Catholic University of Eastern Africa

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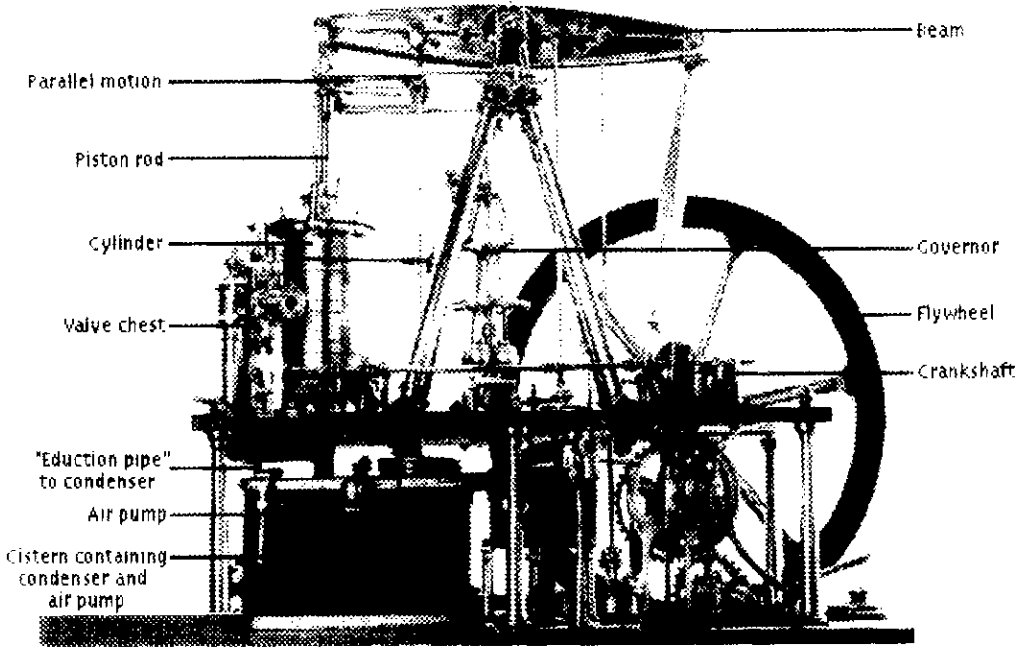
Institute of Social Ministry

TECHNOLOGY TRANSFER AND SOME REPERCUSSIONS IN KENYA



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STUDENTS DECLARATION

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Signed.....

"The consumption patterns of both
the rich and the poor must change rapidly.
The affluent waste and excessively deplete
non-renewable resources.
The poor excessively utilise
and destroy renewable ones.
Only through equitable development
can we make a significant transition."

Ashok Khosla

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INTRODUCTION

The present work does not pretend to exhaust all the implications, advantages and disadvantages that the transference of technology implies, especially for the countries of the Third World. This work is just a modest attempt to illustrate some of the repercussions that such transference has caused to the different social dimensions focusing briefly on the Kenya reality. The first chapter presents the process that technology has experienced along history. It is just a fast view that embraces a short definition, the relation between science and technology and some of its historical steps. This historical overview ends up with a short assessment on the destructive effects that technology in its modern development brought to the I and II World War.

The social control generated by technological elites is mentioned in this first chapter as hindrance to the access of the minorities to power that derives from technological acquisition.

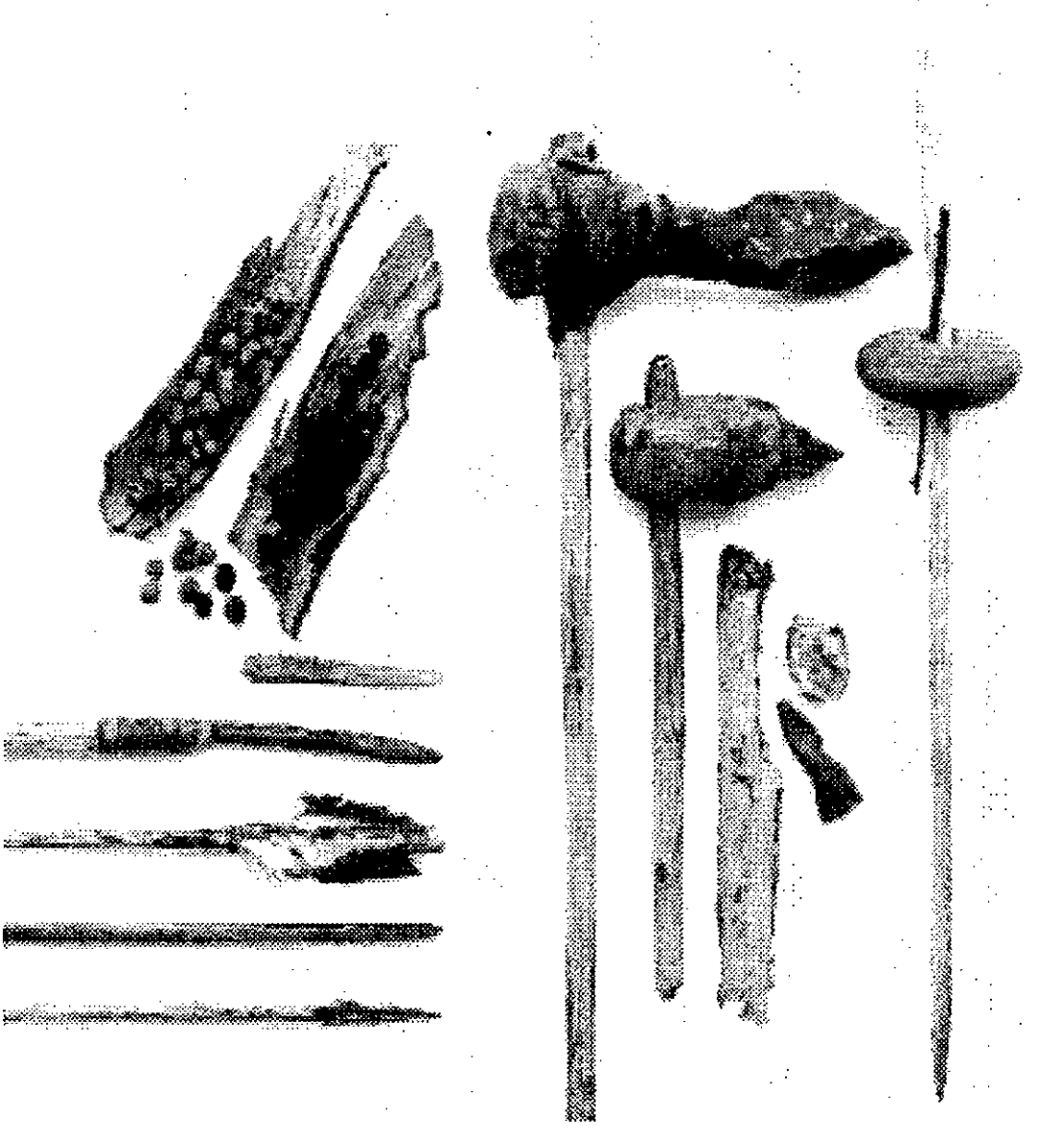
With this social repercussion, some cultural values have been affected tremendously by Western values that have not taken into consideration local values, neither the philosophical and mystical dimension of some cultural settlements. These repercussions are briefly explained in this section.

A fashionable term in nowadays is the fighting for Social Justice. Some lines are dedicated to the analysis of this reality that has been touched also by the transference of modern technology Social Justice has been treated as a crucial element for the equilibrium in the access of the minorities to the fruits that come from the progress and from the modernisation of social structures

It is considered as well the fact that if technology transfer is maker of job opportunities, it could also by means of automation contribute to labour displacement. The last part of this chapter presents the definition, applicability and advantages of what is called Appropriate Technology. Since Appropriate Technology pretends to respect existent technology and local values here it is treated as an eventual way or factor of development for the Third World countries.

The second and third chapter wants to land on some concrete situations where this technology transfer was adopted. Some samples of the Kenyan reality have been taken to illustrate the mechanisms most used for such transference and the fear of risking of some local companies before the sometimes very heavy conditions that trasnationals companies imposed over their recipients. For countries with scarce technological recourses and very little capital, the most suitable way for their technological and economical development may be the adaptation and actualisation of the modern technology coming from abroad to the already existent technology. This adaptation is presented as an important factor for the design of local manufacture that in the long run would help to the growth of the local industry. Such technology adaptation can be perceived more clearly in the so called Informal Sector. The Jua Kali phenomenon is growing rapidly. Its capacity of adapting and duplicating foreign technology to the local conditions give this sector the potential to be a major contributor to the economic development and technological advancement of Kenya .The technology used by artisans in this sector is either upgraded traditional technology or intermediate technology. In this last section a general glance at the situation of the informal sector will drive our attention by means of some concrete examples to the repercussions and the challenge that technology transfer has meant for those who claimed to belong to the Jua Kali groups. These instances present not only an indigenous creation but in some cases adaptation, which testifies both to the inventiveness of the local people and to their capacity for developing technology.

