TELECOTTAGE: A NEED FOR THE DEVELOPMENT OF THE QUARTERLY INFORMATION SECTOR IN DEVELOPING COUNTRIES

Tânia Mara Botelho *Jaime Robredo*

Universidade de Brasília

RESUMO

BOTELHO, T.M. & ROBREDO, *J. Telecentro: uma necessidade para o desenvolvimento do setor quartenário de informação nos países em desenvolvimento.* **Transinformação,** *4 (1,2,3): 33- 44, 1992.*

A importância crescente das inovações tecnológicas nos países ocidentais é um dos fatores que promove o advento da sociedade baseada em informação. Os conceitos que fundamentam o setor quaternário de informação, a estrutura política, os valores e demandas são examinados neste trabalho. Enfatiza o papel da liderança empreendedora e os desafios necessários para sobrepujar e ultrapassar os problemas da sociedade e as barreiras de um país em desenvolvimento para conseguir desenvolver a abordagem inovadora de telecentros rurais, incluindo sistemas de informação de massa e sistemas conviviais. Salienta os desafios e as mudanças à nível internacional e nacional nas sociedades baseadas em indústria de informação, com referência especial para aspectos econômicos e políticos. Apresenta as principais características da evolução das indústrias de computadores e de programas de computadores no Brasil. Delinea as principais tendências, fatores e responsabilidades na criação do setor quaternário de informação. O cenário e os principais papéis a serem desempenhados pelas instituições no setor são analisados. Sugere metas, estratégias e ações para se levar adiante o empreendimento que é a sociedade pós-industrial, com a abordagem de telecentros nos países em desenvolvimento

Unitermos: *telecenter, informação quaternária, sistemas de informação*

1. THE IMPORTANCE OF TECHNOLOGICAL INNOVATION AND THE QUATERNARY INFORMATION SECTOR

The prevalence of poverty, ignorance and avoidable diseases as well as the continuous degradation of the environment and ethical values and with its tension between human society and the natural surrounding emphasize the limits of existing development approaches, methods and models. Scientific insights and technological innovations modify reality and create new environments. There is a need for accelerated development going through all stages in order to accomplish new models for the less developed parts of a society. One of such fundamental roles recongnizes that science and technology cultivate and expand the local knowledge-base. Science and technology function in different enviroments but are linked by their relationship to information and an expanding local knowledge-base. This symbiotic relationship is an essential component of a process of autonomous development.

Advanced or high technology can be understood as technology with high information content. The emergence of high tech underscores a shift in the qualitative and quantitative balance of material and non-material resources required to substain a process of autonomous development. High tech offers the potencial for a new type of growth with better distribution of resources that conserves energy and raw materials while protecting the enviroment. However, achieving this potential depends on how well societies understand that science and technology are changing the relative value of knowledge in development. It also depends on how quickly the members of society can transform themnselves and their institutions to cultivate and expand the size of and access to the local knowledge-base so as to maximize the pontential use of other local resource to solve real problems in practical ways.

A knowledge based development strategy does not involve the creation of anything new, rather it is a more comprehensive way of perceiving the interrelated aspects of development programmes which expand the local production and use of information it needs to know about it self at all levels. Such a comprehensive approach reveals a more profound and complete picture of the components of the development process and, furthermore, permits the formulation of more effective development strategies.

The growing importance of the technological innovations in the western countries is one of the number of factors promoting the coming of the information-knowledge-based societies. Technological innovations which occur in several sectors of economic activity, particularly in industry and services, display characteristics that are different from those known until our day and age as typical manifestations of social progress. For one thing, the specialization in methods, tasks and knowledge has led to the combining of

processes, operations and systems. Thus, the new technologies, by ranging from the particualr to the general, bring back the old dreams of the alchemists, namely the reproduction of matter and energy through the very manipulation of matter and energy.

The Quaternary information sector of the economy is one industrial sector of processing in which telecommunications and computers are strategic for the exchange of information and knowledge. The information industry is crystallizing its own view of the information millenium and moving toward it by helping others to articulate what we want from the future. There is a need for corporations to transcend goals to make an impact in helping society to reach positive scenarios of the future. At same time, as telecommunications enters a more competitive environment, there is a real desire to make sure business as efficient and effective as possible.

