

Practical Action in Sudan

How can the approach of intermediate technology be further implemented to provide solutions for development problems in Sudan?

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The role of technology in development is essential, particularly its introduction and implementation in societies according to different economic, cultural and political contexts. This paper reviews and analyzes the intermediate technology approach proposed and practiced by The INGO 'Practical Action' in order to contribute by drawing guidelines for further implementation of this approach on the national levels of least developed countries (LDCs). Mainly on the case of Sudan, the policy proposals here concentrate on the fields of education, healthcare, socioeconomic development and rural/civic infrastructure.

INTRODUCTION

International development raises many complex issues, and one of them is the issue of technology transfer. The contextual understanding of different economic, environmental and cultural aspects of least developed countries (LDCs) makes it a necessity to strive to have the right technological appeal to these countries' needs, rather than assuming that what works beneficially in developed countries can work the same way everywhere else.

The objective of this paper is to review and analyze the intermediate technology approach proposed and practiced by 'Practical Action' – an INGO previously known as Intermediate Technology Development Group (ITDG) – in order to contribute by drawing guidelines for further implementation of this approach on the national levels of LDCs. The paper concentrates on the case of Sudan, bearing in mind that Sudan, as an LDC, shares many of the common development problems with other LDCs, especially other Sub-Saharan African countries.

The paper will start with a background that will include the philosophical foundation of the intermediate technology approach and a brief history of Practical Action with emphasis on its history in Sudan. Next, case studies will illustrate technologies implemented in development projects in selected regions in Sudan on relatively large scale and scope (relative to the size and development goals of the country as a whole). The paper will then highlight and discuss some critical public policy issues regarding the matter; after that will propose guidelines for implementation of this intermediate technology approach.

BACKGROUND

Practical Action was first established in 1966 with the name of Intermediate Technology Development Group (ITDG).¹ Its founder was the radical economist and philosopher EF Schumacher, famous for his seminal book *Small is Beautiful*, which was first published in 1973.² This book provides the philosophical base that supports the intermediate technology approach.

Briefly, this approach proposes that international development should be a process that starts with the realities of the communities targeted for development. The concept and practice of 'technology transfer' that was, still is, followed by mainstream organizations in international development is based on the questionable assumption that less developed societies do not have sufficient technologies to help them sustain their lives, and so they need to be supplied with the modern technology created by high-income countries. This is generally a false assumption, according to the intermediate technology approach, as it is evident that all societies have a sense of technology, and all of them – in their different contexts of development and environment – already have the knowledge and use of simple technologies that have evolved over time from within their mental and physical struggle with their surroundings. What happened is that the West, especially Europe, with its modern technology derived from the industrial revolution, came to force new world realities upon less developed societies through direct and indirect colonialism. As a result, some of those societies lost their attachment to their own original technologies, without being able to adopt and master the new 'modern technologies' introduced by the colonizers for a variety of reasons; most importantly the lack of fair access to such technologies through education and independent management.³

Nevertheless, traditional technologies still exist, and there are benefits for these less developed societies to build on them to gradually improve their capacity in the face of current and forthcoming local needs.

The idea of intermediate technology is to provide modern help for these societies, not through the transfer of modern technology, but rather through using the scientific experience of developed countries to help the people in the LDCs help themselves better. This can be done by helping them improve their own technologies through a process facilitated by the findings of modern science. Intermediate technology starts from the technological level of the targeted societies and then endeavours to make these local technologies more efficient, in contrast to the concept of technology transfer which starts from the technological level of developed societies and then seeks to make less developed societies as modernized as developed ones; an approach that ignores the actual level of technology created by the people in these LDCs. Intermediate technology starts with the level of the people it is trying to help, while technology transfer starts with the state-of-the-art modern technology, regardless of the capacity of the people targeted for help.

Another objection to the technology transfer model is that LDCs usually are not economically capable of receiving and sustaining the modern “capital-intensive and large-scale” technologies that developed countries can maintain;⁴ not mentioning that these technologies are usually beyond the scope of necessities the people of LDCs require more essentially, like basic health, sanitation, nutrition and education.

In *Small is Beautiful*, Schumacher suggests that the benefit of technology is not measured by its “size” or scale of sophistication and use of the latest findings in scientific fields. Rather it is measured by its usefulness for the people and its appropriateness for their social and environmental needs.⁵ Sustainable development takes into consideration what is appropriate to the circumstances of the people and the environment, and this is why some other organizations that are following the intermediate technology approach call it “Appropriate Technology.”⁶

If we define the level of technology in terms of ‘equipment cost per workplace’, we can call the indigenous technology of a typical developing country – symbolically speaking – a £1-technology while that of the developed countries could be called a £1,000-technology. The gap between these two technologies is so enormous that a transition from the one to the other is simply impossible. In fact, the current attempt of the developing countries to infiltrate the £1,000-technology into their economies inevitably kills off the £1-technology at an alarming rate, destroying traditional workplaces much faster than modern workplaces can be created, and thus leaves the poor in a more desperate and helpless position than ever before. If effective help is to be brought to those who need it most, a technology is required which would range in some intermediate position between the £1-technology and the £1,000-technology. Let us call it – again symbolically – a £100-technology.

Such an intermediate technology would be immensely more productive than the indigenous technology (which is often in a condition of decay), but it would also be immensely cheaper than the sophisticated, highly capital-intensive technology of modern industry. At such a level of capitalisation,

very large numbers of workplaces could be created within a fairly short time; and the creation of such workplaces would be 'within reach' for the more enterprising minority within the district, not only in financial terms but also in terms of their education, aptitude, organising skill, and so forth.⁷

Therefore the intermediate technology approach proposes itself as the most realistic way to development, since it takes into serious consideration the technological gap between LDCs and developed societies. One other major aspect in this reality is that peoples of LDCs generally lack the technical know-how that can make them able to independently manage and maintain the advanced modern technology, which then makes them permanently dependent on developed nations, and this cannot be the right developmental path. Sustainable development must empower the people and make them continuously self-reliant; otherwise the problem would not be solved. The key to developing any society is making its development a product of its own, rather than a foreign system that it feels alienated from and unable to maintain because this society did not participate in creating and planning this developmental path in the first place. This is why education – technological and strategic – is the most important form of developmental aid for the intermediate technology approach.