Chapter I



CHAPTER I

1.1. HISTORICAL OVERVIEWS

Technology, in general terms it is the process by which human beings fashion tools and machines to increase their control and understanding of the material environment. The term is derived from the Greek words tekhne, which refers to an art or craft, and logia, meaning an area of study; thus, technology means, literally, the study, or science, of crafting.[1]

"Many historians of science argue not only that technology is an essential condition of advanced, industrial civilisation but also that the rate of technological change has developed its own momentum in recent centuries. Innovations now seem to appear at a rate that increases geometrically, without respect to geographical limits or political systems. These innovations tend to transform traditional cultural systems, frequently with unexpected social consequences.

Thus technology can be conceived as both a creative and a destructive process"[2]

1.1.1. Science and Technology

The meanings of the terms science and technology have changed significantly from one generation to another. More similarities than differences, however, can be found between the terms.

Both science and technology imply a thinking process, both are concerned with accidental relationships in the material world, and both employ an experimental methodology that results in practical demonstrations that can be verified by repetition . Science, at least in theory, is less concerned with the practicality of its results and more concerned with the development of general laws, but in practice science and technology are closely involved with each other.[3]

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[1] Sprague, L. De Camp, "Technology", *In*: Glorier Inc., *The New Book of Knowledge*, Vol. 18, Danbury: Glorier Inc., 1987, 45.

[2] Raymond, H. Merritt, "Technology", *Microsoft Encarta*, 1995, 10.

[3] *Ibid.*, 10.

1.1.2. Early Technology

The earliest known human artefacts are hand-ax flints found in Africa, western Asia, and Europe. They date from about 250,000 BC, and they serve to define the beginning of the Stone Age.[4] The first toolmakers were nomadic groups of hunters who used the sharp edges of stone to cut their food and to prepare clothing and shelter.. The use of tools can be observed in many members of the animal kingdom, but this capacity for creating tools to craft other tools distinguishes humans from all other animals. The next big step in the history of technology was the control of fire.

After about 4000 BC, one of the most complex creations of humankind appeared: the city. From this point forward, technology cannot be described only in terms of simple tools, agricultural advancements, and technical processes such as metallurgy, because the city itself is a technological system.[5]

Two other medieval inventions, the clock and the printing press, also have had a permanent influence on all aspects of human life. The invention of a weight-driven clock in 1286 meant that people would no longer live in a world structured primarily by the daily course of the sun and the yearly change of the seasons. The clock was also an immense aid to navigation, and the precise measurement of time was essential for the growth of modern science.[6]

1.1.3. The Industrial Revolution

The Industrial Revolution started in England, because that nation had the technological means, government encouragement, and a large and varied trade network. The first factories appeared in 1740, concentrating on textile production . In 1740 the majority of English people wore woollen garments, but within the next 100 years the scratchy, often soggy and fungus-filled woollens were replaced by cotton—especially after the invention of the cotton gin by Eli Whitney, an American, in 1793.[7]

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[4] *Ibid.*, 11.
[5] Sprague, L. De Camp, 1987, 45.
[6] *Ibid.*, 46
[7] Raymond, H. Merritt, 1995, 11.

One of the most important innovations in the weaving process was introduced in France in 1801 by Joseph Jacquard[8]; his loom used cards with holes punched in them to determine the placement of threads in the warp. This use of punched cards inspired the British mathematician Charles Babbage to attempt to design a calculating machine based on the same principle. Although this machine never became fully practical, it made a path for the great computer revolution of the 20th century.

1.1.4. Reassessments of Technology

World War I and the Great Depression forced a serious reassessment of this rapid technological explosion. The development of submarines, machine guns, battleships, and chemical warfare made increasingly clear the destructive side of technological change. In addition, world-wide mass unemployment and the disasters met by capitalistic institutions in the 1930s initiated a further strong critique of the benefits that result from technological progress. Then, with World War II, came the development of the weapon that has since become a general threat to life on earth: the atomic bomb. Although national leaders often speak of the peaceful uses of nuclear energy, nuclear power can never be discussed without referring to its dangers as well. Another technological outgrowth of World War II—the development of computers and transistors and the accompanying trend toward miniaturisation—is having equally profound effects on society as well [9].

1.2. TECHNOLOGY AND SOCIAL CONTROL

Before developing the different dimensions or rather effects of Technology Transfer to any society, it is necessary to give a brief definition that this concept has in this work. The concept transfer embraces the circulation of know-how used to conduct feasibility or marketing studies and to manage varied services such as a transportation, distribution etc. But also the term transfer as used in this work, refers to the circulation of know-how across national boundaries as well as the transference of machinery, electrical appliances, tools etc. [10]

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[8] *Ibid.*, 12.

[9] *Ibid.*, 13.

[10] Denis, Goulet, *The Uncertain Promise Value Conflits in Technology Transfer,* New York: I.D.O.C., 1977, 7.

In the language of some development agencies, a project's social impact generally refers only to changes in employment and income distribution. These effects are important, and to understand fully the transfer of appropriate technology, it might be necessary a broader conception of social reality. Here I consider "social context" as the whole set of shared values, beliefs, and institutions that join people in common effort.

Harmony between technology and social context is important. There is a lot of evidence that shows how the implanting of a socially inappropriate technology in a village has the same result "as implanting a foreign object in a person"[11], either the technology is rejected or the village may "die" as a social organism. Technologies will be appropriate only if they fit comfortably in dynamic social contexts. This requires to consider the specific effects of specific technological interventions in the lives of specific peoples and their specific social environments. Some transnational corporation have used their special mastery of technology to gain for themselves not only economic advantages but cultural and political influence as well.

Military forces have turn their technological superiority over other institutions into control over the direction of social change in many countries. We can talk about professionals in medicine, engineering education, architecture, and industrial design normally use their technological expertise to set limits within which the users of their services are to have their needs met. In this fields social control takes the form of exercising a kind of monopoly in diagnosis of professional services, a cunning but efficient means of controlling demand. The technological elite exercise social control by means of especial language and symbolism. The say that if knowledge is power, then knowledge is by definition inaccessible power.

Technological knowledge confers upon those who posses the power to solve problems, to delimit solutions in a alternatively way and to influence results. Another aspect related with the influence of technology in the social context is the fact that if technology fosters elitist models of decision making, just because one beliefs that important decision can be reached only after analysis by experts, hence, it is useless to preach democratic participation. But if on the contrary, one concludes that technology itself makes it possible for decision makers to go to the people to learn their wish then, there is not excuse for elites to restrict access to their special information; doing that constitutes a breaking of the developmental expectation.

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[11] Bernard, H. Russell. & Pelto, J. Pertti, *Technology and Cultural Change*, New York: Macmillan, 1972, 21.

Another underlying problem in this social context is that Technology groups and institutions, are for most part, male dominated.. Technological development has not only displaced women as providers but it has reinforced the tendency to ignore women's unpaid and invisible work. In some cases, technological changes make the fulfilment of these tasks even heavier and difficult. Since technology is meant to promote economic growth rather than struggle for survival on a day to day basis, women's traditional subsistence and sustaining activities are assigned low economic value and status. So any kind of discriminatory practice that is responsible for the enhancement of sexism in the development process must be eliminated. Women should not fight for equal status with men if that status requires any kind of treat or allegiance to masculine values. What it is needed is to rid our society of the masculine values of domination, oppression and exploitation and develop new structures based on non-hierarchical, decentralised, sustainable, conserving and preserving values that are non-possessive and mutually supportive. As someone said brilliantly "Since it deals (Technology) specifically with questions of power and control, giving power to oppressed groups, including women, is a central issue within appropriate technology... If it's not appropriate for poor people, for minorities, it's not appropriate. It's simply passing the oppression from one group to another."[12]

1.3. TECHNOLOGY BEARER AND DESTROYER OF VALUES

Developed countries have shaped modern technology and exported it to other societies, most of whom received it willingly. But while process of technology transfer has solved innumerable problems, it has also destroyed many of the cultural values societies needed to achieve a wisdom to face their sciences. " Western man not merely ruined in some degree every culture that he has touched, whether primitive or advanced, but he also robbed his own descendants of countless gifts of art and craftsmanship, as well as precious knowledge passed on only by word of mouth that disappeared with dying languages of dying people"[13] Developing countries have experienced technology as an ambiguous reality. Although it brings new freedom from old pressure impose by nature, tradition, or ancient social patterns; at the same time it destroys precious values. The first value that Western technology brings can be called rationality. For the western technological mind, to be rational , means, manipulate any problem from a very empirical point of view. That is to take the problem break it down into parts, and

[12] Elisabeth. Coppinger, "Ecotope", *Who Control AT*, London: M.T. , 1980, 16.
[13] Everet, Reimer, *Alternative Futures for the World*, New York: U.N.E.P., 1973, 2.

measure in its effects. In other words "You westerners insist on the need to live and think on the historical level. But those of us who still attach importance to the approach of reality have tended to live rather on the mythical level. We believe that the mythical level is no less real than the historical level ."[14]. In short, this western ethnocentrism tries to make rationality prevalent, overlooking values found in other cultures such as profound need for meaning, myths, and symbols.