Let us consider now the changes that are taking place nowdays in the world economy. Over the last ten years we have witnessed essential changes, such as, for instance:

- the economy that relied on basic commodities is now unhitched from the industrial economy.
- production has become unhitched from employment.
- flows of capital, instead of trade, are now the essential ingredient of the world economy.

The world wide economy presently occupies a commanding position, instead of the economy of nation-states. Manual labor is gradually being replaced by machines and the products of knowledge; such industries as were primarily labor-intensive are now knowledge-intensive and the emerging "symbolic" economy - of capital flows, exchange rates and credit availability - is now the mainspring of global economic activity, in substitution of the "real" economy of flows of goods and services. This "invisible" trade, the trade based on services, amounts to an approximate total of US$ 2.5 to 3 trillion a year. At same time, the London eurodollar market handles about US$ 300 billion each work-day, i.e. US$ 75 trillion a year, a figure that is 25 times greater than that for world trade.

All these economic, political and social changes, with the influences they exert or receive, are transforming the underpinnings of existing industrial structures. The "information technology gap" between nations is a much more serious issue than the present gap between industrialized and non-industrialized countries, since there is the possibilitity that the more advanced ones, in terms of information techonology, may use their superiority for military purposes.

In order to successfully face such potential problems it becomes crucial for less-developed countries to make required efforts to achieve

industrilization and to enhance their information resources. It is obvious that countries that master such information technologies should be encouraged to cooperate more effectively in that area.

The key is to be found in an awareness of the significance of information and no just of the importance of hardware and software in carrying out the transition from an industrial society - an undertaking which embodies the structural change from an industrial economy to a service economy.

In the present context, the issue is no longer that of adapting the contents to the electronic environment, but rather of exploring the compatibility of such an environment with information requirements and possibilities. Information is viewed here as a welfare factor that benefits the end user and society. In this prosperous sector, information is considered as a welfare resource that is associated with profits, and the latter are the direct result of effective decisions.

The largest segment of this service economy corresponds to "on line" information and to "on line" distribution services, followed by the data carrier and data base production networks. In Brazil, the revenue accruing from the above mentioned activities is still relatively low, at a level of about US$ 20 million (for 1986), mainly concentrated in businesses located in the southern and southeastern regions of the country.

2. ENTREPRENEURIAL LEADERSHIP

Each era produces its own style. Somehow there is a confluence of fashion, industrial design, politics, social trends, movies influence and even management. In an historical sense, there was time for the evolution of this style, time for the dimensions of life to synthesize and achieve characteristics that came to define that era. The twenty-first century, fifth generation computers, third wave, information millenium are much farther that third generation management with entrepreneurial leadership.

The worker and the manager of the agricultural era were quite different from the industrial era, and will be different from those we see, and will see in the information era. The advent of the information age has signaled a very different era. The style of our times is characterized by high tech buzz of the video arcade and the screen presence. What we see in the developed countries is a shift in the types of workers. from an uneducated, rather unskilled worder to an educated, professiornal worker. The new technologies have created a new world of electronic and biologic miracles. The technological changes have enabled workers at all levels to begin making more and more decisions about their work. These jobs have become complex, with

hihgly intelectual tasks. high discretion jobs. Nevertheless we have to be aware of the existent needs of harmonization of technological development with the social. Rural and educational values where the transformation occurs.

The cultural, economic and social values of the information era are forging a new reality in terms of what the worker expects from the job in the company. While the companies have succeeded in creating the technology for the information society, the shortfall has occurred in the people side - creating the management and entrepreneurial leadership and the environment needed to help employees to flourish. We are still managing and leadering as if we had workers just from the farm. As members of the information industry, none of us are surprised at the power of our industry in society. Some megatrend facts support this:

- between 6000 and 7000 scientific articles are written each day;
- scientific and technical information now increases 13% per year, which means it doubles every 5,5 years;
- this rate will soon jump to 40%;
- in 1988 the volume of information will be somewhere between four to seven times what it was only few years earliers.

