Preface: Knowledge Management and Virtual Organizations

ABSTRACT

In this preface, virtual organizations are described as virtual communities where the combination of social and technological characteristics makes the management of these organizations a difficult and continuously evolving challenge which still has not been completely explored. Different types of virtual communities are analysed using Knowledge Management as a solid theoretical ground for approaching their management. In the second part of the chapter, trends in virtual organization research are identified, classified, and commented upon in regards to their contribution to the state of the art as discussed in the chapters composing this book.

INTRODUCTION

With the rise of Internet and its exponential growth rate in recent years, professionals can communicate with each other via the Internet regardless of geographical distance and time. The ease of communication provided by the World Wide Web has facilitated knowledge sharing and social participation, which in turn has created a powerful type of community that breaks geographical barriers and schedule limitations and where members can share information and knowledge for mutual learning or problem solving in a virtual way. The impact of virtual organizations is increasingly pervasive, with activities ranging from economic and marketing to the social and educational (Chiu et al., 2006:1872). Thus virtual organizations are gaining importance as a new business model for online collaboration, as demonstrated by the proliferation of trading and education communities (Moor and Weigand, 2007:223).

The interest of academic and professional communities in virtual organizations is more than justified since in an “increasingly networked society, with ever more need for global and flexible ways of professional interactions, virtual organizations are natural candidates to fill collaborative gaps in traditional, hierarchical organizations” (Moor and Weigand, 2007:223). This interest has originated a stream of literature regarding the different variations of the phenomenon such as virtual organizations, virtual teams, virtual classrooms, virtual offices, virtual enterprises, virtual teamwork, etc., usually included within the general term virtual communities (VC). Nevertheless, their possibilities and how to exploit their full potential is not yet fully understood.

The motivation and reasons for participating in a virtual community in specific cases may be very varied. However, Chiu et al. (2006:1872) stress that many individuals participate in virtual communities in order to seek knowledge which may resolve problems at work. According to the BUSINESS WEEK / Harris Poll, 42 % of those involved in a virtual community say it is related to their profession.
The phenomenon of virtual communities is not new. In fact, such communities have existed for more than two decades. Nowadays, billions of users worldwide have begun to engage in knowledge sharing and social participation on the Internet through virtual communities (Hagel and Armstrong, 1997), providing a rich new field for sociologists, psychologists, and social analysts. A study developed by Horrigan, Rainie and Fox (2001) through the Pew Internet and American Life Project shows that 90 million Americans had used the Internet to contact or get information from groups, and 56% of these individuals indicated that they had subsequently joined virtual communities with which they interacted online.

Some virtual communities have gained world wide fame and are known by nearly every internet user. For example, take into consideration the following popular examples. **Usenet**, established in 1980 as a “distributed Internet discussion system,” is considered the initial Internet community. Volunteer moderators and votetakers contribute to the community. The **WELL** was a pioneering online community established in 1985. The WELL’s culture has been the subject of several books and articles. Many users voluntarily contribute to community building and maintenance (e.g., as conference hosts). **AOL** is the largest of the online service providers, with chat rooms which, for years, were voluntarily moderated by community leaders. It should be noted, however, that rooms and most message boards are no longer moderated. **Slashdot** is a popular technology-related forum, with articles and readers comments. Slashdot subculture has become well-known in Internet circles. Users accumulate a “karma score” and volunteer moderators are selected from those with high scores. **Wikipedia** is now the largest encyclopaedia in the world. Its editors, who voluntarily publish and revise articles, have formed an intricate and multifaceted community.

As can be seen, there are many examples of virtual communities with their own inherent characteristics and functioning, although all of them share the capacity of creating a dynamic, world wide, easily accessible pool of knowledge. Thus, it is important to shed some light of what is considered by virtual communities and their typologies before approaching their possible potential and management in an organization.

**CONCEPTUALIZATION OF VIRTUAL COMMUNITIES**

Various definitions of virtual communities can be found in literature depending on the approach used in the study, but usually the social component is always underscored. For instance, Kozinets (1992) considers a VC as a “group of people who share social interactions, social ties and a common ‘space’”. Similarly, Smith (2002) defines VC as a “set of relationships where people interact socially for mutual benefit”, and Wellman (2001) defines VC as a “social network of relationships that provide sociability support, information and a sense of belonging,” which creates a sense of shared experiences and perspectives, and emotional support between people working toward similar goals.

