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A review of the programme and organisation of the African Technology Policy Studies (ATPS) network

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A REVIEW OF THE PROGRAMME AND ORGANISATION OF THE AFRICAN TECHNOLOGY POLICY STUDIES (ATPS) NETWORK

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1. Methodological Approach

1.1 Interpretation of Terms of Reference

While generally accepting the terms of reference as outlined in Attachment A to the Consultancy Contract CC0301, the Review Team have dealt with the issues raised in a rather different order from the way they are expressed in that Attachment. This is because it is necessary to see future possible developments of ATPS mainly in the light of current international and regional trends in Science and Technology Policy Analysis. These have been changing quite fast in recent years with clear implications for what may be desirable for ATPS. For example the use of "Technology Foresight" exercises[i] involving government and cognate stakeholder groups has only recently been begun in Third World countries. There are clear implications here for networks like the ATPS network where the impact it can have on the wider policy context may become quite different from what was possible even a matter of 5 years ago.

1.2 Methodology

The Review Team adopted the following methods for assessment purposes. Firstly it examined a sample of recent proposals including 18 that had been scheduled for decision at the most recent ATPS board meeting. Secondly it prepared a questionnaire that was distributed to all National Chapters for completion and return (See Appendix). Thirdly it carried out a series of in-depth interviews with relevant stakeholders including ATPS Board members, Secretariat Staff, National Chapter representatives and ATPS "client groupings." Fourthly it was given access to recent written material including Board Minutes and other documents relating to ATPS conduct and management. Finally the Review Team hired a temporary research assistant to collect further information that was relevant to the overall assessment.

1.3 Limitations

While there was complete and enthusiastic co-operation from all those interviewed, the response from National Chapters to the postal questionnaire was poor. A second limitation is that in the event it has only been possible to solicit views from a relatively small range of potential "client groupings". One technique used here was to commission Chapter representatives to conduct their own small survey locally according to a general template provided by the Review Team (see Appendix) . This was seen as a capacity building measure and produced one or two interesting comments. A major problem involved in soliciting this type of view, however, is that to some extent demand for S/T policy research needs to be created. This has been the overwhelming experience in the industrialised countries where constituency building has often taken decades to achieve. For this reason, therefore the Review Team is of the view that its overall assessment is probably not much compromised by weak responses in this area.

2. Science and Technology Policy (STP)

While the bulk of this review is clearly devoted to the needs and aspirations of Africa, it is useful to reflect more generally on STP developments over the latter part of the 20th Century. Indeed STP has never been easy to formulate simply because it does not fit easily into the established disciplinary structures found in institutions devoted to research and higher education. Nevertheless in is undeniable that most industrialised countries have begun to take it very seriously indeed and most have offices at the highest levels designed exclusively for STP analysis. We shall start this section with a short summary of Third World experiences before reflecting on the wider international scene and future prospects. Both discussions will then form a backcloth to the specific mission of the ATPS

2.1 Science, Technology and Development

The end of the Second World War heralded a period of international optimism that combined the recognition of economic inequality with a determination that international action could reduce it substantially. And while the organisations created at the time (such as the United Nations and the big financial bodies like the International Monetary Fund and the World Bank) probably had peace and stability as their primary focus[ii], an important secondary element was the harnessing of S/T to economic growth and development. The early debates on this centred on the disjunction between modernisation and autarchic agendas. Initially the former held sway but as we moved into the 1970s the tone became much more radical (in the old political sense)[iii], technology being seen as a tool of exploitative economic relations on the part of corporations having their roots in the industrialised countries of Europe, North America and East Asia.

The influence of modernisation policies was very significant, however, since they laid the basis for institutional investments in many countries (including former colonies). Since improved technology was a key source of economic growth (this had been shown unambiguously by economists in the 1950s and early 1960s;[iv] it was subsequently given greater formal standing with the development of "new growth theory" in the 1980s) it had to be harnessed in the service of development. In policy terms, however, (and guided by international bodies like UNESCO) the goal was seen to be one of creating universities, research institutes and other S/T bodies in the mould of those already extant in the First World. And the result was the creation of massive scientific infrastructures that have subsequently failed to function as an efficient developmental resource. Indeed what to do about them has become a major international issue (e.g. recent debates in India about how to reform an unwieldy, bureaucratic organisational system[v]). One of their failings was an inability to influence economic production since industrialisation depended rather on the import of foreign technology through technology transfer and foreign direct investment. Indeed it was this "foreign" influence that was much resented by countries who saw it as a new form of neo-colonialism, and led to autarchic, inward-looking policies emphasising import substitution, state control and hostility to market forces. Examples of such policies were the creation of "royalty committees" to control financial technology transfer terms in contracts, policies to make "inappropriate" technologies more "appropriate" (defined in terms of labour use and/or scale of operation) and the creation of patent offices to handle related issues of intellectual property rights.