This, then, should become the ever-increasing preoccupation of aid programmes – to make men self-reliant and independent by the generous supply of the appropriate intellectual gifts, gifts of relevant knowledge on the methods of self-help. This approach, incidentally, also has the advantage of being relatively cheap, that is to say, of making money go a very long way. For £100 you may be able to equip one man with certain means of production; but for the same money you may well be able to teach a hundred men to equip themselves.⁸

The applications of this approach will be illustrated later in this paper through a discussion of some projects of Practical Action in Sudan. As those cases will show, empowering the people by helping them become self-reliant is more productive and less of an economic burden to those providing assistance. It should also be mentioned here that the book *Small is Beautiful* also discusses issues of sustainable development and use of modern technologies in developed societies themselves, and connects these with the global situation and the conditions in LDCs, but puts more eggs on the basket of international development, as it is seen, by the author of the book and the founder of Practical Action, to be the crucial field that the future of the world depends on.

It would be entirely wrong to think that the intermediate technology approach assumes or calls for a permanent technological gap between rich and poor countries. The philosophical premise of this approach is that industrialization is a gradual process that happens over time, and cannot be rushed. It is an 'evolutionary' process, not a 'creationary' one, as Schumacher himself states (and analogy from the two rivalling biological theories of evolution and creation). The terms 'evolution' and 'development' are virtually synonymous.⁹ This is why the right development approach should be able to work within this timely context, and walk forward according to possible steps, one by one. It is not wise, indeed counterproductive, to try to jump over some necessary stages. The conditions of poor societies are far behind developed ones today, and in that regard they

are short of the most essential means of survival. There is no benefit in comparing LDCs to high-income countries, and the persisting goal of today is not to make high-income countries out of LDCs. Having a real comprehension for the conditions of the poor around the world will make us realise the uselessness of comparing LDCs to developed societies in any developmental measure. It can be mentioned here, to assert this point, that one in every five persons across the globe lives on less than \$1 a day, and that one in every seven suffers from chronic hunger.¹⁰ These are the poor we are talking about.

Moreover, the situation in LDCs is more complicated by inner contradictions in which Schumacher calls “dual economy.” In this dual economy we may have 20% of the country’s population living in one, two or three big cities, while the other 80% are living in rural areas, as in the case of Sudan. Most of the development efforts usually go to these big cities, which creates an imbalance in service provision to the people, since the majority live in rural areas. These development efforts usually go to the cities because the cities are somewhat more ready for technology transfer efforts than rural areas. This also gives more clarity to the point that technology transfer is not a practical method of development because it assumes an already-established infrastructure to start with, and this infrastructure is only found in big cities of LDCs to some level (i.e. even big cities in many LDCs often do not have sufficient civic infrastructure). These unfair development efforts create what Schumacher calls “mutual poisoning” between urban and rural areas, whereby people in rural areas start to migrate to big cities, leaving their homes and resources to come and find better opportunities in the cities. This process, overtime, drains the rural areas of their essential human resources (especially young working men and women), while at the same time overloads big cities to the point that they cannot keep a steady rate of urban development because they keep expanding beyond their economic capabilities.¹¹ This is one of the clear counterproductive results of the technology transfer approach.

The intermediate technology approach works on overcoming this problem by concentrating on the people. This would mean that people in rural areas should have more development efforts coming to their areas – since they are the majority of the population – and work with them on improving their understanding of their environment and use of the existing technology they have. Better technologies should be innovated in a participatory process in which modern technologists and traditional technologists collaborate to produce an intermediate technology that is cheap, accessible to the people and also understood by them in the manner that they are able to maintain themselves. In this way the majority of the rural people will not find a need to migrate to big cities, as they will have more command over their environment, and by this they will be more productive in their own regions, while at the same time reducing the burden on big cities so that they can direct more of their resources towards strengthening the civic infrastructure. As it can be theoretically comprehended, this approach eliminates the mutual poisoning mentioned above. More will come by illustrating some of the actual achievements of this approach in Sudan.

Schumacher maintains that development does not start with goods – as usually the case in the technology transfer approach – rather “its starts with people and their education, organisation, and discipline.”¹² These three aspects form the real resources of the land that sustainable development should target. This is also why economic development is far a larger spectrum than only the principle of economics.

Economic Development is something much wider than and deeper than economics... Its roots lie outside the economic sphere, in education, organisation, discipline and, beyond that, in political independence and a national consciousness of self-reliance. It cannot be 'produced' by skilful grafting operations carried out by foreign technicians or indigenous elite that has lost contact with the ordinary people. It can succeed only if it is carried forward as a broad, popular 'movement of reconstruction' with primary emphasis on the full utilisation of the drive, enthusiasm, intelligence, and labour power of everyone.¹³

Practical Action has worked, since its establishment, according to the principles outlined above. It has worked, and is still working, in many of the poorest regions in the world; in Africa, Latin America, South and South-east Asia. Thousands of organizations are now established, all around the world, based on the philosophy of "Small of Beautiful" and Practical Action is considered to be the pioneer among them for it was one that started it first.

In Sudan, Practical Action's branch is probably one of the largest of the organization in Africa. The presence of Practical Action in Sudan dates back to 1974. At that year the organization (then named ITDG) was requested by Christian Aid and Sudan Council of Churches to begin a motorised ferro-cement boat building project in Juba, Southern Sudan. "The intention was to establish a commercial boatyard to provide much needed local river transport along the upper reaches of the Nile."¹⁴ The organization was called again in 1987 for another project in the North Darfur region, and two years after that it has decided to extend its operations in Sudan. The first country director was appointed in 1990, and the country's office was officially opened in 1992.¹⁵ "The work undertaken by Practical Action Sudan is aimed at improving the livelihoods of poor communities in selected areas of the country through building the capacity of small-scale producers and their institutions."¹⁶

CASE STUDIES

These case studies consist of achieved technologies and projects that have given visible results for their goals. They will be divided into two main sections: technologies and projects. Technologies refer to the newly innovated technological tools designed specifically for purposes and circumstances of Sudan and similar places with similar resources. Projects refer to the contexts in which the livelihood of specific communities was targeted for improvement with a variety of technologies and organizational plans together.

Technologies:

Here seven technologies will be introduced, with more details on three of them and brief commentaries on the other four. These technologies are: donkey ploughs, stoves and food/water ceramic units, water harvesting techniques, brick-making, affordable housing, donkey carts and nutrition enhancement options.

Donkey Ploughs: this technology was specifically developed for the Northern Darfur region, but by no means restricted its vision on it. The main problem that called for this technology was that the region suffers the presence of a hard crust soil that does not allow rain water to penetrate. The idea for the technology first started from a

ploughing tool used by many farmers in Ethiopia, which is the wooden plough, but because of the hardness of the soil crust, besides the scarcity of wood material suitable for this technology, the new Darfurian plough evolved to be totally made of metal¹⁷ (Figure 1).