This plethora of information and its delivery position have given consumers an ever increasing choices. With renewed spirit of individualism, consumers make these choices demanding their own preferences. This same value choice is reflected within corporate life preferences. With each increase in technology there is a need for a similar increase in human values. The more dramatic the technological change, the more necessary the planning for the human side. The balance of material wonders of technology with spiritual demands is a need for our human nature. Participatory democracy is the basis to approach the new management and entrepreneurial leadership style. Many of the new high tech companies have successfully created corporate cultures which embrace values of this type, where the free ex-change of ideas enhance the climate of creativity and knowledge. Some tangible steps to take in order to move toward this climate are:

- sharing of power, training, viewing the company holistically, helping managers through a change, creating options to work, planning for the human needs as you plan for the next computer.

Information service break throughs and economic grouwth for the industry are to be derived and the cultural barriers of each segment must be overcome, strategic alliances must be created to link the diverse sectors of the information industry

3. CHALLENGES AND CHANGES IN BRAZIL

In Brazil, the State is the great generator of information, since it collects such information practically for the sole purpose of the State's own administration. The shift of part of this activity to the private sector is a viable undertaking, on a long term basis. Information produced by the Government has been under-utilized, since no consideration has been given to the obligation of making that information readily available to society.

At this time, the country is experiencing an evolution which has developed on the part of society an awareness about a number of issues that call for profound thinking. This in wiew of the fact that any action to be undertaken must not only be effective in terms of the present, but also geared to the future.

The different groups that make up Brazilian society have been insistently endeavoring, through a clear-cut and responsible commitmet, to attain a constant improvement in the quality of life, from a social, economic, political and cultural standpoint.

The provision of computer services, is most extensive and of an extremely high strategic value for Brazil. Never-theless, and paradoxical as it may seem, it is one of the sectors of the econonmy where the presence of the State is strongest and most stifling. In this paraticualr area dealing with most advanced technologies and where rapidly occurring developments must be absorbed and used so as not to widen the technological "gap" that exists between our selves and the industrializes nations, we are witnessing the fact that, contrary to logical assumptions, the bulk of expenditures is concentrated in governmental agencies.

Although private enterprise is endowed with the necessary amount of flexibility for self-adaptation to far-reaching technological impacts, and despite the fact that it has abundantly displayed both capabilits and competence in supplying market requirements, the State - in the form of state-owned corporations (federal, of the single states, or municipal) or of data processing units (DPU) within governmental agencies - does encroach upon the market in question, very often as part and parcel of mere political horse-trading or, just about as frequently, by providing low-grade services at the Government's expense and to the detriment of private enterprise in the sector

As it happens, in our economy the Government is the main source of contracts for such services. Figures for 1986 shows that data processing services ran at a total cost of US$ 1.35 billion, of which US$ 740 million was the share accruing to the private sector of Technical Data Processing Services.

So, with the state of affairs now prevailing in Brazil, the entire sector of data processing services finds itself in a truly awkward situation

On the one hand, there are actual limitations on the authorized level of expenditures for the public sector, which handles the greater share of contracts for the services in question, in conformity with the typical procedures of a predominantly state-controlled economy such as ours

And on other hand, running contrary to the above described market-restrictive tendency, there are two decidedly positive factors which may completely reverse the trend in question. The first one is the "micro revolution". Strangely enough, the market-motivated reasons which led the big transnational vendors to encourage and espouse themselves the idea of having large-scale DPUs installed in major organizations and thus bring data processing to society, were the very same reasons that made them engage in directly targeting the end-users of the DPUs, by offering to such users solutions that were practical, fast and much cheaper in most instances, namely micro computers.

This genuine "revolution" had a considerable impact on the public at large. The latter, even though lacking in technical information about the matter, began resorting to data processing as a technology for common every day usage.

This emerging technology of widespread data processing opens new and vast horizons, where private enterprise can and must find its proper place.

The second positive factor, which may mean "a stepping up in the demand for adata processing services", is a result of the curbing that is taking place with regard to public expenditures. Once there has been some fresh thinking about the technology underlying the use of data processing in organizations, and, broadly speaking, in society it self, there are going to be opportunities for the adoption of immediate solutions. Such solutions will consist in the introduction of productivity increasing measures in those same organizations, so that the latter way then re-invest the financial resources made available by the effective achievement of the afore mentioned gains in productivity.

Thus, it becomes more and more obvions that there is going to be an ever growing need for companies engaged in "generating knowledge", such as consulting, software engineering firms and the like, as well as for concerns specializing in information science and technology.

