A Political Approach to Building Female Capacity in Science and Technology for Poverty Alleviation in Transitional Societies in Africa

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Abstract

This paper presents a critical analysis of poverty reduction through female gender capacity building in science and technology. It addresses policy issues and future-oriented planning that best enhance the role of women's contribution towards sustainable development and the improvement of the quality of livelihood of the population. It looks at what factors impeded their participation in science and technology and how this can best possibly be ameliorated. The paper looks at the challenges and strategies for improving the status of women in Africa and how human capital development in the domain of science and technology will greatly enhance female gender input in reducing poverty and promoting growth.

It is argued that science and technology have and will play a major role in contributing towards developmental challenges and changes. Furthermore, it will be maintained that without gender empowerment deepening their democratic participation and enhancing their access to the domain of credit facilities, land tenure issues and rights, and capacities in technological skills, the problem of poverty reduction will not be adequately addressed. There is no poverty reduction without female gender empowerment across the board. Female gender empowerment should begin with capacity building, giving greater access to their education in all disciplines so as to enable their climb to vital decision-making positions that enable holistic processes of socio-economic transformation. The conclusion is that there must be a clear vision and a comprehensive agenda for female human capital development.

Keywords: science and technology, gender empowerment, deepening democracy, socio-economic transformation, capacity building, knowledge creation

## Introduction: Moving Beyond the Politics of Differences

The strategic role played by both technological change and capability in economic and social development remains well established. Unfortunately within that essential component or context, particularly within the framework of transitional societies, there is little opportunity for female input. The penetrating impact of new emerging technologies (NET), genetic engineering and information communication technologies (ITCs) only adds to the plight of the female gender enhancing their input roles. It is not that women do not have the capacity to be part of this evolving and emerging technologies but that the politics of differences inhibit their participation. Unless this politics of difference is adequately addressed, it will be difficult for women to be part of poverty reduction mainstreaming in any transitional societies in Africa.

For quite some time, women and gender related issues attracted critical studies. A turning point came in the 1970s when feminist critique and women's Non-Governmental Organizations (NGOs) made visible the ways in which development plans overlooked women, including their role as workers, mothers, and entrepreneurs, as well as in subsistence and family production.

Generally, women welcome modernization as long as they can have some say in the manner in which the technology, which is affecting the quality of their working and family lives, is adopted. The existing politics is that women usual-ly have insignificant power over decision-making when they are confined by traditions and constrained by norms of behaviour and cultural attitude in their communities. For quite sometime now, there has been some reluctance to initiate women into technological development and its related impact on society: in the same vein, there has been reluctance to discuss the effects of modern technology on the working lives of women. Vandana Shiva (1993: 9) challenges the universality of western existence, asserting that emerging from a dominating and colonizing culture, modern technological systems are themselves colonizing.

Given that a majority of women are involved in the subsistence economy, there is need that technologies address areas of subsistence. This perspective means not only implying a change in various accepted social and economic divisions of labour, but also a process of substituting money and commodity relationships by principles such as reciprocity, sharing, caring and respect for the individual. Mitter (1995: 16) asserts "a subsistence perspective demands a shift away from the prevailing instrumentalist, reductionist mode of technology, which (according to ecofeminist's) has given rise to and maintained man's domination over nature, women and other peoples. Subsistence science and technology could be developed in participatory action with the people. Such science and technology will not reinforce unequal social relationships and will lead to greater social justice." Seen within this framework, one is bound to question state capacity in science
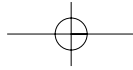
and technology (S&T) related activities. In particular we need to ask what is the impact of change in the political regime on the evolution of S&T, its effects on women and how international political factors influence policy change?

A political approach that signals a genuine revolution for gender equality and builds female capacity in S&T for poverty alleviation requires concerted and comprehensive policy strategies and agendas. Four factors underline the revolution for gender equality namely (i) equality of opportunity for all the people in society; (ii) sustainability of such opportunities from one generation to the next; (iii) empowerment of people so that they participate and benefit from development processes; and (iv) overcoming cultural taboos and diversities.

The struggle for gender empowerment and equality changes most of today's premises for social, economic and political life of the nation. It goes without saying that the revolution toward gender empowerment and equality must be propelled by concrete strategies for accelerating progress. Furthermore, government intervention is vital through policy reforms and affirmative actions. Policies must be framed within the context of short, medium and long-term perspectives. Access to productive resources is critical to enhancing women's choices. Box 1 outlines the multiple problems faced by the vast majority of women in third world.