A second value deeply rooted in Western technology is its own approach to efficiency, which in industrial terminology can be called productivity. Production is just the proportion between what is put in and what comes out. It reflects a kind of mechanistic engineering mentality. Production is an indispensable element in development strategies, but when it becomes an absolute, important social values are systematically excluded or displaced. Let us now think for instance of leisure. Leisure has been an inherent value in humanity. Relaxing, resting and sharing played a significant role in any society. In traditional societies, "there was no time set for eating, recreation, rest or even prayers. People went to till the land in communal groups. They would work while singing the praise of wonders of God. As they worked they sang songs that motivated them to more hard work. When they felt hungry, food was brought to them where they were working. They would then stop working and eat with story-telling..."[15]. Today because of this "fever" for effectiveness people have to work sometimes more 11 hours per day, and normally 6 days per week. The time for meals has been reduced to the minimum . Moreover, "the means of transport make them tired even before they arrive at their places of work. A working day could start at 6:00 a.m. and would probably end by 6:00 p.m. without resting. Although some industries provide transport and rest time for employees others do not care. Recreational facilities are just a luxury!"[16]. Human being has been transformed into a merely component of a sophisticated machine called productivity.

Human being has fallen into a sort of technological trap. Another "value" carried by technology is a disfigured view of the Universe. According to this view, natural forces as well as human institutions are just objects to be used and manipulated. At least this is the apparently appreciation of those that can be labelled adepts of technology. "The value of existence is quated with the usefulness of human being, that usefulness in turn being rendered or conferred

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[14] Dennis, Meredith, *Western Technology Abroad*, London: A.T. Pub., 1975, 18.
[15] John, Chege, *Workers Situation*, Nairobi: Pauline Publications Africa, 1995, 27.
[16] *Ibid.*

by a force that enables men to control and change nature, Technology."[17]. We all know by experience or at least by reference that most of the traditional societies inherited from one generation to another some kind of harmonious compact with nature and its forces and tried to minimise the damage that could be done to life. There are some cultures for whom planting life was so precious that when someone stepped on a plant or broke a stem of wheat it was his responsibility to make a whole ritualistic process to invoke nature, to express sorrow for destroying life. Under this technological prism, work is not longer be seen as sharing in the creativity of nature or as expressing an ordered cosmic system of relationships; it just become the purely performance of a task which has as a reward, the acquisition of money. In the same way, time has become a collection of moments to be used in the most profitable and efficient way possible. Before Western technology emerged, time was lived as rhythmic process of maturation developed in precise cycles. The criteria of performance or power has become the dominant element over kinship and any other type of intimate relationships. Even authority that was organised in clear and stable patterns accessible even to those lacking power, has become negotiable and artificially attached to laws of competition. "The process which produces these changes is one pervasive commercialisation of friendship, of procreation, of love, of partnership"[18]. Certainly, those technological importers do not pretended to destroy values that existed already in any culture. Their lack of a holistic approach towards social elements such as family, relationships, work, commercial exchange and dealings with leaders, produced a rupture of the unifying vision of life in its total meaning in the traditional settings where technology was planted.

1.4. TECHNOLOGY TRANSFER AND SOCIAL JUSTICE

It is worthy bringing about a brief definition of Social Justice. It is very difficult to subject the wide and dense meaning that is enclosed within the term social justice in a single definition. Hence, Social Justice in technological dimension means the full participation of the community in decision making, choosing the technology they need according to the local resources they have, considering the set of cultural values present already.

[17] Denis. Goulet, 1977. 17.
[18] *Ibid.*

If there is no better method to measure just development, at least equality, Equity and participation must be the three elements social justice should embrace.. A development strategy which stresses social justice, then look for the achievement of acceptable equality in the distribution of basic goods and opportunities. It is concerns also with a balanced acquisition and enjoyment of the advantages coming from progress, as well as the respect that must be exercised by leaders for the wishes of the people at large. At this point, we can ask who benefits from technology transfer. If in designing this technological transfer it is kept in mind only the creation of marketable new products and processes, it is obvious that these products will be consumed by all those whose basic needs are met. In this way technology transfer will never reach the masses.

Modern technology bothers only for the production of marketable goods and services so expensive that are automatically out of the possibilities of those most in need. It means, that transference of such technologies causes some hindrance to social justice by contributing nothing to enhance it, being instead an obstacle for its accomplishment. Going back to the question formulated above, it can be said that technology transfer as it is now carry on, tends to enhance the relative position of those who are already getting benefit from it and bettering all those already favoured.. It follows that technology benefits primarily individuals and institutions who are already in control of large amounts of resources. Most products and services facilitated by technology can be purchased only by the rich sectors of societies. Regarding levels of income, the direct beneficiaries are the professionals like engineers, chemists, and technicians and less the unskilled workers. At the level of opportunity the issue is linked to the overall educational an training systems entrenched in given societies; in other words, unless these systems are better structured to make them equitable for less - developed countries, technological opportunities will be in the hands of the tiny group of well educated people. It stands out clearly that modern technologies imported from Western exclude unskilled workers.

Technology will be significant for masses only if it fits comfortably in dynamic social context. To be fully an element of social justice and to benefit people at large, technology should ideally grow from within the society rather than be imposed from without by the hidden interest of the selected elite. In other words, the need for the technology and its profit must come from the needs which people themselves feel and recognise and in regard to which they are motivated towards progress.

1.5. TECHNOLOGY AND JOBS

As we noted in our previous reflection, modern technology favours mainly the skilled workers. The possibility to get a job is accessible to a small sector of the society in developing countries. Unless this problem may be faced with a different approach that takes into consideration the various realities like economic, employment and other social goals, the social repercussions of these modern technologies may take the form of longer hours of work, increased fatigue, job alienation, mental stress and increased risk of occupational hazards and accidents. There is not enough awareness about the constrains that recent technologies including automation, place on job design, work organisation and work experience. " The employment impact of new technologies, particularly of computers and advanced communication in developing countries, is difficult to asses. The introduction of computerisation may lead to reduced demand for job displacement. Existing employees with retraining, would greatly improve their performance. Experienced industrialised countries suggest that the use of microelectronics technologies can bring about a substantial increase in efficiency and productivity with a much smaller increase in the workforce.

Experience in developing countries are still very limited in this regard and, to the extent that such technologies are used for new additional work functions, the effects may be positive

However, new skill and capability have to be developed and adequate programmes of training and retraining need to be implemented"[19] .One can be tempted to think that if modern technologies bring about such inconveniences, the use of second hand equipment instead of sophisticated machinery could in some way solve the problem. But the transfer of this simpler technologies may have also social consequences. If such machinery is not adequately maintained, health and safety hazards will be created. Even though its use may be otherwise needed for economising capital and generating employment. It is a fact that modern technologies from industrialised countries require highly qualified labour. Labour expertise that is found in those countries is generally superior to the levels found in developing countries.

Technology transfer that does not take this factor into consideration becomes inadequate hindering the possibilities for job seekers. Since educational system in most of the developing countries is less accessible for women and as we have discussed modern technologies demand

[19] David, French, *Appropriate Technology in Social Context*, New York: Vita Pub. 1997, 9.

high skills, it can be deduced that the most affected social group in this looking for job in technological spheres, are women. " If women are initially involved in the design/redesign and installation stages of Technology development, they can simplify operations, repairs and maintenance of the same technology to their advantage, thus facilitating economical use of local(indigenous) materials/facilities and effect improvement in working conditions of women and society. The use of technology, which by its nature is relevant to the family in particular and the society in general, helps women in society to conserve and to involve themselves in all types of work and activities which used to be regarded as men's work"[20]. Now, how it is possible to improve employment for this complex environment conquered by modern technologies? How to reduce the gap between the unskilled population in developing countries and the high skill qualification that modern technology demands?. Giving a general answer for such problem would be rather inadequate, inasmuch knowing that labour intensive technology requires different types of skill. "It is not possible to state in a general sense that labour intensive saves skill or that it requires more skill than capital intensive technologies. Very probably, the real answer is that capital and labour intensive technologies requires different kinds of skills, it is difficult to weight the different types of skill to arrive at judgements in terms of more or less."[21] Although there is not magic formula already given , it is necessary to set a suitable strategy to face this situation that modern technologies bring to developing countries. Among the policy objectives of the ILO whose Programme Of Action was adopted by the World Employment Congress, I would like to point out the paragraph 50, "Choice development and transfer of technology require that proper emphasis should be placed on the building up of national infrastructure for human resources development, particularly to promote training workers, technicians and managers for appropriate technology selection."[22] Certainly, the developing of training programmes must be a priority to provide rapid training and especially retraining. "In its technical assistance programme the ILO is also heavily involved with institutions training machinists, filters, welders, electricians, mechanics, wood workers, bricklayers, pattern makers and foundry operatives. It is important that the training needs of the small-scale informal sector should not be neglected and valuable programmes in this very field have already been devised in small-industry institutes, craft training centres, co-operative workshops and so on.."[23] I will

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[20] Evelyn, James Nelly, *Who Controls AT*, London: M.T., 1980, 24.
[21] Hans, Singer, *Technology for Basic Needs*, Geneva: Atar S.A., 1977, 85.
[22] Ronald, J Casey, *The UN Seventh Special Session* III 4, September, 1975, 2.
[23] Denis, Goulet, 1977. 129.

transcribe literally four levels for the implementation and formulation of national training, given by World Employment Conference as Programme of Action to match inaccessibility of modern technologies and the job opportunities.