4. COOPERATION STRATEGIES

The ability to add value to human material and non-material resources is the key for generating local wealth and an important factor for contributing for a more equitable distribution of new wealth. To add value is to increase the information content of resources. As more and more human beings add value to themselves through education, experience, skill development, they are able to increase the value of technological and other resources and also to increase their purchasing power to sufficiently satisfy basic needs.

The size of the information quaternary sector, which of course takes into account science and technology, reflects the capacity of the economy to add value to resources.

The major goal is to take the Telecottage approach in the developing countries to foster and to develop the telecommunication among production, research, consulting and universities, referring to small and medium size industries in typical regional areas and alming at the valorization of technological production and research in our countries.

With the technological diffusion, especially of new technologies, it becomes necessary to have the availability of services other than the mere production ones, like promotional services, financial technical and training.

The main for the matching of scientific, industrial and rural worlds are:

- the creation of promotion links between small and medium size industries, with specific reference to productions and technologies using local resources, including management capacity;

- the development of initiatives of scientific research and technological innovation and diffusion within the production environment, schools, universities and public bodies;

- the creation of an open centre for documentation and special information, on technological diffusion and development of advanced services;

- the development of critical mass by levels of development together with the image and the importance of the cultural aspects of the area which it operates, also through the multiplication of meeting opportunities and the promotion of local production and initiatives.

Nascent capabilities of the information industry are coming alive in country after country, all in need of experienced guidance, funding and staffing. The international cooperation is an important supportive element in strenghning the national capacity to apply and utilise telecottage for development. Consequently one of the strategies is to intensify modalities employed in this regard are bilateral programmes, regional programmes, multilateral arrangements, inter-institutional programmes and the maintenance of telecottage representatives in each country.

The sources of external support are foreign governments and United Nations entities through bilateral Programmes with foreign and domestic private enterprises.

5.THE SCENARIO

The very essence of managerial planning lies in the espousing of a pragmatic philosophy. It is management policy. as a set of techniques for reconciling philosophy with action, that actually establishes guidelines for the

kind of management planning involved in organized information-knowledge based societies.

With regard to the outlook for domestic private enterprises, it is impossible to make any prediction unless there is some perception, limited though it may be, of current trends in the economy. Brazil does indeed have a high level of poverty; still, the problem of capitalization is a common feature of all developing countries. Also, institutional inadequacy and opposition there to are universal problems.

The other difficulty namely how the country can extricate it self from the economic crisis, means that research, education and high tech should be used as key issues together with social programmes to be perhaps even as the very key for a socio-political, cultural and economic reawakening of the country.

In order for such a philosophy to be translated into action, it will necessary to have a far reaching mobilization of the entire scientific, technological, industrial, entrepreneurial and financial community It would then be possible to bring about what some might describe the Brazilian version of the Japanese miracle.

Therefore, we should concern our selves with the shoring up of the more fragile structures in both the public and private sectors, but without burocauratizing management. In essence we propose that the following goals be sought:

(1) formation of economic, human, political and information capital;

(2) generation of technology and innovation;

(3) creation of mechanisms for cooperation and managerial alliances among the public, private and educational sectors;

This solution then consists in increasing the productivity of knowledge-intensive work through the adoption of the following strategies;

(1) application of industrial systematization methods to the logical organization of services;

(2) capital-information intensive activities;

(3) use of high tech;

(4) maintenance of a steady flow of information that will ensure dynamic adaptation and self controlling of the systems involved

The existing reality is demanding from all of us a positive commitment to dialogue, so that together, we may shape our new mangement-entrepreneurial leadership culture.

It is only natural that we ask ourselves such questions as who are we in the context of the computer age market and where are we headed, as the year 2000 is gettings ever nearer? What is there that we can and must do for

the sake of the market economy in Brazil and what is the outlook for the development of the computerized information sector in developing countries?

The new corporations coming to the fore in the computerized information market in Brazil are creating new jobs and have as well an opportunity to establish new professional profiles, together with the development of new technology that will enhance the creation of convivial information systems in society.

The issue of the definitive coming into being of an information industry hinges on the need for a re-assessment of any subsequent course to be charted for the quaternary sector as a whole, a sector whose sundry elements are beginning to take shape and acquire significance. Brazilian companies in this area have quickly gained a foothold in the market and their favorable position is due to the difficulties encountered in the industrialization and realy marketing of products that enjoy world-wide acceptance.

