THE IMPACT OF INFORMATION TECHNOLOGY IN WORK PLACES: CONVERGENCES AND CONTRACTIONS

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Abstract: This paper attempts to discuss the impact of IT in work places generally and on employment and skills in particular. It provides, albeit briefly, an overview of the wind of change exacerbated by information technology across different countries, organizations and indeed cultures in the employment scene. This scenario is reflected through an array of optimist and pessimist view. The paper concludes by arguing that human choices invariably overshadow technological tides.

INTRODUCTION

The past two decades have witnessed rapidly changing market environments and increasing global competition. Governments and organizations throughout the world have been wrestling with the transformation process, trying to determine how best to reinvent themselves. This has elevated information technology (IT) as a driving force behind pervasive changes in public and private organizations.

Underlying this trend is the idea that in addition to human, capital and machinery, information is viewed as a strategic business tool. Many countries increasingly realize that they cannot maintain let alone improve their competitive edge in the world economy without information technology.

As work requirements become increasingly specialized in the information age, there is a growing realization by many organizations and governments that effective performance hinges on production and consumption of IT. (Forester, 1989). The rationale stems from the idea that IT can facilitate collection, processing and utilization of information in both operative and strategic planning. IT is increasingly applied in a host of applications ranging from simple tasks of record keeping through decision support and expert systems to computer-aided design (CAD) and computer - aided manufacturing (CAM). This is largely attributed to its potentially - capacity, flexibility, speed, low cost, accuracy and reliability (Long, 1987, Child, 1987; Forester, 1985).

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By and large, each wave of change invariably changes the number, nature, skill mix of human resource requirements and the location of jobs. This is exacerbated by the interplay of both internal and external environment in political, socio-economic, cultural and technological perspectives. This scenario transcends difference sectors, occupations and indeed jobs with varying magnitudes. (Walsham, 1989).

What is Information Technology (IT)?

Various writers have attempted to define IT. the OECD (1989:11) defines IT at length as:

> A new techno-economic paradigm affecting the management and control of production and service systems throughout the economy based on an interconnected set of radical innovations in electronic computers, software engineering, control systems, integrated circuits and telecommunications, which have drastically reduced the cost of storing, processing, communicating and disseminating information.

Child (1987:43) defines IT as:

> The technologies and applications which combine the data processing, and storage power of computers with the distance transmission capabilities.

From these definitions, we learn that IT focuses on gathering, storage, processing and transmission of computer-based information for efficient and effective business operations. It is not a single, monolithic technology but rather it reflects diversity in machines and processes.

Like other technologies, the impact of IT in work settings has been received with both skepticism and optimism. Along theoretical and empirical perspectives it has triggered a debate among researchers, academics and policy makers. For some (Toffler, 1990) IT is seen as a golden age. For others (Jenkin and Sherman, 1983); IT is nothing but a threat to employment opportunities. Still for others (Buchanan, 1985), IT is a matter of choice by policy makers.

THE IMPACT OF IT ON EMPLOYMENT

A literature survey of the impact of IT on employment is littered with a mixture of fear for job losses (pessimists) and excitement of job opportunities (optimists). Overall, IT is seen as inevitable tool for competitive advantage. The crux of the matter which is the focus of the employment debate is the impact of its adoption. In the ensuing section, let us examine the arguments from both sides.

Optimistic Views

In defense of IT, Long, (1987); and OECD, (1988), among others, dismiss earlier fears that IT would produce widespread unemployment. For example, the OECD (1988) report pointed out that the services sector had experienced substantial job gains despite the wide spread application of computers. It is argued that falls in employment would even be greater if IT was not adopted. (Gill and Krieger, 1992). Underlying this line of reasoning is the idea that a weaker competitor may be forced to reduce labour costs and hence job losses.

According to Forester (1989), the rate of adoption of IT has been much slower than expected. In this respect, it has had little impact on employment levels. For Discard (1989), IT created jobs in roughly the same proportion as those eliminated. He cites AT & T as a typical case in which the number of managers, clerical employees and semi-skilled workers dropped while the number of professional specialists increased by 17 per cent and the number of technicians by 50 per cent.

While acknowledging that labour may be displaced from certain sectors, Long, (1987) Marshal et al. (1984) argue that dislocations associated with new IT may be offset by an increased demand for labour in sectors where new goods and services are being produced. Moreover, IT may lead to higher productivity and incomes that may in turn have a multiplier effect on economic growth. This can be a stimulus for employment creation. They contend that IT holds out the prospects of more jobs in the long term. This is particularly so in occupations and industries associated with this technology. While subscribing to the fact that IT can eliminate some jobs, they note that new jobs would be created to offset these losses. Webster and Robins (1986:91) point out that job opportunities in the British hardware and software industries were enormous in the late 1970s. As testified by Jenkin (1983: 526):

> Total employment showed no overall fall during the 70s; a decade which witnessed the widespread diffusion of computers.