1.5.1. These levels are:

(a) middle-level technicians and skilled workers to be employed in the production technologies associated with the goods and services required to satisfy the basic needs;

(b) professionals, technicians, managers and skilled workers to replaced expatriate staff who at present apply advanced technology;

(c) professional, technicians needed to manage research and studies undertaken by national and/or regional technological research bodies; and

(d) technicians, professional and skilled workers, who should be assured of measure of social status and incentives to prevent a brain drain, in order to promote the utilisation of technologies designed to achieve material and social objectives.

1.6. APPROPRIATE TECHNOLOGY

Definition: Appropriate Technology is Technology that is appropriate according to all relevant criteria: technical, economic, social and environmental of any given society.[24]

With the coming of political independence the developing countries found that they were still economically dependent on the industrialised countries. Facing problems of poverty, illiteracy, inadequate housing, and limited industrial capacity, the developing countries had to import technologies from the industrialised countries and more often than not skilled personnel to make those technologies work.

The technologies imported were very expensive and obviously this has caused a serious drain on the financial resources of the developing countries, increasing dramatically their external debt in the last years.

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[24] Digby, Swift, *Appropriate Technology and Environmental Education*. Nairobi: Kenyata University College, Department of Physics, 1995, 2.

The UN's Sixth Special Session urged that developing countries have greater access to appropriate technologies. So, "All efforts should made:

(a) To give access on improved terms to modern technology and then adaptation of that technology, as appropriate, to specific economic, social and ecological conditions and varying stages of development in developing countries;

(b) To expand significantly the assistance from developed to developing countries in research and development programmes and in the creation of suitable indigenous technology;

(c) To adapt commercial practices governing transfer of technology to requirements of the developing countries and to prevent abuse of the right of sellers."[25] Technology may be defined as...material tools and the knowledge to apply them in solving certain tasks.

Defined this way, technology is a relational concept, implying that technology has no meaning unless it is related to persons - teams- who operate the technology, and to tasks, which are socially and culturally defined needs.

The teams can vary from a single person digging with his/her hoe to huge enterprises involving thousands of people in running a complex line of assemblage.

Looking at the tasks, there has been a tendency in our industrialised history oriented rather one-sidedly production in the development of technology. Technologies have been developed in order to produce consumer goods for which there are demand. Since this technology emphasised production as one of the main tasks, looking at the profits in sales, running uncontrolled , such a development will lastly deplete resources, damage the physical environment and maintain the gap between rich and poor. When this technology is framed in the context of Sustainable Development it is termed as Appropriate Technology. In short Appropriate Technology is adjusted to the social, economic and physical conditions in the region where it is to be implemented.

To be appropriate in certain region and in certain population, a technology should, ideally, satisfy needs related to :

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[25] U.N.C.T.A.D., *Mayor Issues Arising from Transfer Technology to Developing Countries*, New York:U.N.C.T.A.D., 1975, 7.

(a) Productive tasks, i.e. produce tools or goods for which there is actual demand,

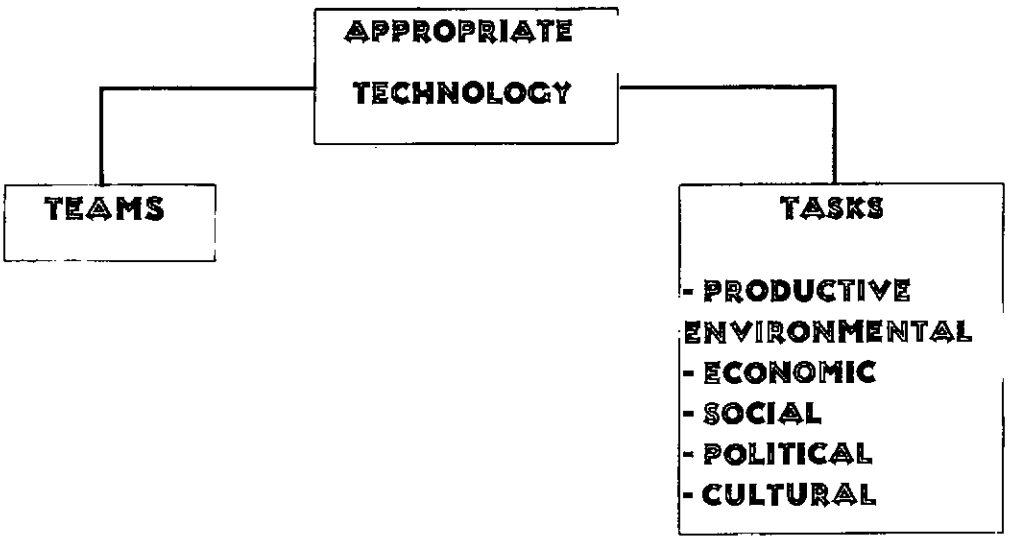
(b) Environmental tasks, like avoiding air- and water pollution, preventing soil erosion, leave natural resources for future generations, avoid extinction of species,

(c) Economic tasks, implying that the technology ensures an optimal allocation of local resources, that it will be self-perpetuating in terms of operational and capital costs, and that it will increase the purchasing power of household and nations,

(d) Social tasks, with an emphasis on employment and distributional effects on men and women, on rich and poor, on various groups, on rural and urban dwellers,

(e) Cultural tasks, meaning that the technology in question should be adapted to local value systems, preferences, taboos, and aesthetics.

There is a world-wide consciousness about the effects of the environmental implications of technology. In some cases industrial activity acts upon the physical environment directly, by depletion of resources, discharge of chemical elements etc. However, physical environment is not always affected directly, but through the medium of cultural practices, socio-economic conditions or lack of political control.



The problem of desertification in Africa may be seen as a combined result of unprotected ecological habitats in savannahs and semi-deserts, increasing population with energy needs for household purposes, no availability of electricity or kerosene, deforestation and eventually desertification.

I would like to present a kind of summary about what should be and what should not be Inappropriate Technology.

1.6.1. Appropriate Technology is:

- Based on an understanding that the Earth's resources are limited and decreased poverty is the solution to environmental stewardship
- Based on application of scientific knowledge to effect positive change
- Focused on communities and villages; not privatised
- Socially and culturally acceptable
- Both a process (software) and a product(hardware)
- Backed up by advocacy and policy
- Environmentally friendly part of the efforts to heal the wounds of the Earth
- Technologically and economically feasible
- Replicable
- Improved by government support
- Founded on traditional knowledge and complemented by improved or technical knowledge
- Based on an appreciation of diversity and on traditional values of living in harmony with and love for nature
- Founded on people's control over their own resources democratic
- Builds the people's confidence in their capabilities and in the use of technology to meet human needs and protect environment
- Versatile
- Holistic concerned for the past, present, and future

- Positive in the long term for the people an the Earth
- Improved by NGO involvement in
- Identifying research and development needs of the people
- Identifying possible technology sources (from research laboratories, traditional technologies, local wisdom)
- Evaluating the appropriateness of technologies from the people's perspective

