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Editorial

IT and Socio-Economic Development?

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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 Elull [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

ends without understanding the means or the relationship between the ends, the means and their context. This understanding is only in the head of the designer of the technique. Thus, holistic or hermeneutic understanding [10, 5] is substituted for technique. The context of creation is substituted with the context of application. This is the advantage of technique. Even if the context is not understood, the technique will still produce something. Technique is designed to create ends if applied. It does not require the applicator to understand 'why', it only requires him or her to know 'how'. This is a very powerful incentive in a society where results have become the norm. Thus, the developer must move with the utmost prudence and not merely mindlessly populate a developing community with technology, and the subsequent proliferation of instrumental reason. Especially when it is evident from modern societies of excess technology what ecological damage (and I am using this term in a very general sense) technology could bring in the long run.

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 as such the 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 being 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.

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Information Technology in a Developing Economy*

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Abstract

There is considerable debate about the value of information technology (IT) in developing economies. Some argue optimistically that without IT, developing economies will not grow. Others, somewhat pessimistically, warn that IT can play a negative role in developing countries and prevent economic growth. This paper attempts to identify a realistic value of IT (somewhere between the extremes of optimism and pessimism). Rather than refer to developing economies generally, the focus here is on the economy of the New South Africa. The paper ends with a call to the IT industry to provide a platform for the realistic use of IT in our economy.

Keywords: *Developing economies, social responsibilities, value of IT, unemployment*

Computing Review Categories: *K.4.0; K.4.2; K.4.m; K.7.m*

1 Introduction

‘... there is great potential in the utilisation of Information Technology (IT) to promote development, and alleviate some of the problems in developing countries.’ [8]

Naturally enough, there is significant interest in the role of IT in the economies of developing countries [3, 1, 16, 10, 17]. Some views about its value are decidedly pessimistic. IT’s usefulness is questioned [14] and its impact on the economies of developing countries is regarded as predominantly negative [17, 24, 19]). On the other hand, others contend that the influence of IT on all economies is so positive that developing economies cannot afford to ignore its value [17, 14].

This paper revisits the problem. It offers an analysis of both the positive and negative roles of IT in developing countries. Based on this analysis, it attempts to present a realistic view of the value of IT to developing economies.

The work done for this paper was part of a group research programme for fourth year students at the University of Natal, Durban. During the initial stages of the programme it became clear that we needed to establish clear definitions of the key terms associated with the topic.

2 Definitions

The two terms which have most influence on the topic are ‘IT’ and ‘developing economy’. The definitions of these terms determine the context of the observations made, and the conclusions drawn from the arguments.

*This paper was prepared during 1994 as part of the Human Issues in Computing topic of the Business Information Systems Honours Course at the University of Natal, Durban. The ideas expressed here were presented at the UUASA Conference, Johannesburg, June 1994.

Information Technology (IT)

This term is used in a number of ways in the literature (and perhaps even more ways in general vocabulary). For this paper we have borrowed a definition from the management literature. Here IT means:

‘Any device or system that helps individuals or organizations assemble, store, transmit, process, and retrieve data or information.’ [11].

It is clear from this definition that IT refers not just to computers, but also to allied fields such as communication (including telephone, video and radio) and to office equipment (such as word processors, copiers, and fax machines). The traditional application of computers to words and numbers, therefore, must not constrain the scope of the definition. IT also applies to fields that deal with images (engineering, graphics, fashion and film) and sound (music and speech). This wide definition of the term has support in the IT literature, e.g. [9, 8].

Developing Economy

Perhaps because we are not part of the discipline of economics, we found it surprising that there is not a widely accepted definition of a ‘developing economy’. We were expecting to find a check-list that would enable us to identify unmistakably its characteristics. Economists make it clear that the situation is not as simplistic as that. Typical of the stand they take is that of Johnston and Sasson. They provide some indication of the characteristics of a developing economy (e.g. a small range of export products, a minority enjoying the benefits of growth, and the lack of ability for the country to implement a rapid process of industrialisation), but add the rider that ‘this should be seen not as a strict classification so much as an indication of the most characteristic conditions’ [13].

