Editorial

IT and Socio-Economic Development?

L Introna
London School of Economics

With this first SACJ special issue on IT and development, it may be meaningful, for a moment, to reflect on the very notion of development and its relationship (or not) with information technology. What do we mean by this concept of development? Can information technology play a role in it? And, what should this role be (if at all)? These are very fundamental questions that need to be addressed. I am of the opinion that if we were to neglect these questions developing societies may fall prey to a whole set of reductionist notions and mechanisms that may eventually have more 'costs' than 'benefits'. The questions raised above are complex and could surely not be resolved within the limits of an editorial, or even a single paper for that matter. However, I do believe it necessary to make some comments in order to highlight the issues and maybe propose outlines of possible answers.

The traditional (and commonly accepted) idea of development has a very Enlightenment twist to it. One may articulate it in the following manner. The fundamental idea of this type of development is the notion of progress that is one of the cornerstone values and assumptions of the Modernity movement [6]. In this paradigm the institutions of modern society must create the intellectual and physical artifacts for humankind to conquer Nature and in so doing control its own destiny. Development, according to the modernity view, is progress in degrees and levels of control. The modern, developed, person must be delivered from a contingent and haphazard existence into progressive modes of freedom, through progressive control. They, and society at large, must be the masters of their own destinies. Science and technology must provide the tools (material or conceptual artifacts) for control. Progress, and development as such, is defined by the variety of tools and tool application skills that an individual or a society has at its disposal to shape its own future. In this view then, information technology (and the associated skills to apply it) is seen as tools of development, as a way of increasing the variety to tools at the disposal of the less developed, tool impoverished society, in need of development. Development is for the modern developer synonymous with tool or technology consumption.

Information technology with its characteristics of relative low cost (due to large scale integration and economies of scale), flexibility (through software engineering methods) and ease of use (through sophisticated graphical user interfaces) is clearly an ideal host for the delivery of a wide variety of tools and technologies to a underdeveloped, tool impoverished, society. With the aid of IT a whole host of technological capabilities could be made available, for rapid socio-economic development, at a fraction of the cost of traditional means of delivery. Without too much thought one can provide many examples. For example, through computer assisted training, reading and writing skills can be taught reducing the demand for expensive human teachers. An expert system could be used for clinical diagnosis in the rural hospital reducing the need for expensive human medical experts. From this brief exposition it is clear why there are many who believe that IT, of all technologies, has an enormous potential to leapfrog the underdeveloped societies into the twenty first century.

What is the problem with this paradigm of development? I will briefly discuss three issues that come to mind. Firstly, technologically based progress will lead to the proliferation of instrumental reason [11–13]. Instrumental action is concerned with effect and is success-oriented. Its basis of validity is efficiency and effectiveness which are morally justified aims in modern society. In an instrumental society all things become objects to be manipulated in pursuit of effect. Instrumentality is at the heart of technology (technique) as seen in the definition of technology by Jacques Ellul [4]:

Technique is the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity.

Instrumental action through technology is clearly by definition reductionist since the pursuit of efficiency and effectiveness are always specific, not general. The forces shaping the modern technological society assume that if technique is applied to every problem or domain then eventually the whole of society will become efficient. This is an illusion. It is well known from systems theory that the optimization of the parts does not necessarily lead to the optimization of the whole. What is efficient for the local (individual) is not necessarily efficient for the whole (society). The effects of sub optimization, such as environmental damage, pollution, poverty, crime, suicide, etc., that is so prevalent in modern society, bear testimony to this illusion.

Also, with technique it has become possible to achieve

SACJ/SART, No 15, 1995
For those who want to use information technology for a reductionistic and instrumental approach to technology. The cost of technology is not exposed to the public, and the benefits are often ignored as the price. Heidegger argued that technology will always ‘enframe’ [7]. Unluckily, the cost of technology is not exposed to the public, and the benefits are often ignored as the price. Heidegger argued that technology will always ‘enframe’ [7].

Some may argue that the proliferation of instrumental reason (embodied in technology) may not be desirable but it is inevitable. However, they would argue, there is the benefit that the technology does increase the choices available to the individual (or society) and such the cost of freedom of the individual or society. Hence the benefit of increased freedom outweighs the cost of instrumentality. This may be true, but the whole notion of increased freedom is based on a very doubtful syllogism which may be stated as follows:

- Technology increases choices
- Increased choices leads to more freedom
- Therefore increased technology implies more freedom

It is true that access to technology can increase the choices available to me. For example there are many more places that I could choose to visit if I have a car as opposed to being on foot. Thus the access to a car increases my freedom of movement. But, this is only true in that one dimension of analysis. In another dimension, to have the access to a car, I may have to forfeit my leisure time to work so that I can pay for the purchase and maintenance of the car and in so doing reduce my choice (and freedom) in how I want to spend my time. Similarly, a mobile phone provides me freedom to make a call where and when I choose but, it may also reduce my choices in another dimension as people may expect me to be contactable whenever or wherever I may be. Thus, the syllogism is only true in a one dimensional space of analysis.

