IDENTIFYING BEST PRACTICES IN COLLABORATIVE NETWORKS

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ABSTRACT

Several studies point to collaborative networks as an option to meet ongoing changes rapidly and flexibly in the global market. This paper presents the best practices identified during the life cycle of a collaborative network. The theme is contextualized, and the objectives and method employed are presented. This is followed by a review of the literature on collaborative network terminology and the minimum life cycle for its existence. The best practices are then identified and the limitations of the life cycle of a collaborative network are discussed. Topics requiring additional research are also identified.

KEYWORDS: Collaborative networks. Best practice. Life cicle.

INTRODUCTION

Progressive changes in the fields of science and technology in recent years have made it necessary to curtail research-development-product cycles, and to demand greater dynamism and flexibility on the part of organizations, teaching institutions and government agencies in the production of their goods and services. In this context, structures emerge that are based on collaborative networks as an alternative to take advantage of business opportunities or particular projects.

The expression "networks" has been employed to describe a system that contains agents (teaching institutions, companies, liberal professionals, public and private nongovernmental organizations) who seek to create synergies in competitive or noncompetitive environments.

Research has demonstrated that a collaborative network has a minimum life cycle which consists of the following phases: creation, operation, evolution and dissolution. Various studies have been published with the purpose of highlighting the contribution of collaborative networks, but no substantive efforts have been dedicated to identifying the best practices in their life cycle.

This article therefore proposes to describe, by means of a review of the literature, the best practices and difficulties encountered during the various phases of the life cycle of collaborative networks. This review should allow gaps to be identified so that improvements can be discussed and implemented, aiming to increase the capacity for survival and competitiveness of these networks.

The best practices selected in this study are expected to serve as guidelines for teaching institutions, companies, liberal professionals, and public and private nongovernmental organizations to systematize their collaborative work.

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1 LITERATURE REVIEW

The procedure adopted in the writing of this article was bibliographic research (Lakatos & Markoni, 2005), with the main objective of becoming familiar with and analyzing the existing cultural or scientific contributions on a given subject.

This research comprised the following macrophases:
- *Planning:* which presents the research objectives and problem, as well as the method to be employed;
- *Execution*: which identifies, selects and evaluates the sources of the study; and
- *Analysis of the results:* the data extracted from the articles are analyzed (inference) and lastly, the conclusions are presented.

1.1 PLANNING OF THE RESEARCH

This research was limited to seeking objective evidence of the best practices present in the life cycle of a collaborative network. The intermediary objectives should be presented in the form of macrophases of the life cycle of a collaborative network and the difficulties attending the network's life cycle.

1.2 EXECUTION OF THE RESEARCH

The execution of this research involved a review of the literature on collaborative network terminology, and the outlining of a description of the generic life cycle of these terms. The best practices in the life cycle of collaborative networks were then identified, and the difficulties attending the network's lifecycle were highlighted, concluding the topic.

1.2.1 TERMINOLOGY OF COLLABORATIVE NETWORKS

Collaborative networks (Camarinha-Matos & Afsarmanesh, 2008) have been set up with the purpose of sharing information, processes, costs, risks, and responsibilities.

The main reasons for setting up collaborative networks (Rabelo *et al.*, 2006) are to share uncertainties, enrich knowledge, reduce the development cycle to market, monitor technological opportunities and changes, share competencies, and have access to global markets. The results are the fruit not only of the knowledge and skills of each agent but also of the synergy of the different working styles (Murphy, Ganz & Karapidis, 2000; Schuh & Wegehaupt, 2005; Martinez, 2006).

Collaborative networks have been called by various names, including virtual companies, virtual organizations, local productive arrangements, research networks, extended companies, and supply chains.
- *Virtual company:* a temporary alliance of companies that share their competencies and resources with each other in order to respond more readily to business opportunities, under a computational infrastructure.
- *Virtual organization:* a temporary collaboration among virtual companies consisting mainly of the integration of competencies from distinct companies, generating a product or service that one company, alone, would be unable to produce with competitive time and quality. It should be noted

that this concept is applicable when there is a relationship between the life cycle of a product/service and the life cycle of a company, where the project of the former implies 1) formation, 2) operation, and 3) dissolution. This collaboration will exist as long as there is a market demand for the product/service (Molina, Bremer & Eversheim, 2001; McCormack & Lockamy, 2004).