We did find a list of characteristics which was useful in defining what we were meaning by a developing economy (although it is not taken from the economics literature). We present this as a working definition for this paper. Here, a

developing economy is one in which there is:

- Little export diversification
- Lack of national economic independence
- Increased economic subordination
- Wage differentiation
- Widespread poverty
- Widespread unemployment
- Population demographics (mostly young people) [18].

These characteristics identify the environment in which the value of IT will be assessed in this paper.

3 What type of economy does South Africa have?

Most of the listed characteristics of a developing economy can be identified in our own economy. So rather than attempt to assess the value of IT in some developing economy of some country somewhere (which may not even exist), we felt the question could be made more direct. We decided to focus specifically on the value of IT – in the economy of our country – at this time.

4 Views on The Value of IT

We recognize that multiple points of view are held on the value of IT. In fact we found a cacophony of voices on the subject [14]. Each point of view paints a different portrait of the possibilities and dangers of IT in a developing economy. It is our opinion that each of these views has some face validity. We will, therefore, present three perspectives. The first we call the optimistic view, the second is the pessimistic view and the third we name the realistic view.

5 The Optimistic View

Typical of the people who are optimistic about the value of technology to our developing economy are the organizers of the Powershift Conference (held in Johannesburg in mid-1994). Delegates were examining how the technological revolution is reshaping the distribution of power and wealth in the world. Alvin Toffler was invited to deliver the keynote address on how technology will redefine ways that organizations will do business from now until beyond the year 2000. Obviously the organizers thought that South African needs to know this.

Three reasons often given to support this argument are that IT contributes to efficiency/effectiveness of business, information is a company asset, and IT brings more employment (and therefore more wealth) to a country. Each of these will be examined.

Efficiency/Effectiveness

Claims about IT's positive influence on business processes are well documented. Typical of these benefits is the list taught to first year university students. This list includes:

- Competitive advantage
- Fewer errors/greater accuracy
- Improved communications
- More efficiency
- Reduced costs
- More productivity
- Superior decision making [21].

Myers supports this view. He argues that the automation introduced by IT is a managerial strategy to replace unreliable and finicky 'human machines' with more reliable, more productive, and less self-interested mechanical or electronic machines [14]. While this may be an extreme view, the point made is that IT increases the efficient and effective use of business resources and this, in turn, increases market-share, productivity and profits.

The Value of Information

We like to remind people that we are involved in an important industry. We enjoy quotations such as:

'Without material nothing exists, without energy nothing happens, without information nothing makes sense' (Oettinger, quoted by [13]).

The value of information has rightly become one of our favourite themes. We strongly support the suggestions of writers like Capron who argue that, while it used to be taught that economics is built on the tripod of land, labour and capital, it is now legitimate to include 'information' as one of the primary economic resources [4]. Remenyi takes a stronger stand. He quotes Drucker to support his claim that international economic theory based on land, labour and capital is obsolete, and that knowledge (that is basically acquired through information) is becoming the one critical factor of production [20].

If developing economies are to improve (ours included), they need to have access in the same time frame to the same markets and the same information as is available to more developed countries. The point made by the optimists is that such access is only achievable through IT [17]. For this reason alone, the optimists argue, IT is of value to the economy of the new South Africa.

More Employment/Wealth

Employment and IT is a typical controversial issue (see below). While we need to be mindful of possible increased unemployment caused by increased use of IT, there are those who argue (e.g. [19]) that the creation of less employment and output in the present, will lead to more employment and output in the future. Capital intensive techniques generate a high output per worker. For a given wage rate, therefore, these techniques generate a higher surplus. If this surplus is reinvested over time, and reinvested in technology of different capital intensity, it will create more jobs in the future [19].