Technology always has a price attached to it. This is why modern, technology saturated, societies are often the most existentially ‘repressive’ type of societies. More often than not one hears the modern plea to “get out” of the rat race, to get “away” for a break, to “escape” to some holiday destination. What is it that we must “get out” from, get “away” from or “escape” from? Heidegger correctly argued that technology will always ‘enframe’ [7]. Unfortunately the cost of technology is not exposed with the same vigour as the benefits. Mostly this price is ignored by a reductionistic and instrumental approach to technology. For those who want to use (information) technology for development this must surely be a major concern. What will the cost of the technology be for the society in which it will be introduced? Is the cost known or knowable? Do the recipient society agree with this cost and are they willing to pay it? Who will benefit and who will pay? These are ethical and moral issues that are mostly ignored by the Enlightenment paradigm of development.

Finally, there is the issue of technology transfer. I will agree that I may be overstating the case but, it seems to me that many technology based development projects are less about development and more about mere technology ‘dumping’. Technology dumping does not lead to development it leads, in fact, to an increase in ignorance as argued by Hobart [9]. The law of requisite variety states that a system can only control another if it has, for every state or condition that the system to be controlled can produce, a counter state or condition [3]. Thus, if one dumps technology on individuals or societies without providing the individual or society with the necessary knowledge, skills and infra-structure to deal with all the conditions that the technology can produce (such as breakdowns, error messages, menu options, buttons, input data, configurations, etc.), then the technology will control them and not the reverse. In such a situation the individual or societies will be placed in a situation of increased ignorance. In this manner developing societies, through reductionistic development, are increasingly been pushed into a world of increased ignorance and higher levels of dependence [2]. It seems, without sounding too dramatic, that ‘primitive’ societies are pushed by development through mass education systems into factories and innercity slums, into economic systems where they have the disadvantage and, in general, into a world they are wholly unprepared for. In such conditions they merely become objects of control since they do not have the required variety. This form of development alienates them from their traditional world that they know and understand. I am not suggesting that this is the conscious objective of many of those in the development field. I am merely suggesting that good intentions on a local level can, in fact, lead to big injustices in a more global sense. Also, it is clear that technology can not be haphazardly transferred. If it is transferred it must happen as a coherent whole and not as a part. This is what Amin refers to as delinking [1].

If one accepts that technology must be transferred in a holistic manner then the next issue comes into play, namely, the fact that technology is not value free. If we transfer a technology, particularly in this manner, then we also transfer a whole set of values with it (this is very clear in some globally integrated societies where there is a homogeneous “coke” and “hollywood” culture). These imported values may displace some of the local values. Are the recipient culture prepared to pay the price of this cultural imperialism? Are they aware of it? Or, is it only discovered after it is lost?

It is clear from the above discussion that the Enlightenment paradigm of development may create a whole lot of very difficult moral and ethical dilemmas for those involved. It also seems clear that a technology based de-
velopment intervention may have more 'costs' than the 'benefit' attached to it. It also seems to me that there is a need for a more holistic paradigm of development that is multi-dimensional in its efforts to develop [8]. A paradigm that is more than a mere converting of 'primitive' societies into modern societies. We in the field of information systems must not make the mistake to reductionistically 'drop' technology on individuals and societies. Due to the nature of our technology the urge may be big. We must, however, move with much caution and in a very transparent manner if we are to be seen as legitimate agents of development.

In this volume you will find a set of papers that, hopefully, is a move towards this type of holistic development? Decide for yourself.

References

Research Articles

Development, Self-determination and Information

C Avgerou S Madon

Department of Information Systems, London School of Economics, Houghton Street, London WC2A 2AE

Abstract

In this article we review the current debate on the impact of the increasing significance of information handling enabled by advances in information technology on socio-economic development, with particular emphasis on the self-determination of developing countries.

We explore the concept of development, and examine the ways development has been linked to the notion of self-determination. We examine how the trend towards economic internationalisation, which is based on new communication technologies, has been seen to affect the self-determination of developing countries.

Finally, we examine the challenges posed on organisations and governments of developing countries: on organisations which are making efforts to create new information systems, and on governments trying to participate in a global politico-economic system while safeguarding their cultural identity and their right to self-determination.

Keywords: Development, Self-determination, Information
Computing Review Categories: J.1, J.4, K.4, K.4.m

1 Introduction

In recent years, much has been written and said about information and information technology being vital resources in promoting socio-economic development for third world countries [61, 42]. It is often pointed out that lack of data and limitations of the capacity to apply advanced scientific models hinder development planning efforts, inefficiencies of information processing in government and industries prohibit economic growth, inadequate capacity to participate in world-wide communication systems implies isolation and backwardness. Consequently, increasingly more attention is given to information and ‘knowledge’ intensive techniques for alleviating social problems and raising the economic value of production processes. Declining capital cost and rapid improvements in hardware and software technology make possible the diffusion of information technology in even the poorest countries [31].