- *Local productive arrangement:* local arrangements (Lastres, 2003) are territorial agglomerations among economic, political and social agents, which focus on a specific set of activities and present bonds and interdependence. They usually involve the participation of companies that may range from producers of goods and services to suppliers of raw materials and equipment, consulting and services companies, dealers and clients. They also include other public and private institutions engaged in teaching and training human resources, such as technical schools, universities, research institutes and governmental agencies. An LPA can be considered a VBE (Virtual organization Breeding Environment), i.e., a long-term network whose objective is to help the emergence of virtual organizations.
- *Cluster:* is one of the earliest forms of VO breeding environment, consisting of a group of companies that compete with other companies outside the cluster, or that compete with other clusters (Porter, 1998). Clusters are characterized by strong sociocultural traits connected to their physical space and their past. These historical roots influence their acquisition of qualities, which enable them to gain competitive advantages. Among the factors that play a decisive role in the formation of clusters and in the success of this development model are the available infrastructure, access to scholarships and grants, and above all, the participation of universities.
- *Research networks:* also referred to as virtual teaching labs (Klen, Cardoso & Camarinha-Matos, 2005), and research and development labs, research groups are composed of multidisciplinary teams of professors and students, both undergraduate and postgraduate, connected to given lines of research and chosen for personal interests and competencies.
- *Extended company:* seen as a particular case of a virtual company, this term is used when a dominant company extends its limits to all or some of its suppliers. An extended company can therefore be considered a particular case of a virtual company.
- *Supply Chain:* this term refers to the support mechanisms and policies for managing the flow of materials in values chains. It is applied to relatively stable organizations which focus on materials logistics, and product and information flow.

Several studies have been dedicated to the theme of collaborative networks, ranging from their systematization to the way they have been rendered operational by their agents. One of these efforts has focused on identifying a generic life cycle for collaborative networks. The topic below presents a minimal life cycle for a collaborative network.

1.2.2 LIFE CYCLE OF A COLLABORATIVE NETWORK

A collaborative network usually has a life cycle (Figure 1), which consists of the phases of Creation, Operation, Evolution, and Dissolution (Camarinha-Matos & Afsarmanesh, 1999), as follows:

- *Creation:* this phase generally comprises the stages of the quest for opportunities (identification, refinement and/or characterization of business opportunities), and the search for partners (once a business opportunity has been identified, the next step is to find partners to act in the network).
- *Operation:* after the identification of the opportunity and of partners, a detailed work plan is drawn up. When this plan has been established, the network is activated.
- *Evolution:* this phase is fundamental, since it establishes rules, for example, for the entrance of

new partners into the network.

- *Dissolution:* at a preestablished point, the opportunity will have been fully exploited or will need to be modified.