Figure 1: The plough in use in Darfur
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In addition to being a technology that the people of North Darfur can use and maintain by themselves, the donkey plough is now a technology that the people are manufacturing by themselves too. The metal used for the plough comes from scrap, which is available from old vehicles. The Azagarfa village Blacksmiths Society is another part of the same Practical Action project that is “concerned with participatory technology development [PTD] in the design of a donkey-drawn plough using locally available skills and appropriate materials. The blade, for example, would be made from leaf springs from old suspensions. The steel is useful as it can easily be hardened through quenching to produce a hardwearing surface.”¹⁸

Training was – and is – provided for blacksmiths and farmers in manufacturing and using this technology by senior expert members from the communities. This way it is entirely maintained by the people themselves, which allows even more room for future improvement in the technical knowledge (Figures 2-4). Since its initiation, a few improvements have been made to the technology as a result of experience. For example, new harnesses were introduced in order to prevent donkeys from developing sores in the process of ploughing. “The donkey plough demonstrates the relationship between the different aspects of Practical Action’s work from the adaptation of a traditional technology to the development of an intermediate technology and brings together farming, metalworking and the production of improved harnesses.”¹⁹ Production has significantly increased by using this technology. In one of the projects of Practical Action, the provision of this technology was proved to be very beneficial to the people as “plants proved to withstand the long dry spells because the capacity of the soil to retain the moisture was highly improved; agricultural activities burden was reduced... One makamus (2.5 feddan) takes a week to weed it manually while it takes only two days to weed the same area with [the] plough.”²⁰

This case study [shows] how this process led to strengthening farmers’ and blacksmiths’ capacities to engage in PTD and attracted the interest of formal institutions of agricultural extension and training in this approach to technology development.²¹



Figure 2: Hammering one of the component parts of the plough ©Practical Action



Figure 3: Assembly of the plough ©Practical Action



Figure 4: The plough before assembly ©Practical Action

Stoves and food/water ceramic units: the modern technology of electric stoves and food/water storage units is obviously not affordable to the majority of the rural people in Sudan, when in fact they are the most in need for food storage because of the limitation of food and water, and the need to keep vegetables fresh and water clean for longer periods. Practical Action has been a leader in promoting new simple stoves and food/water containers made from the available resources on the land. Women were trained to make these stoves and containers by themselves, and they were mostly trained by other Sudanese women who have first received courses in TOT (training of trainers), which is an approach that Practical Action uses to multiply the number of community members that are ready, not only to manufacture and use the technology independently, but also to help others do so. This is a part of what Practical Action calls 'Participatory Technology Development—PTD', which is aimed at designing intermediate technologies born from the expertise of both traditional and modern technologists (as seen also in the donkey plough example above). These new stoves and storage units were modified from the traditional designs and materials widely used by rural households, only to be more efficient and standardized (Figures 5-8). The impact of the new stove design can be summarised in the following points:²²

- Reduced biomass consumption to 40% compared to traditional stoves.
- Reduced smoke emission considerably, thus protecting women and children from heavy exposure to kitchen smoke.
- Reduced firewood collection time by 50%.
- Reduced household expenditure on fuel wood by 50%.



Figure 5: Stoves' production workshop ©Practical Action



Figure 6: Food/water storage units workshop ©Practical Action



Figure 7: demonstration of finished storage unit
©Practical Action



Figure 8: Final stage demonstration – finishing their own stoves
©Practical Action

These stoves have proved to be preferred among the people in North Darfur, even compared to other new designed stoves by other NGOs, including a design that was proposed by the Berkeley Institute of California University.²³ It has also shown great competency with the situation of internally displaced people (IDP) in Darfur – the victims of the tragedy that the world is witnessing these days. The food/water storage units have also shown good results, but their case is not very unique as it was generally an adaptation of traditional technologies already used in other regions of Sudan and other African countries. This case (the food/water storages) demonstrates that some already-existing traditional technologies can be successfully adopted in other places with similar conditions, which in turn can result in some traditional technologies' trade. This can open another scope of commerce between rural regions, and thus contribute to a stronger self-reliant national economy.

Water harvesting in Sudan: this is another good example for the challenges intermediate technology can address. Many regions in Sudan are semi arid and the rainfall – one of the main water resources – is concentrated over a small time period. What makes balancing the supply and demand of water even more difficult is that the regularity and quantity of rainfall in some regions, like Darfur, has been decreasing lately; “for example the mean rainfall in Kutum has dropped from 345mm to 243mm between 1967 and 1982.”²⁴ To keep adapting to these conditions water harvesting techniques were developed by the people of the region, especially the techniques that catch and save water in flood time.

Practical Action, once again, aimed at improving the already-existing techniques and standardizing them in a more professional manner so that people everywhere could participate in developing them, according to their expertise, and share the findings with others so that the collaborated work results is the best available and affordable technology for everyone. Practical Action has concentrated on four rainwater harvesting techniques, which are:²⁵

- Check dams: “The check dam is usually located where there is a stream in a narrow valley; the velocity of the water during a rainy season will often lead to soil erosion. The dam acts to slow the water, allowing percolation and the recharging of aquifers. Over time the dam will gather fertile silt carried down the valley, which enhances the soil’s fertility.”²⁶ Practical Action has contributed to this technology by research and implementation to optimise its performance.

- Hafirs: the local name for water reservoirs in Darfur. “The hafir is a hollow dug in the ground designed to store water runoff after a rainy season. It is usually used in semi arid regions where rainfall is annual but over short periods and storage is required for the rest of the year.”²⁷ More sophisticated and scientific techniques were added and standardized to maximize the storage capacity of the hafirs, especially that communities generally depended on them after the rainy season for long periods (3 to 5 months) and for living activities (farming, livestock, and drinking). Further techniques were introduced for the water sanitation, and for separating cleaner drinking water from the rest used for other purposes.
- Contour schemes: used to stop the movement of the runoff floodwater, so that it can be used for a longer period of time. It is also a technique that tries to reduce the soil erosion caused by the quick movement of the runoff water over bare ground. Practical Action has incorporated different experiences from various regions, added a modern scientific evaluation and modification, and worked on spreading the new standardized techniques.
- Terracing and contour trenches: “This method uses earthen banks and ditches following the contours of the land, which catch and slow water runoff down the slope allowing percolation. In other areas a ditch may be dug and then filled with stones until a stone bank is formed. This then provides a subsurface control of water infiltration.”²⁸ Similar optimizing procedures, like the ones done for the previous techniques, have been introduced to this one.

