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TRENDS OF MICROCOMPUTER TECHNOLOGY IN DEVELOPING COUNTRIES, WITH MORE FOCUS ON TANZANIAN EXPERIENCES: ACHIEVEMENT AND PROBLEMS.

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ABSTRACT:

Trends of microcomputer technology in developing countries, including Tanzanian, is like a 'mixed bag' of achievement and problems. Although the technology has been available for many years in developed world, developing countries are responding to it differently due to differences in political and economic policies. Some countries have acrimonious policies on the technology, some not. There are countries which utilize fully the technology in work places and others are still at dilemma on the importation of the technology due to what is 'claimed to be a weak economy in the presence of many other pressing needs'. Other countries seem to have very little information on the gamut of the technology. Ironically, among the major problems of the same developing countries include lowest level of work efficiency, and more serious, have lowest level of managing information in the services and production industries compared to countries which utilize in full the gamut of the technology. Since computer technology together with its informatics is becoming cheaply accessible, developing countries should use it in solving data management problems and improving the quality of work efficiency. Similarly developing countries should review more seriously policies of importation of the technology to enhance national development.

Inception of Microcomputer Technology in Developing Countries

The speed of technological advancement of the microcomputer has been a break through for national development in various sectors in various countries. The technology is also enormously permeating in developing countries that its contribution in work places is becoming more apparent to most users [1]. The use of the technology becomes more popular when people become informed about it and use it in daily work. Developed countries have made microcomputers an integral part of human life in business, industry, governments, politics, education, hospitals and in homes [2,3]. However, current indicators in developing countries show promising future prospects for

the automating the environment in work places. Hence majority of the work places will require employing competent personnel in computers.

Inherently, the impact of computer technology in the society will very much depend on policies, strategies, conditions formulated within each working place and society in general [4]. Just as important also, it will depend on individuals' efforts accompanied by the ability to understand and work with the computer technology. The purpose of this article is to discuss on the trends of microcomputer technology in developing countries with more focus on Tanzanian experiences on the inception and use of the technology. The current challenges and task ahead on the use of computer technology in developing countries are mainly discussed on the policy reforms, improving infrastructure and manpower training in order to utilize and sustain the technology adequately.

Although the computer technology has been available for many years in developed world, the response to it has been varying from country to country and from individual to individual due to differences in political and economic policies. It has been evidenced that microcomputers are dramatically changing the quality of work in various sectors in developed nations.

The growing availability and affordability of microcomputers in the work places have generated a need to increase work output with less manpower. Computer technology can effectively be utilized in education such as classroom teaching and learning [5]. As Venter and Blignaut [6] point out that the rapidly changing end-user, computing environment requires an informed recipient of information who can play an active role in the design of information systems to capture, retrieve and interpret data. It is viewed that the students can play an effective future role in the society if they can develop practical skills as well as thorough theoretical understanding of information technology.

Developing countries which have computers do not utilize them in their fullest capacity, and more serious in managing information. Rateau [7] argues very well that, a country's capacity to manage and handle the information in its various activities is a condition for that country to be developed. Since microcomputer technology together with its informatics is becoming cheaper and effective, developing countries can access them in various types of work such as solving data management problems and information sharing. Essentially, the use of computers can improve the development of the countries

in various sectors such as industrial economy, administration and training, information and communication, business and many other sectors.

The computer technology has been in use for a long time in developed nations that today, human life depends on it in most electronic environment [3,8]. Essentially computer technology has allowed modernization of economic life such as in industry, agriculture, education and various service sectors without increasing the number of workers [9,10,11]. On the other hand, since late 1980s microcomputer technology has slowly been permeating in the developing countries as well. The response to this new technology can be placed in three main categories.

Category I:

This category represent developing countries which have fully welcomed computer technology in work places for daily tasks and in educational system [2]. Having realized the astonishing work microcomputers can do, policy makers and various decision making bodies have allowed in full support of importation of the technology without acrimonious restrictions. They are seriously engaged in organizing programs for more sensitization and literacy in microcomputers to the public in general, and in school and college systems. India [13,14], Singapore [15] and a few others, are among the developing countries which started using microcomputer technology much earlier in the 1980s.