However, there is also considerable scepticism regarding the efforts of developing countries to adopt information intensive procedures and to exploit the developmental potential of information technology. Indicatively, Lind [32] questions whether the promise of benefits from information technology is nothing but a myth and argues that unrealistic expectations have led to the failure of information technology applications. Hill [25] makes the point that the introduction of new information technologies drawn from modern industrialised society implies cultural values that are fundamentally at variance with those of traditional societies.

In this article we examine how the current emphasis on information activities affect the self-determination of developing countries and their people. First we review the general theoretical arguments regarding information handling activities and development, which drive the dominant trends towards information intensive societies, the ‘informational mode of development’ [10]. Then we outline the conceptions of development which are relevant to the poor countries of the world. We identify self-determination as a fundamental aspect of development and suggest two relevant levels for consideration: the level of nation states, and the level of individual citizens and their immediate communities, such as the village. We discuss how the informational mode of development affects the self-determination of developing nations and social groups within them, and what governments and organizations could do to avoid risks and to achieve potential benefits.

2 Theoretical perspectives on the significance of information and IT for development

The terms ‘information age’ and ‘information economy’ have been coined to convey the prevailing perception that nations tend to devote increasing proportions of their effort to information handling. Specifically, the term information age is used to express the contention that in business, policy making and public life in general, information has now acquired a role more prominent than ever before. There are efforts to measure the information intensity of a society by measuring the amount of information it circulates and processes [22]. Better known are the efforts to mea-
sure the information economy in terms of proportion of occupations concerned with the creation and handling of information [41, 47], or in terms of the contribution of the production of information goods and services to the national accounts of a country [49, 50, 47, 27, 14, 28].

The continuing growth of the measures of these indicators is hardly disputed. What is much more controversial is the explanation of these trends and their relation to development. The most influential view is that the trend of growing information activities observed in the industrialised economies in the post-war period, signifies the arrival of the post-industrial economic stage. The notion of transformation of the economy from an industrial to a service based post-industrial economy has been described by Daniel Bell [6] and other writers but rests upon a much older model of linear economic change known as the Fisher/Klark thesis. This theory views economic growth as a succession of growth and decline of the three economic sectors: primary, consisting from agriculture, forestry, and fishing; secondary, consisting from manufacturing, construction and utilities; and tertiary, which consists of services. The argument is that, as economies grow, rising productivity levels, made possible by technological advances, allow workers to pass to the next sector and, as national incomes rise, the increase in demand generated is channelled first into the secondary sector and then into the tertiary sector.

Daniel Bell’s model expresses a similar linear succession by referring to pre-industrial, industrial and post-industrial phases. In the post-industrial economies, human and information services, such as health, education, recreational, research and development, hold a prevailing position. Bell considers theoretical knowledge to drive innovation and change and to give rise to new social relationships and new structures. He calls theoretical knowledge the 'axial structure' of post-industrial societies. Knowledge and information are strategic resources for the transformation of the economy and professional and technical groups are considered to be catalysts of change. The post-industrial economy, it is argued, is a new kind of economic system which does not preserve the economic structures of the industrial economies. The driving forces seize to be ideological; they are knowledge and logical reasoning.

Many writers in the seventies and the eighties have disputed the logic of the post-industrial economy thesis. For example, the argument about growing demand for services has been challenged by Gershuny [20], who puts forward the view that the trend is towards a ‘self-servicing’ economy which substitutes goods for services. People tend to use new products to service themselves, as for example, the use of television programmes or videos to deliver material for higher education, instead of the labour intensive conventional teaching methods. Gershuny explains the increase in service occupations in terms of changes in the technological and organizational structure of production within manufacturing industries. Thus, the increase in service occupations such as managers and technicians became necessary in order to increase the efficiency of the production of goods. The growth of service industries is explained as an organizational phenomenon, with manufacturing industries subcontracting services to specialised service companies.

Central in this thesis is the role of technological and organizational change [20]. The connection between technical innovation, economic development and social and institutional change has been studied extensively [59, 19, 21] establishing relations between the pervasiveness of certain types of technologies with periods of radical change in the structure of the economy. Technologies are characterised as 'pervasive' if their applications affect almost all sectors of the economy. More specifically, a technology has pervasive economic effects and employment implications if it generates a wide range of new products and services, reduces the costs and improves the performance of the processes, services and products of many sectors of the economy, it gains widespread social acceptance (although new regulatory frameworks are needed), and generates strong industrial interest as means for profitability and competitive advantage [48]. Indeed, information technology is singled out as being at the centre of the present wave of technological change in most industrialized countries. The interconnected innovations in integrated circuits, computer hardware, software and telecommunications affect dramatically the cost of storing, processing, communicating and disseminating information. Also, they lead to new industries producing a great range of new products and services.