Moreover, several new water-lifting technologies (manual water pumps, etc) were introduced. In addition to the technologies mentioned, others have been modified. Here are four more brief examples:

- **Brick-making:** about 40,000 workers in Sudan are brick-makers. They and their dependents form $\frac{1}{3}$ rd of a million of the population depending on the brick-making industry.²⁹ Practical Action has introduced Liquefied Petroleum Gas (LPG) as a new type of energy for the industry (in burning the bricks). This new energy source alleviates the dependency on firewood and thus protects the forests and the environment, plus it helps in introducing new advanced brick-making technologies that do not work with firewood.³⁰ Practical Action has also helped brick-makers organize in East Sudan to establish an association; similar to a union.
- **Affordable housing:** This project is another one that is very essential in the Eastern region where people are faced with annual floods that destroy their weak shelters and therefore burden them and the national economy with the annual aid operations that barely ease the situation temporarily but do not solve the problem. As the architect of one affordable housing project said: “The cost of providing adequate shelter for all is immense. Yet, the cost of doing nothing may be even greater.”³¹ Practical Action has established the “Sawa sawa self-help group for housing,” with the goal of achieving an integrated approach to housing low income families in adequate, safe, healthy and affordable homes.³² The phrase “Sawa sawa” means “together” in Sudanese dialects. The group built some demonstration houses (Figures 9-11), provided technical training, and created a knowledge-sharing atmosphere.
- **Donkey carts:** animal drawn carts have been used in Sudan since early times.

What Practical Action did is modify this technology and integrate it in a more organized manner to serve different livelihood purposes in poor regions.

- **Nutrition enhancement:** Practical Action has also participated in providing the people in poor areas with more nutritional choices out of their environment. This has been done by providing different food processing options, or by helping make these options shared among different regions and communities. For example, the organization has helped standardize and spread the cooking of Kawal – an available “protein-rich food prepared by fermenting the leaves of a wild African legume, *Cassia obtusifolia*, and is usually cooked in stews and soups. It is used as a meat replacer or a meat extender.”³³



Figure 9: construction in process
©Practical Action



Figure 10: finalized – interior view
©Practical Action



Figure 11: finalized – exterior view
©Practical Action

Projects:

The paper has introduced some of the technologies adopted and modified by Practical Action as separate entities, but in reality Practical Action does not execute its projects in Sudan by only introducing and orienting these technologies to the people. As mentioned before, the goal of Practical Action in Sudan is to improve the livelihood of poor communities. The organization does this by executing large projects that target these communities in different ways, including education, organization and discipline (as put by Schumacher). These large projects include the modification and introduction of the technologies above, but do not consist solely of them. The paper is going to demonstrate this by giving brief summaries to two of the biggest projects that Practical Action has undertaken in Sudan (according to the documents and standards of Practical Action itself).

Women Development Associations (WDAs): This project has started in the Eastern region of Sudan (most of the big projects of Practical Action – until today – have been located in the East and in Darfur). However, the outcome of this project has proven great success that it was carried on to many other regions in which a similar level of success has been observed.

This project occurred in two phases for a total of 6 years (1994 to 1997 and 2000 to 2003).³⁴ It started as a food processing training program, targeting poor households that are mostly women-headed, in order to provide them with food processing skills that can help them establish businesses and have good food management for their own households. However, the project has grown with the process to become a poverty alleviation one through the empowerment of women. “The project aimed at strengthening WDAs as active civil society organizations in Eastern Sudan.”³⁵ Great material results came out of this project, as shall be shown here, but the greatest gain was in the

level of knowledge and awareness the women of this program have gained, which gives a continuous impact to the project long after it has officially ended.

The project's main objective was to improve the livelihood of the beneficiaries. This, however, came to be defined by a large scope of objectives, scaling from basic economic education and production skills to general social and political awareness. A series of TOT courses were conducted first for women in food processing skills, then the other activities evolved. Now even other NGOs – national and international – and UN agencies are making use of the skills of the WDAs' members in their regions to “complement their existing activities and replicating the approach.”³⁶ The project faced difficulties from the beginning, and the WDAs are still facing them to this day, but the struggle is understood – by the people involved in these projects – to be a part of the change process. Some of the threats that were clear are the “unfavourable government policies and binding traditions and cultures that suppress women,” but WDAs were able to make progress despite of these threats. The achievements of the WDAs have made good impressions on some government agencies that the ministry of finance came to contribute by furnishing the offices of the associations and paying their rent (when they were renting).³⁷

Women learned to participate in decision making in the WDAs by direct practice, as the management was always leaning toward a democratic way. Training programs included “food processing, small business management, credit management, handi-crafts, marketing, simple book-keeping, sewing, dyeing, etc. The diversity of training is demonstrated by in the coverage of topics such as computer training, literacy classes, health education, awareness on legal issues, first aid, health education and home gardens.”³⁸ Marketing avenues were created for women to establish personal or cooperative businesses. There has also been a good mobilization of internal funds coming to the WDAs from their members (membership fees and monthly subscriptions, regular savings, contributions to joint projects, and contributions to supplement loan funds received from Practical Action and other organizations, etc).³⁹

Women members' contribution to their family incomes jumped from 2% and 9% to 25% and 28%. Still, however, to this time more than 50% of the surveyed members say that both the incomes of the husband and wife are not enough to cover the household needs. The situation became better, as seen from the statistics above, but the problem is not yet solved.⁴⁰ Nevertheless, the same survey shows great optimism among the WDAs' members, saying that they are aspiring for more financial self-sufficiency and independence. “The project [in general] is accredited by partner [organizations] for promoting group work and raising the awareness of women on gender, health, environment, legal issues and democratic practices. It has also helped in reducing illiteracy, including the financial illiteracy.”⁴¹ Women were also able to use the humble increase in their income to pay for adequate education for their children, enhance the nutritional benefits of their food and afford better housing conditions, besides becoming empowered to participate with stronger voices in social affairs.⁴²

The WDAs in East Sudan have established several branches in the region (more than 40 branches), with about 2000 members, and more than 430 individual projects⁴³ (Table 1). Although efforts in having a national advocacy and support for these associations are not successful yet, there is no reason to think they would not be possible in the future.

Table 1: Detailed information on WDAs (source: Evaluation of WDAs Report)							
Name of WDA	Date of registration	No of branches	Name of branch	Date of foundation-branch	No of members	No of individual projects	No of group projects
Women Development Association, Kassala	1996	11 in cluster	Elsuk Elshaabie	99	32	29	1
			Elshaheed Tagelsir	2000	34	35	In exhibition
			Hay Elnour	2002	94	26	2
			Shambob	2000	24	24	In exhibition
			Turaa	2002	21	3	In exhibition
			Khatmia1	2001	16	16	
			Khatmia2	2002	20	10	
			Khatmia3	2003	19	16	
		*Sijon					
		*Kadugli					
		*7 in displaced					
		*12 in rural area					
Women Development Association ,Elgedarif	1997	10 in cluster	Alsalam	2002	62	38	In exhibition
			Karfis	2002	45	32	In exhibition
			Gamhoria N	2002	30	18	
			Gamhoria s				
			Elnazir	2002	27	18	In exhibition
			Wad Kibair	2002	50	25	In exhibition
			Sawakin	2001	37	37	
Gibaisha							
Women development Association - River Nile	1/2004	7	Halfa	2004	200	-	-
			5 Arab S	2004	155	-	-
			5 Arab N	2004	69	-	-
			Elginaid	2004	145	3	-
			Village 6	2004	30	-	-
			Village 18	2004	30	-	In exhibition & preparation school uniform
			Algafala & Asburi	2004	30	-	-
Rural Women Development Association Village 10	2001	5	Village 8	2003	82	-	-
			Village 11	2003	254	-	-
			Village 14	2000	173	-	-
			Abuashosh	2003	53	-	-
			Dar-Elmouminat	2003	48	-	-
			Total		610	98	2
Khashm- Elgirba WD Association		-	-	-	120	-	1

Food Security Project: Re-Establishing Food Self-Reliance Amongst Drought Affected People of North Darfur: This case study is one where all the aspects of the intermediate technology development approach come together. It combines all the other aspects mentioned in the previous case studies.