On the other hand, from a technical point of view, a virtual community may be understood as one of the community types where the communications are computer-mediated (Koh and Kim, 2004). Hsu et al (2007:153) defines virtual community as “a cyberspace supported by information technology. It is centred upon the communications and interactions of participants to generate specific domain knowledge that enables the participants to perform common functions and to learn from, contribute to, and collectively build upon that knowledge.”

Thus, a good way to conceptualize a virtual community is to consider it as a socio-technical system, a complex social system enabled by a complex set of information technologies (Preece, 2000). Following this conception, for Schubert and Ginsburg (2000), virtual communities describe “the union between individuals or organizations who share common values and interests using electronic media to com-
communicate within a shared semantic space on a regular basis.” In a similar way, Chiu et al., (2006:1873) point out that “Virtual Communities are online social networks in which people with common interests, goals, or practices interact to share information and knowledge, and engage in social interactions.”

Therefore, virtual communities (VC) are socio-technical systems where their members, like in any kind of community, share social interactions and social ties in a common ‘space’ (De Moor and Weigand, 2007). The difference of virtual communities compared with any other kind of community is that their common space is the cyberspace and this confers a unique set of behavioural characteristics not yet completely understood. These characteristics are bound to the virtuality of the relationship. The term virtuality implies the ability of computers to represent information in ways different from reality, with new tools that allow a broad range of different people to understand complex or conceptual information and participate in exploring it. According to Bieber et al (2002:14) “Virtuality” has several implications. It indicates distance, requiring collaborators to communicate asynchronously (different time, different place). This urges for an organization (or community) structure that is flexible enough to optimize individual and group performance under new and changing conditions.

In our view, participation in Virtual Communities should involve all of these characteristics. We broadly define a Virtual Community to include anyone actively interested in, or associated with, a group formed around a particular domain of interest. Dispersed or local, the community requires electronic support to implement a continuous meta-improvement strategy in its services. Thus we parallel Mowshowitz’s view of virtual organizations — “flexible organizations that actively seek flexible approaches to their own improvements.” We agree with Lin et al (2007) and Lee et al (2002) defining virtual community, and identify four characteristics: (1) a virtual community is built on a computer-mediated space, called cyberspace; (2) activities in the virtual community are enabled by information technology; (3) the contents or topics of the virtual community are driven by its participants; (4) the virtual community relationship evolves through communicating among members. Similarly to Lin et al (2007), we consider that VC rest on a technology-supported cyberspace, centred upon communication and interaction of participants, and resulting in the building of a relationship.

This broad definition is not important in itself, but a declaration of intentions about how to tackle the problem under study. The combination of human relationships and technology creates a new realm where is necessary not only technical and management knowledge is necessary, but a new and not yet completely understood kind of skills to administer a new social interaction conditioned by virtuality. These aspects make Virtual Communities one of the most attractive and compelling fields of management research.

**TYPES OF VIRTUAL COMMUNITIES AND THEIR ROLE IN ORGANIZATIONS**

Although virtual communities have existed in some fashion for almost twenty years, it is not completely understood what reasons prompt people to use them and to share valuable information. It has to be taken into account that the members of communities are typically strangers to one another. The scholarly literature lacks of empirical work for determining the causes why people use virtual communities. Blanchard and Horan (1998) state that it is necessary to distinguish between physical based virtual communities and virtual communities of interest. It does not imply that both typologies are mutually exclusive, in fact, very often virtual communities belong to both categories.

In many cases, some communities of interest originate in an off-line context and then move to a Web site hosted by virtual community providers (portals). The members of theses communities interact with one another predominantly in cyberspace. Therefore, virtual communities should be classified as either on-line originated or off-line originated.
An example of on-line originated VC are newsgroups or various e-commerce sites, such as ebay.com, the world’s online marketplace, places for buyers and sellers to come together and trade almost anything. In reference to examples of off-line originated virtual communities, we can mention on-line alumni associations or class forums in universities. Balasubramanian and Mahajan (2001) state that most on-line originated virtual communities are based on common interests and themes reinforced through computer-mediated communications.