Another line of critique of the post-industrial notion challenges the view of the emergence of a new economic system. According to Mandel [36], the growth of the service industries is driven by the search for profits. Shifts in employment follow shifts in investment in the service sector; the post-industrial era is viewed as the continuation of the capitalist system by further extending the technical division of labour. Morris-Suzuki [38] argues against both the theses of Bell and Mandel. She views the changes occurring in Japan, one of the most industrialised countries, as the transformation to a new form of capitalism, which she calls 'information capitalism'.

Theoretical arguments such as the above do not highlight only the differences of perception of the writers; by focusing on different aspects of the nature of the occurring socio-economic changes they contribute to the formulation of more elaborate theories. One recent attempt to understand the geography of socio-economic change draws from a great number of concepts and theoretical constructs from different writers (although without discussing their theoretical origins and bypassing relevant critical or controversial issues) to formulate an interesting set of hypotheses [10]: First, advances in IT and the emergence of information processing as the fundamental activity conditioning the effectiveness and productivity of the processes of production, distribution, consumption and management have led to a new mode of development, called ‘informational mode’ or ‘informationalism’. Second, the emergence of the informational mode has coincided with fundamental changes of the capitalist system in its efforts to overcome its structural
crisis. Third, informationalism and capitalism have converged in a process of techno-economic restructuring of the society. On the basis of this set of hypotheses Castells examines a variety of themes, such as the locational pattern of IT and IT user industries, the significance of the military use of IT, and the impact of IT on employment, capital-labour relations, the social and spatial restructuring of cities and regions, the internationalization of the economy.

3 Development and the notion of self-determination

While the debate on the nature of changes that characterise economic growth and social reforms in industrialised societies continues, efforts for the development of the poor countries of the world focus on different sets of issues. In the economic literature of the early post-Second World War period, the process of development was conceived of primarily in terms of the structure and growth of the national economy and the degree of development was most often measured in terms of national income [13]. It was assumed that less developed countries should aspire to achieve the type of society which existed in the developed world. In order to do this, it was believed that they would have to pass through a number of stages of economic growth similar to those which the countries of western Europe has experienced [53]. Emphasis was placed on stimulating the "take off" which would be needed to launch developing countries into this process of economic growth and much emphasis was placed on industrialisation and urbanisation in developing countries.

In the 1960s, however, this dominant view of development as economic growth and social reforms in industrialised societies continues, efforts for the development of the poor countries of the world focus on different sets of issues. In the economic literature of the early post-Second World War period, the process of development was conceived of primarily in terms of the structure and growth of the national economy and the degree of development was most often measured in terms of national income [13]. It was assumed that less developed countries should aspire to achieve the type of society which existed in the developed world. In order to do this, it was believed that they would have to pass through a number of stages of economic growth similar to those which the countries of western Europe has experienced [53]. Emphasis was placed on stimulating the "take off" which would be needed to launch developing countries into this process of economic growth and much emphasis was placed on industrialisation and urbanisation in developing countries.

In the 1960s, however, this dominant view of development as economic growth and social reforms in industrialised societies continues, efforts for the development of the poor countries of the world focus on different sets of issues. In the economic literature of the early post-Second World War period, the process of development was conceived of primarily in terms of the structure and growth of the national economy and the degree of development was most often measured in terms of national income [13]. It was assumed that less developed countries should aspire to achieve the type of society which existed in the developed world. In order to do this, it was believed that they would have to pass through a number of stages of economic growth similar to those which the countries of western Europe has experienced [53]. Emphasis was placed on stimulating the "take off" which would be needed to launch developing countries into this process of economic growth and much emphasis was placed on industrialisation and urbanisation in developing countries.

In summary, the main perception of development as economic growth has been challenged by alternative approaches which, in addition to economic growth, have given much emphasis on social and human aspects of development. Attention has been focused on the notion of dependency between citizens groups and between nations. The multinational increased their grip on the raw material and labour power of developing countries which resulted in increasing concentration of capital and the integration of production on a worldwide basis. Nevertheless, most developing countries envisaged that multinationals would be instrumental in introducing technology adapted for domestic use, creating employment, as well as providing know-how [12]. This expectation did not materialise but in few cases only. The multinationals, by giving emphasis to highly sophisticated and capital intensive production methods, neither provided new skills, nor the opportunity to adjust technology to local needs. Without the development of local capabilities, no long range benefits could be acquired and it became difficult for developing countries to bridge the wide technological gap between their nations and the developed world thereby underscoring the reality of economic dependence [33].

A major contributing factor to dependency was seen to be the overwhelming role of the powerful multinational corporations. The multinationals increased their grip on the raw material and labour power of developing countries which resulted in increasing concentration of capital and the integration of production on a worldwide basis. Nevertheless, most developing countries envisaged that multinationals would be instrumental in introducing technology adapted for domestic use, creating employment, as well as providing know-how [12]. This expectation did not materialise but in few cases only. The multinationals, by giving emphasis to highly sophisticated and capital intensive production methods, neither provided new skills, nor the opportunity to adjust technology to local needs. Without the development of local capabilities, no long range benefits could be acquired and it became difficult for developing countries to bridge the wide technological gap between their nations and the developed world thereby underscoring the reality of economic dependence [33].