This project started about one year before the civil armed conflict plunged in Darfur in 2003. The project and all the activities of Practical Action in Darfur have been significantly affected by the conflict. However, the organization has adapted to the new circumstances by making some compromises, but did not abandon the project altogether.⁴⁴ The whole region became dangerous, and even after pulling back from some villages that were targeted in the original outline of the project, Practical Action still faced two incidents of carjacking from the rebels.⁴⁵

Almost all of the technologies mentioned previously in this paper were introduced to the targeted communities in this project as a part of this project. WDAs were also introduced besides the formation of Village Development Committees (VDCs) in each village, which are the committees Practical Action deals with as spokespersons for their people in the PTD process. Several TOT workshops have been conducted for various technological and organizational skills, and the overall impact of the project can be seen in all the current livelihood aspects of the targeted communities, besides the evident self-reliance that they have achieved and self-development leadership skills that both women and men of the communities have gained.

Practical Action is one of the few NGOs – if not the only one – that are working on sustainable development for the drought-affected people in the region of North Darfur. Almost all the other NGOs are working on relief help with internally displaced people (IDP). The majority of the population of North Darfur are not IDP, but people that are affected by the drought and civil conflict, and even the IDP are joining this majority gradually because of their relatively long-term settlements in their new areas (some of them decide to settle in other villages than stay in relief camps). Practical Action is working with those IDP as well. North Darfur has 90% of its population living below the national poverty level (1993 Census), which makes the state one of the poorest in Sudan, the country that is already one of the poorest in the world.⁴⁶ This is the reason why Practical Action has conducted a series of intensive projects in the region.

Blacksmiths and farmers' associations were established, and VDCs became recognized by other NGOs working in the area as the committees to reach the people through, especially since the management of VDCs have shown great competency and ability to represent their people equally (20% to 50% of the committees' members are women, aside from WDAs).⁴⁷ Table 2 shows some of the major innovations and technologies introduced to the people in this project and their impact.

Besides the innovations in table 2, donkey-drawn water carts were produced and distributed to individuals in the communities to use them to provide water for their people and establish businesses with them. 90 carts were distributed to different villages, with the number of carts correlated to the number of beneficiaries in the villages, under the supervision of the VDCs and WDAs of those villages. The total number of beneficiaries from these 90 carts is up to 2301 individuals. These carts were not provided for free, but as loans that their new owners will pay for from the profits they make out of them.

The point of this (providing the carts as financial loans) is to create a self-reliant industry from the start, besides the need to minimize the financial expenses met by Practical Action, especially when not needed, since the organization's financial resources for such projects are often limited and accountable. In most of the cases, 100% repayments were made, and the rest were mostly above the 90%, with only tow cases of repayment problems (out of 20 cases), and even in those two cases, more than 60% of the cart's cost was repaid.⁴⁸

Table 2: Innovations and their impact (source: project final evaluation report)			
Innovations	Quantitative measures Planned & achieved		Qualitative/Evidence of impact
1. Plough	1000	1900	Over 80% of farmers produced double and their income increased by 80%
2. Tool & seed Banks	15	16	Farmers production and productivity increased and products diversified
3. Seedling nurseries	6	7	Environment enhanced as a result of Tree growing promotion
4. Crop diversification	4 new crops	8 New crops & vegetables introduced	Over 80% of farmers produced double and their income increased by 80% (situation)
5. Water harvesting terraces	900	1935	Food secured for poor small producers
6. Dams for irrigation	4	3 & 90% of the 4 th one is constructed	Area under cultivation increased (more than 5000 feddans) and agricultural production increased by 80%
7. Hafirs for irrigation	6	4 + rehabilitation for one large Hafirs (Abu Degies)	Water supply & sanitation improved by hafirs system (inlet/outlet and fencing) Tree and flower growing promoted. Growing of endangered trees considered (Baobab)
8. Household grain stores	45	15	Food secured for more than 450 poor households
9. Community grain banks	12	11	Food secured for 11 communities (more than 6535 households)
10. Seed fairs	2	0	Nothing done in this subject
11. VEA (Village Extension Agents)	36	38	Crop diversification adopted and good agric. Production secured for more 1223 farming families.

Before the introduction of the donkey cart, a trip to the water source would bring two jerry cans equivalent to 32 litres and with the donkey water cart it brings in 11 jerry cans that are equivalent to 176 litres. Although there is no data on time saved and changes it brought to women, it is clear from the cart capacity that it brought in more water and saved time.⁴⁹

The impacts of the project were felt everywhere in the villages, as mentioned above, and healthcare was not an exception. Training for community health workers (including midwives), and provision of first aid equipment and donkey-drawn ambulances was part of the project.⁵⁰

One of the clear indicators of the success of this project is that “under the current situation of conflict and drought the beneficiaries [of this project] have never faced food

shortages. Food enough for the whole year was produced annually.”⁵¹ In addition to this economic impact, the social impact did not perform any less:

Women members of the VDCs committee had been empowered and started acquiring senior positions within VDCs committees. Two women for the first time have been selected to chair VDCs. This is the first time in Darfur that women be at the top of an organization in which men are members.⁵²

The technologies and organizational tools that have been introduced by this project and its likes are now being adopted all over the rural areas that have had relative contact with this experience; even beyond areas that Practical Action has worked in before (like some towns close by the city of Khartoum, and even in the poor neighbourhoods inside the city itself). This is a powerful indicator that poor communities are well-responding to the intermediate technology approach, because it simply provides practical answers to the currently pressing problems they face.

POILICY DISCUSSION

The case studies above show clearly that the efforts of NGOs like Practical Action are giving desirable results. However, this should not lead to the assumption that this kind of help is enough. NGOs don't have the capacity to solve developmental problems in scales as large as countries. Moreover, NGOs generally don't have the resources, neither the authority, to standardize development approaches over states' territories, let alone bigger regions with various governing systems and cultural differences (like Sub-Saharan Africa for example).

