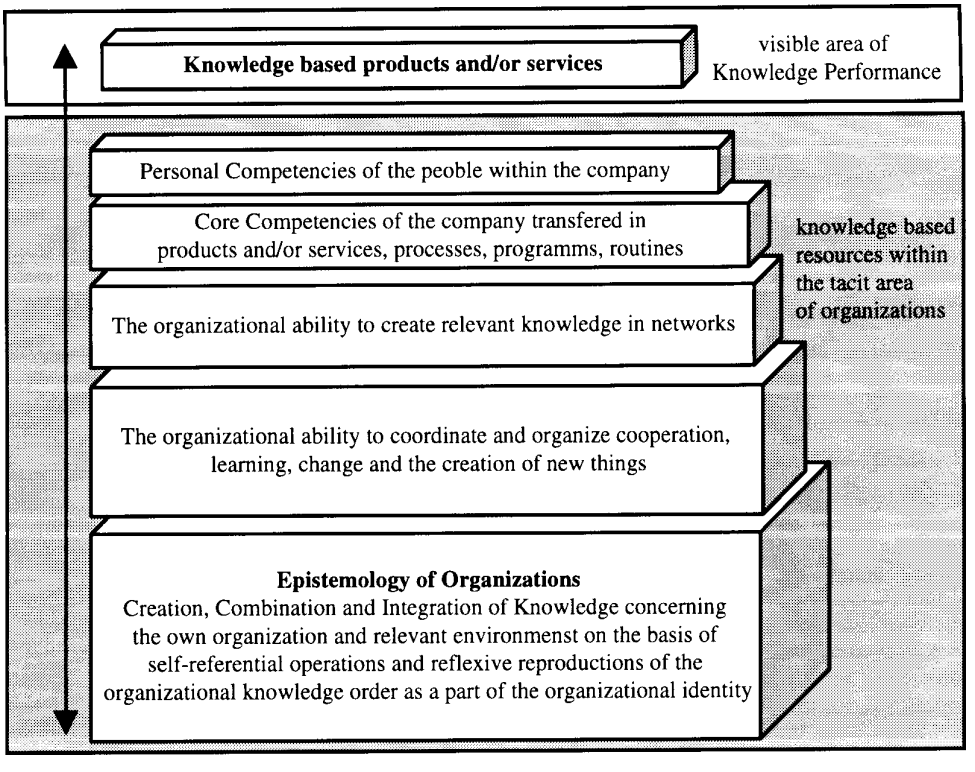
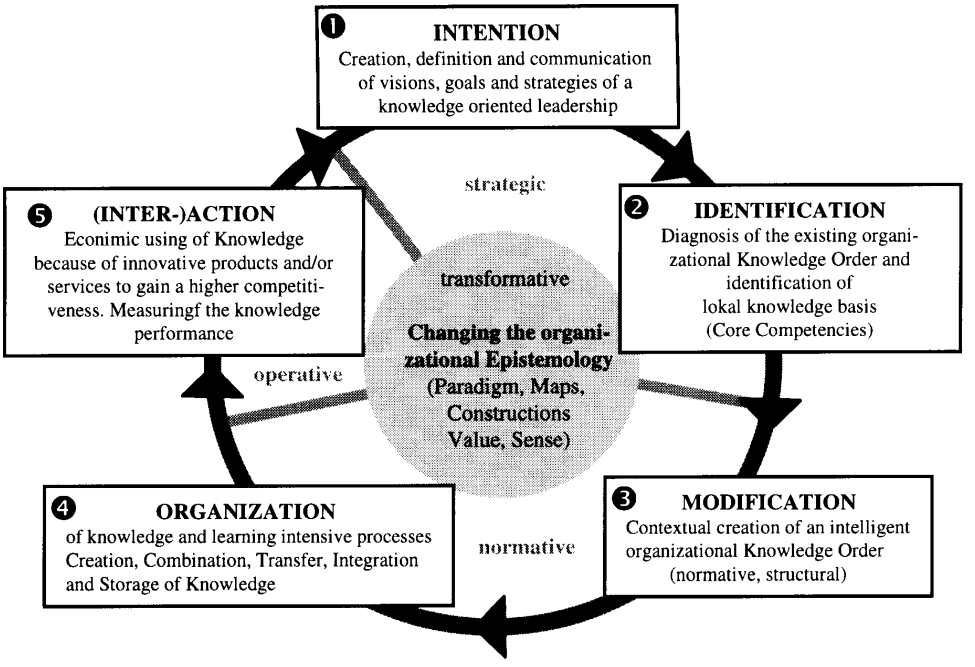