### Box 1 Multiple Problems faced by Women in Transitional Polities

- Lack of access to bank credit is a persistent barrier to attaining economic independence and widening choices.
- Choice in the spacing and number of children will enable women to control their life choices.
- Access to productive resources is crucial in enhancing women's economic choices – land tenure issues, women do not have legal control over the land they farm, nor equipped with technologies designed to increase production and consumption of food-producing crops.
- Access to human capital development in education should not only be limited to the boy child. Human capacity development is the gateway to empower many. Illiteracy rates are higher among women and girls.
- Cultural taboos and violence against women should be addressed.
- The lack of creation and dissemination of food processing technologies to reduce chores and free up more time for food production and caring for children.
- The absence of the promotion and development of agricultural techniques for women in terms of production, agricultural work after the harvest and selling.

Capturing Gender Disparities

The issue of understanding and measuring gender inequality is essential to capture gender disparities and their adverse effects on social progress. Capturing such a complex reality situates the problem of gender inequality firmly on the social agenda and should enable policy-makers to rethink and meticu-

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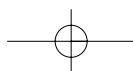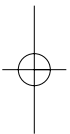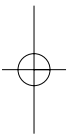
lously draw policy conclusions about critical shortfalls in gender capabilities or opportunities and about priorities to consider in their plans of action for the sustainable socio-economic transformation of the country.

We may describe gender issues as a political project to understand and therefore to change women's inequality, exploitation, or oppression. Gender becomes a social construction, which can be changed. It enables one to explore different meanings of gender. Gender is (i) personal identity – experience of being a woman; (ii) social identity – what others expect of a women; and (iii) a power relation – why are women as a social category always under-represented in relations of power. The bottom line is that "gender" is political – men contest it and women regularly subvert, challenge, or bolster gender difference in different contexts. Therefore, gender constitutes the basis for a mobilized political identity.

Not only differences between generations but ethnic, racial and class segregation have been shown to have interacted with gender to produce hierarchies among women. Gender cannot be regarded as a distinct unchanging category (Rowbotham 1995). Baron (1987: 62) argues, "We need to scrutinize how class and gender are constructed simultaneously." Gender itself is shaped by circumstances of class, race, and ethnicity. The view that men shape work to protect their gender interests assumes that gender is monolithic, rather than multidimensional and internally inconsistent it also assumes that men are omnipotent, that they know what

their gender interests are and have power to construct the world the way they like and want. Female gender research needs both to question male power rather than assume its existence, and to examine what its limitations are.

It is not only how women do science which matters but what science does to women; not simply women's lack of power to shape technologies but also the effect of existing technologies upon their lives. This implies involving women in decision-making and the development and utilization of science and technology for the socio-economic transformation of the society.

After the first ever global conference on women (Mexico 1975) the Decade for Women (1976-1986) was instituted. It generated a huge amount of material on women's lives and the discrimination they face. It equally documented the gendered effects of development as well as provided a base for the themes of justice, peace, development, equality that became pronounced during the third women's conference in Nairobi (Kenya) 1985. The concept "Women in Development" (WID) was introduced in the policy action plans of most countries. Opinions however, were divided on WID: some sought to integrate women more equally into development while others saw development as damaging to women. Rather they sought the empowerment of women through participation in development decisions that affect their own lives and choices.

Over time these concepts have come to dominate gender issues. These concepts include (i) Human
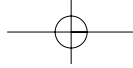
Development Index (HDI); (ii) Gender-related Development Index (GDI): and (iii) Gender Empowerment Measure (GEM). The Human Development Index (HDI) measures the average achievement of a country in basic human capabilities. The HDI examines different aspects of social conditions in a country, life expectancy, and human capacity development, distributional inequalities for various groups of society. The Gender-related Development Index (GDI) concentrates on the same variable as the HDI but focuses on inequality between women and men as well as on the average achievement of all people taken together. The greater the gender disparity in basic capabilities, the lower a country's GDI compared with its HDI. The GDI is simply the HDI discounted, or adjusted downward, for gender inequality. The Gender Empowerment Measure (GEM) examines whether women and men are able to actively participate in economic and political life and take part in decision-making while the GDI focuses on expansion of capabilities, the GEM is concerned with the use of these capabilities to take advantage of the opportunities of life. The GEM measures women's participation in economic, political and professional activities.

The statistics for Africa are not encouraging. Much progress remains to be made in gender equality: to enhance their empowerment and to permit them entry into the corridors of economic, scientific, technological and political power. African women constitute a distinct minority in exercising real power or decision-making authority throughout the continent, even though they constitute the majority in physical numbers; and contribute more hours to the daily scourge of work.

Growth and Human Development

Empowering people – particularly women – is a sure way to link growth and human development with poverty alleviation. There is no doubt that the denial of opportunities and recognition of women in Africa pervades nearly all areas of human endeavour. Their situation becomes more precarious with the great advances made in science and technology. These advances further exclude their input in the development process. In so doing it retards the sustainable development of the continent.