A special case of virtual communities is the communities of practice (CoP). Pavlin (2006:136-137) and Wenger et al (2002:4) define CoPs as groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. According to Pavlin (2006:143) individuals who share common practices at a job, or job related activities, could be connected to the CoP. This type of community is different from the community of interest, community of purpose or learning community as practitioners themselves are creating and disseminating knowledge of working practices. CoP is categorized by its primary business intents; namely, to provide a forum for community members to help each other in solving everyday problems in employment, to develop and disseminate best practices, guidelines and procedures for their members to use, to organize, manage and steward a body of knowledge from which the community members can benefit, to innovate and create ideas, knowledge and practices. Thus, the structure of the CoP is based on three components (Pavlin, 2006:138): “(1) the domain as the area of knowledge that brings the community together, (2) the community as the group of people for whom the domain is relevant, and (3) the practice as a body of knowledge, methods, tools and stories that members share and develop together.”

Some criteria of classification can be combined. For instance, specifically talking about CoPs, Saint-Onge and Wallace (2003) distinguish among informal, supported and structured types. The informal community of practice is self-joining, without organizational sponsor. On the contrary, supported and structured types are characterized by more intense involvement of the host organization. The competency building of such a CoP is aligned with the strategic purpose of host organization and monitoring of the management is present. Another example of CoP classification is that of Wenger et al. (2002: 76) that consider CoPs by their strategic intent to the organization. In this case, four types could be established: helping communities, best-practice communities, knowledge-stewarding communities and innovation communities. In a similar way, Pavlin (2006:143) affirms that there are many different types of CoPs serving different purposes such as problem solving, knowledge creation, sharing best practices, and so forth. This classification implies the recognition of specific problems in each CoPs beyond a common set of characteristics and consequently the necessity of different approaches in their development and governance in order to attain the dissimilar aims. For instance, in the case of knowledge creation purpose, an extremely important issue that sees knowledge as a property of the community rather than as a resource that can be generated and possessed by individuals (Brown and Duguid, 1991), the conditions and organization structure to deploy and to facilitate innovation are very complex, as in de “ba” model of Nonaka and Knoon, (1998), and a specific design and policy is necessary.

Besides the above mentioned CoPs, we can find other typologies that need a more formal approach for their development. It is the case of firms’ networks. Kodama (2005:896) considers these Strategic Communities as both emergent and strategic, a collaborative, inter-organizational relationship that is negotiated and associated with creative yet strategic thinking and action in an ongoing communicative and collaborative process involving several arrangements (e.g. strategic alliances, joint ventures, consortia, associations, and round-tables) which neither depends on marked nor hierarchical mechanisms of control. From the practical aspect, Strategic Communities are a kind of informal organization with a knowledge-based foundation (Mintzberg et al., 1998) but at the same time with a strategic ignition and direction (Porter, 1980). The knowledge based view is an emergent, learning view of the community
in a shared context, while the strategic view is a planning view that aims to establish a desired position in the target market. According to Kodama (2005:895-896) “it becomes most important for leaders of corporations to aggressively create strategic communities tapping on their own organizations’ as well as outside contacts, including customers, in leading positions for use in innovating their own in-house core knowledge while at the same time creating new values and offering them to their customers.” In this way, Interorganizational Virtual Organizations can be created (Fuehrer and Ashkanasy, 1998) as “a temporary network organization, consisting of independent enterprises (organizations, companies, institutions, or specialized individuals) that come together swiftly to exploit an apparent market opportunity.”

All these classifications are related to different ways of approaching the management of Virtual Communities. Each group has its peculiarities and need a different kind of solution. This variety of classification criteria shows that a general solution cannot be applied to every Virtual Community, but each case must be studied and a specific solution must be built, knowing when past lessons can be applied and how.

To get a glimpse of the complexity of the subject, it is enough to state that in the literature there are as many classifications of VC as management areas. For instance, according to Lin et al (2007), from a sociological viewpoint, virtual communities can be classified into interest, transaction, fantasy, and relationship, while from the business viewpoint (Hagel & Armstrong, 1997), they are driven by four motivations: purpose, practice, circumstance, and interest (Bressler, 2000). In addition to all this, Wenger et al. (2002: 24-27) present the following community categorizations: big and small, long and short lived, collocated and distributed, homogeneous and heterogeneous, within and across boundaries, spontaneous and intentional, and unrecognized and institutionalized. Adding more complexity to the problem, we are obliged to consider if we are dealing with communities represented by corporate entities and non-profit organizations. (Kodama, 2005:895). We can find even mixed kinds of organization in a same VC, as the case studied by Kodama (2005:896) of a networked community in which university, hospital, private businesses and non-profit organizations take part in the advancement of virtual networking in the field of veterinary medicine.