Figure 7: Process of Interorganizational Knowledge Management in long-term Virtual Organizations



assessed as relevant or not depends on the identity of the respective system, that is, of experiences, historical lines of development and cognitive structures. In strategic management, a corresponding approach is the path dependency of individual resources in the Resource-Based View. In the understanding of a "resources trajectory" mainly those resources, abilities, and routines are consolidated to core competencies, which are based on the historically grown knowledge of an enterprise. Furthermore, the direction of these processes depends on the historical background and small events in the environment. Thus, the imitation of "organizational capabilities" by competitors or partners becomes extremely difficult within a Virtual Organization. (Fig. 6)

The organizational knowledge order and epistemology of an organization is protected against imitations and, therefore, provides a permanent competitive advantage. This protection is mainly based on a non-imitable identity of the organization as well as individual processes of producing and reproducing knowledge. Knowledge order and epistemology simultaneously represent firm-specific competencies and, hence, belong to the organizational capabilities.

If we apply these principles to long-term oriented relations within a network, the question arises, if a cooperative enterprise-spreading knowledge order can contribute to an increase of the competitiveness of the companies involved. For the materialization of this effect, the companies in a Virtual Organization require clear defined arrangements regarding a cooperative generation and usage of knowledge. Additionally, arrangements regarding the integration of the common knowledge into the respective company goals, strategies, and processes need to be made. Therefore, the conscious production of an interorganizational

knowledge order is a special management function. Companies involved have to create border-crossing processes for knowledge management and organizational learning.

Thus, knowledge management in Virtual Organizations means designing, controlling and developing a purpose-oriented knowledge order together with the partners. According to the systems-oriented management approach (e.g. Gomez, Carpenter 1992) strategic, normative, operational, and transformative management functions can be distinguished (Bleicher 1991). Since knowledge management in long-term Virtual Organizations concerns regular and parallel fulfilled management functions, an iterative process evolves. This process consists of five phases: intention, identification, modification, organization, and internal action. As illustrated in Fig. 7, these phases are linked by feedback processes forming a closed loop of an "Interorganizational Knowledge Management".

Phases of an Interorganizational Knowledge Management

Intention

The intention phase consists of determining knowledge targets and measuring criteria. For this purposes in a first step the companies involved need to develop common visions, objectives and strategies of a knowledge-oriented management and to communicate them among partners.

For accomplishing this common set of guidelines, two major questions need to be addressed:

- Which importance does knowledge have for the economic success of our company?
- What strategic targets are primarily supported by a more efficient use of knowledge?

In a second step, in addition to already existing targets of the respective company knowledge-oriented objectives have to be established. This notion is also supported by Hamel and Prahalad (1994), who consider a so-called "strategic architecture" as an important prerequisite for the generation of competencies. This architecture determines the way a company will compete successfully on the bases of core competencies in future. The importance of knowledge and the intention phase is also emphasized by Nonaka & Takeuchi (1995, pp. 156), erecting a "conceptual umbrella" over the whole company. This conceptual umbrella contains common ideas regarding the future of the company, which are expressed as universal metaphors, analogies, symbols, and models. Exact guidelines and procedures as well as concrete measuring criteria are derived from these objectives and strategies. For this purpose methods like the "Balanced Scorecard" (Kaplan, Norton 1996), the "Intangible Assets Monitor" (Sveiby 1997) or the "Intellectual Capital Navigator" (Stewart 1997) can be applied. The respective decisions need to be made on an individual base by each company.