In summary, the main perception of development as economic growth has been challenged by alternative approaches which, in addition to economic growth, have given much emphasis on social and human aspects of development. Attention has been focused on the notion of dependency between citizens groups and between nations as a fundamental aspect of underdevelopment. As governments and private companies of advanced industrial countries are able to extend more effectively and articulate their activities on a global scale, there is the growing prospect...
of many developing countries becoming more dependent on foreign economic and political interests. New information and communication technologies emerge as a major force presenting new opportunities but also bringing to the surface the critical issue of the self-determination of developing countries, both in terms of the ability of independent nation states to make decisions within the prevailing international power structure, and in terms of preserving the basic rights to human development of individuals within those countries.

4 Information related trends and the self-determination of developing countries

Concerns about the risk of loosing national sovereignty as a result of lagging behind other countries in utilizing effectively information and the emerging powerful information and communication technologies have been repeatedly expressed, even in industrialized countries [45, 43]. Military strength, political independence, cultural identity, as well as economic competitiveness, depend on a country’s capacity to generate, acquire, handle and disseminate information. Not surprisingly, the emerging powerful information and communication technologies, which are instrumental in such activities, have become a significant aspect of government policy [15, 60].

While industrialised countries are making great efforts for the development and production of such technologies, for the establishment of rich information infrastructures, and for the promotion of information intensive activities, developing countries are faced with unprecedented opportunities, but also new threats. The impressive economic success of newly industrialised countries such as Singapore, Korea, Hong-Kong and Taiwan, are often quoted to indicate the developmental opportunities of information intensive industries. Since the 1970’s large developing countries such as India and Brazil have worked out policies to safeguard and promote indigenous information technology industries, to develop their own information resources and to encourage the utilization of information in order to serve national development goals [65]. Several studies indicate that information technology is increasingly widely diffused in almost all regions of the world [31, 29], promising solution to chronic pressing problems - such as bureaucratic inefficiency -, providing the means to participate in industries with universal standards - such as airlines or banking -, or even providing new opportunities - such as monitoring geological and climatic changes by remote sensing technologies. The scope of this section is to examine some of the major issues related with the intensification of information related activities and the self-determination of developing countries.

Media communication

Mass media and telecommunications have undoubtedly great developmental potential. Many countries have used mass media for emancipatory, educational and nation building purposes. A well known example is the project SITE, which used satellites to reach and educate remote communities in India [37]. Indonesia has also used satellite communications, since the early 1980’s, to reach its many islands and to create a common national identity [30]. However, the international scene is characterised by severe disparities in information and information technology. This problem started being discussed in the mid-1970s. The debates on a ‘New International Information Order’ culminated in the MacBride Commission report [34]. The report heavily criticised the contemporary network of global telematics that reinforces dependency relationships [26]. A call was made for a democratic restructuring of global information opportunities. It was suggested that industrialised countries and transnational companies should help in the creation of self-determined communication institutions in developing countries, by exercising restraint in exploiting the nearly one-way flow of information, advertising, political propaganda, and mass media content. Perhaps the most important outcome of the New International Information Order was the increased recognition that a crucial dimension in international relations is the degree of influence on decision-making and consequent participation in information exchange.

However, after publication of the MacBride Commission report, little actually changed in the 1980s. International information services and communications beyond the control of developing countries perpetuated cultural hegemony because the values of the industrialised countries had greater opportunity for transmission. The inability of poor societies to produce quality programmes for filling up enormous airtime meant that national networks have no option but to buy cheap productions from salesmen.

Brazil is widely cited for the great progress it has made in developing telecommunications structure that has been helpful in maintaining its national and cultural integrity [16]. The evolution of cultural industries in Brazil, at least in the area of television, has been an important factor in limiting the influence of the multinationals. More recently, there have been pressures to decentralise and regionalise the media, especially television. It is hoped that with the strengthening of regional or local media, there will be an expansion of communications access to those sectors of the population that are still not reached by television. This decentralisation therefore is expected to have important cultural implications because it would enable the various regional identities to come to the surface and play a stronger role in the development of national culture. Despite these positive trends, however, Fadul and Straubhaar [16] argue that the Brazilian culture still continues to be threatened by pressure from industrialised countries, especially the United States.

The commodification of information

One of the most significant changes that has occurred in the recent decades is the emergence of a market for information services. The new industry of information services involves a chain of activities: the production and collection of
"raw data", the storing and organization of data in databases, the processing of available data to meet particular informational needs of clients, the provision of telecommunication network facilities to access required data. This chain of activities is usually composed by several actors: the 'raw data' provider, the database host, the information processing service provider, the telecommunication network operator. The most widely traded information is financial data, scientific abstracts, and bibliographic data [22, 46].