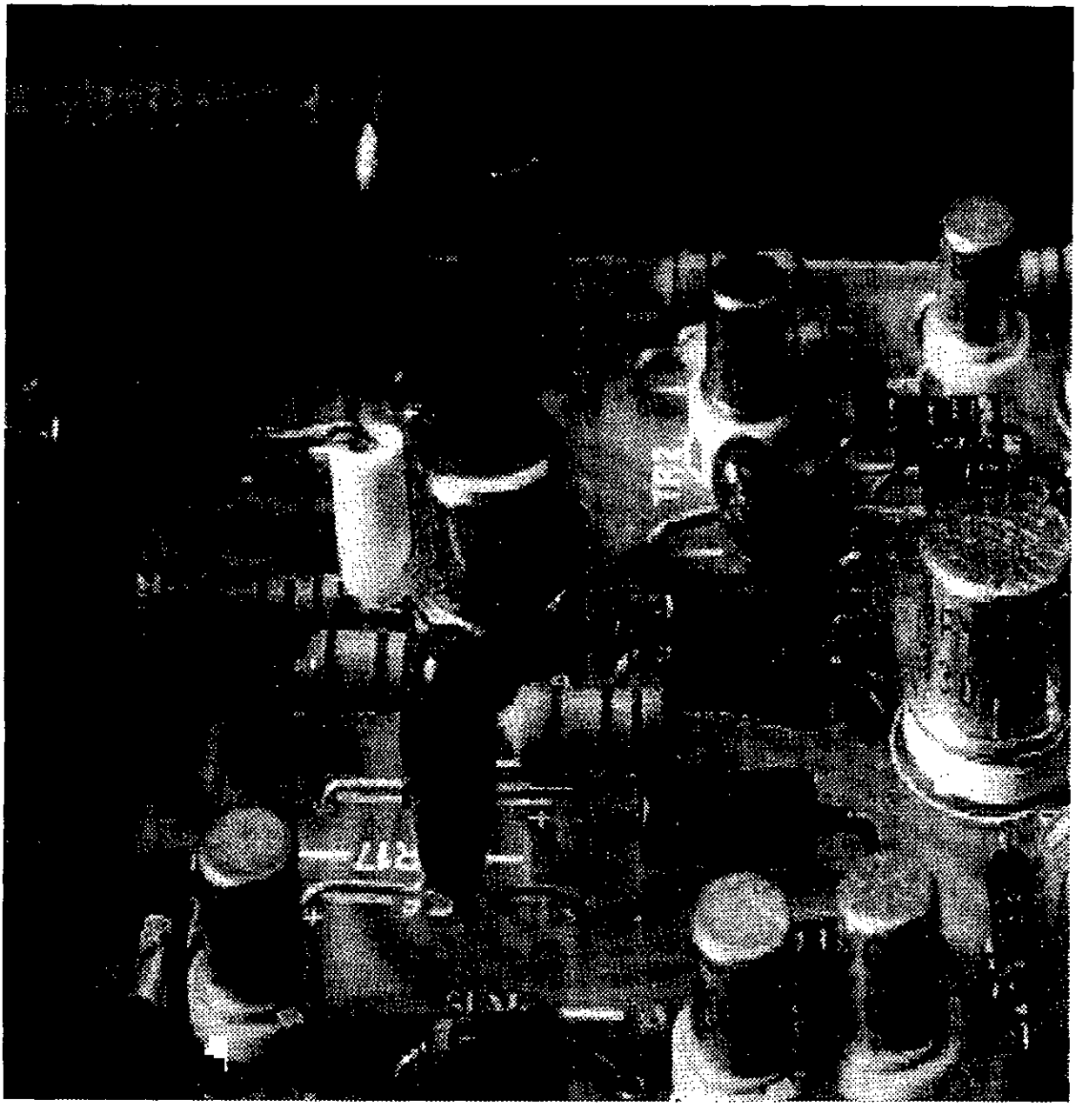
Promoting beneficial technologies .Campaigning against inappropriate technologies or inappropriate uses of technology.

1.6.2. Inappropriate Technology is:

- Privatised
- Unsustainable
- Unjust
- Unbalanced in access of the poor to its benefits
- Focused on profit or markets at the expense of peoples' quality of life and the environment.[26]

[26] United. Nations, *Appropriate and Inappropriate Technology*, Nairobi: Uniterra, 1977, 2.

Chapter JJ



Chapter II

2.1. TECHNOLOGY TRANSFER IN KENYA

We are all aware about the profound changes that have taken place around the world in the last 20 years. The increasing of the foreign debt in many of the Third World countries has been a determinant factor for a New Economic Order. The unequal distribution of the benefits of the World's economic and social development expresses a deep concern at the dependence of a large number of countries on a handful of other countries. In this context an element appears as the basis for the formulation of development strategies in the less developed countries. This concept that is known as self-reliance seems to be the key to neutralised or diminish this dependence which is generated by the international influence on the internal conditions of those so called developing countries. We can not deny the fact that science and technology play a very important role within a development strategy for self-reliance.

The exportation of high technology to the developing countries without any consideration by the Western countries has increased the degree of dependence, beside many other factors that were already described in the previous chapter. Kenya has been not the exception in this process of "swallowing" expensive technology from abroad. In this chapter it will be stressed above all the mechanism for technology transfer its adaptation and the positive repercussions of transference of technology, in terms of appropriate technology and intermediate technology implemented on the informal sector and on domestic applications, as a possibility to enhance the Kenyan's economy.

2.2. MECHANISM FOR TECHNOLOGY TRANSFER

Kenya like any other developing country, acquire technology principally by purchasing or lease from the transnational corporation (TNCs) since they have been the major developers of technology. There are a variety of ways in which technology can be acquired.

2.2.1. - A national enterprise can purchase the machinery and other capital goods from foreign suppliers and contract with foreign technicians and consultants on the organisation of industrial productions and distributions. This is a direct transfer and an importing enterprise can exercise a large degree of control..

2.2.2. - Technology transfer through indirect methods involves some loss of control of enterprise. Direct investment by transnational corporations is such a case. Transnational corporation provide from a single source various elements of technology packaged with critical industrial inputs like capital and managerial skills. Often the entire package must be accepted so the importer of this technology has a fewer options.

2.2.3. - Technology is also acquired by means of licensing and other contractual arrangement with foreign enterprises. What is important here are the terms of the contract, and the degree of control left to the developing counties depends on its economic strength and negotiating skills. These ways are not mutually exclusive and technology transfer usually takes place as a combination of them. A foreign subsidiary in a developing country may have a contract with a parent company to buy technology, or the foreign supplier of technology may have minority ownership in the enterprise that imports the technology. The crucial aspect as far as control of the technology is concern is the degree to which the technology acquired is tied to purchase or limiting conditions, in other words, the degree of "packing."[27] It will be presented briefly how far has Kenya participated in the process of transference of technology. The analysis will be made out of the table No. 1 which contains relevant data of foreign suppliers and the mechanism used by hem. If technology transfer implies or involves loss of control of enterprise, very few local firms exercised control in purchasing machinery. As it is shows in table 1, out of 24 cases of model that were transferred in Kenya, only 12 showed the participation of the local companies of the technology foreign suppliers, which reflects relative control of enterprise of the recipient firms. The full control of the transaction was achieved only by three transnational corporations out of eight, which decided for a greater percentage of fair ownership as we can see in table 1. Regarding to licensing agreements only 5 out 8 Kenyan recipient partners took part in management contracts and technical assistance. It seems that the most common mechanism for technology transfer in Kenya is purchasing machinery directly which implies reduced control over the degree of packing by local firms.

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[27] Donald, J. Casey. *United Nations Development Programme*. New York: Division of information, 1975, 7.

Table 1

FORMS OF TECHNOLOGY TRANSFER BY SAMPLE FOREIGN SUPPLIERS

Equity share of technology suppliers (percentages)	TNCs					SMEs				
	Licensing agreement	Technical assistance	Management contract	Supply of machinery	TOTAL TNCs	Licensing agreement	Technical assistance	Management agreement	Supply of machinery	TOTAL SMEs
00	-	-	-	-	-	-	-	-	-	-
ver 50 majority oint ventures)	1		2		3					
0-50			1		1	1			1	2
nder 50 minority oint ventures)						2			4	6
	1	2	-	1	4	1	2		5	8
OTAL	2	2	3	1	8	4	2		10	16

Source: Compiled by the UNCTAD secretariat from data generated during firm interviews.

2.3. ADAPTATION OF TECHNOLOGY TRANSFER

The technologies which industrialised countries tend to promote, and to solve the weak economies of the underdeveloped countries, are sophisticated and capital intensive. Adaptation attempts to modify and apply high technology by using scientific knowledge in places where labour is abundant, where local markets need to be generated and use made local materials and local skills. It is obvious that any transnational company will take the risk of adapting technology to local situations, if this could mean loosing brand-name and product quality. I will take as a reference a table built up on some statistics coming from interviews made to some sample firms in Kenya. "From the point of view of the adaptation of technology transferred, it seems that comparatively high incidence of intra-firm machinery sales by sampled TNCs tended to induce the same levels of mechanisation in their technology acquiring firms."[28]. In the most of the cases the sampled foreign SMEs transferred relatively labour intensive technologies. Table 2 gives an over view of the main efforts to adapt foreign technologies made by sample recipients firms. The adaptive efforts in the fields of products design aimed at reducing the import of raw material of the products manufactured locally and adapting the strategies of production to components available. From the table 2 can be deduced that the recipient partners of TNCs showed less inclination to adapt product design to local conditions. Four out of eight of the TNCs' firms did not undertake any product modification. These companies were operating in the pharmaceutical, chemical and food processing industries. No so much modification was made to the development new brands Most of SMEs' recipient partners have shown a marked inclination to undertake modification in the product design. In 10 case out of 16 the recipients firms carried out product changes and adaptation. Sometimes this looking for adaptation of technology is just a way to create jobs in industrialised countries at expense of the Third World countries. Like the case of a foreign company that tried to improved in certain area in Kenya the production of a type of seed . The mechanical process used by the local people was rather slow. The machine brought accelerated the process to higher speed, but in the process a lot of the grain was wasted. The people understood the inappropriateness of this method. For them time was not an crucial factor in their production. Moreover they profited practically all the grain. They stopped using this machinery. Unfortunately this decision affected the rate of unemployment in that country where the machine was brought from.