Besides, VC can be professional societies where members participate to better understand its domain and improve the way they perform community-related tasks or they can be virtual educational communities (Bieber et al, 2002:14) where the main objective is to provide a truly interactive environment for mutual sharing and action learning. There are many kinds of professional virtual communities such as the medical professional virtual communities or the engineering networks, which view themselves as a composition of special interest groups. In the educational domain, some teachers’ professional virtual communities are TappedIn (http://www.tappedin.org), TENet (http://www.tenet.edu) or SCTNet (http://sctnet.edu.tw). In the latter cases, the aim of the educational virtual community is to generalize the use of Internet as an innovation tool between teachers, pupils, parents, schools and institutions, that is to say, all the agents implied in the learning process. As an example, we can cite Educared, a Spanish virtual community with more than 11000 educational centres subscribed to it. Educared is a virtual learning environment that is a system that creates an environment designed to facilitate teachers in the management of educational courses for their students, especially involving distance learning. The activities developed by this kind of educational community range from extracurricular activities and knowledge about a determined topic to prizes, forums, courses, conferences, news, etc.

As it can be easily deduced, all these kinds of VC have different objectives and creation processes and need different treatment. Nevertheless, VC offer a common ground which can establish the foundation of the study of virtual organizations, since all the VC pursue the same aim— the knowledge sharing of their members.
One of the main reasons to use a virtual community is to share knowledge. The members of a virtual community develop a pool of collective knowledge which transcends any individual’s knowledge and it is fully accessible for all the members. If one member deals with an unfamiliar situation regarding the know-how of the organization, the members conduct a series of alternating experimentation and improvisation stages, accompanied by sharing and reflecting stories of comparable situations, which eventually leads to a solution for the problem. Therefore, Knowledge Management may be considered the most important issue in order to achieve the goals of virtual communities.

Knowledge management has been boosted in the last two decades by the tremendous IT breakthrough reached in information processing and connectivity. Although Knowledge Management has an important soft or social component, technology has functioned as an enabler that permits the exploitation of the knowledge potential of large and geographically disconnected organizations. Nevertheless, organizational practices and policies must always accompany technology, since they are the central cornerstone of any Knowledge Management initiative (Davenport and Prusak, 1998).

The potential of technological Knowledge Management tools is vast in itself, since they can not only make better use of the raw information already available, but they can sift, abstract and help to share new information, and present it to users in new and compelling ways. Nevertheless, the objectives of Knowledge Management are more ambitious, trying to influence the organizational culture, policies and procedures to lever up knowledge creation and sharing. For instance, perhaps the more popular and common tool of a Knowledge Management systems is a library for depositing the knowledge of the community. The management of this library covers such diverse issues as to sort the importance, context, sequence, significance, causality and association of the knowledge. The great advantages that can be easily reached in a community or organization by means of a digital library of multimedia documents and manuals are clear, but the inherent potential of a virtual community is greater than that related to documents management. For Bieber et al (2002), the digital repository should be expanded to support computer-mediated communications, process, workflow and decision analysis capabilities, and conceptual knowledge structures, supporting many of the everyday tasks of community members. This implies a cultural change that must be fostered to happen. In these cases, Knowledge Management theory is a good support since it explores the foundations and the variables involved in knowledge creation and sharing.

