LEARNING PROCESSES AND THE ROLE OF TECHNOLOGICAL NETWORKS AS AN INNOVATIVE CHALLENGE

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Keywords: Technological networks, learning process

Abstract: This paper intends to contribute to a comprehensive understanding of the role and the value of technological networks in learning processes, whose integration can enhance enterprise performance. Considering that the adequate combination of some variables, as IT, Internet, Intranet, computers, Information Systems and teamwork's' activities may modify drastically organisations' behaviour, a conceptual model for the optimisation of enterprises' performance as a function of technological networks is suggested.

1 INTRODUCTION

Nowadays, Information Technology (IT) is a critical success factor for implementation success. Management is exposed to pressures and challenges that require innovative and flexible responses to a rapidly changing global environment. The major challenge is the ability to maximise the use of technological resources and to organize an adequate number of links in order to establish a strategic network.

The concept of Technological Networks (TN) includes architecture of new technologies, equipment and also human resource skills. Summarising, aggregating, comparing, or combining various sets of data collected in the environment and from competitors and customers needs the presence of other technologies.

Information Technologies have been identified in recent years in some industries as having a critical impact on the organisation's capacity to learn new advances in several domains and to change processes (Amburgey *et al.*, 1993). Organisations have to consider resources such as computing equipment, software, audio-visual and multimedia equipment, telecommunications equipment, cellular phones, and visual communication resources. This infrastructure should evidence flexibility in order to provide a better use of TN capacity (Duncan, 1995).

In an organisational context, TN could be understood as a comprehensive approach to all aspects of managing the information resources and processes associated with data, computing technologies, and activities based on acquiring storing, processing and distributing data to meet functional needs for the benefit of the entire organisation.

Underlying the TN concept, some dimensions, such as information technology integration, communication technologies, and knowledge management should be considered. These dimensions of TN have to be evaluated and some work would be necessary in order to find a survey instrument for measuring them (Lewis *et al.*, 1995). It should permit to assess how well technological resources are managed and how this relates to the organisation's performance.

This paper proposes that the integration of technological networks in learning processes can be a significant factor in promoting organisational innovation and in transforming the teaching and learning paradigm.

2 THE ROLE OF TECHNOLOGICAL NETWORKS IN THE LEARNING ORGANISATIONAL PROCESS

Strategically, the success of most management innovation processes also depends on a competitive

effort, which may includes a deep knowledge of technological advances and an adequate analysis of networks' benefits (Cohen and Levinthal, 1990). In this case, this means that managers should pay attention to the following questions:

1) How their employees perceive the quality of the respective technologies;
2) How middle managers can be motivated to deliver the results of their teams in a qualified manner;
3) Which technologies should be integrated to generate high knowledge levels in order to improve the quality of offering alternatives;
4) Finally, all these findings should be integrated into a Decision Support System, which has to present a competitive perspective based on TN.

TN may be a true asset of a knowledge-oriented organisation and the integration of different technologies should be emphasised. Learning theories may explain the development of educational experiences for information technology concepts (Money, 1996). According to the major framework of social cognitive learning theory, it can be recognised that e-learning technologies provide new possibilities of adopting new ways of teaching and learning. These ways will demand for the interaction among cognitive processes and network techniques. Dealing with computing equipment, software, several Information and Communication Technologies and human values, TN provides that learning organisations can re-engineer their processes, using applied knowledge-based approach and knowledge management perspectives. In fact, assembling a set of resources as a means of changing what an existing organisation can do is relatively straightforward. Human resources with new skills can be hired, technologies can be obtained and adopted, capital can be raised, and product lines, brands, and information can be acquired.

Emerging technology is also transforming teaching and learning in higher education (Baldwin, 1998; Batson and Bass, 1996; Bork, 2000; Dickson and Segars, 1999; Gilbert, 1995; 1996). More than ever, we are now aware of the learning role of professors (Gillespie, 1998). It is not only adequate to design learning experiences which will familiarize students with existing technology and that will enhance their learning processes but it is also important that faculty members feel comfortable with this new learning environment. This challenge represents one of the most difficult tasks faculty development coordinators should be undertaking in their faculty development program. The integration of teaching, learning, and technological networks is needed to enhance organisations performance within the context of their learning processes.

Networking and technology resources have become central, indispensable tools in team co-ordinated operations, manufacturing *resources,* for example, computer-automated equipment that is designed to reduce cost and improve quality. TN is becoming progressively more useful because management is taking into account the value of information, technology, resources' systems and team networks (Woodridge and Jennings, 1995). Organisations need to properly manage its intellectual capital and its technical tools in the information domain, that is, persons, technical resources and information systems.

TN can be seen faced as a useful way for creating, maintaining and exploiting all the possibilities of the huge set of technological resources, such as Information Technology (IT) and its equipment, that many organisations can use in its activities (March and Kim, 1989). According to this perspective, an organisation can obtain a better qualitative image using technological network. Nowadays, networks can support a variety of communication programmes, and intense efforts are being made to improve its technological features in order to improve communications infrastructures.