The participation of women in science and technology and the impact of technology on women's working lives is extremely important to addressing the pandemic of underdevelopment and poverty that now engulfs the continent. Therefore, up grading women's skills through a continuous learning process benefits them and the countries involved. In a globalising world, with increased competitiveness through foreign collaboration considered as a high priority, women's education and training in new technology producing jobs assumes special importance. Furthermore, in such human capacity building, it is of vital importance to give women access to "soft" and transferable business skills that allow them to cope with the dictates
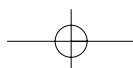
of the market and of technology.

Women's empowerment, linked to science and technology development, is shaped and tailor-made essentially by the country's geopolitical environment, which, of course, does not exclude the inherent factors and impediments of creed and culture. Even within a country, the inherent impact of cultural taboos and value beliefs constraining female gender capacity building is never uniform. Cultural diversity implies diversity of attitudes and approaches to female capital building in the country.

The labour and job markets are changing and creating new job opportunities and career structures for women in society. Women are however, handicapped when it comes to taking advantage of these widening opportunities due to their limited human resource capabilities. The African woman generally is not properly equipped in this respect.

It should be pointed out that technology has not simply replaced labour; it has also led to a polarization in skills and to decentralization of work to home-based workers especially in the developed world. This makes it all-important for a concerted government policy to address the situation. A political approach remains imperative; one that must exhibit political will, necessary to redress the current situation of marginalization in light of the prevailing social environment and cultural norms. It is extremely difficult for most African women to have access even to primary and secondary education, let alone technical education.
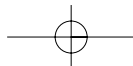
The most important issue for Africa now is to examine and seriously address women capital development (WCD) as the gateway to their empowerment. In other words any advances are based on the precondition of effective women capacity development. The slogan should be expanding capabilities with unlimited opportunities. We continue to live in an unequal countries, continent and global environment, reflecting both the existing deficit in women's human development backed with current institutional, legal and socio-economic constraints to their access to power and opportunities.

Incidentally, African women acquired the right to vote at independence. They had been a strong, active and contributing force and partner in the struggle for self-determination, freedom and liberty. Being a significant part of the political process and space, the African political landscape unfortunately operates today without women in the political and decision-making process. Since changes in society normally come through the political process, women's lack of political opportunities remain a serious concern and impediment to poverty alleviation. This equally impedes the way forward for the continent in a very challenging and rapidly changing, tough and competitive global environment of the characterises the twenty-first century and beyond.

Disparities in Science and Technology

The disparity gap between males and females in science and technology is unfortunately not narrowing, but rather the gap has been exacer-

bated by the growing impact of information and communication technologies which places women at an even greater disadvantage.

Given the hybrid nature of cultural identity, taboos and the consciousness of peoples in most societies, it is prudent to look at the various categorizations that place women on the disadvantaged side of the divide. It becomes necessary for the continent to move beyond the politics and policies of differences: to bring the female gender to the plus side of the development continuum, the reasons being simple. One cannot talk of sustainable development when more than 51% of the population is not given a new lease of life and seen as partners, participants and beneficiaries in the development bandwagon.

Admittedly, it is not that there is a lack of thinking about women in S&T and R&D related activities. Indeed, there has and continues to be a plethora of literature and debate in the field especially since the late 1970s. What has been lacking is the political will to bring to fruition the recommendations (national and international) on getting the female gender more active in S&T related activities. The second problem has been the lack of access to exploit their potentials in this domain (business and marketing skills). There is also the question of overcoming cultural taboos about developing and building the human capital of women.

Against this background of contradictory trends, male chauvinism and other impediments, it is futile to formulate a generalized strategy for giving women access to education and training. Miller (1995) points out that the opportunities and barriers that women face in gaining appropriate skills depend too much on the historical specificity of the situation and on their class backgrounds. For this to be possible it is vital to have a clear vision of both the similarities and differences in the interests of different groups of women.

We need to move beyond the present situation and understand the simplistic notion of unchanging women's role and responsibility to technology. African women need a transition. It is sad to note that forty or more years after independence, the women in Africa have not moved ahead. The over-all status of women in Africa remains bleak even though some progress has been made. That progress is not sufficient and significant enough nor does it reflect their contribution to the economic, political and developmental struggles of the continent.