The availability of such information services provides an easy - albeit expensive - solution to the severe lack of information and information processing capacity that many developing countries face. Access to scientific databases, such as those on agriculture, can provide information which is lacking from the libraries of national universities, research institutes, and ministries undertaking development programmes. Although most poor countries lack the capacity to process data as required by development projects, they may have their data processed in international information services centres. Moreover, many developing countries can enter this new market as data providers. Data about their products, their resources, their culture have value as a tradable commodity.

However, each of these opportunities bears significant risks of dependency and unequal exchange. Access to scientific data centres of industrialised countries may provide a temporary solution for particular development programmes, but cannot be a substitute to an indigenous infrastructure for generating and utilising such data by local experts. Despite efforts by international agencies, such as the Unesco programmes UNISIST or PGI, the development of such an infrastructure has so far proved particularly problematic [4].

Also, even if a country has raw data to sell, the value added chain of the information industry is unfavourable to the data providers. The most profitable part of the chain is the storing and processing of data [22]. Yet, at present, the vast majority of countries are raw data suppliers, with the USA, and to a lesser extent Europe and Japan exclusive exporters of processed data [58]. As it is becoming cheaper in many cases for enterprises in developing countries to send their design problems, calculations, research and routine data abroad rather than to form local teams, developing countries risk to transfer key decision-making processes [7] outside their own decision making centres. The commodification of information appears to reinforce the unequal exchange that development theorists have long ago observed as a major problem hindering development.

Overall, lacking in adequate resources to fund the development of an indigenous information sector or to purchase information goods and services in the international market-place increases the vulnerability of developing countries regarding the management and control of their own resources. A developing country may have to face the prospect of buying information on the state of its own natural resources from a multinational company.

The diffusion of IT
Developing countries come to rely increasingly on technologies which are produced almost exclusively in industrialised countries. As Rada [51] wrote, electronics is becoming the heavy industry of the future and will be an essential sector in the development of 'knowledge-intensive' economies. However, most developing countries have no capacity to produce IT and very limited ability to maintain and upgrade locally the imported technology. For many years, international aid agencies have been the main providers of information technology for projects in developing countries. However, support from international agencies has tended to be sporadic and uncoordinated and has often created great problems in terms of compatibility and parts. Few international aid agencies have policies concerning the use of information technology in developing countries. Donor agencies treat computers and information technology as tools that support projects in other traditional aid-receiving sectors such as agriculture, energy, health and transport. They do not consider information technology as a new and important sector in itself requiring integrated rather than ad hoc support [42].

There is increasing concern that the role of international aid agencies as carriers of information and information handling resources for development will cause more dependency between developing and developed countries. Odedra notes that in the case of many African countries, equipment is brought into countries through aid agencies without the necessary imparting of knowledge of how to use, operate or maintain it. Hence, very little information technology transfer has actually taken place to date between the developed world and the African developing countries.

Information systems for development planning
There have been many efforts by governments of developing countries and international agencies to address the building of information resources such as document referencing systems, management information systems and statistical information services [24, 5]. Technical information emerged as a prime requirement for strengthening a developing country's economic and industrial base and science and technological document centres cropped up under international, especially Unesco, sponsorship [12]. Also, in recent years, a number of developing countries have attempted to create computer based information systems similar to those in operation in the institutions of industrialised countries to support the planning and implementation of development programmes. For example, in India, district planning is being introduced in the states with the National Informatics Centre placing microcomputers in each of the 439 districts [55]. In Kenya, the Resource Management for Rural Development Project is currently engaged in the introduction of microcomputers in the districts [40]. In South-East Asia, Malaysia is extending its Integrated Development Project Information System (SETIA) to the districts [23].

With all these initiatives, however, the main objective of improving the planning and monitoring systems of SACJ/SART, No 15, 1995
rural development remains unfulfilled [56]. Averou [5] notes that current efforts to create information systems infrastructure for development planning assume a particular rationality of the decision making process using numerical analysis and quantitative data which is at odds with the dynamics of organisations in developing countries. They ignore the significance of political influences which stem from their social and cultural environment. However, the extent to which development planning relies on political and informal channels of information and decision-making practices has implications for the kind of information and information processing required for development planning. In Madon’s [35] research on the impact of the Computerised Rural Information Systems Project (CRISP) in India, the findings revealed that the CRISP system design has been based on a rational model of planning perceived by the central government which was at variance with the reality of informal decision-making that prevailed at the district level. The system was designed and developed with inadequate understanding of the functioning, dynamics and causes of inefficiencies in the bureaucracy. As a result, in many occasions the reinforced, rather than alleviated, bureaucratic inefficiencies.

Waema and Walsham [63] make also he point that such applications predispose those who use it to the acceptance of values, attitudes and norms of the society in which they originate. For example, the principles observed in the rational model of planning are based on reasoned decision-making and logic. In other cultures, the basis of decision-making is more judgemental, based on intuition[17].

More recently, there has been growing recognition amongst planners that while information and communication is a factor in development, the causes of underdevelopment are mostly structural. Madon’s [35] findings reveal that information technology may be a vehicle for promoting structural change within the administration. National and state governments began to encourage greater local communication and information sharing as part of a larger policy of investment in rural areas and local autonomy in contrast to earlier models of control from the centre and fascination with hi-tech tools.

