



An Information Architecture For A Social-Environment System

Pedro Felipe de Abreu, PhD
Fundação Universidade do Vale do Itajaí-UNIVALE

Christiano Hugo Cagnin, MSc and Aline França de Abreu, PhD
Universidade Federal de Santa Catarina-UFSC; aline@eps.ufsc.br

ABSTRACT

The objective of this paper is to show the importance of the sustainable development and social responsiveness concepts in the formulation of an Information Architecture (IA) in the business sector and discuss the steps for its development.

Nowadays, in the globalized and highly competitive economy, companies are facing the challenge of reducing the innovation time cycle and providing services/products which are socially and environmentally acceptable. Therefore, they need information system which support such decision making process.

Thus, to place a new market product, to make a new plant process or to create a new industrial component, it is even more necessary, an evaluation and updating of the associated social-environmental impacts.

By implementing an Environmental Management System (EMS), aligned with a company's business strategies, and supported by its IA, decision makers will be able to consider the inter-related aspects of the company's business strategy and its environmental and social responsibilities in delivering its products and/or services to the society.

INTRODUCTION

The intensive use of Information Technology (IT) turns the productive processes more flexible and rational, enabling a more efficient use of capital, work and natural resources. It also turns even more possible the arising of new means and tools, the opportunity of new investments, and the production and commercialization of innovative products and services based on knowledge.

The globalized economy and the diffusion of IT are a two-way road: by one side, it is possible for companies to expand their activities in distant markets; by the other, the consumers request products and services which are more advanced, technologically speaking. In this scenario the enterprises define their competition strategies based on different criteria (the workforce availability and ability, tax and financial benefits, new requests, among others), establishing in a decentralized way their production units in advantageous places, independent of geographical boundaries [Socinfo, 2000].

However, it is fundamental that the enterprises consider the real and possible, local and global, environmental and social, impacts of their activities into all the value-chain. Therefore, an organization is responsible not only for the activities inside its boundaries, but also for the activities that happens before and after in the productive chain to develop their processes and their products and services. It is important to remark that the begin and the end of a productive chain are always the society and the environment.

In this context, the implementation of an EMS is one way for a company to demonstrate its concern with the environmental impacts of their activities. The EMS system must be seen as a starting point to reach an environmental responsibility [Cagnin, 2000], even because it will represent a final attempt to monitor and to gather data about such issues.

Besides the environmental responsibility, reached by a systematic environmental management of a companies' activities and the consciousness of its employees and the community around it, arises the social responsibility concept that applies a sense of obligation of the firm with the society. This responsibility can assume different forms: environmental protection, philanthropic and educational projects, social services support, among others [Cagnin, 2000]. The justification of the enterprise social responsiveness comes from its freedom to exist given by society [Donaire, 1999]. One way to demonstrate a responsibility for the society is to create and to implement an Ethics Code [Moreira, 1999]. But, since the environmental and social responsiveness don't really have defined limits among each

other (they are concepts that complement one another), it is not possible to be aware to the environment without considering the community next to the firm and all society. At the same way, addressing social issues means also consider the sustainable development principle. Moreira [1999], Ibase [2001] and Ethos [2001] believe also that exists an integration among the social and the environmental responsiveness as they affirm that a corporate social responsibility involves the protection and conservation of the natural resources, acting towards the sustainable development. At the same way, the World Wide Fund for Nature (WWF) [2001] says that ethical values are an important idea of sustainable development that presuppose a better quality of human life inside the ecosystems support capacity limits.

Therefore, the purpose of this paper is to show the importance of an EMS (Environmental Management System) which supports either environmental and social responsibility issues regarding business managing and decision making and to describe the steps to build an Information Architecture (IA) aligned to such values.

THE IMPORTANCE OF THE IT ALIGNMENT WITH THE BUSINESS STRATEGY

In this globalized scenario, information is the most important raw-material and it becomes the principal strategic resource of an organization [Socinfo, 2000]. As Abreu [2000] says, the information gives an enterprise the possibility of knowing itself deeply. When the business structure is really known, the planning, the organization, the management and the processes controls are facilitated. The first step of a value-chain integration is the capacity to generate, treat and transmit information on products and services adding value to it. But, in order to achieve such level of integration and also add value to the chain's activities and companies, it is fundamental for companies and workers to overcome the challenge to acquire capacity to transform information into an economic strategic resource: knowledge [Socinfo, 2000].