Let us look at some of the statistics that depict the disparity between the genders. For example, in education, women's participation in national educational systems remains biased due to their socio-cultural and economic environments. As earlier indicated, this is due to a gross lack of genuine political will to ensure that girls are given due access to education in many African countries. Of course, we cannot bypass cultural taboos and other constraints impeding their human capital development. More than two-thirds of the continent's illiterates are women. Women are generally regarded as inferior to men and it is generally accepted that they should not therefore aspire as high as men,

particularly in the engineering disciplines. The general fear for men is that women's venturing into these disciplines would take them away from household related duties like looking after the home, bringing up children and above all, providing for the essential services and needs of their husbands. Table 1 illustrates existing disparities in respect of male-female enrolment ratios by level of education in 1970 and 1990(% estimates)

Table 1: Male and Female enrolment Ratios by Level of Education in 1970 and 1990

| level
Region | 1970 | | | | | |
| | First level | | Second level | | Third | |
	M	F	M	F	M	F
Sub-Saharan Africa	56.7	36.0	9.9	4.4	0.8	0.2
Arab states	77.9	46.4	28.1	12.5	6.3	2.0
LAC	91.9	89.4	26.3	24.6	8.0	4.5
East Asia	107.9	94.5	33.1	23.6	1.6	1.1
South Asia	87.1	53.2	30.7	13.1	7.4	2.2
North America	103.5	102.8	92.6	93.6	52.8	37.8

| Table 1 Continue
Level | 1990 | | | | | | |
| | First level | | Second level | | Third | | |
	M	F	M	F	M		F
Sub-Saharan Africa	73.5	59.9	21.2	13.8	2.8		1.0
Arab States	92.3	74.2	60.2	44.9	15.6		9.5
LAC	111.4	107.2	55.7	59,6	19.3		18.2
East Asia	124.6	114.9	58.7	47.7	7.3		4.9
South Asia	100.8	75.1	47.8	28.2	12.1		5.3
North America	103.0	101.4	98.4	99.5	66.7	74.1	

Source. UNESCO 1991 (p.53)
M=Male   F=Female: LAC=Latin American and Caribbean
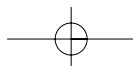
A Political Approach to Building Female Capacity

Africa is falling behind the rest of the world in respect of human capital development for women in particular and at all levels of education in general. Table 2 is the projected adult literacy rates by sex (% literate adults in the population aged 15 or over.)

Table 2. Projected Adult literacy rates by sex
(% adults in the Population aged 15 or over)

|	1990			2000		
	Both	M	F	Both	M	F
SSA	47.3	59.8	36.1	59.7	70.2	49.6
Arab States	51.3	64.3	38.0	62.0	73.1	50.6
LAC	84.7	86.4	83.0	88.5	89.7	87.3
East Asia	76.2	85.7	66.4	82.8	90.0	75.4
South Asia	46.1	59.1	32.2	54.1	66.2	41.2
DC	96.7	97.4	96.1	98.5	99.0	98.0

Source: UNESCO (1991: 26)
SSA=Sub-Saharan Africa; LAC=Latin America and Caribbean; DC= Developed Countries

Table 2 is equally indicative of the fact that Africa like South Asia and the Arab States trails behind as far as the general literacy rate for women is concerned. It is lower than for men. Many factors contribute to the differences in these regions and the rest of the world in enrolment levels, for example, government expenditures on education, or the general socio-cultural and economic environments of the region. In Chad for example, the enthusiasm for schooling is increasing rapidly, faster than many schools can cope with. In public schools there are school desks having seats for only 23% of the pupils. Even private schools have seats for only 48% of their pupils. Most children who go to school do so between the age of seven and eleven. After that age many children start to drop out. Most of the dropouts are girls. In 2000 that meant that only 4.7% of all the students who left school, had obtained a diploma.

Turning to Table 1, we discover that the number of female enrolments and those continuing to the

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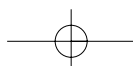
secondary level in Africa has shown some significant increases. The gap is narrowing between male and female enrolment in secondary education. However, the disparity gap between male and female enrolments in the tertiary sector is not showing any significant improvement. As earlier indicated, Africa has the lowest figure in the world in female enrolment in the tertiary levels of education.
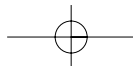
Generally it should be noted that in developing countries, Africa in particular, the opportunities for girls to proceed beyond the first level of formal education are still significantly less than for boys. Furthermore, public expenditure on education in Africa is the lowest in the world. This may be due to the economic situation of the continent backed also with its rapid population increase: It could also be as a result of poor planning and vision regarding human capital development, institutional capacity building and social foresight. Another cause of such gaps is that in many countries, public spending on education is skewed towards the rich. Even when public spending is distributed more equitably, rich parents can buy a far better education for their children at private schools. Poor parents cannot. They are not even sure when they will have their next meal.