This endorses the findings of NEDC (1980) in the UK in which a shortage of at least twenty-five thousand (25,000) people and sixteen thousand (16,000) programmers were identified. After all, the argument goes, past job losses in agriculture and manufacturing due to technological displacement were offset by rapid employment growth in the service industries.

From 1987 to 1988, a large attitudinal survey in all twelve (12) Member States of the European Economic Community (EEC) was carried out by the European Foundation to determine the impact of IT on employment. According to Cressey and Williams (1990:4), the survey covered 2,807 European Companies. Employment effects were found to be as follows:

Recruitment	-	46%
No effects	-	30%
Job loss	-	7%
Transfer	-	30%

Although the above percentages exceed 100%, it may be attributed to the distribution of the respondent's choices across these variables. From these results, we find a positive portrayal of the employment flows in European enterprises. In this vein, IT did not necessitate any major changes on employment levels.

Pessimistic Views

Drawing parallels with the industrial revolution in which machines replaced people, they predict that IT would be rapid and wide spread with adverse effects on employment levels. While the post industrial era produced a wave of concern to massive unemployment, the information age painted a gloomy picture of job losses. (Jenkin and Sherman, 1983). Owing to its potential, and pervasive application in industry and offices, IT is viewed as a potential threat to many jobs. In particular, they observed that IT has a differential impact on employment (Bird, 1980). There are variations between sectors, occupations, jobs and indeed gender. Whereas lower level jobs like secretarial, typist and bank clerks have been adversely affected, managerial jobs are comparatively better. Since control is transferred from clerical jobs to computers, it is observed that their role in the work process is minimized. Let us explore empirical evidence on these scenarios.

In a Labor Ministry Survey of Japanese Companies which had introduced computerization, it was found that female employment declined by 4.3 per cent in 1981. (The Japanese Times, 30 August 1982). It is doubtful whether new employment opportunities which are likely to be capital intensive in nature made any difference in employment creation.

According to Webster and Robins (1986:120), the privatized British Telecom reduced sixteen thousands five hundred (16,500) staff - 7.5 per cent between 1982 and 1984.

A similar scenario is painted by the Institute of Manpower Studies (1985). In its report, it shows that between 1982 and 1983, one third of clerical and related occupations declined.

Braverman (1974) examines the role of middle management in collection, interpretation and distribution of information to upper levels of management. Since such functions can be efficiently handled by computers, he observes that the need for middle management is substantially reduced. Such fears are extended to include even IT specialists with the advent of increasing availability of specialist software packages.

Rowe (1990:38) reports job losses in a number of UK organizations. First, Bradford City Council. The introduction of nine processors led to a reduction in its staff in one sector from forty- four to twenty- two. Second, the British Standards Institution. It created a centralized specialist word processing department by installing ten (10) IBM word processors. As a result, the number of typists and secretaries had to be cut out by a third. Third, is Littlewoods, a mail order firm. The introduction of a computer in 1985 lead to six hundred (600) job losses.

Osterman (1991) examined the impact of the spread of mainframe computers on the employment of clerks and managers. His findings reveal that each 10 per cent increase in computer power was associated with a 1. 8 per cent decrease in the employment of clerks and a 1.2 per cent decrease in the employment of managers. This illustrates the differential impact of IT on employment.

Reflecting on the scenario in Tanzania, computers have triggered job losses in some sectors. The application of computers in functions hitherto the domain of people - bank teller, typists, personal secretaries, and secretarial works rationalized job losses. For

example- the Tanzania National Bank of Commerce (NBC) retrenched 3000 employees in January 1996 following computerization of some customer services. Following the introduction of integrated computer system by NBC (1997) it was expected that by the end of August 2000, 150 employees would have been retrenched (*The Guardian*, July 2000: 1). Indeed, this scenario is not restricted to NBC alone. There is an array of privatized organizations which have resorted to employee retrenchment with varying magnitudes(e.g. CRDB). Arguably, one cannot loose sight of the fact that these trends were exacerbated by the holistic view of reducing operational costs enshrined in IMF/World Bank conditionality.

THE IMPACT OF IT ON SKILLS

Like the employment debate, there are divergent views on the impact of IT on skills. Whereas the optimists contend IT would re-skill the workers, the pessimists retort that IT would de-skill workers. Let us once again explore the arguments advanced by both sides.