5 Information developments and the self-determination of the poor

In addition to deepening dependency linkages between countries, recent trends of information development affect also the self-determination capacity of the unprivileged poor communities within developing countries. While a great deal has been written about using the potential of information technology for spreading the benefits of socio-economic development to weaker sections of the population in developing countries [64], in practice such applications are rare. On the contrary, a standard feature of societies in developing countries has been an elitisation of information with concentration of schools, libraries and technology in relatively few and mostly urban centres. In this section we examine briefly how the current information developments affect the human development in poor countries.

Most information systems applications for development leave the masses of individuals in rural areas uninvolved in the process of socio-economic development. The case of the CRISP project in India, mentioned above, demonstrates how the formal information system which is intended to serve the needs to the poor results in cutting off the beneficiaries, and their immediate village communities from the decision making process of the development programme. CRISP was based on a model of a desirable - to the originators of the scheme - democratic decision making, whereby a village community decides by democratic procedures which of its members are in most need to receive credit assistance from the rural development programme. This idea however ignored some deeply rooted traditions such as decision making by authority rather than through participation of all. It ignored also differences of perception and priorities of ‘needs’. The attempt to impose a ‘fair’ and effective decision making process resulted in the complete alienation of the beneficiaries from the information system. Contrary to what the logic of the designed information system assumes, decisions at this local level follow the traditional values of the community, and information supplied the district administration as input to CRISP is largely unreliable. As a result, the task that the system was built to perform, namely the monitoring of the development of the poorest within the rural communities, is based on arbitrary information.

The effort to develop an overall national capacity for effective information handling tends to have a discriminatory effect, favouring the most prosperous population of urban areas and those with a western type education background, against the poor and the traditional communities [1]. Scarce financial and technical resources lead to a concentration of training efforts in urban centres, creating a further distinction between an elite capable to make a living in an information intensive society and ‘backward communities’ who are increasingly marginalised from the centres of power.

Discrimination between communities in the same country is not a new phenomenon. Previous industrialization efforts have had similar effects and led to the movement of ‘appropriate technology’. The current efforts to build the skills and the infrastructure of a ‘post-industrial society’, do not raise the same degree of opposition because they do not have the immediately obvious devastating to the fabric of the community effects, such as mass exodus from rural communities to the cities or environmental destruction. They have, nevertheless, subtle but far reaching effects on the rationality and cultural values [39] of traditional communities and can aggravate the conflict between ‘modern’ and ‘traditional’ which is already discernible among the communities of many developing countries.

Some attempts have been made by governments in developing countries to popularise informatics culture into the lifestyles of the common public. For example, the project GISTNIC (General Information Service Terminal)
in India was introduced in 1991 by the National Informatics Centre to provide online information to the public. GISTNIC is currently available throughout the country in booths located at public places both in urban and rural areas [44].

There are few endeavours to promote local projects aiming at overcoming cultural biases inherent in imported technology and to develop information resources that meet the needs of users. Notable examples are the adaptation of portable microcomputers to villages where it reaches relatively small audiences [12] and Forster's [18] primary health sector data collection and expert system for community health workers.

6 Conclusions

This chapter has explored some of the issues facing developing countries which are brought about by the increasing significance attributed to information. The concurancy of threats and opportunities represents a policy dilemma which developing countries have to face in preserving their right to self-determination. The fundamental difficulty for developing countries is that they try to participate in the international system, which tends to impose imperatives on information handling models for decision-making, while preserving their rights and capacity for their self-determination. In addition, large numbers of individuals and communities within these countries tend to be further marginalised as their traditional life pattern is considered inadequate to cope with the demands of the emerging information intensive and technologically demanding post-industrial society, and they have little means to develop the new skills required.

So far little effort has been made to study what information processes are required and are feasible to be developed in developing countries. Our current knowledge and dominant practices regarding the handling of information is the result of research mainly in North America, North Europe, Japan, and Australia. Although there is little evidence that this knowledge is applicable to the conditions of the rest of the world, particularly those of Eastern European countries, South European countries and third world countries, it is applied unquestionably as a recipe for economic success. This situation puts further obstacles to development, hinders the exploitation of the developmental potential of information technologies and promotes dependence rather than inter-dependence among nations. Characteristically, in the literature of information systems the term 'globalization' has acquired the meaning of networking the globe to serve the interests of multinational corporations. Even if one has faith in the benevolent nature of such economic institutions and the trickle down effect their success may have for the poor nations within which they do business, a vital aspect of development, that of self-determination is neglected. At present, internationalization trends enabled by new information technologies are based on the domination of a single culture, a single system for valuing information, and a single rationality for decision making.