While gender gaps in education are large in some countries and nonexistent in others, wealth gaps exist the world over. Existing examples include Senegal, where the enrolment ration for 6-14 year olds from the poorest households is 52 percent points lower than for those from the richest households, and

Zambia, with a 36 point difference. Such wealth gaps perpetuate the cycle of poverty; those born poor are likely to die poor. Furthermore, in some countries (Egypt, India, Morocco, Niger, Pakistan) the gender gap in education is much larger for poor households. In India the gender gap in enrolment is only 3 percentage points in the richest households, but 34 points in the poorest (UNDP 2002) The girl child in poor homes is worse off in such situations as far as human capital development is concerned.

Table 3 presents a view of public expenditure on education between 1970 - 1985. Much remains to be undertaken by African states to step up female enrolment in higher educational institutions (HEI). According to the World Bank (2000) various university systems in Africa have sought to increase female gender enrolment through affirmative action. For example, in Ghana, Kenya and Uganda, women university candidates have been given bonus points on their admissions examination score so that more of them pass the cut off point. Between 1990 and 1999, female participation increased from 27 to 34 percent in Uganda and from 21 to 27 percent in Ghana.

In Tanzania, rather than provide women with a score bonus, an intensive six-weeks remedial course in science and math was offered to women who did not pass the matriculation examination. Those who completed the course in science and math were given a second chance to take the exam, and university authorities report a high pass rate in the second round. The university of Dar es Salaam recently

conducted a performance assessment of female students who had entered the university in this way and found that most of them were performing well; in fact, several were at the top of their classes.

Table 3: Public Expenditure on Education 1970-1985

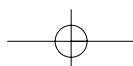| Regions	US$					Percentage of GNP				
	1970	1975	1980	1985	1988	1970	1975	1980	1985	1988
SSA	1.3	4.0	11.0	8.0	7.1	3.1	3.8	4.9	4.3	4.5
Arab states	1.8	8.4	18.0	23.8	27.7	5.0	5.9	4.4	6.0	6.4
LAC	5.6	13.6	32.7	28.6	38.9	3.3	3.6	3.9	4.0	4.4
East Asia	2.6	6.3	15.5	19.9	24.4	1.9	2.3	2.7	3.2	2.9
South Asia	2.2	5.3	12.8	14.8	24.0	2.6	3.0	4.0	3.4	3.6
North America	83.0	131.3	201.8	293.3	365.7	7.5	7.4	6.7	6.7	6.8

Source: UNESCO (1991: 36)
SSA= Sub-Saharan Africa; LAC= Latin American and Caribbean

This experiment shows the need to demystify science subjects especially mathematics. These are subjects taught mostly by male teachers who give the impression that girls cannot do math and science related disciplines like biology, chemistry and physics. The shying away from science related subjects by female's accounts for their marginalization in fields like engineering, architecture, medicines etc. Judging from the initiative of the University of Dar es Salaam to intensify the capacity of girls in math and sciences, there is reason for serious efforts to improve their capacity in these disciplines so as to open greater opportunities for their participation in professions considered to be male dominated and reserved.

Women in Education

There is a wide disparity between male and female scientists and engineers on the African continent. This leads to the exclusion of African women in the access to modern technology or the creation of alternatives to reduce their daily burden particularly in agricultural related activities, in industrial production and also in the fast growing information and communication technology which is revolutionising the job market, making it impossible for women to find a place in the banking indus-

try for example.

The recent move by the Ministry of Women Affairs in Cameroon to promote female gender academic excellence is welcome. The Ministry has recognized the achievement of girls in recent public examinations, the General Certificate of Education (GCE), Ordinary and Advanced levels and its French equivalent (2003) as a way of encouraging girls to take human capital development seriously. It is a motivating factor for parents to send the girl child to school.

Advancing human development requires governance that is democratic in both form and substance – for the people and by the people. Countries can promote human development for all only when they have governance systems that are fully accountable to all people – and when all people can participate in the debates and decisions that shape their lives. Worse outcomes for women in many aspects of human development result from the fact that their hopes and aspirations have less impact than men's in the decisions that shape their lives. This inequality in empowerment is partly captured by the gender empowerment measures (GEM), which helps assess gender inequality in economic and political opportunities.

More than fifteen years after the Jomtien Conference (1990), the objectives of "Education for All" are still far from being achieved, and have been churned into another distant dream for the next ten years or so. The proportion of women in education, 26 percent of secondary enrolment and 3.9 percent of tertiary enrolment in Africa, compares

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unfavourably with that of many developing countries, where it has reached up to 51 percent and 10.9 percent respectively. Low female participation and achievement remains a salient feature of higher education in sub-Saharan African countries. Studies on barriers to women's participation in Tanzania (Mhehe 2002) and in Malawi (Banda & Polepole 2002) point to the "everyday realities of women's lives", particularly those in full-time employment, which make higher learning in traditional face-to-face teaching almost impossible due to all sorts of social constraints (Rumajagee 2003: 293).