Put another way, prohibiting the introduction of productivity-raising technology will make it impossible to finance the higher standard of living wanted in South Africa. In fact, Eugene Nyati is quoted as saying:

'The short-term view (is) that introducing technology means getting rid of human beings technology means more efficient resource utilization we (in South Africa) dare not remain too far behind.' [23]

6 The Pessimistic View

The advantages of using IT in a developing economy identified above all belong to one point of view. This view suggests that IT is making a meaningful contribution to the economy of our country. But there is another point of view. This other point of view can be illustrated by concentrating just on the computer industry. It is a pessimistic point of view, often driven by the probing question:

'What have computers done to or for people who interact with them, or for activities that depend on them?' [14].

Consequences of IT are not just technical

Only the most ardent technical determinist would claim that the consequences of IT-use depend exclusively on the characteristics of the technology adopted [14]. It is argued that computer-based systems increase the influence of those who have access to their power, and can organize the data stored on the computer to their advantage [12, 14]. This is why Laudon views new computer systems as political instruments that are selected to fit the political contours of existing organizations. His study casts doubt on the easy assumption that computing is only a workplace-transforming technology [14]. He argues that computer use is often designed to fit the stresses and strains perceived by the business élites. It is these élites who control decisions regarding the use of computers and can therefore ensure that the technology is used to further enhance their position.

This point forces us to recognise that IT, like all technology, has inherent and identifiable social, political, and environmental consequences (e.g. think of TV, the internal combustion engine and nuclear power [12, 15, 6]). It is, therefore, no surprise that Boland asks whether designing an information system (IS) can ever be an amoral and purely technical act [2]. He concluded that designing an IS must have moral implications because it puts one party (the systems designer) in the position of imposing an order on the world of another (the user). This forces the designers of an IS to face the ethical responsibility of analysing critically the consequences of using the technology [12, 2].

Perhaps this is why recently published texts on IT, even at the introductory level, often include sections on social and ethical issues of computing [21]. In research done in the South African context, Clarke identified the extent to which these issues are taught in South African universities. He found that our performance in this regard is inadequate, and he strongly recommended that all members of our discipline should be acquainted with the social and ethical implications of using IT in our developing economy [5].

Technologies not transferable

From the points made in the previous section it can be understood why people argued that extreme care must be used by all the parties involved in the transfer of technology from one environment (or country) to another. This act is not the simple transfer of a system or equipment. A number of points which support this caution are identified below.

Income/Labour

When IT has been developed for use in industrialized countries, those (developed) economies typically have high consumer incomes, a relative shortage of labour, and a large service sector [17]. Under such conditions the use of the technology is not only convenient, it becomes necessary. Usually these conditions do not exist in a developing economy [18].

Capital/Costs

Usually technologies are developed in countries whose economies are capital intensive, whereas developing economies tend to be more labour intensive [18]. In a developing economy, the abundant supply of cheap human resources results in the relative cost of technology being too expensive. This point is well illustrated by an example from Zambia. A microcomputer in a developed country may cost one month's wages for a programmer, but the same machine in Zambia would cost the equivalent of six years' wages [17].

Environment

Certain prerequisites, (such as a reliable power supply, a well-functioning datacommunications network, foreign currency and computer literate personnel), are necessary for successful use of IT [17, 5]. We may feel that in South Africa that, at least in this area, we will cope with the transfer of IT into our economy. There is an effective infrastructure in place. However, at the University of Natal we still register students for our courses in Business Information Systems who have lived all their childhood in homes without electricity. We do not believe that this is unique to the KwaZulu/Natal region. So for some South Africans, the appropriate environment does not exist. Some opinions on the subject are revealing:

'We don't need state of the art technology we need tried and tested systems, we need reliability over performance, we need simplicity over complexity be ten years behind everyone else and you will succeed' [24].

'At present, the most pressing need in sub-Saharan Africa is not new systems, but rather the know-how to effectively use what is already there.' [17].

'Seek the transfer of know-how rather than the transfers of finished products.' [1] quoting Ngcaba.

'.... what Africa has experienced for the most part so far is not IT transfer but transplantation, the dumping of boxes without the necessary know-how.' [17].