However, more recently still the agenda has become much more complex and in a sense less narrowly political. Arguably this has a lot to do with rapid changes in globalisation on the part of international trade, capital, finance and technology. But clearly it has also been affected by the fact that some (formerly underdeveloped) economic systems have been able to benefit substantially from the import of foreign technology. Given that technology development was clearly a key resource, why was it that some countries could use S/T well while other countries apparently could not? The issue is now recognised as one of understanding in more detail the macroeconomic context and policy regimes that are beneficial in this regard. S/T can be a positive resource provided this context is suitable. The difficult question is to determine for each economic system what determines that suitability. Here the debate is still in a fluid state but it has become clear that success depends on the degree to which S/T interventions can be applied to those parts of the economic system where they are most needed. In turn this seems to be an institutional question and it is instructive to explore this in a little more detail.

2.2 Changing Context

The experiences of the richer industrialised countries have a similar historical genesis. Indeed the social studies of science as public policy goes back a long way, certainly as far as the famous C P Snow lecture in the 1950's and probably also to the earlier writings of Bernal and Blackett in the period just before the 2nd World War[vi]. It grew out of the increasing concerns felt by eminent scientists and others, regarding increased science and technology (S/T) activity and its growing impact on all aspects of society. Snow, for example, felt that UK national governance was profoundly at risk because senior civil servants in the UK were unable to grasp the full implications of modern technological developments for their ministries, while scientists themselves were becoming narrow specialists devoid of any wider understanding of civic life. His remarks, though targeted mainly at higher education and government, sparked considerable controversy and are still referred to today.

A major part of the problem, however, was clearly that analysts thought about "science" and "society" as separate activities. Indeed the conventional way of setting out the general conceptual issues was to think in terms of a division of labour between "knowledge search" and "knowledge use". University departments and state funded research institutes carry out pure research according to canons of objectivity determined by the cognitive authority of peer review. The knowledge that results from this activity is then drawn upon as and when needed by a productive sector which has quite a different agenda, that of making money from the sale of goods and services. Whether it refers to the natural or the social sciences makes no real difference. The market will draw upon the technological resources it needs as and when necessary. Knowledge impinges on economic production at the end of a *pipeline*, which in turn represents a cognitive hierarchy of excellence.

The pipeline view of S/T policy analysis did not just lead to cognitive differentiation. It also became reflected in an institutional division of labour that sub-divided S/T activity into separate organisations. Not only did these begin not to relate to each other in a technical sense, but also

they were often discouraged from doing so for bureaucratic reasons. In many countries this then led to a culture of inward thinking whereby scientific infrastructures became increasingly divorced from the wider social context, including importantly economic production. This became especially true in the Third World. Far from the modernising force anticipated by postcolonial planners, national laboratories have all too often become an inefficient drain on resources with little developmental justification.

The pipeline view of S/T policy analysis has been breaking down in the industrialised countries for a number of reasons. These are the shortage of governmental capacity to continue to fund pure research, disciplinary rigidities within academic and quasi-academic bodies, changing technological demands in the productive sector and expansion of activity within the knowledge-producing sector itself, each contributed to the blurring of the boundaries that demarcated these traditional knowledge categories. For instance, in the UK (and similar trends have obtained in other countries) a range of new institutional forms has emerged to improve the efficiency of this emergent knowledge market. Examples include the increased use of directorates, such as the UK Biotechnology Directorate, designed to focus the combined strengths of industry, research, university and government on a key generic technology: interdisciplinary research programmes; and schemes like the UK "teaching company" scheme that introduce joint academic/industry PhD supervision of students that are also employees of companies. The net effect of all these initiatives has been to blur the distinction between knowledge search and knowledge use and hence to make the notion of a knowledge pipeline (or shelf) increasingly untenable. Instead attention is now placed on more complex ideas like that of the *national innovation system*. Defined as the "network of economic agents together with the institutions and policies that influence their innovative behaviour and performance",[vii] emphasis is placed on how such a system should be organised to improve the dynamics of economic production.