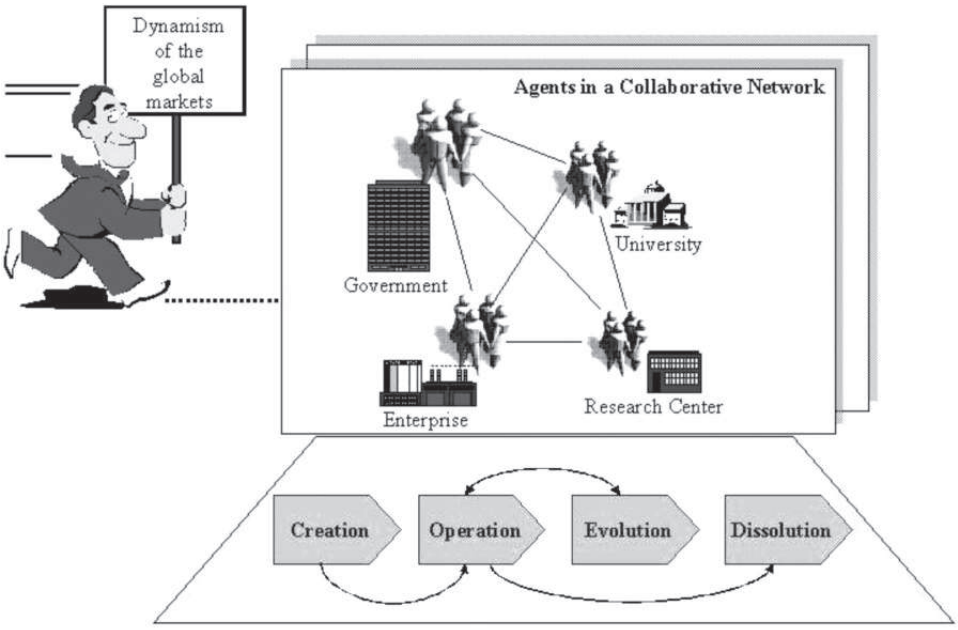

Figure 1 – Minimum life cycle of a collaborative network

The fact that various studies have classified the above life cycle as generic is justified by the particularities in each of the terms described under item 2.2.1, which make it to determine a strict life cycle for collaborative networks.

1.2.3 BEST PRACTICES IN THE LIFE CYCLE OF A COLLABORATIVE NETWORK

The term *best practices* (Rozenfeld *et al.*, 2004; Beaumont, 2005; Mansar & Reijers, 2005) has been used to describe the way companies and their collaborators engage in the business activities of all their key processes, such as planning, customer relationship management, suppliers, relations with the community, production and supply of products, and the use of benchmarking. When integrated, these practices can yield world-class results in terms of quality, innovation and competitiveness.

The following best practices stand out in the life cycle of collaborative networks:

- *Learning/education:* Mutual learning through the synergy of competencies among the members of a collaborative network promotes a product or service that a company, alone, would be unable to produce with competitive time and quality (Zaharia & Gibert, 2005).
- *Benchmarking:* The objective is to encourage the companies participating in the collaboration to have ongoing improvement indicators (Bremer *et al.*, 2001).
- *Managerial and administrative capacitation:* In the case of a large number of small companies, good capacitation (qualifications) in cost administration and in managerial methods enables these companies not only to operate in a network but also to remain competitive in the market (Suzigan,

Garcia & Furtado, 2002; Di-Serio & Figueiredo, 2006).

- *Compatibility of rights and duties:* The fair sharing of benefits and contributions is fundamental to the workings of the network. When one of the partners perceives an imbalance, he sees no benefit in collaborating, which threatens the success of the network.
- *Commitment:* A partner committed to the network will dedicate efforts to ensure the network's success. An uncommitted partner acts like an opportunist, allowing the other partners to assume the responsibility for all the efforts (Håkansson & Ford, 2002).
- *Trust:* When a partner sees the others showing trust in him, it is easier to create a trust-building cycle (Thoben & Jagdev, 2001). Trust must be built up over time, for characteristics such as honesty, willingness and effectiveness can be perceived only after a long period in the relationship (Lajara, Lillo & Sempere, 2002).
- *Control:* Since there may be conflicts among the members of a network, control mechanisms are necessary. Among the control mechanisms most frequently cited in the literature are contracts, recorded agreements, and documented procedures.
- *Sources of financing:* Financing sources have enabled many companies organized in a network to participate in the competitive environment, generating economic development and changes in the competitive level of the industry toward product differentiation and innovation (Salerno & Daher, 2006).
- *Physical, legal, sociocultural, communicational, and informational infrastructure*: The physical infrastructure encompasses the fabrication, equipment, layout, handling, or any physical characteristics of the network. The legal infrastructure encompasses the processes involved in legal instruments, such as contractual clauses, for instance. The sociocultural infrastructure refers to the implicit and explicit rules and political issues. The informational infrastructure includes mechanisms employed to create, manage and disseminate information through the network (Goranson, 1999; Wognum & Faber, 2002).
- *Innovation:* In this context, innovation is a differential which can ensure standards and rules that only later will be adopted by other companies wishing to participate in the competitive environment (Klotzle, 2002; Birchall & Chanaron, 2006).
- *Modeling:* The modeling process is one of the key activities for understanding, designing, implementing, and operating a collaborative network. Modeling has been employed as a form of documenting processes, promoting integration, and allowing for the recording of knowledge, and the rationalization and visualization of information flows in the network (Perrin & Godart, 2004; Camarinha-Matos & Afsarmanesh, 2007).
- *Use of computational technologies:* These technologies have been used not only as a way to dynamize and improve the quality of the work, but also as a form of measuring the network's performance (albeit infrequently applied), highlight points that could be better exploited (Camarinha-Matos *et al.*, 2007).