This is why this paper suggests that there is an essential and persistent need for development approaches like the intermediate technology one to be adopted by states' systems. Intermediate technology needs to be integrated within countries as a state's policy and strategy. Plans that cover all the territories of the state, with their various environmental and social differences, are needed to make a true difference in the lives of all citizens, not just small village communities.

This paper proposes guidelines for national policies in Sudan that adopt the intermediate technology approach. Four main sectors of development will be analyzed in light of this approach, and drawn results will be proposed as general goals for policy formation and implementation. The four sectors accordingly are: education, healthcare, socio-economic development, and rural/civic infrastructure.

Education:

Education should always take priority because it is the most guaranteed development investment. Utilization of human resources is the key to sustainable development, and education is the key to utilization of human resources.

Since the general goal of intermediate technology is “to help people help themselves,”⁵³ education should aim to “educate people to educate themselves.” The proposal made in this section is not new; rather it is a new advocacy for an old proposition. This old proposition is even older than EF Schumacher's ITDG organization and *Small is Beautiful*. Mahmoud Taha, one of the prominent Sudanese national

movement figures, authentic theologian, and socio-political leader, wrote in 1958 (two years after Sudan's independence):

I believe that if we want for our education to be beneficial and fruitful, it is indispensable to refer to foundation assets in planning the educational curricula. A quick glance to these assets tells us that those educational curricula must aim first to teach a student how to educate himself and how to be obliged to continue that education throughout his lifetime "self-education or self-learning." Filling the students' minds with a selected set of diverse and numerous bits and pieces of information, on which they have to pass exams to be able to proceed for further stages, is a useless- and in fact, a harmful- method... We can not prepare a person for life as properly needed, unless we are able to sustain him – within the regular schooling systems that civilized governments provide – with the scientific style by which he can continue educating himself. The benefit of education rests on the ability of the learner to adapt to his environment. In turn, the function of education is to provide the learner with a complete and correct image of the environment he occupies.⁵⁴

'Ustadh Mahmoud'⁵⁵ did not only say the above; he has also proposed some practical guidelines and measures for a national education system that can truly be appropriate for the Sudanese environment, culture and economy. Changing the curricula of education in Sudan – which is inherited from the colonial system – was his central proposal. This is one of the vital aspects because the colonial education system, as a whole, is not a system that was designed according to the Sudanese context. It was rather designed according to the British experience, which historically does not relate enough to the Sudanese experience; the environmental and social aspects are clearly different, which makes the geopolitical and industrial levels clearly different too. Appropriate education has to be appropriate for its context, as Ustadh Mahmoud mentioned.

He proposed the change of the educational stages, and the inclusion of technical education from earlier ages, in order to teach the students to be productive and well-utilizing of their settings rather than filling their brains only with theoretical material that they can hardly realize how it relates to their daily life basics. Community participation in the construction, organization and maintenance of schools is very important, he suggested. Schools' premises can be built by the people of the communities themselves, he advocated, especially ones that are built for early education levels in rural areas, and the building does not have to be any different in quality than the general housing standards in these areas. Facilities for these schools should also be affordable for the communities and familiar with their environment. The state gets involved with the people in the supervision of schools, but none of the two monopolizes that job. Higher education institutions are not as needed as primary and secondary ones, because we first need to work within our economic limitations to provide the basics for the majority of the population first, rather than provide highly sophisticated levels for a minority. "Coverage must come before perfection."⁵⁶ This is besides the general fact that university education in LDCs mostly creates a local elite that generally don't contribute efficiently to the growth of their nations. "Male and female [university] graduates constitute a new class that is not concerned much with the poverty conditions that the

nation suffers. Moreover, they are surely incapable of living in villages and rural areas to be able to understand the reality of their society, and thereafter, foster rural development.”⁵⁷

Ustadh Mahmoud also emphasised on an educational system that provides students with the proper tools to continue self-educating themselves. This means the provision of proper analytical and communication skills, along with basic education on the making, use, maintenance and improvement of production tools. The education system inherited from the colonial rule assumes that technology in general is highly complicated for young students to comprehend, and thus it starts by concentrating on theoretical science education for a long time before giving students the chance to deal directly with technology. If this approach suites the technological level of European and North American countries – along with other high-income countries today – it does not mean that it suites the level of LDCs. The local technologies that can be comprehended, standardized and improved in LDCs are much less complicated than the ones in high-income countries, and are more understood by direct practical training than by extensive theoretical one.

Another critically important factor in education, and all the other aspects of development, is the gender factor (also mentioned by Ustadh Mahmoud). Gender equality is not only for the benefit of women in LDCs, but also directly benefits children and directly enhances the economic capacity of countries like Sudan. Throughout history, African women have actually been innovators, developers and users of many traditional technologies, and their technological and economic contribution to their societies has never been less than that of men, if not more.

In Africa, agriculture, health, and nutrition are largely the responsibility of women, therefore, successful technology transfers in these fields are those that empower women, strengthening rather than weakening their community involvement and their decision-making authority in the village and the family.⁵⁸

Needless to say that gender equality starts with education, the Sudanese education system must aim to implement direct policies that address the issue of gender equality, both in theoretical foundation and production skills. We have seen, from the study cases in this paper, how the Practical Action technologies and projects in Sudan have improved the livelihood of many communities by empowering their women with technological and organizational skills, and it is always true in the case of Africa that “if [a technology] is not appropriate for women, it is not appropriate.”⁵⁹

Three more aspects: the importance of creating an educational system flexible and creative enough to enable teachers to realize great potentials in children from early ages, so that they can direct them from these ages to utilize their unique talents and special capacities. The second one is the importance of basic introduction and utilization of modern technology, especially communication ones, within adequate economic limits, in urban and rural communities. Modern communication technology is more important than other modern technologies for LDCs because they directly contribute to the enhancement of knowledge resources, which is the best kind of aid for LDCs. Included in this aspect is the provision of adequate number of scholarships for outstanding students to get university education in developed countries, with the clear and policy-

expressed intention of preparing them to come back and contribute with their knowledge in furthering the development of civic infrastructure in their country. The last aspect is the importance of moral education, which basically means the emphasis in teaching social responsibility and ethical values needed to produce generations that take the issues of their societies personally. It can also be called 'character education,' and its importance should not be underestimated by the fact that this paper did not elaborate on it, for more material on this issue is richly available in other efforts, like those of Ustadh Mahmoud and other prominent social leaders in Sudan and LDCs in general.