Unemployment

Unemployment figures in South Africa are uncomfortably high. Evidence of this is too close to too many. The Business Day 25 April 1994 gave the official figure for unemployment here as 29%. Unfortunately that may not be the whole picture. Actual figures are difficult to establish because people who are without a job are not compelled to register as unemployed with the Department of Manpower [19].

Job Elimination

Through the efficiencies of automation, the consequences of implementing large-scale IT systems are often the spread of dehumanizing jobs in automated workplaces, and the loss of jobs overall in the economy [14]. As we see it, this is a particular problem in our society.

The use of IT results in a threat to what used to be perceived as relatively secure clerical jobs. These are the jobs which are the prime target for retrenchment. This creates a core concern for the trade unions. Technical progress eliminates the types of jobs to which trade union members aspire [19]. This is a problem as it effectively blocks the hope for many of South Africa's unskilled and semi-skilled people of ever upgrading into safe office jobs [19].

It is clear that the 'information revolution' associated with the spread of IT is different from the mechanisation upheaval that radically changed industry about a century ago [19]. The industrial revolution eliminated unskilled jobs, while creating semi-skilled and clerical ones. The electronic revolution once again shakes out unskilled labour, but it will also remove clerical jobs. Many South Africans seem ill-prepared for this possibility [19].

Job Mobility

In developed countries, the usual solution to unemployment caused by IT is job mobility. Workers who have been displaced by the installation of IT have a chance to move to other jobs or upgrade their skills to cope with the change [16]. In developing economies job mobility is not part of the economic culture. Clerical or factory workers are likely to retain their original job for their entire lives [16].

Retraining

The use of IT demands a high degree of flexibility from the workers [19]. There is an associated issue here. Not only do IT systems, once installed and working, displace unskilled workers and create an immediate demand (directly and indirectly) for more skills or different skills, it may be even worse. What is required of staff may change every two or three years, as new IT is introduced [19]. Workers can only achieve this flexibility if they have the opportunity to develop new skills through retraining. Employees with inappropriate skills need to be given the opportunity to improve their skills. Because retraining is expensive, and because unemployment is high, organisations are tempted to hire new skills rather than retrain employees [19].

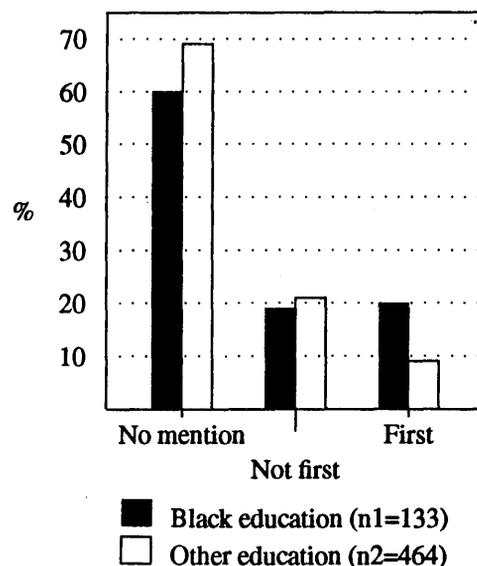


Figure 1. A comparison of the answers given to an examination question on the disadvantages of using computers in business

People Need Work

It is for the above reasons that people argue that any displacement caused by the installation of IT is likely to be detrimental to the social and political stability of a developing country [24]. Although IT might be used to solve a localized problem successfully, long-term negative social impacts are likely, because employees are displaced. Speaking from his experience in Zimbabwe, Watermeyer suggests that we in the New South Africa must forget about efficiency and increased productivity from IT. What, in his opinion, is needed in a developing economy is an increase in the demand for jobs to which people can aspire (e.g. the number of tellers in the banks) [24].

Some Student Opinions

In South Africa, where unemployment is more widespread in certain sections of society than others, it is more likely to be on the minds of some groups rather than others. We attempted to establish some empirical evidence to support this.

One of the questions set in the June 1994 examination paper for our 597 first year Business Information Systems students was:

'What are the disadvantages of using computers in the business environment?'