Modern literature emphasis factors such as the increasing knowledge base of economic production, the tacitness of much of this knowledge (i.e. the importance of non-codified knowledge), the role of "learning interactions" amongst different techno-economic agents and associated networking arrangements, the non-linear properties of relevant knowledge flows, the significance of user/supplier contact, specially designed public policy regimes, and other factors which do not *in and of themselves* relate directly to S/T organisations as conventionally defined. In other words the allocation of S/T resources cannot now be left to "market forces" or the benign efficiency of an all-seeing civil service. Instead all stakeholders, including scientists themselves, must be aware of the whole network of relationships involved in innovative activity and adjust their behaviour accordingly. This will certainly require institutional reform.

2.3 The Challenge for Africa

This issue has simply not been recognised in Africa. Instead most countries possess a scientific infrastructure that is under-funded, heavily reliant on international donors (each of which has its own agenda), inefficient in every sense, and therefore increasingly demoralised and lacking in self-confidence. It is this background that sets the agenda for ATPS. Africa's economies have experienced poor and deteriorating performance in the past two decades. In 1970, sub-Saharan Africa's annual growth of real per capita Gross Domestic Product (GDP) was estimated at 3.2 per cent, while South Asia's was 1.2 per cent. By 1989 the trend had been reversed with Africa registering 2.2 per cent and South Asia averaging 3.2 per cent. In 1998 more than 301 million Africans were living on less than US$ 1 per day compared to 217 million in 1987.[viii] Africa has now the largest share of people living on less than $1 per day. In contrast, poverty declined most rapidly in South and East Asia during the 1990s. In Vietnam, for example, the incidence of poverty dropped from 58 percent in 1993 to 37 percent in 1998. Africa is today confronted with increasing food insecurity, a deteriorating public health, environmental degradation, and intense political and ethnic conflicts. It is now the poorest region of the world.

The region's telecommunications infrastructure is the least developed in the world. Africa has less than 2 percent of the world's telephone mainlines. By 1999 it had just about 10 million telephones.[ix] "Africa has less international bandwidth than Sao Paul, Brazil."[x] Of the 400 million Internet users in the world in the year 2000 less than 500,000 were in Africa. Many of the region's economies are yet to be linked to global e-commerce. In terms of public health, recent estimates show that less than 35 percent of Africa's population has access to basic health or medical care facilities. Malaria and the Acquired Immune Deficiency Syndrome (AIDS) are now major destroyers of human life on the continent. The World Health Organization (WHO) estimates show that at least 0.4 million adults and 1.6 million infants died of HIV/AIDS related illnesses in Africa between 1998 and 1999.[xi] Malaria is known to be responsible for at least 50 percent of rural deaths in Africa. At least half of the region's one-year olds have not been immunized against

polio, measles or tetanus. Such simple life-saving therapies as rehydration are not used in more than 50% of diarrhoea cases in Africa.

The poor economic status and associated deterioration of public health, increasing food insecurity and the relatively poor state of telecommunications should be major concerns of African governments and some of the multilateral and bilateral donor agencies. At the regional level, there is a growing recognition by African politicians and policy-makers that collective (Africa-wide) action is required to "extricate …the continent from the malaise of underdevelopment and exclusion in a globalising world."[xii] Translating this recognition into action requires a well thought out agenda and associated programmes. It will require African governments to pay more attention to the main sources of economic change and globalisation: science and technological innovation.