Re-skilling

As globalization forces gain momentum, developing countries like Tanzania cannot cope with intensifying competition without embracing IT. Slowly but increasingly, IT is being taught in few Schools and Institutions of Higher Learning (in training, research, and consultancy) activities. This scenario is reflected by the move away from traditional teaching style of chalk and board to computer presentation and online learning that is gaining currency. However, the demand exceeds the supply of requisite IT skills. This calls for concerted efforts to revitalize the Education Curriculum to enhance computer literacy. Indeed, Universities and Higher Education Institutions have to be proactive rather than reactive in furtherance of IT innovations. As Mutagahwa and Bakari (2000) observes, it is a pity that the University of Dar-es-Salaam is producing 30-40 computer engineering graduates annually. This is an alarming situation given the yawning gap of IT training opportunities at certificate and diploma levels. Increasingly, IT skills are becoming a prerequisite in many occupations and jobs in Tanzania. It clearly emerges that the need to enshrine IT knowledge and skills in our training programmes (both on and off the job) is not only necessary but also urgent.

According to Long (1987) and Rowe (1990), IT creates jobs with a high level of discretion since it relieves workers from boring and repetitive jobs. They can therefore, utilize their skills in strategic functions and get greater satisfaction and motivation. Similarly, Hirschhorn (1984) dismisses the idea that computers eliminate the need for human skills and judgement. He argues that like other technological tools, computers are prone to errors. This endorses constant operation through human skills. Most importantly, computers simplify the day-to-day monitoring and control functions of management and hence facilitate better managerial decision-making.

Webster and Robins (1986:129) observe that IT liberates the worker from alienation. They cite possible changes in the nature of jobs - From Bank Teller to Financial Advisor, Clerk to Mortage Broker, Typist to Personal Assistant. This is in line with Donkin's (1996:29) observation that IT is driving convergence between secretarial and managerial roles. He reports that a study of secretaries at Colnel University found that the spread of personal computers was changing the nature of secretarial job into that of an administrative or research assistant.

De- skilling

As put by Braverman (1974), the driving force behind IT in industry and offices is the search for greater profits and wider control of workers by management. As Rowe (1986) points out, whereas the advent of the typewriter left job

control in the hands of the typist, IT will de-skill secretarial and other forms of clerical work. Unlike earlier technologies that replace work by hand, IT replaces work by both hand and brain. In support of this Jenkin and Sherman (1979:85) observe that,

> Whilst other tools have been developed to replace muscle power, the computer and its adjuncts were the first to replace brain power.

This is in part due to its potential to perform a range of functions hitherto the domain of secretaries. A similar scenario is reflected in the work of Cooper and Cox (1985) with reference to job satisfaction. They found that job satisfaction was higher among traditional secretaries and copy typists compared to word processor operators. Much as it is acknowledged that IT can create jobs that require new skills, Gill (1985) argues that the skills made redundant by the new technology may be inappropriate for emerging new opportunities.

In a study of banking industry in Canada, Gill (1985) notes that computerization of banking activities changed the nature of the teller. The job description of the teller changed from the information handling to information marketing. Crompton and Jones (1984) observe that computerization leads to greater polarization of skills. Underlying this view is the idea that whereas certain types of jobs have a high premium (data base management, computer programmers) others become less important (clerical and other un skilled jobs).

The differential impact of IT on job satisfaction is painted by Fearfull (1996). Drawing on a verbatim quote of one Clerk, Fearful (1996) wrote:

> Oh! Absolutely fantastic, unbelievable-for the better because it's made more interesting. Whereas before, you had people doing a very narrow job... you had people involved in just one little thing.. now you can follow every thing through ... if you didn't have computers to do all your donkey work you couldn't possibly do that.

In this regard, it is viewed as a means of worker domination. From the above scenario, we note that IT may increase job satisfaction as well as dissatisfaction. Essentially, it depends on the value of one's job. The magnitude of the impact is a largely a function of the nature and design of work.

Having held arguments from both the optimists and pessimists, other writers attribute the impact of IT on employment and skills to neither group. For example, Wilkinson (1983) reminds us that the impact of IT is a function of human choices - the prerogative and interest of management. His study of IT in modem factories is in sharp contrast to Braverman's (1974) deterministic argument that underscores technical change as the driving force of other changes. Wilkinson's (1983) study reinforces the idea that the management has the opportunity to determine the course of action and hence the possible outcomes of new technologies like IT.