An analysis of the answers given by the students is provided in Tables 1 and 2 and shown diagrammatically in Figure 1.

When the answers of those who went through the Black education systems are compared with the answers of those from other education systems, the following points are noted:

1. A higher percentage of students who had been through the Black education system mentioned unemployment as a disadvantage of introducing computers into the business environment (39,9% compared with 30,6%).
2. A higher percentage of students who had been through

Table 1. Data from analysing the answers to the examination question on the disadvantages of using computers in business.

	Black education system	Other education system
Answered the question	133 (100%)	464 (100%)
Unemployment not mentioned	80 (60,1%)	322 (69,4%)
Unemployment mentioned – not first	26 (19,5%)	97 (20,9%)
Unemployment mentioned – first	27 (20,3%)	45 (9,7%)

the Black education system and who mentioned unemployment as a disadvantage of using computers, mentioned it as the first disadvantage in their answer (20,3% compared with 9,7%).

- Based on a Chi-square test, the differences between the opinions of the two groups of students is significant at the 5% level (see Table 2).

One interpretation of these data is that, among these first year students, those who have been through the Black education systems are more aware than students from other education systems, that the introduction of IT into the business environment may lead to further unemployment.

7 A Realistic View

Some of the views expressed by the optimists and the pessimists are extreme. We suspect a realistic view lies somewhere between them. What, then, is the realistic value of IT in a developing economy?

We suggest the answer should include the following ideas. We openly admit, however, that these ideas are based, not on objective facts but on conjecture, qualification and subjectivity.

Employment

The problem of increased unemployment in South Africa is so serious that solving this issue needs inordinate care. The simplistic answer of attempting to prohibit the advance of IT is a non-starter [19]. Anything which artificially holds down possible productivity increases for any length of time reduces our international competitiveness, and hence ultimately destroys more jobs than might temporarily be saved [19]. The following points provide some direction.

Retrain

Although retraining is expensive and not part of the economic culture of the typical developing economy, the advice of Nyati must be heard here:

‘There is no conflict between the technology and the human resources, other than in the most primitive sense The challenge is not to resent technology replacing labour, but to accept the inevitability of continually retraining our labour to keep abreast of technology Workers must accept that in order to keep abreast with the rest of the world, they will have to be retrained again and again. There is no substitute. It is the only way to survive.’ [23].

Therefore, while we acknowledge the difficulties associated with retraining identified preciously, retraining is imperative.

Accept Chances

A point made by Davis and Olson a decade ago is worth remembering. One of the advantages of using IT is that in some circumstances it reduces the skills level required of

Table 2. The Chi-Square Contingency Table. Expected values are place in round brackets ().

	Black education system	Other education system
Did not mention	80 (89,55)	322 (312,44)
Mentioned – not first	26 (27,40)	97 (95,59)
Mentioned – first	27 (16,04)	45 (55,95)
Totals	133	464
Calculated Chi-Square = 11,11		
Chi-square from tables = 5,99 (2 df, 5% level)		

This shows a significant difference between the two sets of answers.

clerical jobs (e.g. word processing and typing; accounting packages and book-keeping). This is also true of some jobs within our own industry (e.g. the impact of 4GLS on the programming activity) [7]. A developing economy can benefit from this drop in the demand for skills while it builds up its national skills base.

Lengthen Time Horizons

There is the need to lengthen the time horizons in assessing technology. If the time horizon is too short, the value of the IT investment may never be justified [22].

Service

We are often reminded (and it is unfortunate that it needs to be so) that we are involved in a service industry. The foremost aspect of IT is providing organizational service [21].

Watermeyer suggest that this is particularly important as we in South Africa 'go into the third world scenario' [24]. His concern is that the whole IT industry may take the users for a 'big expensive ride' [24]. He supports this claim with an personal anecdote. He bought a PC in Johannesburg but when he returned to Zimbabwe he found it was malfunctioning. In spite of a number of long distance telephone calls, the cause of the problem was not identified. He continued:

'... twelve months later, that machine still doesn't work. I have not been able on this trip (to Johannesburg) to find the group of people that I bought it from, they have moved three times in the year, they have changed their name, they have changed their ownership and everyone I spoke to has gone.' [24].