The emergence of Knowledge Management can be attributed to the high rate of job turnover among key employees, carrying with them when leaving to other firms the knowledge acquired during years of work experience. In order to solve this problem, the main aim of KM is to maximize the knowledge sharing in the organization. This knowledge can be deposited in the organization through patents, software, databases, reports, formulas, drawings, etc. In this sense, virtual organizations can take great advantage from the KM techniques since all the communication and coordination in virtual networks must be done explicitly. Following KM theory, the community’s knowledge has both explicit and tacit components. Due to the special characteristics of tacit knowledge, specific policies must be articulated to tap this kind of knowledge. Since the implicit knowledge resides in the heads of the community members, special emphasis must be put in its externalization (articulating implicit knowledge into explicit documents, formulas, manuals, etc.) (Nonaka and Takeuchi, 1995). But even the explicit knowledge is not always stored so easily in the community digital repository, urging for a set of formal procedures or motivation strategies among the members of the community. Therefore, building an intranet-based store of information is not sufficient for Knowledge Management.
Exclusive virtual communication, as it happens in many virtual organizations, has a special drawback regarding Knowledge Management, since virtuality is much more limited on tacit knowledge transmission than conventional communication. The physical experience of learning by doing is not possible, restraining the socialization phase of Nonaka and Takeuchi’s knowledge creation model. But this disadvantage of the virtual organizations has its positive side, since the necessity of a digital format for knowledge transmission, like text, formulas or drawings, forces the user to reflect about the explicitation of the knowledge. It must be taken into account that the key phase in knowledge creation is the “combination,” where a group of experts are capable of combining their explicit knowledge in different fields and producing new knowledge. This phase needs a deep understanding of the knowledge put in place, and skills to make it explicit to the group. Here, the culture of the community and social interaction among members play a decisive role tapping out this characteristic of virtuality, and a deep understanding of the mechanism involved in knowledge creation is necessary for their correct management.

TRENDS IN VIRTUAL ORGANIZATIONS

Trends in virtual organizations have been marked by the state of the art of technology. Connectivity, compatibility and security have been big issues until now, stressing the attention on support technologies and applications for discussion or conversation, task and goal-oriented work (Stanojevska, 2002). But whereas new applications and projects are facing the most challenging technical problems like developing security architectures spanning across administrative and enterprise boundaries (Djordjevic et al, 2007:63), the social issues regarding motivation and management of the members of virtual organizations are gaining force. Technology has evolved from the initial complex to develop and install solutions to an affordable commodity, where standard systems are at hand for every company. This has caused researchers’ concerns to increasingly move towards how information technologies must be used to leverage all the knowledge in the firm, not only inside the organization, but from customers, providers, competitors and government, rather the technological development. As a result, social and managerial issues like motivation, VC formal structure, control, rewards, etc are gaining interest among researchers and professionals.

Here, the interaction of both systems, the social and technical ones, has created an interesting research field. The technical system design, complex in itself, must be subordinated to the social system, but it is inevitable that the possibilities and limitations of the technology mould the organization and the social system, including goals, workflows, organizational structures and social norms.

The first thing to take into account is that fluency of communication among members of a VC depends on the goodness of the channel. Here, the limitations of the cyberspace are patent. Although the continuous improvements and breakthroughs on information technologies widen the possibilities of virtual communication at a surprising speed, most authors affirm that a virtual relationship will never reach all the hues and richness of a face to face conversation or meeting. This must be overcome by specific management policies depending on the specific communities that at the same time could range from a community with a complete lack of central control to a tight hierarchical structure in the case of some organizations. A key aspect seems to be strong and lasting interactions that bind community members in a trust relationship (Wenger et al, 2002). In this sense, Chapter I (Garrigos) “Interrelationships Between Professional Virtual Communities and Social Networks, and the Importance of Virtual Communities in Creating and Sharing Knowledge” and Chapter II (Flavián) “The Role of Trust, Satisfaction, and Communication in the Development of Participation in Virtual Communities” offers an interesting view of the problem, the second one presenting empirical data supporting the analysis.
Networking and Electronic Information as a Source of Competitive Advantage

The fast evolving and the increasingly demanding business environment has placed knowledge as a critical factor for business success. The markets, customers tastes, competitors and technology evolves so fast that promoting learning and connecting the organization to get solid information has become the new challenges for organizations. But the relationship between access to information and knowledge is not always direct, and a more complex set of variables is involved. Thus, how to use networking for competitive advantage is a critical issue. In this regard, Chapter III (Forés) “Can Virtual Networks Encourage Knowledge Absorptive Capacity?” analyses the effect of networking on the factors identified as antecedents of knowledge absorption and creation, and how to take advantage of the relevant business information, knowledge, resources, technologies and capabilities circulating in the virtual networks. Chapter IV (Boronat-Navarro) “Knowledge Integration Through Inter-Organizational Virtual Organizations” exposes the process of knowledge creation through strategic alliances using virtual collaboration.