The benefits obtained from TN depend on the type of technologies' utilisation and its inactivity. Based on a set of technical resources (SDSS, groupware, interfaces, systems integrators, hardware and software), managers can try to find a new approach to obtain higher levels of integrated strategic decisions, competitiveness, and performance. Moreover, an adequate combination of technological resources can help managers to anticipate problems better, to guide the innovation effort (Drury and Farhoomand, 1996), and to contribute to a greater TN efficiency, focused on the achievement of organisational objectives.

3 WHAT NETWORK RESOURCES SHOULD ORGANISATIONS IMPLEMENT?

Organisations have to consider resources such as computing equipment, software, and audio-visual and multimedia equipment, teleconferencing facilities, telecommunications equipment, cellular phones, and visual communication resources. This infrastructure should evidence flexibility in order to provide a better use of TN capacity (Duncan, 1995).

Resources are the most visible of the factors that contribute to what an organisation performance and development. Resources should be flexible and include a great set of components where information technologies and technological networks play a decisive role.

Within organisations such as universities, computer-mediated education technologies facilitate the transmission of knowledge between the educators and the students. Electronic mail systems, computer networks, and interactive compressed video (ICV) systems are included. It is well known that computer networks have changed dramatically the way information is delivered throughout education systems. Computer networks enable educators in both distance education and traditional education classes to interact with individual students at remote sites. Computer networks are effective means of facilitating student learning (Kulik and Kulik, 1987; Kulik and Kulik, 1991; Siegel et al., 1986). These networks can range in size from local area networks (LAN), which link computers within a small area (such as a university), to wide area networks (WAN).

A model that captures integrated technological resources, namely information technologies, is therefore needed. This integrated model can be used directly by managers from a coaching perspective in order to gain access to applications and information to support their pedagogical skills. Managers who can use an explicit organisation model in their preferences of large information bases may learn more about technological capacities and therefore facilitate the organisational learning process (Chen, 1995; Powell *et al.*, 1996).

4 THE VALUE OF NETWORKS IN TEAMWORK

It is well known that computer-mediated communication (CMC) mechanisms allow team members to communicate over network and share information during their co-operative duties. Most organisations have served their telecommunication needs through separate dedicated networks, such as a voice telephone network, the corporate telecom network and its links to the Internet, local area networks (LAN), wireless manufacturing site networks, a video conferencing network.

Network decisions are almost systematically submitted to the general approval of the whole network, whether explicitly or not. It will be stressed here that the functioning of the networks is not based on hierarchical principles, and not on democratic ones, as such, either: it is knowledge driven and highly dependent on general consensus.

The perception of an agreeable working climate is one of the strongest factors influencing employee's involvement in personal efforts on creativity and innovation. Climate has to do with behaviour, attitudes and feelings, which are easily observed. Some technologies can act in order to create a creative climate within the organisations in the context of work groups. Through collaborative technologies, team members can become more easily involved. For example, the Internet can provide instantaneous communication without a LAN, and allows instant communication to all team members. The possibility to communicate quickly and with less inhibition allows problems to be addressed and resolved more quickly.

5 AN INTERPRETATIVE MODEL

The objective of this paper is to present a proposal of some variables, which, according to our point of view, should support organisational TN, concerning the one that better satisfies goal achievement. The adequate combination of IT, Internet, Intranet, equipment, Information Systems and teamwork's' activities can lead the organisation to a particularly strong performance. Our model will emphasise the optimisation of innovation and learning processes as a function of the technologies that are integrated into the TN.

As can be seen in figure 1, a conceptual model for "**The influence of Networks on the learning process**" is proposed. It emphasises that better learning efforts, innovation and creativity, organisational effectiveness and management performance can be the results obtained from a KM efficiency based on **Teamwork Agents and Resources** and **Technological Resources**, namely IT and DSS. This model should take into account numerous determinants of the relationships among various fields.

The top portion of the model shows two domains: 1) **Technological Resources** and 2) **Teamwork Agents and other Resources**. Technological resources include IT and DSS, because they contribute intensively to the formulation of competitive strategies. As has been explained before, **teamwork agents** are all the personal whose functions imply learning efforts, creativity, and decision capacities at different levels in the

organisation. Teamwork agents make learning progresses based on each individual' s efforts and skills.