There is a common lesson that Africa can draw from the economic history of some of the Asian countries. A key factor in the successful economic and industrial development of these countries is that they have formulated and are implementing deliberate policies to harness and apply science and new technologies. These countries have acquired new forms of technological dynamism that have enabled them to improve their methods of economic production. For example, "the reduction in undernutrition in South Asia from around 40% in the 1970s to 23% in 1997—and the end of chronic famine—was made possible by technological breakthroughs in plant breeding, fertilizers and pesticides in the 1960s that doubled world cereal yields in just 40 years. That is an astonishingly short period relevant to the 1,000 years it took for English wheat yields to quadruple from 0.5 to 2.0 tonnes per hectare."[xiii] In Africa, many countries and their governments have not accorded science and technology the necessary attention. Their development policies, programmes and politics have continued to downplay and/or not appreciate the role that science and technology play in national and global economic change in general and human development in particular. In addition, African countries face the following challenges in their aspiration to harness and apply science and technology for human development:

3. ATPS: Origins and Growth

3.1 ATPS Background

The origins of ATPS go back to the 1970s, a period when many parts of the world had begun to recognise the importance of S/T for development had begun to establish suitable mechanisms to promote S/T policy. ATPS was established by IDRC as one outcome of a major research project carried out in the late 1970s and the early 1980s. That project, entitled the Science and Technology Policy Instruments (STPI) Project, had been aimed at developing viable policy instruments for the allocation of S/T resources for developmental purposes in the Third World. Since much of its focus at that time had been on the Caribbean and Latin America it was recognised that there was a need to transfer that experience to Africa where conditions were (and are) different in many respects. IDRC designed the programme and sponsored two workshop series, the first in the UK (1977-1980) and the second (1982/83) in Africa. These workshops were on S/T policy training and research issues and were designed to promote a network of people working on such issues. It quickly became clear, however, that a more proactive mechanism would be needed to establish S/T policy research in Africa---hence the creation of two sub-regional bodies, WATPS that dealt with West Africa and EATPS, which dealt with East Africa. At this stage IDRC was still the primary donor. Carnegie and Rockefeller came on board later on

Both sections of this network began to fund S/T Policy Research projects but for a variety of reasons the bifurcated structure was not really succeeding in its aim of building up a viable S/T policy constituency. Accordingly the two sub-regional bodies were amalgamated in 1994 to form the present ATPS under a headquarters secretariat based in the IDRC offices in Nairobi. Funded by three major donors, viz. IDRC, Carnegie and Rockefeller, it is mandated to carry out a series of activities designed to propagate and diffuse science and technology policy research throughout Sub-Saharan Africa.

Three developments began to occur during this new phase. The first was a series of systematic attempts to improve the quality of research proposals. Here the difficulty seems to have been one of developing proposals that were truly inter-disciplinary from university cultures that were still heavily dominated by disciplinary cognitive structures[xiv]. The second was a greater emphasis on improving links between network-supported researchers and potential users of research results[xv]. The third was the beginnings of a devolutionary process in which "national chapters" of ATPS were established and fostered in selected countries. Up to that point the ATPS network had always been made up of a number of national "focal points" but these "focal points" had never

been able to act as propagators of sustainable S/T capacity in the countries they were supposed to serve. By 1996 only six of the eleven appointed in October 1994 were active and even these seemed to have made little impact in the relevant countries. That is, they were little known amongst the policy academic communities that acted as potential clients for ATPS output.[xvi]

In a sense, however, all three developments were inter-linked since only an improved organisation at country level could produce the necessary networking designed to link stakeholders effectively which in turn would lead to better research proposals. The "focal points" therefore became the "nodes" of the national chapters, which in turn became responsible for developing the ATPS network at country level. Each chapter was managed by a National Co-ordinator who would be a senior researcher working in an appropriate research establishment, such as a university or national research institute. Although continuing to be employed (and remunerated) by his/her parent body the National Co-ordinator became responsible for facilitating and orchestrating ATPS events in that country. A small budget was made available to carry out this task.

By the end of the 1994-96 phase many achievements had been made although there was still considerable room for improvement. Chudnovsky and Makhubu carried out a review in 1996 and concluded that while the ATPS is an "excellent initiative to fill a crucial gap in African development" and while its stated objectives are pertinent, it was "unrealistic to think that they could have been achieved in just two years"[xvii]. They pointed to continuing weaknesses in proposal quality, research impact and network development and made a series of recommendations designed to improve things. These included importantly the building of relevant capacity at national level and greater efforts by the national chapters to improve the generation of good research proposals (including more user influence on proposal generation), on the one hand and to disseminate findings on the other.

Since 1997 there have been further changes. Secretariat staff summarised these as follows:

(a) Programmatic Focus.