There are many claims that IT staff under-perform in terms of the critical service needs of responsiveness and reliability [20]. We need to correct any inadequate understanding of customer needs, and avoid an overemphasis on technological issues or the structuring our resources around technical skills. Ours is a service industry, and it will survive in a developing economy only by providing the level of service our users need.

Society Is Not Homogeneous

Because of the homogeneous nature of the suburbs in which we live, the people with whom we work, others who enjoy our pastimes and recreation, (in spite of what we see in the media), it is easy to forget the diverse nature of our society. This diversity is the result of social and structural differences, differences in subsistence mode, the use of technology, family structure and occupational mobility [3]. This diversity leads to distinct sectors within our economy.

It is unwise, therefore, to expect to find one best way to use IT in this diversity. Whatever is done is likely to be criticized [17] and may be inappropriate for some sector of the economy. Wise judgement is needed when deciding on the selective use of IT. No matter what can, or has been done in other countries, the extremes of optimism or pessimism are likely to be wrong. Instead of trying to 'catch up' with the industrialized world, we should instead use IT for selected and discriminated applications which

will bring substantive benefits to our economy and to our people [17].

A comment from Nyati again provides guidance. He says that there are areas where we can make a reasonable showing against international competitors (e.g. our capital and financial markets) [23]. In such areas IT will have a different value to our developing economy than in some of the more labour intensive, less internationally competitive sectors of the economy (e.g. manufacturing).

Accept Moral Responsibilities

By confirming, as has been done in this paper, that IT is not a discipline locked into a purely technical world, powerful reasons are provided to ensure that the moral and social consequences of using IT are considered [15]. It is no longer acceptable, if it ever was, that those who develop IT-based systems see their role as no more than attempting to implement neat and tidy technical solutions to a network of business needs [12]. Those who imagine this do the industry a disservice, and (in the long run), harm the economy [6].

8 Conclusion

We see that four basic issues form a foundation for the effective use of IT in the New South Africa.

Accept There Is No Theoretical Base

The pace and scope of new IT developments far outstrip our capability to carefully understand their social repercussions. In spite of this, only about two dozen scholars currently undertake serious, empirically grounded investigations of the social aspects of IT use [14]. To our knowledge, none of this work is being done in the South African context. This is a call to acknowledge that we do not know the impact on society of the systems we implement. While we search for a theoretical base, we must not pretend that we can forecast the social and political implications of implementing IT systems.

Need For Training

Ngcaba made it clear that he thought there was the need to develop a Technology Education Trust to establish proper IT training. In fact, he suggested that our industry should provide proper technical education to a wide spectrum of people, and provide this virtually free. This will enable more people to use computers effectively. He said we should see that such a move is in our own interests as an IT industry, (never mind in the intere country as a whole) [1].

Realistic/No Myths

Odedra is one of those who have made the point that IT development is all about people, their needs and their potential, and not about the sophistication of technology [17]. While we are waiting for the theory-base mentioned above, the challenge we face is to use our curiosity and inventiveness to mould IT's advances to the benefit of society.

An appropriate balance between a desire to improve and create wealth, and a fear of the unknown repercussions is needed [22]. Because the theory-base is still unknown, common myths (like 'the latest is the greatest') develop to compensate for this lack and to attempt to explain the value of the technology [14]. We need, however, to be realistic. Our industry cannot afford to be built on myths.

Accept Moral Responsibility

Finally, we suggest support for Introna [12], Clarke [5] and Boland [2] in their call for the developers of IT-based systems to accept the moral and ethical responsibilities which are an integral part of our discipline. Our goal is much more than developing technologically neat business systems. We are making a work environment for people, and we are accountable to them for this environment.

We suggest that keeping these conclusions in mind will result in IT being of value to our country at this time.

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