Similarly individuals coming from these countries, respond positively to the technology. Those who go to developed countries for studies take an interest in learning computer skills. They become excited by the amazing work computers can do. They anxiously learn the computer skills in anticipation that they will apply it in their home countries when they go back. They use all opportunities available, such as taking microcomputer courses, attending workshops, learning from other microcomputer literate friends, and various other sources to learn the skills. Some individuals with enough money buy their own microcomputers for use. Essentially, they view microcomputers as friendly tools to work with in day to day tasks. In other words, the positive policy climate and accessibility to the technology in their home countries encourage them to learn the skills.

Category II:

These are developing countries which still face a dilemma on the importation of microcomputer technology. Balancing between countries' weak economy and numerous other pressing needs, they remain skeptical on whether importation of microcomputer technology should be one of the national priorities. However, these are the countries which have at least some basic ideas about microcomputers but have not yet fully unfolded the wonderful secrets of the technology in national development. Instead they are still relying on Mainframe computers which are extremely few and owned by very big corporations, companies, Universities and various Ministries' headquarters. Some of the African countries fall under this category. In-fact, although Tanzania and some other African countries are still on the initial preparation towards Category I, they were in this category before 1990s.

The cost of operating and programming these large and complicated mainframes is so great that the services become too expensive and thus inaccessible to individuals, small departments, small business, schools, colleges. In most cases the bulk of the work (e.g. calculation, making reports, record keeping, graphics, etc.) are done either manually, or by simple machines which are primarily mechanical in nature. Apart from being more tedious and error prone, using simple machines manually is time consuming. Such machines include, table adding machines, typewriters, calculators. Hence, the very concept of efficient development so much needed in these countries is hampered by the level of technology they have.

Along the same trend of the countries' policy and technological climate of this category, people are also some how inertia to the technology. Even those who go to developed countries for education and training in different fields reflect passivity in gripping the technology. Although some of them become excited by the technology, they are skeptical on whether or not they should clutch the microcomputer skills. Some of the individuals are fully informed on the basic knowledge and skills of the technology through interaction with knowledgeable friends. In most cases those who study at graduate level in universities, are compelled to write their assignments and dissertations using microcomputers. Since students do not get enough money to type their dissertations and other assignments using private typists, they find it necessary to study the skills and type their work.

Category III:

In some developing countries the efforts of importing microcomputers are not sufficient enough due to economic problems. Thus information about microcomputer technology is not fully availed to majority of sectors. Similarly individuals who go for studies in developed countries are not motivated in learning the skills due to the absence of the technology in their work places in home countries. They consider it a waste of time to learn skills that will not be in use when they go back to their countries.

Unfortunately this category has also some individuals who become repulsive to the new technology. They have a somewhat "hard core" attitude against interacting with any electronically driven machine including computers. Any seemingly complicated electronic machine is viewed as 'wild beast which may prove unsafe to interact with'. On the other hand developed countries had similar attitudes in early 1980s when microcomputers were just beginning to appear in their offices [16,17,18,6]. However, as time went on people realized the importance of learning the skills for work efficiency. The more they learnt the more they became interested in the technology. Hence developing countries that have similar problems can solve them gradually if the government economic policies can convenient importation and accessibility to more microcomputers in their countries.

Tanzanian Experiences

Tanzania is one of the developing countries in East Africa, which up to June 1990, had not yet exploited fully the use of microcomputers in work places. Only the country's big parastatal organizations such as the University of Dar-es-Salaam, the Ministry of Treasury (Government) and a few others owned a very limited number of mainframe computers which were used for data processing and payroll accounts.

Due to their expensive services, individuals and various small institutions did not have access to the mainframe computers. The society at large was and is still labour intensive in work that could have been facilitated by microcomputers. Very few non-government agencies such as international institutions were using microcomputers in their work places. Air travel agencies, embassies, some departments of Universities and other institutions of higher learning had scantily begun using microcomputers in late 1980s.

Given that the economy was centrally planned and controlled by the ruling party and government, importation of anything including foreign currency by the institutions and individuals was perceived as contrary to socialist transformation process, and thus they were stringently checked and taxed. Computer and television technologies were perceived by the ruling party and government as luxury to the country. The country was therefore restricted to the importation of other pressing basic needs other than computers and television sets.