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[28] U.N.C.T.A.D., *Impact of technology Transfer by foreign small and medium sized enterprises on technological development in Kenya*. New York: U.N.C.T.A.D., 84, 11.

Product involved in the transfer of technology	Nature and objectives of main adaptive efforts by recipient firms		Degree and scope of innovation by recipient firms	
	Affiliatex or partners of TNCs	Affiliates or partners of SMEs	Affiliates or partners of TNCs	Affiliates or partners of SMEs
1. Spark-plugs	Na	Nil	Na	Nil
2. Cosmetics, beauty care	Nil	Na	Nil	Na
3. Metal (coffee machinery irrigation fittings)	Na	Mould improvements, new shapes	Na	Minor process improvement and product improvement (mould improvements)
4. Stencil and duplicating machines	Change of quality in manufacturing	Na	Replace aluminium tube with cheaper plastic tubes	Na
5. Industrial detergents and adhesives	Use of local materials (starch)	Na	New product sulfation for detergents	Na
6. Pharmaceuticals	Nil	Na	Nil	Na
7. Steel billets	Na	Replacement of imported inputs with local ones	Na	Minor process refinement
8. Pharmaceuticals	Na	Product refinement to extend shelf life of drugs	Na	Improvement of product taste (sugar content)
9. Polyvinyl chloride materials	Na	Product refinement and new minor process refinement	Na	New product developments (local spare parts, local materials)
10. Pharmaceuticals	Nil	Na	Nil	Na
11. Food (drinks, jam, jellies, etc.)	Na	Scaling-down of technology	Na	Development of new products (branded)
12. Plastic goods	Na	Substitution of imported raw materials	Na	New product mix
13. Rubber goods	Na	Process refinement (compression moulding)	Na	Manufacture of new moulds in-house
14. Pesticides	Process refinement for manual operations	Na	Nil	Na

Product involved in the transfer of technology	Nature and objectives of main adaptive efforts by recipient firms		Degree and scope of innovation by recipient firms	
	Affiliates or partners of TNCs	Affiliates or partners of SMEs	Affiliates or partners of TNCs	Affiliates or partners of SMEs
. Machinery (coffee)	Na	Nil	Na	New process design, new pre-grading machine components to do three grades instead of one originally
. Hardware engineering goods	Process refinement for more manual operations	Na	Introduction of new brass	Casting elements and high security locks
. Plastic products	Na	Process refinement (special dyes and tools)	Na	Automating filing machine to increase productivity
. Food (drinks, wine)	Na	Quality control (to suit climate)	Na	New product development (papaya wine)
. Food (infant food, catering food)	Minor process refinements (pasteurizing); substitution of maize for wheat	Na	Development of new local brands	Na
. Food (meat processing)	Na	Process refinement (continuous system for meat treatment)	Na	New product development (garlic sausage, fermented salami)
. Agro-chemical products (power alcohol)	Na	Minor process refinement (less automation)	Na	Na
. Polyvinyl chloride electric cables	Na	Minor process refinement (less automation)	Na	New design of components (winding machines)
. Shock absorbers	Minor process refinements (less automation)	Na	Major products innovations: development of new products and about 160 product changes	Na
. Machinery and specialized equipment	Na	Process refinement to suit local raw materials (castings made locally)	Na	New product developments (solar hitters and windmills

Source: Compiled from data generated during firm interviews in Kenya.

"Na" means "Not applicable".

I will present a positive example of adapting technology in the field of informatics. It is about one of Kenya's leading software houses. From its roots in Nairobi, it has grown to the point it where it now boasts over 200 customers sites across East Africa and is one of the most highly respected information technology vendors in the region. It all started back in 1986 when working compatriots and computers experts saw the demand in the marketplace for software solutions. Together with a company called Copy Cat and its manager Rajoo Patel, they formed Software Applications Limited (SAL), which is located on Moi Avenue now with five members of staff, including the owners of SAL.

The main focus at the time was to provide locally developed software, and so SAL's first standard payroll package applications, the TurboSoft Payroll System, was introduced to the Kenya market. Constantly adapted in accordance with statutory requirements, TurboSoft remains extremely popular, and currently be found at over 150 sites throughout out Kenya.

Software was subsequently developed for several clients, including Mumias Sugar Company, UTC (vehicle fleet management system) and Severin Sea Lodge. It also signed distribution agreements with companies such as Systems Union UK for accountancy software, plant maintenance and planning software from Cruikshank Technology of Australia and time and attendance clocking systems from Linear Industries of Israel.[29] In the struggle for adapting technology have appeared some initiatives or new approaches to this issue. One is called appropriate technology already mentioned in the previous chapter and Intermediate Technology, which will be developed in this chapter in the frame of adapting technology in Kenyan context and its repercussions in the so called informal sector.

2.4. SOME REPERCUSSIONS OF TECHNOLOGY TRANSFER IN KENYA

Intermediate Technology aims to develop ways of giving people in the Third World to help themselves, by developing appropriate technologies and methods which give them more control over their lives and which contribute to the sustainable development of their communities.

[29] Toyin, Ogunseinde, "Spreading Roots in Africa", *Computers in Africa*, Cambridgeshire: Sean Moroney, November, 1996, 32.

IT works with people to use and adapt their existing technologies to help them deal with the rapidly changing context of their everyday lives.

IT builds on resources the community already has.

IT does not impose solutions from the outside.

IT seeks out new uses for local materials which will improve the quality the local way of life.

IT develops technologies which will complement local skills and fit easily into the local culture.

IT works closely with the community to strengthen local institutions.

IT works to widen the choice of technologies for people who lack the resources to explore what could be available to them.

IT uses participatory methodologies. People must take the initiative. They must do it themselves, or development is not sustainable

IT exchanges experience and information with other agencies groups and key

decision-makers as widely as possible.

IT brings expertise from different programmes together to focus on the needs of the community as whole.

IT aims to be sensitive to gender issues in all its projects. Although women make up half the population they are still marginalized many ways.

IT explores the potential for income-generation in many of its projects .People everywhere net to earn a living.

IT is aware of the need to protect the environment so that the resources available to this generation are on hand to support the next.

2.4.1. IT & IT Kenya

The Intermediate Technology development Group - IT - was created in 1965 by Fritz Shumacher and others. It was an attempt to put into practice his then radical ideas, explained in his book Small is Beautiful that 'We must learn to recognise the boundaries of poverty. If you live in a poor environment start with something small.[30]. It's role was primarily to make information on appropriate technologies available to development workers and policymakers. Today IT works with a staff of over three hundred in ten different countries and four continents.

IT aims to develop ways of giving people the opportunity to help themselves, by developing appropriate technologies with local communities, by making information about these technologies more widely available, and by seeking to influence decision-makers to develop policies which favour their use.

IT Kenya has grown over the last year. Staff capacity has increased from 27 to 35 people, and the budget has expanded from KSh 20,754,000 to KSh47,802,705. This expansion has enabled them to increase their work in the existing programme areas in Kenya and in neighbouring countries, and to develop work in two new areas -Jua kali and Communications.[31]

2.4.2. Communications and Resource Centre

Some of IT Kenya's work has reached the Stage that makes possible to have information about it more widely available, so it has been recruited a Publications Officer and invested in the equipment necessary to produce high quality publications. Six Shelter Forum Bulletins have been produced, and a range of technical manuals on aspects of improved stove production will soon be published. Other publications on animal health care and building materials are also in the pipeline.[32]

It group has also established a Resource Centre with over a thousand publications on a wide range of technologies, and a computerised information database to help them to respond to requests for information across a much wider range of technologies than they have direct experience of in Kenya.

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[30] IT Group,"How IT Works", *Intermediate Technology Annual Report*, Nairobi: A.P. Pub., 1994, 15.
[31] *Ibid.*, 16.
[32] *Ibid.*, 17

Much of the work is located in marginalized areas, for example the livestock and shelter projects are in arid and semi-arid lands, and it focuses on a problem that is particularly sharp for poor people, such as work on fuel-efficient 'biomass' burning stoves.[33] .Some of the work is with particularly poor groups such as the quarry workers in Ngong, or it focuses on more disadvantaged groups within the community, for example the Maasai Housing Project specifically works with women to help them improve their houses. The cost of any 'technological' intervention can be a major constraint for Poorer people, so the transport project in Kathekani is looking at mechanisms for group ownership or management of bicycle trailers, and credit schemes so poorer people can buy them individually. Another common problem is that poor people don't get the information they need; the popularity of the stove programme's experiments with radio advertisements for the Upesi Jiko have demonstrated that nearly everybody listens to the radio.