Identification

The phase of identification aims at identifying the existing intraorganizational knowledge order as well as core competencies available in the Virtual Organization. Furthermore, companies try to assess the core competencies necessary for the future. Thus, this phase focuses on the systematic discussion of the unique elements of knowledge of the own business (North 1998, pp. 28). Divergent knowledge bases often cause differences in performance among the companies involved in a Virtual Organization. Therefore, it is

essential to discover what kind of knowledge a company disposes of.

On the one hand, every company needs to know what kind of knowledge is required regarding its economic environment. On the other hand, also the assessment of the internal knowledge is crucial. This knowledge mainly exists in the form of internal routines, competencies, projects, products, and best practices. It is unveiled by a thorough analysis of all value activities, business process, and interorganizational linkages regarding the associated explicit and tacit knowledge. In this way companies get an overview of their core knowledge, the structure of the knowledge-combining process and the behavior of the knowledge agents involved.

Based on this information the possibility of forming learning partnerships between companies and external knowledge agents in order to combine internal and external knowledge can be analyzed. Further targets of this phase consist of uncovering cognitive patterns, analyzing inter-subjective representation of reality and the illustration of existing context conditions (Neumann 1999a, pp. 18). In order to achieve these targets the following questions have to be answered:

- How is knowledge currently managed as a resource?
- What are the most important dimensions of the environment regarding the companies core businesses and future strategic approaches?
- Which instruments are applied in order to monitor these dimensions?
- What are the current organizational conditions and how do they determine the generation of knowledge?
- To what extent does the company make use of formal or informal communication channels?
- What kind of theories influence behavior on different organizational levels?
- What obstacles hinder the perception, accommodation, and integration of new knowledge?
- What mechanisms maintain the existing patterns of knowledge and behavior routines?
- Which factors block the transmission of new knowledge?

By comparing currently existing knowledge resources and competencies necessary for gaining long-term competitive advantages in future companies may identify the major managerial challenges for their functional areas.

Modification

In the course of the third phase an intelligent knowledge order is developed. It contains the creation, organization, and modification of contextual systems. Special emphasis is placed on the knowledge ecology (Kirsch 1996, Nonaka, Takeuchi, & Takeuchi 1995, North 1998). This is mainly the duty of the top management. The intra and interorganizational prerequisites consist of a supportive environment. This usually contains:

- The generation and usage of Cooperative Slack (Blecker 1999, pp. 136, Kaluza, Blecker 1999a, pp. 272);
- Flexible process-oriented organizations that aim at modularity, multi-dimensionality, and multi-functionality (Neumann 1995, pp. 313);
- the promotion of network-based and cross-functional co-operation in task forces and project teams (Blecker, pp. 314);

- control and sanction mechanisms suitable for networks (Wildemann 1997);
- the promotion of a high interaction density (Blecker 1999, p. 151);
- a common languaging (Krogh, Roos, & Slocum 1994, pp. 62);
- institutionalizing of knowledge-links (Badaracco 1996, pp. 133);
- institutionalizing trust-generating activities (Blecker 1999, pp. 26, pp. 328);
- motivational incentives in order to prevent the "not invented here"-syndrome (Baliga, Sjostrom 1997, Blecker 1999, p. 260, pp. 308);
- establishing feedback systems;
- the active participation in continuing education programs and learning circles of a Virtual Organization (Blecker, pp. 314);
- the construction of internal and external knowledge cluster (Sydow, van Well 1996, p. 212) and
- institutionalizing of competence centers with comparisons and exchange of best practices.

Modifying an existing interorganizational knowledge order or creating a new one within a Virtual Organizations requires a high level of congruence among assumptions, interpretation patterns, standards, rules, conventions and procedures of a social interaction practice and knowledge-oriented behavior. This contains a conscious re-structuration of the organization, which aims at changing rules and resources as well as established structures of signification and legitimization (Neumann 1999a, pp. 9). Still, changing only structures is not sufficient. Additionally, also interpretation patterns and the corporate culture have to be modified (Neumann 1999a, p. 6).