Knowledge is essential in every step of the productive process, since the basic research phase until the final marketing and consumer assistance. But its at the initial project and conception of products and services that the knowledge becomes critical. This phase requires the domination of key-technologies and possible social-environmental impacts, great investments in research, favorable organizational environment, and capable people [Socinfo, 2000; Cagnin, 2000].

According to Abreu [2000], the information is essential to create a flexible organization in which learning is a systematic process by having the necessary and actualized information one enterprise can immediately implement, monitor and modify its strategic objectives when they become ineffective. It also helps the coordination, communication, collaboration among people, also supporting knowledge management activities.

The Information Systems (IS) is like a skeleton that sustains the organization. The IT in the globalized firm is not only the basic instrument to deal with its principal resource, the information, but also it permits the strategic application of this resource in order to achieve real profits for the company. Thus, the enterprises restructure themselves in order to become more productive and more competitive, and the IT is the tool to build the change foundation [Abreu, 2000; Torres, 2001]. And since IT is essential, its planned use must be part of the organizational strategy. The strategy use of IT must be coherent with business. This alignment should guarantee the resources allocation for IT projects and give the path for its plan and priorities [Boar, 1993; Kearns & Lederer, 1997; Luftman & Brier, 1999; Henderson & Venkatraman, 1993].

This way, the challenge for CEOs and CIOs becomes to converge business and IT strategies [Wang, 1995, 1998; Rezende & Abreu, 2000; Rezende 2000]. The same way, there is the challenge to converge and align the objectives of each individual business within the general objectives of the value-chain [Andel *in* Soares, 2000]. The business and IT alignment tries to evidence the IT potential treating it, as other variables like distribution strategies or positioning of products, as an indispensable resource in the strategy definition process [McGee & Prusak, 1994; Rezende, 2000; Rezende & Abreu, 2000], and finally in the rational use of the natural resources and the correct management of the waste. To make possible this alignment its essential that the management team responsible for formulating the business strategies have the knowledge of the IT use possibilities and that they are assisted about the opportunities that these possibilities can bring. By the other side, the team responsible for formulating the IT strategies must have a good knowledge of the business [Abreu, 2000; Wang, 1998].

Considering the exposed, it arises the necessity of integrating the environmental and social responsiveness issues as part inherent of the business strategy and its alignment with the existing IT infrastructure needed to support this model. It means that there is a necessity to develop an Information Architecture (IA) considering the sustainable development and social responsiveness concepts, aiming at the value-chain integrated management in order to produce and deliver products and services, socially and environmentally acceptable.

JUSTIFICATION OF THE IMPORTANCE OF BUILDING A SOCIAL-ENVIRONMENTAL INFORMATION ARCHITECTURE

The natural resources are finite. The irrational and predatory exploration of these resources by men can cause its extinction and, eventually, threaten to the humankind. The global ecosystem conservation, were apparently isolated actions with no immediate consequences provoke reactions that still unknown globally, depends of the responsibility of its inhabitants, of its government and enterprises.

The environment conservation agenda must be seen by the business men as pragmatism, as an intelligent task. Independent of the conscious of their actions, everyone depends, directly or not, of raw-materials extracted from nature, and of the quality of air and water.

As the society is consciousness towards the environmental conservation is raising, governmental and non governmental entities, communities and other society actors are pressing the companies to assume their responsibility for their production emissions on water, air and soil. The life cycle analysis of processes and products will demand the enterprises responsibility for their value-chain. According to the Institute of Social and Ethical Accountability (AccountAbility) [2001], the pressure over organizations demanding from them the demonstra-

tion of an ethical and social responsibility performance raised different practices towards responsiveness, auditing and communication of actions related to ethics, society and sustainability. The managerial community and other sectors are implementing in a fast manner these practices.

However, people among civil organizations, the media, and opinion makers are concerned about these practices. What can guarantee and evaluate the validity of them? Are the organizations that are implementing these practices improving their performance and demonstrating it?

Responding to this questions, a great number of norms and guides, volunteer or not, are being produced. The processes and activities inside this norms embraces the necessity of internal and external communication of social and ethical actions, stakeholders dialog, organizational change, fair and ethical negotiations, fair work conditions, training and education of human resources, environmental and animal protection, community development, and human rights.

In this context, among the environmental standards, the ISO 14001 is the one that is drawn special attention to. It defines the necessary steps towards the implementation of an Environmental Management System (EMS) and turns possible its certification by an independent company. Among the Social Responsibility standards, the SA8000 is on the spot and can also be certified by an independent firm.

Active enterprises have already seen these necessities and stimulate this process. These are innovative companies that bet on the education and creation of an organizational culture based on ethics and sustainability. As a fundamental step in order to adapt themselves into this new culture, these firms are implementing their EMS systems and Ethic Codes.