Though distance education may create new avenues for the women to further their education, it only adds to their daily struggle and the other burdens of caring for the family. The important policy approach is establishing a conducive atmosphere for their empowerment; to ensure their human capital development from the onset, and within the same parameters as males. The Millennium Development Goal (MDG) calls for the elimination of gender disparity in primary and secondary education at all levels by 2015. Still of the world's estimated 854 million illiterate adults, 544 million are women - and of the 113 million children not in primary school, 60% are girls (Filmer 1999). The world is still a long way from achieving equal rights and opportunities between females and males. The situation in Africa is even worse. Without the appropriate human capital development, particularly in science and technology related disciplines, the female gender cannot
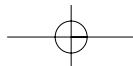
effectively further the struggles for poverty alleviation nor ensures a sustainable developed society.

African countries must devise strategies that incorporate the development of a mix of skills at higher educational levels for all, and in particular, as far as the female gender is concerned. Triggering a virtuous cycle for human development requires promoting democratic politics. Promoting democratic politics means expanding capabilities such as education, to enable people to play a more effective role in such politics and fostering the development of civil society infrastructure and other informal institutions to help democratic institutions better represent the people.

Poverty Alleviation

Empowering women by enhancing their human capital development and deepening their participation in the democratic governance process constitutes a sure means for addressing the ongoing issue of the poverty pandemic virus that pervades the society. Given the massive involvement of women in the agricultural and informal sectors of the economy, it is only logical that their knowledge capacity be continuously developed and sustained. Society needs to enhance their capacity for increasing food production, safety palatability and maintaining food security.

Sub-Saharan Africa continues to have the highest prevalence of under nourishment and the biggest increase in the number of undernourished people. Currently, in many parts in southern and eastern Africa are facing food shortages. However, the picture is not uniformly grim on the continent, and many countries have made progress in reducing the prevalence and number of undernourished people. Simply producing more food cannot solve the problem of hunger and malnutrition. Rather, food security is achieved when the individuals concerned have secure and sustainable access to the food they need for healthy, active lives. This makes it more imperative to increase female human capacity particularly in the domain of science and technology

And there are reasons why greater emphasis should be laid on science and technology and women's active involvement and in particular, of their greater role in caring for the home, health and dietary of the family. Poverty has equally contributed to poor quality diet. Poverty and food policy needs a new focus with more emphasis on the industrial structure of the food industry, more on food preservation, more on supply and value chains, more on food safety, more on chronic dietary diseases. There is need to enhance women capacity in the job market, in the preservation and marketing of their products. Diversified food products, traditional storage facilities and the availability of natural additives for different crops within various ethnic groups reveal the volume of indigenous knowledge of preserving the wholesomeness of our food items for longer periods.

Building on Women's Experience

As custodians of indigenous knowledge particularly in the domain of food preservation, their knowledge and wisdom should constantly be updated and harnessed. Women play a major role in food security and poverty alleviation whether as vulnerable groups or as individuals who can contribute to procuring food security for the household and each of its members. One of the main factors contributing to poverty and food insecurity in rural households, in particular as regards child nutrition, is that women simply have too much work. This calls for more user-friendly technologies that can significantly ease their burden of work.

The role of women in poverty alleviation is multifaceted. But their skills and human capacity must constantly be improved upon. Their knowledge in the growing information and communication technology boom must be intensified even in the rural areas and where possible in local languages which they understand. Moves in Eastern Africa in this area should be greatly encouraged. As already indicated, one of the main factors contributing to growing poverty is the total marginalization of women, their non-empowerment and of course the oppressive fact that women simply have too much work.

Measures must be taken to strengthen the position of women as key figures in achieving poverty alleviation and food security, such as:
- Improving women's access to education and to productive resources; i.e. land, credit and technologies designed to increase production and consumption of food producing crops.
- Enhance rural women's skills through training, education, publication and network creation programmes.
- Promote and develop agricultural techniques for women in terms of production, agricultural work after the harvest, and selling.

The issue of female human capital development should not only be limited to poverty alleviation. Enhancing female empowerment has significance in addressing health related issues, which also is fundamental in poverty alleviation? The ongoing scourge of the HIV/AIDS pandemic and other sexually transmitted diseases, including the Africa's historical killers like malaria and tuberculosis, along with ensuring clean water and surroundings, are important issues which must be adequately addressed.