The paradigms determining organizational behavior are — in the sense of a transformative management — adopted in a way that the companies learn to overcome the contradictions "co-operation versus competition" (North 1998, pp. 75), "order versus modification", and "available versus necessary knowledge". The final objective of every company undergoing this process is the creation of context-sensitive organizational consciousness. Given their individual background regarding identity, companies participating in a Virtual Organization therefore need to create consciousness and knowledge with respect to those forms of interaction, which aim at existing requirements of the market. Especially in Virtual Organizations, a lack of consciousness regarding the potential of an existing knowledge order leads to uncertainties and blockades in the exchange of knowledge.

The less a company is conscious about its own knowledge the more a diffuse and irrational fear of imitation or loss of knowledge and competencies takes place. For this reason companies especially need to regenerate those conditions, that promote the cooperative thinking and acting of all partners within a Virtual Organization.

Organization

The fourth phase can be attributed to the normative area of knowledge-oriented management of Virtual Organizations. In this way, it focuses predominantly on interorganizational knowledge-generating and learn-intensive processes. The development and creation of knowledge (Nonaka, Takeuchi, & Takeuchi 1995) is effected in processes of improvement and renewal learning. The interorganizational implementation and institutionalizing of these processes can be achieved by means of common competence and

knowledge clusters (Sydow, van Well 1996, p. 212). They derive from autonomous practices of acting participants and lead to an institutionalized enlargement and combination of knowledge based on exchange relations.

By collective reflecting existing experiences ("lessons learned") within common projects or by dealing with customer orders, knowledge is accumulated, that has to be documented and distributed. After this process of generating and transferring it is to be integrated into the respective knowledge base of the companies involved, so that it becomes effective (Walsh, Ungson 1991). Initially, the common interpretation patterns of the communication processes are determined in order to allow the companies involved to become acquainted with external views and experiences and to integrate them into their own interpretation patterns. From a structuration-theoretical viewpoint an integration only takes place, if knowledgeable agents (Ortmann, Sydow, & Windeler 1997, pp. 317) are able to reproduce their behavior modified by the newly acquired knowledge. Additionally, in the course of interaction they need to refer change structures, rules, and resources.

Only if the last prerequisite is fulfilled knowledge becomes relevant for day-to-day behavior as an "accurate or valid awareness" (Giddens 1984, p. 90). Through this behavior, participants in a Virtual Organization generate new characteristics and features regarding their pool of potential actions. Thus, an imitation and integration of this behavior by other participants is implied. In this way, newly acquired knowledge circulates within the Virtual Organization as a not intended consequence of behavior and gets ever and ever reproduced. A new knowledge order evolves (Neumann 1999a, p. 38).

(Inter-)Action

Generation, transfer, and integration of knowledge can only materialize as competitive advantages if knowledge is actively used for innovative products and services. Therefore, the fifth phase aims at a systematic intra and interorganizational utilization of knowledge. In the past, competitive advantages mainly derived from a more efficient combination of traditional factors. In future, knowledge as a resource will become a major critical success factor. In this way, former highly industrialized economies become knowledge-driven (Drucker 1994 & 1998, Ungson, Trudel 1999, p. 65).

Conventional market structures change due to significantly shortened half-lives of knowledge, its quantitative and qualitative explosion, as well as the intensification and globalization of competition regarding knowledge resources (Romhardt 1998). In particular, the innovative development of customer-focused solutions based on the large pool of core competencies at the disposal of a Virtual Organization represents an attractive opportunity to gain and sustain long-term competitive advantages even in a complex and highly dynamic economic environment (Blecker 1999a, Kaluza, Blecker, & Bischof 1998, Kaluza, Blecker 1999a, 1999b).

IMPLICATIONS FOR STRATEGIC MANAGEMENT IN VIRTUAL ORGANIZATIONS

The proverb "who operates alone adds knowledge, who co-operates multiplies knowledge" emphasizes the high importance of a systematic strategic management of the resource knowledge in co-operations. Often this becomes the major principle for the

construction of Virtual Organizations in order to generate and effectively use knowledge within an interorganizational co-operation. Even although the tacit organizational and individual knowledge forms the base for non-imitable and non-transferable core competencies, a successful exchange of knowledge is impossible in short-term Virtual Organizations. It even implies, that due to the short-termness the necessary basic conditions for knowledge exchange are missing, e.g. common interest and knowledge targets as well as a high interorganizational trust. Therefore, the main function of a knowledge oriented strategic management is the reduction of institutionalized co-operation conflicts, which appear in the thinking and acting of the respective participants.