To conclude the findings of this analysis on education, here are basic conclusions for policy implementation proposed for the education system in Sudan:

- A radical change in the current education curricula. Although this proposal seems to be the most controversial, it is the most important, and all the other guidelines depend on it to a great degree. We must understand that the severe development problems we're facing in Sudan require radical changes like this one. The main points proposed as guidelines for this project by Ustadh Mahmoud in the previously mentioned document are also suggested by this paper.
- Emphasis on gender equality and women empowerment in education, both in theoretical foundation and in provision of practical skills.
- Empowering potential responsible citizens (i.e. students) with adequate economic views and measurements. Education of economy basics is one of the most essential aspects of appropriate education that the current curricula is ignoring and reserving for higher education institutions. Since economy is a daily-life factor for all the people, there no logic in not providing them with its basics as early as possible, starting from primary school levels and continuing up and accordingly in a gradual approach of complexity. The economic approach this paper suggests for teaching in schools is the hedonic approach. It is because this approach provides reasonable economic valuation measurements for goods and resources. It does not only measure the economic value of products and resources by their quantitative expenses, but rather by including the value of their social and environmental attributes besides their quantity, and it also takes into consideration the multiple attributes that many goods and resources seem to have.⁶⁰ Other economic approaches can also be suggested by experts in intermediate technology.
- Ethical education, or character education, is important for upbringing socially responsible, creative and visionary generations.
- Political Education in citizen rights and responsibilities, besides basic human rights and social awareness. This aspect is also essential in terms of understanding that political change in LDCs towards democracy and social justice is a necessity for development, and educating the people about it is an important step. The current formal Education system is definitely not enough for this aspect, as for others, but it should aim to provide students with basic tools that allow them to further educate and organize themselves for these causes in civic society and public work, outside the direct heed of the state.
- More concentration on primary, secondary and technical schools, with minimum number of universities (1 or 2 universities for the whole country is enough). The economic resources of Sudan should be more invested in providing basic

education for everybody rather than providing highly sophisticated one for a small portion of the population.

- Communities in all the regions, and especially in rural areas, should be directly involved in the construction and maintenance of public schools. This also relates to the proper introduction and emphasis on the value of volunteer work in the community, which will also be mentioned in the socio-economic development section of this paper.

The budget that can be allocated for these suggestions, and the coming ones, should not be beyond the reasonable limits of the national capacity. As a matter of fact, these suggestions can prove themselves suitable only by being applicable within the national economic capability. It is one of the main supporting facts to this approach that the government in Sudan is not allocating enough resources for education.⁶¹ Another supporting fact is that the current budget allocated for education is not even used appropriately, because it seeks to sustain the contemporary education system that is inherited from the colonial rule, which is a system designed for a different economic level – that of the British – that Sudan is yet to reach. The design of strategies to implement these suggestions, and the coming ones, should be the mission of experienced professionals and policy makers that are familiar with the conditions of Sudan and similar LDCs, whether they are Sudanese, NGOs workers with a good background on intermediate technology, or Africans that have practical experience with implementing similar policies in their own countries.

Healthcare:

It is commonly agreed upon that education and healthcare are the two most essential elements of development. The two together constitute the backbone of any well-established society.⁶² Most of the problems with healthcare in Sudan come from the fact that the state is not dedicating enough resources for it, as the case with education, because the military is exhausting the national budget. This is probably the case with the majority of politically unstable regimes across Sub-Saharan Africa.⁶³ The political factor in all the cases of development is very visible, but this paper is trying not to be overwhelmed with it here as it might take it to a different area of research. However, it should be clear that development cannot proceed without continuous attention to political issues and citizenship entitlements. The people of Sudan, with the help of the international community, have to consider political strive for change towards democracy and political stability as a part of strive for development. One measure that the people and the international community can go for is to assure, at this stage, that both the education and healthcare systems within the state are not politicized by any means. This means the assurance that the budgets, organization and management of these two systems within the country are autonomous from the state politics. Ministers of education and health, for example, should not be appointed according to their political affiliation, as it is mostly the case today, but according to competency in management of such systems. The pressure of the international community – i.e. the UNESCO with the support of the political power of the UN – should advocate establishing independent committees, for example, dedicated for appointing the governing staff of the education and healthcare ministries, along with assuring that the budgets for the two systems are adequate and not controlled by the government as it is the case with the other state

institutions. This should be a measure to protect these two essential systems from the dangers of political instability.

In addition to the above, two intermediate technology approaches are suggested in this paper to be integrated in the healthcare system. The first one is the integration of traditional medicine in the state's healthcare system. Efforts should also go further to developing mixtures of traditional medicine with modern medicine and medical techniques of sanitation. Traditional medicine has been around for many generations in Sudan and LDCs, and it has proven viable for many cases. Only with the recent introduction of modern medicine to the colonized societies that traditional medicine became a "bad practice." The fact that modern medicine is more sophisticated and has a greater chance of success does not take away the fact that traditional medicine has the ability to cure many illnesses, especially the local ones that are characteristic of local environments, and that it can be developed and systemized in a way that will improve its capabilities more than before. This effort is affordable, unlike the provision of modern medicine to all the population in poor countries. This approach is not totally new, and some African countries have started with it since the 1980s, and traditional medicine research efforts have been conducted since the 1970s.⁶⁴ The use of natural herbs and psychology, which is typical of traditional medicine, actually forms the roots that modern medicine evolved from.

We can realistically talk of tribal healers upgraded to 'barefoot' doctors. Here tribal or local medicine men provide the services much needed by a large majority of the people. Western medicine is beginning to accept both the traditional practices and the medicines of the underdeveloped regions of the world – in particular that of the East. Doctors in the North have mostly lost the art of treating the whole person. Many are now rediscovering the effectiveness of the comprehensive approach to health and sickness. Clinical studies have shown that many traditional medicines and therapies can be highly effective.⁶⁵

Statistics from the late 1980s in Africa have shown that only less than 50% of Africa's population can be considered to have reasonable access to modern healthcare, and a big portion of these 50% themselves, even when having access to modern medicine, still use traditional medical care.⁶⁶ Having in mind that the basic health situation in Africa did not change much from the 1980s, if it didn't worsen in some regions, the basic advantage traditional healthcare still has over modern one is its easy accessibility for the vast majority of the population, in both rural and urban areas. For this reason the registration of local healers and midwives, with the provision of basic sanitary equipment and training, can have a huge impact on the healthcare system within affordable measures. Moreover, this will give a chance for the natural development of various alternative medicine approaches that can even be more effective and appropriate for the local contexts in Sudan and other LDCs, especially that they deal directly with health issues related directly to their environments, which give them more expertise.