Microcomputers and television were so much restricted by the government that, unless one had special permission, one would not import them. It took a long time to get permission, and worse still, when one imported even a single personal computer, much time was wasted in going through complicated bureaucratic procedures to clear it at the custom's offices. Hence some institutions and individuals who would have liked buying personal computers were scared of high customs tariffs. Sometimes a person who imported a microcomputer met strange hustles from the custom officers as if one had imported a 'dangerous creature' to the country.

However, the continued publicity of microcomputers from the enlightened groups from abroad created a potential awareness and preparedness of the country to hug the technology to enhance work efficiency. On June 7, 1990, the Government announced in its Parliamentary Budget Speech that:

"Trade liberalization will continue and all importers will be required to import commodities approved by the government and which will assist in alleviating economic problems. With effect from today restriction on importation of personal computers has been removed" (Daily News Paper, Friday 8, 1990; No. 3236).

The above quotation speaks out quite publicly, that before that 'golden date', Tanzania had, inflexible "bolts and nuts" of microcomputer restrictions. Ironically, by the time the above policy statement was released, the country was not economically better of, if not worse than before. Hence, such government public statement was a milestone in policy decision making for enhancing the country's work efficiency. The policy statement was announced by new political leadership which believed in trade liberalization and that microcomputers and televisions were not as luxury as conceived before, but rather as indispensable technologies for national development.

After the release of the policy statement, and especially with the liberalization of trade, the country realized its potential capacity in importing microcomputers for use in offices and schools. There have been some efforts of importating more microcomputers and the skills. For example, effective from 1992, private companies have been allowed to import microcomputers for selling in the country. Various training institutions have been formed to facilitate the wide spread of computer literacy and simple maintenance skills.

By 1993 institutions of higher learning such as the University of Dar-es-Salaam introduced degree programmes on Computing Science under the Faculty of Science. Hence computer laboratories were established for theory and practical training of students in computing science leading to degree qualification. However, the Computer Centre was established in 1980 to conduct lectures in all computer related courses and research in informatics. In addition the Centre provided computing services and consultancy to the University and to the rest of the country using mainframe computer system. It started offering to workers from various institutions and companies tailor made short courses both on site and at the Centre using up-to-date microcomputers since 1994 [19].

Since 1995, training on the use of computer and simple maintenance skills from various institutions are becoming commercially competitive. Some private secondary schools have computer labs for teaching students computer skills. The demand of manpower training from various work places has been increasing. Essentially there has been a proliferation of skilled manpower on the use of computer technology from both local initiatives and overseas training. There are some students who are sent abroad to specialize in computer science at much higher levels. Others take computer studies together with other subjects such as in Engineering, Science, Business, etc. Very few, in-fact not more than 4 have specialized in computing science at Ph.D. level in the whole country at the time of writing this article. It is expected that more Tanzanians will soon have studied in highly specialized computer technology at higher levels in the near future.

The technology that just a few years ago was perceived as too foreign to handle, has attracted peoples' positive attitudes so much that even the traditional typewriters are gradually becoming absolute technologies in some of the offices in the city of Dar-es-Salaam. From 1991 to the present time, the language of microcomputer technology is slowly becoming popular in the city. Other big towns, such as Arusha, Mwanza, Mbeya, Tanga, and others, are on the way to acquiring more computers in work places.

The private sector appears to be more active in the use of the microcomputers than the public sector. For example, about 20 out of 258 private secondary schools have established microcomputer labs for training their students. On the other hand, in-spite of the fact that, a syllabus of computer studies was made for all secondary schools in the country by the Ministry of Education and Culture almost non of the 164 [20,21] government secondary schools has microcomputers to the present time.

However, considering the fact that about 18 percent of total population live in towns where microcomputers are permeating in some of the work places and businesses, very few people use them compared to the majority of 82 percent [22] who live in rural farming. The very nature of peasantry farming life style of the rural population, and the absence of electricity and telephone infrastructure in rural areas, such alienation from the computer technology will continue for many years to come.