The HIV/AIDS pandemic has been both a cause and effect of Africa's deepening poverty and financial problems that have pushed many families to the very edge of survival as well as limiting government's ability to respond to the growing orphan crisis.

The Impact of Orphans

In most countries, many of the orphans live in a household with a surviving parent, usually their mother. The high incidence of HIV infection within marriage, however, means that many children soon lose both parents, and become the

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responsibility of the extended family. Grandparents raise about 40 percent of these children, while aunts and uncles raise about 30 percent. Such new charges are a great and added burden to women and their families.

Thus the HIV/AIDS pandemic is presenting a daunting development challenge, diverting labour from farming into care provision, increasing food insecurity and poverty and threatening the survival of entire communities. In 1999, 24 Sub-Saharan African countries had infection rates of five percent or more. Over two million AIDS related deaths occurred in these countries. As a result of these deaths, it is estimated that the number of AIDS orphans stands close to, or more than, one million in each of the following countries, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe (Cohen 2002, World Bank 2001, Kouakou 2003).

These developments make it imperative for improving the human capacity of the people, particularly women who often bear the brunt of the social effects and consequences of the aftermath of HIV/AIDS victims. Only through political will and commitment involving the state, civil society, the productive private sector and the international community can these issues be adequately addressed. As of now, child-headed households, once a rarity in Africa, are now increasingly common, but formal and traditional inheritance, land ownership, and health and education policies have not kept pace with their needs. African states must

therefore show strong commitment towards female gender empowerment and move fast to improvise solid solutions, drawing on local skills and available resources.

Since women make a predominant contribution to Africa's agricultural production, especially of food, greater efforts need to be made by governments, donor agencies and local financial institutions to ensure that women's efforts are maximized and sustained. In particular, rural women must be brought into the mainstream of bank lending programmers, in a way which recognizes their specific needs. Presently, bank credit policies are extremely discriminatory, tending to label women – whose small-scale economic activity might be mobile or seasonal – as credit risks. This locks women into a "vicious cycle of small-scale operations" lacking credit to improve, expand and gain in credit worthiness. Considering that women produce about 75 per cent of Africa's food, such discrimination is detrimental to the continent's efforts to achieve food security and effectively fight against the state of growing abject poverty and misery in society.

Women also need training skills in how to manage and expand their enterprises. Depriving them from human capital development impedes development. Poverty reduction, food security have to be a self-sustaining process that continuously applies the values and institutions of rural people, rather than a series of programmes designed elsewhere, which have no faith in the people. Africa is not making maximum use of the natural intelligence obtained

from the experiences of women. Enhancing their capacity and capability through education and empowerment is a sure way of mobilizing local resources and promoting income-generating activities as engines of growth for Africa's economic and industrial take-off. The irony and fundamental difference is men have access to the means of improving themselves and their status and women do not and are being denied human capital development opportunities. These inequalities show that the issue of fundamental human rights as advocated in the West, important though they are, may well be meaningless within the African context. This has to be redressed so that both men and women are equally treated.
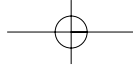
Ways Forward - A Political Approach

Indeed, African states have to a large degree been confronted with the issues of (i) accelerating the process or pathway for sustainable development; (ii) the promotion of science and technology activities to achieve envisaged goals; (iii) the existence or lack of capacity in S&T due to political factors; and (iv) the bringing of the female gender into the mainstream development process. These issues demonstrate the scope and concern of this paper. In fact, the underlying intention has been to explore the political condition for human capital development, science and technology policy articulation and aggregation for the socioeconomic transformation of the country.

The relationship between education – human capital development and science and technology is fundamental in the socio-economic transformation success of Africa. For years the educational system of African countries has not delivered the human capital necessary to actualise the economic and industrial development of the region. Worse, women have been left out in the process. Generally human capital development is plagued with numerous problems, including insufficient levels of investment, inadequate infrastructure (human and material), poor leadership and inconsistent policy approaches among others.

However, these challenges are not insurmountable. The human capital development, particularly of women would have to be tackled, if the continent is to create a viable progressive and prosperous future. To discuss the subject of female human capital development in the continent is to conceptualise how to address and overcome in a positive way the penetrating impact of cultural beliefs and other taboos, male chauvinism and the other handicaps that plague the continent. A new form of accessibility and connectivity between destroying or modernizing cultural values and venturing into the twenty-first century under the canopy of ITCs has to be established.