In long-term Virtual Organizations knowledge represents the decisive basis for the intelligent and competent performance of the partners. Thereby, only a conscious and organized reflection of "lessons learned" from common activities supports a flow back of the acquainted knowledge into the knowledge base of the companies involved. Thus, the functions of a knowledge oriented strategic management are substantially more extensive than in the short-term form of Virtual Organizations. First common knowledge targets and strategies have to be developed and communicated as well as common agreements for a boundary spanning management of knowledge obtained. Simultaneously, the companies have to observe the internal and external available knowledge. Each company and in particular the possible existing focal enterprise must increase and analyze its organizational consciousness in order to become aware of the knowledge that is constitutional for the firm's specific core competencies. Only because of this awareness regarding the own knowledge order and the competencies contained companies can generate, exchange, and use knowledge interorganizationally in Virtual Organizations.

In a second step the structures, programs, rules, principles, and processes for an interorganizational order of knowledge have to be compiled and implemented. The respective best practices of the partners are exchanged as explicit knowledge by means of knowledge-links and integrated by communicative interaction-relations. An intelligent form of the strategically aligned and loose "knowledge architecture" is manifested in the organizational structure. Therefore, on a structural level flexible regulation and control systems aiming at learning processes are needed, which support the acquisition, generation, distribution, integration and usage of knowledge in Virtual Organizations. The help of cross-organizational teams, which take over concrete projects or a common research & development, can achieve this. The knowledge gained in these processes is made available to all companies participating in the Virtual Organization. However, as these teams mainly consist of specialists high demands for education and management result. Within the teams a high level of functional trust has to be developed in order to fulfill the expectations efficiently. The ability to permanently manage constantly changing task forces and project teams becomes a central prerequisite to the individual participants in a Virtual Organization. Additionally, in order to document experiences (lessons learned) during and particularly after working on an interorganizational project regular learning and reflection meetings have to be established. The objective is to share the knowledge contained in the experiences with other project teams. Information and communication technologies like Groupware, Intranet, knowledge maps, and knowledge databases provide additional support. Consequently, the personnel development has to strengthen the technical and methodical as well as the social and communicative competencies on an individual level. Enterprise-spreading training networks have the function of developing and offering those educational contents,

which are needed for an efficient participation in the Virtual Organization. This common training does not only lead to common knowledge and standards of competence, but also supports cooperative working and the development of a common language. Interorganizational learning is supported also by the exchange of employees (job rotation) on horizontal level between the partners of a Virtual Organization. Additionally, effective reward and incentive systems for employees can promote competent and knowledge-based acting in an interorganizational network. Finally enterprise-spreading suggestion and improvement processes support the generation of common ideas, which can be transformed into knowledge and transferred into individual competencies.

For the implementation of the outlined approaches to a knowledge-oriented management in Virtual Organizations commonly developed and internalized standards and routines are needed. However, each individual company has to create supporting internal conditions in order to realize these standards and routines. For instance, companies may establish new quality and performance standards, e.g. by implementing Total Quality Management concepts (EFQM, Malcolm Baldridge), information and communication systems to support learning processes as well as control principles. Furthermore, companies involved in Virtual Organizations can reduce the intraorganizational and interorganizational coordination expenditure by implementing routines and rules, which contain the knowledge from the lessons learned. Thus, the quality of the common performances and knowledge processes is increased.

In summary, a successful participation in a long-term Virtual Organization requires a common development of an Interorganizational Knowledge Management. In particular top-managers are assigned a provocative formative function in this process. Not only they have to provide a supporting intraorganizational knowledge order, but also to represent the respective companies in the emergence of a new interorganizational knowledge order. Knowledge is more and more considered as a critical strategic success factor for long-term Virtual Organizations. Thus, an effective Interorganizational Knowledge Management becomes crucial for strategic success.

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