Until now, this model has only been conceptualised according to literature review and our personal

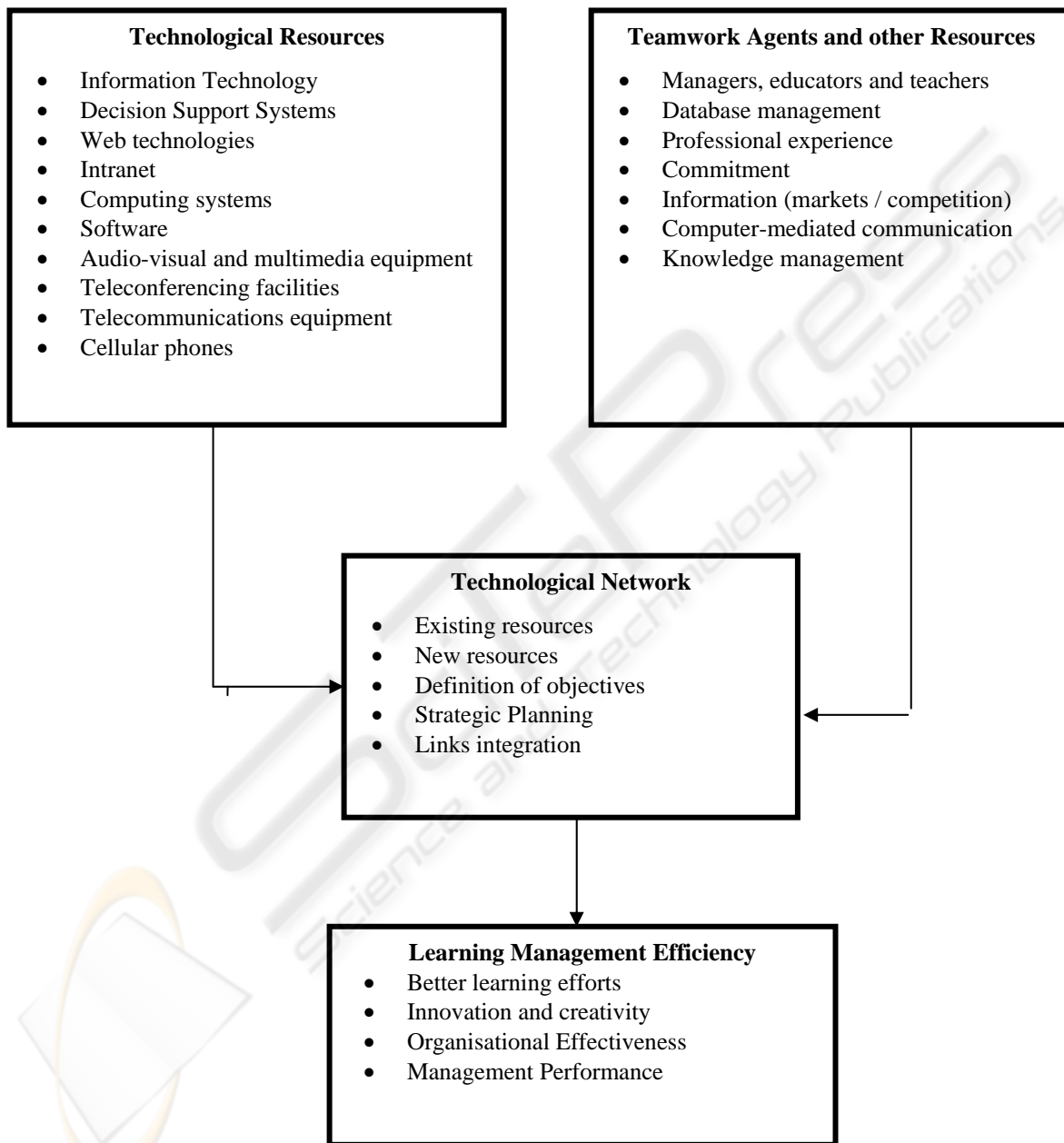perspective. Further work will be required in order to validate this model.

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│   Technological Resources       │        │ Teamwork Agents and other       │
│                                 │        │           Resources             │
│  • Information Technology        │        │  • Managers, educators and      │
│  • Decision Support Systems      │        │    teachers                     │
│  • Web technologies              │        │  • Database management          │
│  • Intranet                      │        │  • Professional experience      │
│  • Computing systems             │        │  • Commitment                   │
│  • Software                      │        │  • Information (markets /       │
│  • Audio-visual and multimedia   │        │    competition)                 │
│    equipment                     │        │  • Computer-mediated            │
│  • Teleconferencing facilities   │        │    communication                │
│  • Telecommunications equipment  │        │  • Knowledge management         │
│  • Cellular phones               │        │                                 │
└─────────────────────────────────┘        └─────────────────────────────────┘

              ┌──────────────────────────────────┐
              │      Technological Network        │
              │  • Existing resources             │
              │  • New resources                  │
              │  • Definition of objectives       │
              │  • Strategic Planning             │
              │  • Links integration              │
              └──────────────────────────────────┘

              ┌──────────────────────────────────┐
              │   Learning Management Efficiency   │
              │  • Better learning efforts         │
              │  • Innovation and creativity       │
              │  • Organisational Effectiveness    │
              │  • Management Performance          │
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Figure 1: The influence of Networks on the learning process

6 CONCLUSIONS

Organisations should commit to a new vision of technological network integration and recognise and harness the potential of networks to transform multiple knowledge levels, to improve the consequences of communications' management, and promote technical progress in order to increase the performance level of some industries.

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