Reflections and Discussion

It transpires from the foregoing discussion that the range of views leaves us at the crossroads. Which way then? Taking these views together, and drawing on our experience in work settings, it seems to me that the impact of IT on employment and skills cannot be expressed in a simple cause-effect relationship. Arguably, economies like USA, United Kingdom, and Japan with high production and consumption of IT could experience both high levels of unemployment and skill obsolescence. This is not the case. There is no direct correlation between these variables. IT does not operate in a vacuum. Indeed, political, economic, sociological and cultural interventions are invariably at play. There are both direct and indirect effects of IT on employment and skills. On the whole, it depends on the level of analysis one is confined to. Is it the macro or micro level? Each level manifests different scenarios. The impact of IT on both employment and skills

manifests differently along a continuum ofjob creation, job displacement, and job losses on one hand, and re-skilling, de-skilling and polarization on the other. Let us explore each element.

First, the issue of employment. A closer examination of the empirical evidence reveals that IT has a differential impact across different economics, sectors, occupations and jobs from one organization to another and within a single organization. The magnitude ranges along a continuum of job creation on one hand and job displacement on the other. Given the nature of IT generally and computers in particular, their potential power, speed, flexibility, accuracy and lower costs have joined forces to create an atmosphere in which the quest for reduced labour costs lead to job losses or de-skilling.

There is a grain of truth enshrined in both optimist and pessimist views. However, the magnitude of the changes do not commensurate with earlier fears and hopes associated with IT. We cannot generalize the impact of IT across the board. It emerges that lower level jobs - secretarial, typing and related clerical jobs are invariably vulnerable. As computerization gathers pace, higher levels of management are no exception. The growth of specialist software packages may reduce employment prospect for middle and high level managers. This will largely be determined by the nature and organization of work which in turn depends on managerial choices.

Second, the issue of skills. Although employment and skill issues have been discussed separately, they are inextricably linked. The pendulum of the labour market in any economy swings in the direction of the skills required to perform specific functions.

Indeed one may be tempted to say that skills determine the employment pattern. Changes in the organization of work may lead to skill obsolescence as well as skill shortages. The pervasive nature of IT elevates the demand for IT skills in many jobs. However, with the advent of fast computer innovative changes, it emerges that even IT specialists run the risk of loosing their jobs.

In our case of IT, there are possible outcomes. It can enhance skills in some jobs or deskill other jobs. Invariably, IT affects those jobs which can be efficiently and effectively performed by computers. From empirical studies, we noted that secretarial and related jobs that focus on information collection, storage, processing and dissemination are vulnerable. Indeed, with increasing pace of IT innovations, even managerial jobs run the risk of obsolescence.

On the whole, we take cognizance of the view that computers can complement human creativity and judgement but they have not yet replaced it. What clearly emerges is the implication of IT on employee training and development. The skills dictated by IT adoption are not ready made and those rendered obsolete are not that much useless. They can be meaningfully utilized if at all there is considered organization of work in the light of the environment in which the organization operates.

CONCLUSION

A recurring theme in this paper revolves around the impact of IT on employment and skills. It transpires from our discussion that overtime developments in IT have been received with both optimism and skepticism. While there is consensus that IT can sharpen the competitive edge of organizations and nations, there is disagreement on the impact of its adoption.

On the one hand, there is a crisis of expectations by the optimists. This is premised on the potential and pervasive nature of IT across sectors, occupations and jobs. Whereas earlier periods of competition were essentially linked to labour and capital, contemporary factors of competition heavily depend on IT. In their view, IT has spurred a wind of change in the employment scene. Much as they acknowledge that IT can eliminate or dislocate

some jobs, they argue that such disequilibrium is temporary since manyjobs will be created. Since IT relieves workers from repetitive tasks, it is assumed that they will have more opportunities to do more important tasks which may raise their level of satisfaction and in turn increased their motivation.

On the other hand, the pessimists cast doubt as to whether IT will not lead to high levels of unemployment and de-skilling. By extension, they argue that IT is primarily geared to increased control of workers by management with dire consequences of job dissatisfaction and skill polarization. It seems to me that there is a grain of truth in both sides. There are both positive and negative impacts of IT. However, the scale and pace of these changes may be underestimated or overestimated. What clearly emerges is that the impact of IT varies across economies, sectors, occupations and jobs from one organization to another.

As viewed in our empirical evidence, secretarial jobs and related occupations have been vulnerable to job losses. Underlying this scenario is the idea that the potentiality of IT endorses the rationale for labour substitution in work processes.

However, it can be argued that IT does not operate in vacuum. One cannot lose sight of the fact that, invariably socio-political, economic and cultural factors are at play. Indisputably, there is no simple correlation of IT on employment and skills. In this vein, the production and diffusion of IT should be beyond technological consideration. Given that organizations are socio-technical systems, it is my considered view that the adoption of IT must consider the environment in which an organization operates. Intervention strategies may include among other things, job design and organization of work in the light of the environment in which IT operates. Most importantly, any optimal computerization of any management system e.g. personnel inventory, must be the brainchild of good system study and design.

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