The second intermediate technology approach to be integrated in the healthcare system is the formation, support and facilitation of moving clinics for special needs, in both rural and semi-rural areas. These special needs can be dentistry, eye care and ophthalmology, diabetes, and similar complicated fields of medicine. These clinics will

reach people in rural areas periodically instead of having the people travel for miles without adequate and affordable means of transportation or adequate economic capacity for such journeys. Cooperation between village organizations (like VDCs), traditional health workers and the ministry of health will make easier accessibility for sick people in these villages to schedule in advance for moving clinics coming to their areas according to collective needs of several villages within close areas. This practice can also be facilitated by the state for other NGOs willing to serve in this field. This can be considered an intermediate technology approach because the service provided by moving clinics will not be as sophisticated as those in established modern hospitals, but nonetheless will be sufficient to handle most of the cases in the rural areas. It also requires the cooperation of the people in rural areas, especially traditional health workers who would have adequate training that enables them to be an official and essential part of the country's healthcare system. The policy proposals for this section can be summarized like this:

- Allocating more resources for the healthcare and education systems, as the two are integral to each other. The autonomy of these two systems from the state politics is critically important. This is only achievable, as can be concluded, with political tools; i.e. empowering the political causes of ending civil wars and directing more of the national budget towards development and away from military expenses.
- The integration and standardization of traditional medical care across the country, by registering herbalists, traditional midwives and healers, and by providing them with adequate sanitary equipment and training. This is to be funded generally by the ministry of health, with the frequent help of NGOs according to feasibility.
- The formation, support and facilitation of moving clinics for special needs, in both rural and semi-rural areas.

Socio-economic Development:

Since the scope of socio-economic development is very wide, and can actually be termed to include all national development measures, and since this paper has already mentioned many aspects of the issue, in the case studies and above policy discussion sections, the policy suggestions for this section are going to be simply put in generalized concluding points:

- The promotion and support of community based organizations, like WMAs and VDCs and similar organizations that depend on management and support of the community members, voluntary work, and address apparent organizational and representational needs for their communities.
- The mainstreaming and standardization of a national policy that encourages self-reliant communities through the expert help of central organizations with sufficient technological and knowledge resources, like Practical Action. The formation of state institutions that support and facilitate intermediate technology approaches and researches is also important. Media support can be of great help for mainstreaming these efforts across the country.
- The Facilitation of shared markets between closer villages and between Sudanese regions. These markets will support local production of intermediate technologies and spread the economic benefits of their use across the country,

needless to say that such markets, if successful, will greatly contribute to a national self-reliant economy.

- The integration and standardization of voluntary work within communities as part of the positive social participation. Understanding the social and economic value of voluntary work for communal causes is essential for socio-economic development, and it can be promoted by the education system and the media in order to support a culture that respects and promotes voluntary work. Economic encouragements by valuing records of voluntary work for state and non-state employees can also be used.

Rural/Civic Infrastructure:

There are no specific policy suggestions for this section, but there is the discussion of the question: how can we apply intermediate technology visions in the current world of globalization, where local products are unfairly competing against foreign sophisticated technologies that are mass-produced and have better ways of marketing themselves?

To start by understanding the reality, there is not a clear answer to this question, since the complexities of today's global economy don't seem to be working for the benefit of the poor (so far). One thing that can be easily noticed is that foreign products' marketing in LDCs is hardly good for their economies, since it diminishes local production and therefore creates unemployment and crippled national economies. Moreover, most foreign products are not affordable by the majority of the LDCs' populations, and sometimes alternatives are non-existent because globalization discourages local production. This is the general scenario, but, despite that, some positive efforts can be done.

Modern technology in production and civil infrastructure can be adopted in metropolitan areas in Sudan, with attention to sufficient service and production within the national economic limitations. Competing in mass production does not suit the needs of Sudan for modern technology, and does not help employment either, so for that we need to use a reasonable level of modern technology to develop our urban areas and provide employment for city residents. Of course employment will be limited in cities this way – and that is how it should be – because the rural areas have more natural resources, and thus they should have more human resources to work for them.

In the rural areas, not all modern products and services will fit the life styles there. The people there also won't wait until modern technology arrives to them all at once, because they will have to sustain their lives currently. Here is where the need for intermediate technology appears to sustain the livelihood and the socio-economic development of the rural areas, while the appropriate fruits of modern technology can arrive to them gradually, and take the shape of the rural context in the process. This is a large project and a huge mission for intermediate technology if we look at the hugeness of rural areas in Sudan (and LDCs in general) and their residents.

We don't need to produce our own phones, computers, and our own fast transportation systems in the rural areas, for example, for these technologies are inherently the products of modern sciences and technologies, but we need to produce and use our own tools and systems in agriculture, sanitation, basic healthcare and education, sheltering and socio-economic organization, and here is where intermediate technology is needed. The basic and most essential needs of the rural people do not

require modern technology, and this is why modern technology hasn't much to offer them today, but intermediate technology has.

This, in brief, how intermediate technology and modern technology can work together for a better national economy that serves the whole population, the rural and the urban, and helps the country take the right steps towards sustainable development.

CONCLUSION

There is sufficient evidence that the mainstream approaches taken for international development are failing. Measures of the year 2000 show that the goals set by the international community as milestones towards the year 2015 are generally not met, especially in Sub-Saharan Africa.⁶⁷ Some progress is shown in some countries regarding specific fields of development, but the overall picture is that efforts and results are less than expected.⁶⁸ This is a good reason for considering different approaches to development.

Sudan is a Sub-Saharan African Country (especially in terms of development classification, when regional ones vary), which makes it one of the poorest countries in the world that have the most failing rates in development. Considering new approaches is a logical option if we are seriously concerned about the problem. Continuing with the old approaches is becoming counter productive. We must start by understanding the contexts enveloping each country to understand the appropriate development approach for it.

Each [LDC] must first of all objectively identify its problems before determining the nature of the programme of development most commensurate with its resources. The best way for African countries to overcome underdevelopment is to adopt pragmatic rather than highly ambitious policies of trying to catch up with the industrial nations. The priorities and goals of African science and technology should not be structured on a 'science and technology olympiad' among the technological nations. For one thing, given the existing African predicament, the continent cannot in any way compete.⁶⁹

Although the help of the international community is most needed, self-reliance for Sudan, and all LDCs, must be the mainframe of the goals of development. This is why the best aid that can be provided by the international community is knowledge. It should aim towards "not giving a man a fish, and not only teaching him how to fish, but also helping him make his own fishing tools," as they say in the organization of Practical Action.

The intermediate technology approach deserves a better and bigger chance of recognition, support and advocacy, especially after what it has proven to be capable of in the small-scale experiences it has been through, as in the case studies shown previously in this paper. Another reason for the need to consider this approach is the recent changes in the global environment that are threatening living beings everywhere on the planet, which are largely deemed to be the product of uncontrolled and environmentally inappropriate modern technologies.

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