However, according to Rodrigues [in Neto, 1999], most companies still operate themselves as a typical organization from the industrial society, based in a hierarchical structure and on the work division by specialization or functions. These kind of firms create inside their facilities different units with different goals. Each one of these goals aren't integrated one to another and aren't aligned with the organization's vision and strategic objectives. Each one of these units or departments see only their necessities and understand only their own tasks and priorities, without connecting them with the final products and services. To solve the competitiveness problem of this kind of organization it is necessary a new consciousness to be born among people, seeking for quality, costs, attendance, environment and ethic aspects. The business competence of these companies will surely improve by the intense use of knowledge, the economy globalization, the clients' and competitors' pressure, the sense of responsibility over their actions, the government political changes, and the democratization of information.

In this scenario, the development of an Information Architecture (IA) to support the value-chain information management becomes crucial. This IA must contemplate the integration of the business and social-environmental strategies. The IA will be the starting point towards the development of an integrated social-environmental Information System (IS) for the value-chain management with the objective of giving the opportunity for organizations to act with social and environmental responsiveness and also to create and share a knowledge base among the value-chain enterprises and actors. Besides, to manage the knowledge is to manage the intellectual capital, and this must be seen as a knowledge databank and networks. There already exist attempts to join spread information and knowledge seeking to convert them in organizational knowledge. The most succeed are the ones who adopt a just-in-time basis including a group of knowledge that can be pulled when needed instead of pushed every time. The IT use arises in this context to give support to the organizational learning process permitting the explicit and tacit knowledge flows. The possibility to access and transmit information and knowledge by using IT turns this process faster, easier and more effective.

Therefore, the effective integration of social and environmental strategies, the creation and dissemination of a knowledge basis, and the

generation of responsiveness actions at the value-chain will only be achieved by the intense use of IT, which strategies must be clearly aligned with the business objectives and strategies. And the first step towards achieving these goals and to develop an EMIS to support the value-chain management and the integration of social-environmental actions, as also to disseminate and evolve a knowledge base among the value-chain, is the development of an IA contemplating the business and social-environmental strategies integration with the support and strategies of IT.

It should be said that the information flow of an organization must be based in an IA and that the business information are part of the firm property and that it has associated costs [Abreu, 2000]. For this reason, the development of an IA should allow the information to be used as a strategic resource, capable of generating competitive advantage.

McGee & Prussac [1994] affirms that a good developed IA, established as a common sense and coherently managed, permits that all involved parts speaks the same language and uses the information to decision making. They corroborate Abreu [2000] when saying that without comprehensive information architecture the IT won't be able to build a bridge joining the new technologies to the business strategies. In this context, an IA can be seen as a essential tool to explore the information strategically.

NECESSARY STEPS TO BUILD A SOCIAL-ENVIRONMENTAL INFORMATION ARCHITECTURE AND POSSIBLE CONTRIBUTIONS

The development of this IA should embrace the following steps:

- To raise the international existing experiences about the insertion of the environmental and social management in the organizations strategy and its alignment with the Information Technology (IT) strategies;
- To study and characterize the productive sector to be worked with and its value-chain, evaluating the integration and dissemination of knowledge seeking the development of products and services responsibly both socially and environmentally;
- To define measures and business indicators with allows the company (or the companies) to monitor and to evaluate the value-chain performance, specially regarding the environmental and social issues;
- To propose the IA for the chosen productive sector having as a starting point the company to be worked with and looking for its value-chain; and
- To identify in the specialized literature and among software vendors IT solutions to support environmental management systems and social accountability.

Besides these steps to build up an IA aimed at the value-chain integrated management, the EMIS requires along with the social and environmental information the following features (Bovet & Marha, 2000):

- **Consumer's Aligned.** The consumer's choices trigger the activities of seeking for material, manufacturing and delivering. Distinct consumers segments receive personalized solutions in personalized "packages". The consumer commands the value-chain not being characterized as a passive receptor of the supply chain production.
- **Cooperative and Systematic.** The enterprise embodies suppliers, consumers and even competitors in only one value-chain creating relationships. Each activity is designated to the partner with more capacity of to carry it out. Crucial operational activities are delegated to specialized suppliers, and all net offers impeccable results due to collaborative management of all communication and information system.
- **Agile and Flexible.** Receptiveness to necessity changes, new products launching, fast growing or remodeling of the supply chain are all secured by means of the flexible manufacturing, distribution and the information flow system. The restriction imposed by bricks and cement are reduced or eliminated. The re-circulating capital is re-

duced. Time and process phases are decreased, some times, eliminating entire step of traditional supply chain. All value in the chain, physical or virtual, is flexible.