One major lesson that the group has learned is that all communities have mechanisms for ensuring that the poor are provided for. These mechanisms are being corroded by the cultural changes that accompany development, however, and we have found that it is not possible to work only with the poor. There is new project in Tharaka Nithi is working with the Locational Development Committee, and trying to strengthen the community's internal mechanisms for ensuring that the poor get their fair share.

2.4.3. Building Materials & Shelter Programme

The Building Materials and Shelter programme (BMSHEL) is based on practical experience and an understanding of the problems poor communities have in accessing housing in Kenya. BMSHEL's mission is to improve access to more and better shelter for poor people in rural and urban areas, and to increase income for poor producers in shelter production. The programme does this by helping poor people acquire and control the technologies and skills they need to produce or gain access to durable building materials and decent and affordable housing.

[33] *Ibid.*, 18.

2.4.3.1. Methods of Work

BMSHEL works in three main ways:

Participatory research and development: to ensure that technologies are adapted to the needs and circumstances of poor communities, amenable to small-scale production, and sustainable in local markets.

Training and extension: to disseminate information and skills to a variety of audiences including communities and community-based or organisations in search of practical shelter development strategies, NGOs, small-scale building materials producers, and government officials.

Networking and advocacy: to exchange information and promote positive policy changes in the field of shelter development to NGOs, policymakers, and government and public sector officials. [34]

2.4.3.2. Maasai Housing Project

The Maasai Housing Project has being carrying out a very high activity , building 16 more demonstration houses and training over 40 people in new construction techniques. In addition, almost 200 members of women's groups in the district took part in exchange visits organised by the project. Smoke tests were carried out in improved and traditional Maasai homes, which showed a significant reduction of smoke in improved homes.

2.4.3.3. Shelter Forum

The Shelter Forum (SF) is a coalition of non-governmental organisations and individuals concerned with improving the access of marginalized groups to affordable shelter through networking extension, advocacy and information exchange[35].

[34] *Ibid.*, 17.
[35] *Ibid.*

The Bulletin is used to disseminate information about policy, practice, and new technologies. The Forum also organised exchange visits between members so they could learn, first hand, from each other's work.

2.4.3.4. Building by-laws and Planning Codes

An on-going area of work for IT contributes to the process of reviewing and reforming Kenya's building by-laws, and disseminating information about the laws that have changed, so that builders and home-owners can take advantage of the more appropriate new rules and regulations.

2.4.3.5. Stone Project

Stone is one of the cheapest permanent building materials in many areas of Kenya. Quarrying employs many people, but is inefficient and dangerous. The Quarrying Association and five producers' co-operatives were identified to take part in a pilot project. Improved hardened drilling rods and chisels were developed and tested, and production, and the miners' income, has increased by about 30 per cent as a result.[36]

2.4.3.6. Vibrated Concrete Products (VCP) Project

It's work on the development of VCPs is drawing to a close. Appropriate methods for producing a wide range of products have been developed and the main activity this year has been producing and testing a training manual. Businesses and organisations who will manufacture the equipment and provide training have been identified to carry on production.

2.4.3.7. Lime Work

The programme is generating considerable interest. This workshop brings together practitioners, policymakers, and researchers and produces a plan to support the production and use of lime and alternatives to cement in East Africa. IT commissioned national case studies from Kenya, Tanzania and Uganda on both the production and use of lime and the use of binders in low-income housing.

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[36] *Ibid.*, 21.

2.4.3.8. Reaching the Poor

BMSHEL is committed to working for and with the poor, and it does this in three ways: by developing technology to help small-scale producers; by training people in appropriate new skills, and by lobbying for better planning and building regulations on behalf of poor people.[37]

The stone project is working with quarry workers, who are paid by piecework and whose work rate determines their income. BMSHEL has helped improve the quarry workers' tools, which has eased their work and increased their productivity by about 30 per cent. Further tool development might increase this income by another 50 per cent.[38] IT is also working with the Mines & Geology Department to train the quarry workers on the proper use of explosives. This will significantly reduce accidents and deaths in quarries, and by buying co-operatively the quarry workers will spend less money. This may also reduce the cost of stone, making it affordable to low-income urban and rural communities.

IT has also developed technology that enables producers of concrete products to use less cement and to diversify their range of products. The final products are then cheaper for the consumers.

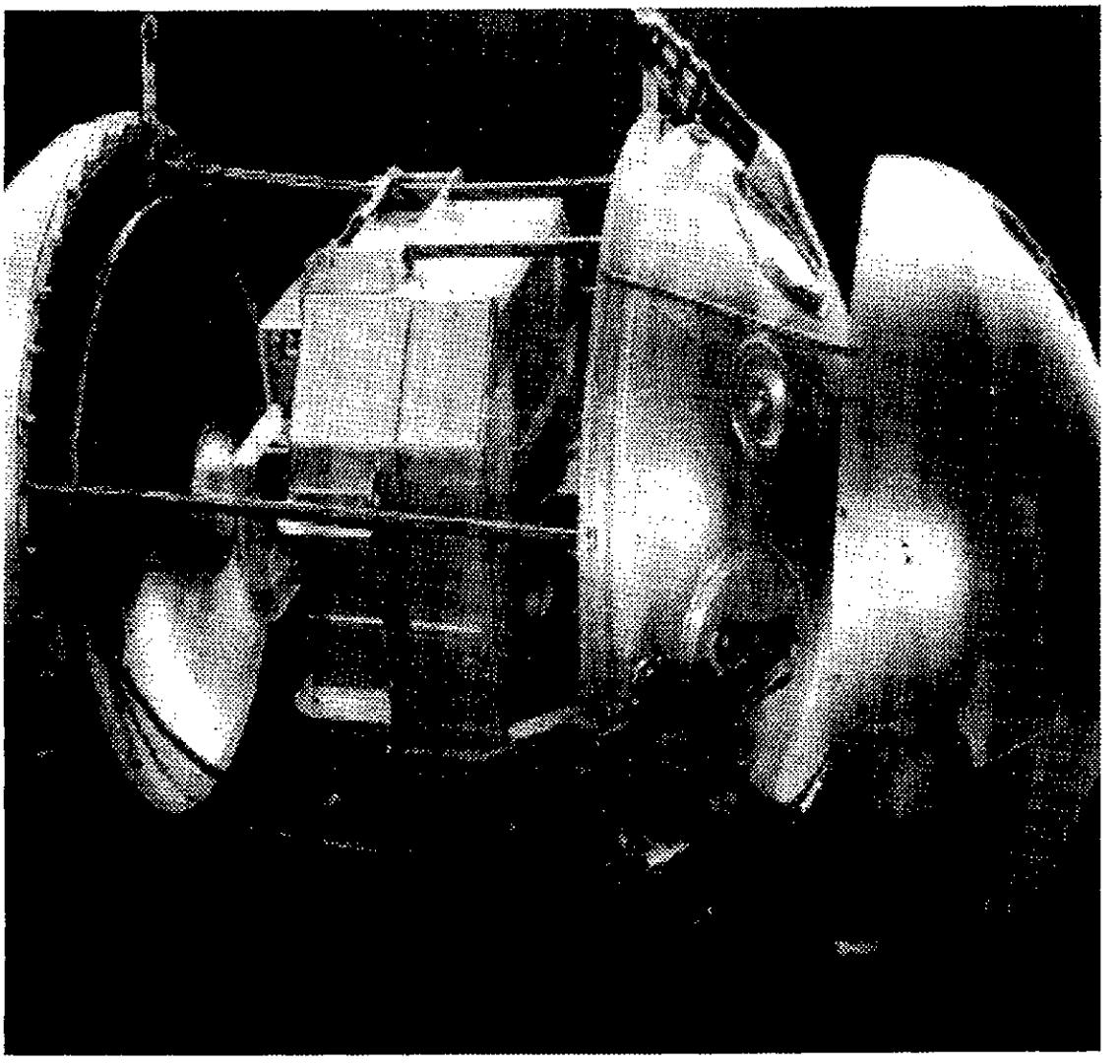
In Kajiado IT works with women, who are the traditional builders. By teaching girls and women new techniques to improve their housing at affordable prices, the whole community gains and the women have skills for life. The project also tries to help particularly disadvantaged members of the community, blind, elderly women and widows, since they often are unable to take advantage of new forms of wealth creations, such as jewellery and ornament production. Members of the family design a culturally appropriate house and provide local building materials, while the project provides the skilled labour, supervision, training, and the cement, doors, and windows.

Kenya's building codes and regulations are one of the main obstacles preventing poor people from building their own affordable shelter. The Shelter Forum was instrumental in getting the by-laws reformed to enable incremental building with local materials, of particular benefit to poor households. The Forum is also arguing for the introduction of innovative land

[37] *Ibid.*, 22.
[38] *Ibid.*, 23.

tenure models, to increase poor people's access to land. Exchange visits have enabled members of small lobby groups to see and learn from each other's community initiatives.