The next section lists the difficulties encountered during the life cycle of collaborative networks.

1.2.4 DIFFICULTIES ENCOUNTERED IN THE LIFE CYCLE OF A COLLABORATIVE NETWORK

In order to ensure that the intermediary objectives are met and also to provide food for thought about the topics that require complementary research, Table 1, below, offers a summary of the difficulties that attend the life cycle of a collaborative network.

Main difficulties encountered during the life cycle of a collaborative network	References
• Lack of financing from private banks. • Lack of systematic processes of interchange and dissemination of sources of information. • Cultural barriers. • Deficiencies in the network's managerial and administrative qualifications. • Lack of knowledge of sources of information for innovations. • Difficulties to adapt to standards. • High costs of innovation. • Paucity of financing sources. • Lack of information about technology. • Lack of information about the market. • Lack of motivation. • Lack of qualified staff. • Lack of technical staff to identify opportunities for innovation and to develop product and process research. • Lack of quality and high costs resulting from low investments in technology. • The company lacks financial resources for the purchase of machinery and equipment. • Weak response from consumers. • Poor spirit of cooperation. • Measurement of performance of the network. • Modeling of competencies. • Low expenditures on innovation. • Intellectual property. • Recognition of opportunities. • Organizational inflexibility (strong verticalization).	Arenius & Clercq, 2005; Ermilova & Afsarmanesh, 2007; Camarinha-Matos & Abreu, 2007.

Table 1 – Main difficulties encountered during the life cycle of a collaborative network

The following section presents a critical analysis of the data collected and conclusions reached in this research.

1.3 ANALYSIS OF THE RESULTS

This article attempted to point out that collaborative networks have a minimal life cycle aimed at ensuring their operation and survival.

Through a review of the literature, we presented the best practices identified in the life cycle of collaborative networks. These best practices include trust, commitment, the use of computational resources, as well as data modeling and availability of infrastructure.

However, to ensure that the complementary objectives of this research were met, and also as a source for additional research, we highlighted the main difficulties encountered in the network's life cycle, such as lack of knowledge about available government resources and lack of qualified staff to manage the network's activities.

2. FINAL REMARKS

Worldwide transformations in contemporary society have required greater dynamisms on the part of companies, universities, research centers and government agencies in the production of their goods and services. In this environment, structures such as collaborative networks emerge, whose objective is to meet the demands of the market in a more flexible way and with differentiated quality.

Based on our analysis of the results of this review, it can be concluded that the best practices in the life cycle of collaborative networks should become increasingly systematized worldwide, since they promote increased competitiveness of products and services, and favor the network's prosperity and mutual learning among its agents.

RESUMO

Diversos estudos apontam para as redes de colaboração, como sendo uma opção para atender com flexibilidade e agilidade, às progressivas mudanças nos mercados globais. O objetivo deste artigo é apresentar as melhores práticas identificadas durante o ciclo de vida de uma rede de colaboração. O artigo tem início com a contextualização do tema, apresentação dos objetivos e do método a ser utilizado. É realizada uma revisão bibliográfica sobre terminologias para redes de colaboração e o ciclo de vida mínimo para sua existência. Em seguida são identificadas as melhores práticas e as limitações presentes nas fases do ciclo de vida de uma rede de colaboração. Tópicos que requerem uma pesquisa adicional também são identificados.

PALAVRAS-CHAVE: *Redes de colaboração. Melhores práticas. Ciclo de vida.*

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