In order to preserve their right and capacity for self-determination, developing countries have to address themselves to their own informational needs and to develop their own information order. There have been several initiatives to break the Western monopoly of the knowledge industry by encouraging regional projects involving developing countries with much in common. For example, in terms of database access, Saracenic et al [57] reported that a large percentage of scientific research relevant to developing countries comes from other developing countries, although such data formed a small part of sources in western-produced databases. In this connection, the advent of the South Asian Association for Regional Cooperation (SAARC) and other regional policy bodies may form the backbone for future developing countries' initiatives in information technology. Many of the African countries have also recently been participating in regional cooperation ventures for the development of broadcasting and communications infrastructure [33]. In order to strengthen efforts to apply information technology to the problems and situations in developing countries, Aksoy and Goddard [1] called for developing countries to broaden the scope of their information policy framework to incorporate not only issues concerning the technology itself, but also issues concerning uses of the information and alternative ways of delivering information services.

Finally, international agencies should reconsider their policy of unquestioned promotion of information processing according to models applied in industrialised countries. Informational development is of crucial significance in the era of ‘information economies’ and they should begin to support research and development projects intended to understand and support the information needs in developing

References

Notes for Contributors

The prime purpose of the journal is to publish original research papers in the fields of Computer Science and Information Systems, as well as shorter technical research notes. However, non-refereed review and exploratory articles of interest to the journal’s readers will be considered for publication under sections marked as Communications or Viewpoints. While English is the preferred language of the journal, papers in Afrikaans will also be accepted. Typed manuscripts for review should be submitted in triplicate to the editor.

Form of Manuscript

Manuscripts for review should be prepared according to the following guidelines:

• Use wide margins and 1½ or double spacing.
• The first page should include:
  - title (as brief as possible);
  - author’s initials and surname;
  - author’s affiliation and address;
  - an abstract of less than 200 words;
  - an appropriate keyword list;
  - a list of relevant Computing Review Categories.
• Tables and figures should be numbered and titled.
• References should be listed at the end of the text in 'alphabetic order of the (first) author’s surname, and should be cited in the text in square brackets [1-3]. References should take the form shown at the end of these notes.

Manuscripts accepted for publication should comply with the above guidelines (except for the spacing requirements), and may be provided in one of the following formats (listed in order of preference):

1. As (a) \LaTeX\ file(s), either on a diskette, or via e-mail/ftp - a \LaTeX\ style file is available from the production editor;
2. As an ASCII file accompanied by a hard-copy showing formatting intentions:
   - Tables and figures should be original line drawings/printouts, (not photocopies) on separate sheets of paper, clearly numbered on the back and ready for cutting and pasting. Figure titles should appear in the text where the figures are to be placed.
   - Mathematical and other symbols may be either handwritten or typed. Greek letters and unusual symbols should be identified in the margin, if they are not clear in the text.
   Contact the production editor for markup instructions.
3. In exceptional cases camera-ready format may be accepted – a detailed page specification is available from the production editor;

Authors of accepted papers will be required to sign a copyright transfer form.

Charges

Charges per final page will be levied on papers accepted for publication. They will be scaled to reflect typesetting, reproduction and other costs. Currently, the minimum rate is R30-00 per final page for \LaTeX\ or camera-ready contributions that require no further attention. The maximum is R120-00 per page (charges include VAT).

These charges may be waived upon request of the author and at the discretion of the editor.

Proofs

Proofs of accepted papers in category 2 above may be sent to the author to ensure that typesetting is correct, and not for addition of new material or major amendments to the text. Corrected proofs should be returned to the production editor within three days.

Note that, in the case of camera-ready submissions, it is the author’s responsibility to ensure that such submissions are error-free. Camera-ready submissions will only be accepted if they are in strict accordance with the detailed guidelines.

Letters and Communications

Letters to the editor are welcomed. They should be signed, and should be limited to less than about 500 words.

Announcements and communications of interest to the readership will be considered for publication in a separate section of the journal. Communications may also reflect minor research contributions. However, such communications will not be refereed and will not be deemed as fully-fledged publications for state subsidy purposes.

Book reviews

Contributions in this regard will be welcomed. Views and opinions expressed in such reviews should, however, be regarded as those of the reviewer alone.

Advertisement

Placement of advertisements at R1000-00 per full page per issue and R500-00 per half page per issue will be considered. These charges exclude specialized production costs which will be borne by the advertiser. Enquiries should be directed to the editor.

References

Contents

EDITORIAL

IT and Socio-Economic Development?
L Introna ............................................. 1

SPECIAL CONTRIBUTIONS: IT and Development

Development, Self-determination and Information
C Avgerou and S Madon ............................... 4

Information Technology in a Developing Economy
TD Crossman, P Fortmann, V Hencke and D Murray ............. 13

Who Will Implement Information Technology for Development?
M Korpela ............................................. 20

Computer-supported Cooperative Education to Support Development in South Africa
M Grobler ............................................. 26

A Pluralistic Approach to Systems Development
LSL Lai ............................................... 36

Lessons from Singapore And Zimbabwe: A Model for Emerging Countries to Achieve Quality Economic Growth
RE Yellen and CC Sanford ............................ 45