Chapter III



Chapter III

3.1. WORK WITH JUA KALI

Today, the government's attention is on resource mobilisation to optimise utilisation of existing capacity. Capacity underutilisation is a household name in Kenya's formal sector. This phenomenon has tended to give rise to the growth of informal sector enterprises whose aim is to meet demands which previously were satisfied by the formal sector, but now went unfulfilled[39]. The importance of the Jua Kali sector in the Kenya economy and particularly in he creation of job opportunities has long been appreciated by Kenya Government planners.

Jua Kali in modern terminology describes a sector which has been in existence for many years but until recently has not been formally recognised . In Kenya it means the Informal Sector as opposed to the Formal Sector of the economy and is thus difficult to describe in precise terms. In some cases it has been defined in relation to its management structure, the environment in which operates, the number of staff employed, the level of investment and even the method of production. This difficulty to define it has led to some confusion in the formulation and implementation of the Jua Kali programmes.

Jua Kali can be referred to as an enterprise employing up to six people operating under circumstances which are at variance with the formal sector and exhibiting an informality and deviation from regulations governing operations therein[40]. Generally a Jua Kali is an entrepreneur who identifies and exploits business in a given environment to advance his business ends.

Related to products and services, the Jua Kali sector is involved in the manufacture of a wide range of items such as farm implements, household utensils, office furniture, assorted handicrafts to special machine parts and machinery. It also offers trade services of varying types and thus provides a wide variety of general economic activity.

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[39] I. A., Oyango, *Contribution of the Informal Sector to Kenya's Development*, Nairobi: P.P., 1985, 12.

[40] Peter, O. Okaka, "Developing The Jua Kali Sector", *Kenya Engineer*, March, Nairobi: K.T., 1996, 25.

The Jua Kali sector has the potential to be a major contributor to the economic development and technological advancement of the country. Being labour intensive and requiring very little capital it can provide more job opportunities than formal sector. The Jua Kali has also other positive effects on the economy as it follow described:

- It provides affordable implements and products for wananchi and this in turn increases production in urban and rural areas.
- It affords an opportunity for entrepreneurs to participate and learn business intricacies.
- By sub-contracting it provides a link between small and large enterprises and thus promotes inter-dependence.
- It maximises the use of resources by using re-cycled material and industrial waste.
- Its flexibility in design and manufacturing methods make it responsive to market demands.

Jua Kalis are innovative and can adapt technologies more readily that the formal sector.

The informal, or Jua kali, sector provides employment for a very large number of people, especially in the rapidly growing urban areas, and produces a wide range of essential products. While most Jua Kali customers buy finished products for household use many Jua Kali workers make products or provide essential services for other producers, for example tools for farmers, metal and wooden parts for builders, equipment for food processors, and intermediate products used by other small-scale manufacturers .IT has undertaken a range of studies to identify opportunities ties to work with 'intermediate' Juan Kali workers to help improve the availability of these goods and services. These studies have already identified Migori -- a rapidly growing town with a vibrant Jua Kali sector -- as an appropriate location for such work.[41]

3.2. DEVELOPING THE JUA KALI SECTOR

In recent years, Kenya has experienced wide-ranging economic activities, unemployment, inflation, balance of Payment deficits etc. This is a result of formal-sector enterprises not having been able to perform up to expectations.

[41] Ii Group, 1994, 12.

It is evident that the sector contributes and has the potential to contribute much to the economy of the country and if exploited to the maximum its contribution will be greatly enhanced.[42] Despite the fact that Jua Kali sector's contribution to the economy is appreciated and that steps are being taken to foster a generation of local entrepreneurs that will be aware of the needs of the country, there are obvious conditions in the system which hinder its operation. Among these difficulties or constraints that can be mentioned are:

- Prohibitive Local Authority by-laws and other regulations
- Inadequate infrastructure
- Lack of markets
- Lack of designated work areas
- Comparatively low quality products and services
- Limited opportunities for financial assistance.
- Limited vocational and management skills.[43]

In the field of technology transfer, Jua Kali operators can readily adapt a technology provided it is within an acceptable level of sophistication. However, most artisans discover new technologies by chance and cannot always assets the suitability of the new technologies to their results in artisans attempts to improve methods of production. It is enough to see the amount of old cars going around. Many of them are obsolete models. They are still moving thanks to the inventive capacity of the Jua Kali that are able even to reproduce spare parts that are not in the market any longer. Another water pipe machine has been designed with a larger capacity than the imported one. It is display along Tom Boya street- Nairobi, it is simple and easy to use.

The development of appropriate technology should be targeted to specific activities after a need has been identified. The technology developed should thus be developed to meet a particular need.

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[42] Peter, O. Okaka, 1996, 32.
[43] *Ibid.*, 34.

Very often in the past an existing technology has been adapted to meet a need and the end result is not always the most suitable for the particular requirement. Hence, local institution should encourage the Jua Kali sector by providing useful information on improvements in manufacturing processes, material, etc. For a start come products manufactured at Jua Kali are taken to national polytechnics for suggested improvement in design and manufacture and, a need may develop for special technological institutions to be created for the sector.

The public attitude towards the Jua kali people is very important factor for the develop of this sector. In the past the Jua kali area has generally been perceived to be one of relatively unskilled or semi-skilled operators who produced inferior items and offered a sub-standard services, but this attitude is gradually changing. Due to the declining power of the middle income class the attitude towards the Jua Kali sector has changed. For instance most middle income vehicle owners can not afford to have their vehicles serviced by the dealers with the result that the Jua Kali sector probably now undertakes 85% of vehicle maintenance and repair in the country and this situation is unlikely to be reversed in the future.[44] Regarding women in Jua Kali, it is worth to mention that the participation of this large group in the informal sector. is mainly concentrated in the trade area and the production of tailored goods, knit products, handicrafts, etc. A great effort is being made by the Ministry of Technical Training for ensuring the women involvement to the maximum and that they benefit from available development programmes.[45]

[44] *Ibid.*, 36.
[45] *Ibid.*, 38.

CONCLUSIONS

According to the definition of Technology set in the first chapter of this essay, Kenya, as well as other developing countries, have had technology since the creation of the first tools. However, the evolving process has been different. The most difficult environment of Europe has made European countries evolve more steadily than the African countries which have a no very difficult environment. Nowadays, we can speak about transference of technology and the transformation of cultural systems that this technology has caused in Kenya and other countries.

Through the history of humankind, it can be seen how a small invention, product of the newest technology, could change the life of a person and, therefore, the life of a people. It can be seen too, how technology could be used as method of social control. With this control humanity, or certain member of it, began to realise that technology was not only a creative action but also a destructive one. It occurred after 19 centuries of the use of technology.

Harmony between technology and social context is important. Technology will be appropriate only if they suitable fit in dynamic social contexts. The use of it as a way to obtain economic advantages and cultural or political influences should be consider as a crime. Modern technology, consciously or unconsciously, has been destroying the ancient values of a culture which was seen as a sharing in the creativity of nature or as expressing an ordered cosmic system of relationships. In Christian terms, the role of the man in the co-operation of God's work in the creation of the world.

Has this harmony been present in the technology transfer to Kenya? There have been a lot of discussion. The aim of the essay was to present some repercussions of Technology Transfer in this country. Intermediate Technology has proved to be the best way to introduce technology in several sectors as it was, e. g. , in informatics, Jua kali, communications, building materials, shelter programme, etc.

Is IT enough to get Kenya developed? It depend on what is understood for developed society, and what is meant by technology. The latter is expressed by means of necessity through cause and succession. It seems that technology is synonymous of destruction or pollution or other negative points, but does not imply that we have to condemn technology.

The essential problem is not technology itself but the successful management of it, which requires wisdom and clarity as to the kind of society desired and the ways in which technology can help construct such society.

Culturally speaking, technology can be both promoter or destroyer of values. What we have to do, as Christians, is certainly not to reject technology, but rather, in this technological society and at the price of whatever controversy, we have to cause hope to be born again, and to redeem the time in relation to the times.

As Social Ministers, our role is not to lose touch with the real world. We know how the technology transfer brought from industrialised countries, as it is there, is not in harmony with the Third World, and specially with Kenyan technological environment. Appropriate and Intermediate technology is an alternative to the caused problems of the industrialised nations, and as a solution to the problem of social disharmony caused by the transfer of advanced technologies to developing countries.

As a Social Ministers, too, we have to implement a method of comprehensive planning and technology assessment. These methods could help us to foresee and evaluate the technology transfer which is being used, so that to implement a corrective action, control or add new technologies when the environment is proper.

As all societies struggle to create a world of genuine development value conflicts will endure. But these conflicts, like technology itself, can prove beneficial. The key lies in the criteria chosen to decide which values will be destroyed and which will be preserved. Technology is indeed a two-edged sword, at once beneficent and destructive. But so is development itself. So is all human history.

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