But even more than external information management, dealing effectively with internal information poses a determinant challenge for competitiveness. Typically, about 80% of the information used in a company is generated internally. When a firm reaches a considerable size or is dispersed geographically, even with an appropriate commitment and information sharing culture among workers, getting the exact information when necessary needs thorough planning and management. This is even more complex when the turbulence of the environment forces a continual learning and knowledge creation. This necessity is aggravated in virtual organizations, where one of the most challenging and important issues is to attain an effective and productive knowledge sharing among the members of the community or organization. The virtuality of the communication adds new difficulties to the already complex knowledge transmission, and for this reason one of the most marked trends in virtual organization is focussed on how to deal with knowledge in networks.

Knowledge Sharing in Virtual Organizations

As it has been above commented, Knowledge Management offers a solid theoretical ground for tackling some of the social and cultural problems in networking, specially those related to knowledge creation and sharing. Then, it is usual to find researches adopting this view to approach the virtual organization study. This is the case of several of the chapters proposed in this book. In Chapter V (Nissen) “Knowledge Networks and Flows in the Virtual Organizational Context” describes how organizational metacognition offers potential to elucidate the key issues associated with knowledge networking and how knowledgflow visualization can be used to diagnose dynamic knowledge patterns. In Chapter VI (Bueno) “Model on Knowledge Governance: Collaboration Focus and Communities of Practice,” analyses the relationship between intellectual capital and knowledge strategies from a strategic management point of view. Completing these analyses of organizational networking, Chapter VII (Capó) “Knowledge Management in SMEs Clusters” assesses the particular case of knowledge generation and sharing in SMES clusters, proposing a network functioning model in order to improve innovation.

Besides these theoretical studies, Chapter VIII (Sanchis) “Tools for Supporting Knowledge Management: Knowledge Internalization Through E-Learning”, and Chapter IX (Camison) “The Value of Virtual Networks for Knowledge Management: A Tool for Practical Development” introduce us to the extant technical tools that would help to implement the KM practices and policies. The first one gives us a tool classification and the characteristics searched in KM, focusing in e-learning techniques. The second chapter exposes the experience of the development and use of a KM software for SMEs, and the difficulties found in the project, its results and the lessons learned. The chapter ponders the tools that
must be included in any KM system to articulate basic KM procedures, tools like groupware, thesaurus, knowledge repositories and expertise maps.

But the relationship is both ways, KM theory can help to understand the social and cultural mechanism involved in virtual knowledge sharing, but at the same time, networking widens the possibilities of traditional organizational learning. Chapter X (Eugenia) “Human Capital and E-Learning: Developing Knowledge Through Virtual Networks” offers a review of this evolution of e-learning in the last decade.

Specific Studies

Relevant Sectors

A great advantage of networking is the access to customers and partners all over the world. This affects decisively some sectors and is provoking the complete restructuring of some industries. This book presents the analysis of two interesting sectors where government action is involved. In the first one, one of the sectors most affected by IT is studied— tourism, which has became an attractive field for research and experimentation. Chapter XI (Mendes), “The Development of Knowledge and Information Networks in Tourism Destinations” analyses how to create inter-organisational networks in a cooperative environment to pump up the advantages associated with knowledge networking in destinations and in organisations, as well as the relationships between public and private organization. The chapter is focused on how to implement inter-organisational networks for developing and maintaining an adequate environment with shared objectives and practices in tourist destinations. A second chapter, Chapter XII (de Juana) “E-Government Challenges: Barriers and Facilitators in Spanish City Councils” assesses how governmental agencies can offer their services to citizens through networking and the main problems these agencies face.

Relevant Problems

Finally, the last two chapters are devoted to specific problems related to information management in networking. Although the importance of networking is present in nearly every activity in business, for those areas where information is a key resource, Knowledge Management and business intelligence are unavoidable issues. For instance, Chapter XIII (Ramakrishna) “Business Analytics Success: A Conceptual Framework and an Application to Virtual Organizing,” proposes an interesting framework for coping with the technical and social complexity of virtuality which is based on the combination of decision sciences, information systems and management in the study of success of business analytics. Chapter XIV (Targowski) “The Evolution from Data to Wisdom in Decision Making at the Level of Real and Virtual Networks” contrasts the decision making problem when important information is extracted from networks and data processing, using a Knowledge Management approach to the problem.

REFERENCES