Nevertheless, the volume of recources that will be required for continued development will grow at a rate egual to that of the overall consolidation of national development.This then means, in no uncertain terms, that both the public and the private sector shall have to thoroughly re-appraise the role and social responsibilities of domestic companies, within the context of this process.

It be hooves the public sector in developing countries to foster the aforementioned development through the adoption of decisions pertaining to transfer of public funds to the private sector that will develop convivial information systems and telecottage in rural areas. Such funds might also be allocated to the privazation of state owned and operated companies, with no jobs being eliminated. In this fashion, the public sector is providing new oportunities for domestic industry, which is now occurring on a mixed economy basis - mainly privately owned and operated - and that same public sector collects the tax revenues accruing from the activities of private enterprises. In addition, new products are being elaborated to meet the anticipated demand generated by international markets. In this connection, the development that is achieved through the widespread adoption of advanced information technologies, favors the creation of a maximum number of jobs with a minimum amount of imports.

The complexity and swiftness of the transformations that are taking place has triggered a number of conflicts of interest, both at the domestic and international levels. The learning process used heretofors is now being evaluated, as a part of some re-thinking about the direction in which the yearned for economic order is headed. Thus, the adoption of a strategy for a cooperation-motivated alliance involving business enterprises in both public and private sectors, as well as management, industrial, professional and

scientific associations, is a prime requisite for an effective concentration of efforts on the part of the quaternary information sector. It becomesthen possible to marshal the cohesive and vital strength that will be brought to bear in a democratic context for "elbowroom", as required by an endogenous scientific and technological development process and a competitive market.

There is a significant and vital role to be played by the Brazilian information industries within the world quaternary information scenary. This is the direct result of the unreleting joint effort on the part of the more representative organization of the sector. Under the present circumstances, it is imperative that all the groups act in unison so to achieve the full emancipation of the sector, not as an end in itself but as a driving force for the enhacenment of the quality of life for all individuals and for the broadening of the collective awareness of our societies in developing countries.

SUMMARY

BOTELHO, T.M. & ROBREDO, *J. TELECOTTAGE: a need for the development of quaternary information sector in developing countries.* **Transinformação, 4** *(1,2,3), 33- 44 ,1992.*

The growing importance of the technological innovations in the western countries is one of a number of factors promoting the coming of the information based societies. The concepsts that underlies the quaternary information sector, the political structure, values and demands are examined. Emphasizes the role of the entrepreneurial leadership and the challenges need to overcome societal problems and barriers of a developing country in order to cope with the telecottage innovation - approach, including mass utility and convivial information systems. Stresses the challenges and changes at the international and national levels in the information based industries, with special reference to economic and political aspects. Presents the main characteristics of the evolution of the computer and the software industries in Brazil. Draws on main trends, factors and responsabilities in the creation of the quaternary information sector. The scenary and the roles played by the main institutions there are analysed. Suggests goals, strategies and actions to carry on the enerprise of being a post-industrial society, with a telecottage approach in a developing country.

Key words: *telecottage, quarternaly information, information systems*

REFERENCES

BOTELHO, Tania Mara. Scientific and technologica development in the computerised information sector (in portuguese). As part of the extension course material of the Brazilian equivalent of the US War College. Rio de Janeiro, ESG, 1985.

-------. The computerised information sector as a supplier of services (in portuguese). Address delivered as President of the ASSESPRO (Brazilian Association of computerised information services companies), august, 1988.

-------. The equilibrium of forces and challenges within the quaternary information sector. In: International conference on The Knowledge industries; levels of economic and social development in the 1990's. Dubrovnik, Yugoslavia, 29 May-3 June 1989 (pre-print).

DRUCKER, P. Major changes in the world economy (translation into portuguese). **Dialogo, 20** (2):2-7, 1987.

IBGE. **Anuário estatístico do Brasil.** Rio de Janeiro, 1987 (Brazilian Institute of Geography and Statistics).

ROBREDO, Jaime. Informação e transformação. Brasília, ABDF.

SPECIAL SECRETARIAT FOR INFORMATICS (SEI). An overview of the computerised information sector. Brasília, 1987.

VITRO, R. A hypothesis on the role of the information sector in development **The Latin American magazine on communications, nº 8, 1983.**

NAISBITT, J. **Megatrends.** New York, Warner books, 1982.