- **Fast Flow.** The cycle's order-deliver is fast and short. The fast delivers past hand by hand, with reliability and comfortableness. This means that complete orders inside the time of deliver, in the factory, in the office or in the consumer house. The time is calculated I hours or days, and it is not calculated in weeks or months. At the same time, this implies enterprise inventory are drastically smaller.
- **Digital.** The e-commerce is a key enabling factor. But, beyond internet, the information flows system and its smart utilization are the heart of the value chain. The new ways of digital information unify and coordinate the activities of the enterprise, their consumers and suppliers. Based on standards, the tools triggered drive the several operational decisions. The real time filtered analyses makes possible a fast decision-making.

Together, these five features constitute a differentiated competitive business model. The business success requires real commitment and involves in a significant costs and work. The challenge is to provide a efficient and differentiated consumer response based on products and services socially and environmentally acceptable. To fulfill the first two features companies and society in general must invest on educational campaigns to increase the consumers' environmental consciousness. The customer would become environmental and social responsible trigger of the whole production process. Furthermore, besides the effort of knowing their clients, companies should gather information regarding these issues and measure their impact on the value chain. The last three features are dependable of IT use to become feasible.

The possible contributions of this IA are:

- Better knowledge on strategies for the organizations sustainability into a competitive and increasingly conscious world;
- To reach the three first of the four most important challenges in the IT area, as defined by Abreu [2000], which are: a) align IT and business, b) build an IA considering business strategies, c) integrate clients and suppliers by information, and d) provide processes automation (this last important challenge wouldn't be considered in this work); and
- To catalyze the cooperation towards sharing a knowledge base among the value-chain and looking for creating combined strategies seeking the competitive integration founded in the environmental sustainability and social solidarity.

FINAL CONSIDERATIONS

Through the exposed, it can be seen that the effective integration of social and environmental strategies seeking the creation and dissemination of a knowledge base among the value-chain can only be achieved by the intense use of IT, and its strategies must be clearly aligned with the business strategies.

The starting point to reach these goals and to develop an IS seeking for the management and the social-environmental strategies integration in the business strategy, as well as creating and disseminating a knowledge base among the value-chain, is the development of an IA contemplating the business an social-environmental strategies integration with the IT support and strategies.

It means the creation of an IA that allows a good performance in the information management seeking the sustainability of all value-chain, aiming for products and services responsibly both social and environmentally.

Only by internalizing the social and environmental strategies in the business strategies and integrating it with the IT support and use strategies is that an enterprise will achieve its sustainability and everlasting in nowadays conscious globalized environment.

REFERENCES

- ABREU, A. F. **Informação Ambiental e o Suporte à Decisão**. 1ª Edição. Editora IGTI, 2000.