Challenges and Recommendations

The above experiences reflect some indicators of computer sensitivity and literacy in Tanzania which need to be 'pumped up'. One of the approaches of increasing computer use in the country, is for the government to continue with its policy reforms [23] in loosening the "bolts and nuts" of import duties and sales tax that still repress various sectors and individuals in importing them. A key strategy is to consider waving all types of tariffs pegged on microcomputer importation as the machines have direct national development benefits in terms of work efficiency [5]. This is a challenge, not only to the government of Tanzania, but to all governments of developing countries which are still having such incisive bottlenecks in the importation of microcomputers. However, since the governments still would like an increasing revenue for national development, the tariffs received from importation and sales of computers can be shifted to entertainment commodities and services such as music systems, smoking, alcoholics and many others.

This challenge is timely essential because, with exceptions of a few, nearly all offices in Tanzania are still working manually using traditional technologies where computers would have been most efficient. For example some offices still have adding machines and calculators where as other offices still use mental calculations and pens on white paper. Other departments still use drafting boards and their related pens and rulers in designing and graphics. Libraries, including national and universities' libraries, still use index cards up

to the time of writing this paper. Although these tools have been very useful in all countries before the invention of modern computer technology, they are comparably inefficient and have low quality of work. In fact, some of these traditional tools cost almost the same or more than some of the microcomputers.

In addition to the above predicament, there are other crucial issues to be considered. For example, there are old fashioned microcomputers which continue prowling in Tanzanian offices in the form of either direct donations or through projects. There are some offices and classrooms which, on no choice, due to lack of sufficing information about the technology, they find themselves having outdated computers incapable of handling new software.
Some of the microcomputers are so outdated that they can not even be sources of spare parts for the modern microcomputers. Those who receive donated computers do so because they cannot afford to buy modern microcomputers due to high prices. The way out of this decoy, would therefore include deliberate reduction of prices of the modern computers sold locally in developing countries through waving all types of tariffs pegged on microcomputers. Continued well planned programmes for educating the public on the changing computer technology and how to cope with it, should be crucially important. Policy making should include more computer literacy programmes for all schools and colleges in the country.

In addition to that, very careful monitoring is required to ensure that appropriate technology of computing is imported and primarily used for development-oriented applications. On the other hand, computer donors and those who receive the outdated microcomputers should review more keenly on the implications of such offers to the developing countries. Though donations are virtually done on generosity, computer technology keeps on changing and expanding. In a way, buying them and the generosity of the donors isolates the recipients from intentional network of information sharing and in expediting national development at international level.

Moreover, by monitoring importation of the modern microcomputers, the government can spend very little foreign currency on them. Since the government has now allowed trade liberalization, the country can be importing many more up-to-date microcomputers using individuals, public institutions, and private sector, if the policy climate is more encouraging than it is now. There are individuals and business groups, and companies who would be willing to import many more microcomputers for business in the country if the

importation and sales tax is removed or reduced more than it is now. Unlike video players and music stereos which can be used for entertainment, microcomputers are efficient work tools in offices, industries, businesses, schools and colleges, hospitals, research and various government offices. Such benefits are now of supreme necessity in developing countries to be able to cope with global technological advancement.

Governments of developing countries may obviously be attempting to solve problem "A" through pegging high tariffs on computers to improve revenue, yet inadvertently be creating problems "B", "C", "D" "E" of incapacitating the pace of their own national development. Through computer technology, developed countries are by far at higher speed in technological advancement than in the past. Similarly developing countries can emulate developed countries' technological and economic civilization if they can double or even triple their speed in advancing though similar approaches. The first strategy to achieve this goal, developing countries will need a reliable infrastructure such as telephone system and electricity in their countries. With such approach it will be possible to have an efficient electronic communication network and computer uses in various work places.

The second strategy requires influencing educational institutions in computer knowledge and skills [24,25]. The impact of educational institutions to the society has been given high accord in developed countries that they have reached a stage where even lower levels of primary school pupils have computer studies in classrooms [26,27,28]. Developing countries can also accomplish the goals in starting with computing studies in higher institutions of learning and secondary schools and later in elementary schools.

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