This paper has only scratched the tip of the iceberg. The socio-economic and industrial development of the continent is dominated largely by common factors; poor leadership and vision, bad governance, inconsistent policy approach-

es, poverty, ethnicity, cultural taboos, vulnerability to natural, technological and economic shocks. It is evident that political and economic governance systems have the potential to provide strong incentives in making a difference in the technological transformation of the African continent. What is required is the political will and vision, one that incorporates all in the development process. In short, one that is people-oriented with the common good taking precedence above individual self-interest. It is clear that female empowerment, science and technology, poverty alleviation and democratic governance go hand-in-hand. Therefore, the state, Civil Society and the Private-Productive sector linkages remain vital in addressing the issues of female human capital development and empowerment. The role of S&T cooperation between the public and private sectors is irreplaceable in developing the knowledge to promote socio-economic development and global competitiveness.

Democracy has to be deepened and women empowered to advance the economic and industrial development of African countries. Without the political will and incorporation of the entire society, science and technology may not deliver the required results. As long as there is a kind of democratic deficit in the governance system, it will be difficult for women to make the necessary breakthroughs in a male dominated world. Thus national fragmentation accounts for the state of poverty and marginalization plaguing each country, region and eventually the continent.
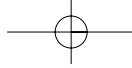
Progress can only be made through a democratic governance system that consistently addresses issues of human capital development and with focus on the female gender. There is an urgent need to radically change the prevailing perception of the girl child and the female gender. Political leaders, the state in conjunction with civil society must address national inequality – which constitutes the grotesque levels, and ambiguous trends in the socio-economic transformation of the country. A genuine political will and positive decision making provides the only way forward. It also calls for women getting politically and scientifically active in changing that image of male chauvinism as the only way for the socio-economic, political, industrial and technological transformation of the society.

Addressing Inequality

Though it can be admitted that each country must determine its own path toward human rights and democracy, the international community must not be silent when gross inequalities exist between men and women, the rich and poor. What is required is to recognize and engage with the issue of popular participation, partnership and responsibility sharing between the state, civil society and private sectors including equitable sharing of the wealth of nation.

Popular participation and partnership between the sexes requires the strengthening of human capital through improved health services, education, training and population policies, with donors (international community) urged to play a signifi-

cant role in these efforts. Women's participation is also seen as vital to successful development. Therefore, African governments must pay special attention to improving access to learning for women, young and old, urban and rural, literate and illiterate. We should bear in mind that the conditions of life are much the same for men and women in Africa; however, with there is one fundamental difference, men have opportunities for self improvement that are denied while women.

In these concluding paragraphs, we contend with the role of political institutions, political constituencies, forms of political representation and political culture as factors for nation-building and inputs to building female human capacity in science and technology related activities. These issues are mapped in Box 2.

Box 2   State Capacity and Constraints in Building S&T Critical Mass

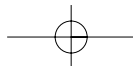|	
State capacity	**A**: State capacity for building National Systems for support of female gender participation and development in Africa.
And Constraints	**B**: Political, economic and administrative constraints on state capacity for promoting science and technology, (S&T), and research and development (R&D) and human capacity development (HCD) in Africa;
	- State-society relations, education and technology policies in Africa Countries:
============>	- Administrative capacity, corporate culture and effectiveness in production and technology policy. - State capacity of education, technology policy making: policy content and responsiveness of technology agencies in change.
Policy in African countries	**C**: Prospect for state action in support of education, science and technology.

Source: Forje (2003)

Conclusion

A number of conclusions can be drawn from the three major areas. First, some African countries are showing some capacity in the support of pockets of activities for poverty alleviation in very specific sectoral projects areas like health and agriculture. Second, is the absence of policy engagement, there is no National Science Policy as an integral component of national development strategy or agenda. Third, is the poor implementation of whatever form of rhetorical policies that have articulated. Cameroon for example, has no national science and technology blue print policy. In addition, the state for the past two decades has abandoned the five year development plan that gives a clear perspective of what was to be accomplished. Rather the state has consistently relegated S&T and R&D to the background. In fact, there seems to be no sense of direction as research institutions are abandon en masse with the Ministry having one of the smallest budgetary allocations.

Clearly, it is easy to recognize the inherent problems in the politics of development policies, but it is plainly a potent source of disillusionment. A fourth source of pessimism concerns the state's seeming capacity to induce technological innovation in many African countries.

Africa finds itself caught between traditional heritage and modernization. In short, it faces a conflict between the power traditional taboos and the power of capacity building. We need to embrace the latter and recognize that this is true development and that it is the core of human capital development that will make the current poor and vulnerable better off tomorrow. If the problems facing the economic, political, industrial and technological transformation of Africa are to be solved and a sustainable rate of growth and society achieved, it is important to enhance and empower women, to promote their active participation in the development process, and to introduce science and technology as measures which will be conducive to accelerating the development and competitiveness of the continent in the global village of the twenty-first century.

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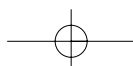
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