- ACCOUNTABILITY - *Institute of social and ethical accountability* - in <http://www.accountability.org.uk/index.htm/>, abr., 2001.
- BOAR, B. H. **The Art of Strategic Planning for Information Technology: Crafting Strategy for the 90s**. John Wiley & Sons, Inc. USA, 1993.
- BOVET, D. & MARTHA, J. **Value Nets: Breaking the Supply Chain to Unlock Hidden Profits**. John Wiley & Sons, Inc., 2000.
- CAGNIN, C. H. **Fatores Relevantes na Implementação de um Sistema de Gestão Ambiental com Base na Norma ISO 14001**. Florianópolis, 2000. Dissertação de Mestrado em Engenharia de Produção – Universidade Federal de Santa Catarina.
- DONAIRE, D. **Gestão Ambiental na Empresa**. 2ª edição. São Paulo: Editora Atlas., 1999.
- ETHOS, in <http://www.ethos.org.br/>, abr., 2001.
- IBASE, in <http://www.ibase.org.br/> e <http://www.balancosocial.org.br/>, abr., 2001.
- HENDERSON, J. C.; VENKATRAMAN, N. **Strategic alignment: Leveraging information technology for transforming organizations**. IBM Systems Journal, Vol 32, Num 1, pp. 4-16, 1993.
- KEARNS, G.; LEDERER, A. **Alignment of IS plan with business plan: the impact on competitive advantage**. Proceedings of AIS 97, Indianapolis, USA, 1997.
- LUFTMAN, J. N.; BRIER, T. **Achieving and sustaining business-IT alignment**. California Management Review, Vol. 42, p. 109-122. Berkeley; Fall 1999.
- McGEE, J. & L. PRUSAK. **Managing Information Strategically**. Willy & Sons, 1993.
- MOREIRA, J. M. **A Ética Empresarial no Brasil**. São Paulo: Pioneira, 1999.
- NETO, M. A. **Avaliação do Papel da Tecnologia de Informação (TI) no Processo de Mudança Organizacional Através da Simulação de Aplicação a um Caso Real**. Florianópolis, 1999. Dissertação de Mestrado em Engenharia de Produção – Universidade Federal de Santa Catarina.
- REZENDE, D. A. & ABREU, A. F. **Information Techology Applied to Enterprise Information Systems (Tecnologia da Informação Aplicada a Sistemas de Informações Empresariais: o Papel Estratégico da Informação e dos Sistemas de Informação nas Empresas**. São Paulo: Atlas, 2000.
- REZENDE, D. A. **Alignment of the Information Technology Strategic Planning to the Enterprise (Alinhamento do Planejamento Estratégico da Tecnologia da Informação ao Empresarial): Análise da Prática de Grandes Empresas Brasileiras**. Florianópolis, Brazil, 2001. Doutoral Proposal – Federal University of Santa Catarina.
- SCHERER, R. L. **Management Environmental System: a Model for Implementinf and Learning (Sistema de Gestão Ambiental: Ecofênix, um Modelo de Implementação e Aprendizagem)**. Florianópolis, Brazil, 1998. Doutoral Proposal – Federal University of Santa Catarina.
- SOARES, J. C. C. **Modeling Logistic Chain Management Information Systems (Modelagem de Sistemas de Informações para o Gerenciamento de Cadeias Logísticas: uma Demonstração das Possibilidades de Aplicação na Indústria de Petróleo)**. Florianópolis, Brazil, 2000. Master Theses – Federal University of Santa Catarina em Engenharia de Produção – Universidade Federal de Santa Catarina.
- SOCINFO. **Information Society in Brasil Green Book (Livro Verde da Sociedade da Informação no Brasil)**. SocInfo, Brasília, ago. 2000. In <http://www.socinfo.org.br>.
- TAIT, T. F. C. **A Information System Architecture for the Public Services (Model um Modelo de Arquitetura de Sistemas de Informação para Setor Público: Estudo em Empresas Estatais Prestadoras de Serviços de Informática)**. Florianópolis, Brazil, 2000. Doctoral Theses – Federal University of Santa Catarina.
- TORRES, N. A. **Enterprise Competitiveness with Information Technology (Competitividade Empresarial com a Tecnologia de Informação)**. São Paulo: MAKRON Books, 2001.
- WANG, C. B. **Techno Vision II: um Guia para Profissionais e Executivos Dominarem a Tecnologia e a Internet**. São Paulo: Makron Books, 1998.
- WWF - *World Wide Fund For Nature* - in <http://www.wwf.org.br/>, abr., 2001.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/proceeding-paper/information-architecture-social-environment-system/31796

Related Content

Pricing Based on Real-Time Analysis of Forklift Utilization Using RFID in Warehouse Management

Numan Celebi, Kübra Sava and Ihsan Hakan Selvi (2018). *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 5490-5502).

www.irma-international.org/chapter/pricing-based-on-real-time-analysis-of-forklift-utilization-using-rfid-in-warehouse-management/184251

Identification of Heart Valve Disease using Bijective Soft Sets Theory

S. Udhaya Kumar, H. Hannah Inbarani, Ahmad Taher Azar and Aboul Ella Hassanien (2014). *International Journal of Rough Sets and Data Analysis* (pp. 1-14).

www.irma-international.org/article/identification-of-heart-valve-disease-using-bijective-soft-sets-theory/116043

Mapping Participatory Design Methods to the Cognitive Process of Creativity to Facilitate Requirements Engineering

Nicky Sulmon, Jan Derboven, Maribel Montero Perez and Bieke Zaman (2013). *Information Systems Research and Exploring Social Artifacts: Approaches and Methodologies* (pp. 221-241).

www.irma-international.org/chapter/mapping-participatory-design-methods-cognitive/70718

Citizens' Engagement Using Communication Technologies

Olga Fedotova, Leonor Teixeira and Helena Alvelos (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 2709-2718).

www.irma-international.org/chapter/citizens-engagement-using-communication-technologies/112689

A Study on Bayesian Decision Theoretic Rough Set

Sharmistha Bhattacharya Halder (2014). *International Journal of Rough Sets and Data Analysis* (pp. 1-14).

www.irma-international.org/article/a-study-on-bayesian-decision-theoretic-rough-set/111309