Initially the programmatic focus of ATPS concentrated on broad science and technology policy issues. This has changed and currently ATPS is more focused on specific technology policy interventions that can contribute to sustainable human development. In the words of one interviewee: "the activities of the network must therefore go beyond research support, publications capacity building and policy round tables to serious policy interventions and advocacy. ATPS now aims to tap knowledge on technology policy issues from scholars and passes this on to policy makers".

(b) Organisational Changes.

There have been a number of these (some mentioned above) as follows:

- The transformation of the Steering Committee into a Board of Directors
- The strengthening of the national "focal points" and creating "national co-ordinators" in charge of the "national chapters" with the following specific duties:
    - Making programmes more demand -driven
    - Establishing ownership of the network from bottom upwards.
    - Building capacity (e.g. in areas such as financial management, strategic planning and human resource management)
    - Vetting Proposals in various ways
- An Executive Director who heads the Secretariat has replaced the position of the Co-ordinator.

(c) Other changes.

- The donor base of ATPS has improved. The original donors were the IDRC, the World Bank and the Carnegie Corporation of New York. Over the years the Rockefeller foundation, the OPEC fund and the Coca Cola East Africa Foundation have joined the donor base and grants are expected from Ford Foundation and the African Capacity Building Foundation [ACBF]
- The number of member countries has increased and presently stands at 15 Anglophone countries. The Board has therefore approved the network expansion into Mali, Benin, Senegal, Cameroon, Burkina Faso and Côte d'Ivoire. The number of proposals received by ATPS has increased substantially in recent years indicating

popularity and interest of researchers in ATPS activities. Consequently the number of grants awarded has also increased.

- The limit for small individual grants has been reduced from U$20,000 to U$15,000.This is to increase the number of grants to reflect the increased number of proposals.
- The quality and quantity of ATPS publications has increased
- The maximum period for research projects has been extended from 12 months to 18 months to allow for good quality work.

A range of factors has influenced these changes. These include the need for efficiency and effectiveness in the delivery of services, the need to interact more with clients, greater donor interest, and more awareness of ATPS on the part of potential stakeholders.

4. ATPS: Present Status

4.1 Organisational Structure

4.1.1 Overall Governance Structure and Objectives

ATPS consists of a Board of Directors, a Secretariat and a number of National Chapters managed by appointed National Co-ordinators. Each year the ATPS network meets at an Annual Assembly where a variety of tasks are transacted. These include organisational meetings, the annual decisions on grant awards, scientific seminars and any other necessary activities such as training sessions, reviews etc. The membership of ATPS General Assembly varies on a yearly basis. The core members of this Assembly include:

- All national co-ordinators [presently 15, but as noted above, the number is expected to increase to 21 when the Francophone West Africa countries come on board.]
- At least 40 persons presenting proposals at any one time.
- Approximately 10-15 members from the host country.
- Other people interested in science and technology policy issues drawn from different stakeholder groups.

This seems a reasonable composition to aim for though the Review Team is aware that as with the Board composition (see below) recent Assembly meetings have not been graced with many representatives from client groupings, especially industry. Accordingly it feels that steps should be taken to improve the proportion of client members.

The ATPS Mission is to:

> Contribute to economic and social development in Africa by improving the quality of decision making and strengthening institutional capacity for the management of technological development through user-oriented research, dissemination, training, and close interaction with decision makers and research end-users[xviii]

Its objectives are to:

- Generate a critical mass of knowledge for strengthening policy making and for identifying and assessing the impact of past and present policy on technological change and its consequence for development
- Build a continuous interactive process of knowledge diffusion by fostering linkages among researchers and between researchers and the private sector, policy makers and other end-users; and
- Disseminate and encourage the utilisation of research results through publications, workshops, conferences and policy round tables.

These are worthy objectives and the Review Team concurs with their spirit. The difficulty of course is to develop appropriate mechanisms to achieve such aims. Here a number of points are made below that may improve things in this regard.

4.1.2 The Board of Directors

The Board is composed of not less than seven and not more than fifteen persons. It meets formally at the annual AGM where its composition is renewed. Prior to each AGM the Board calls upon all its members for nominations to vacant board positions. Donors, directors and members

then seek to appoint or elect from among the nominees a board of which reflects a balance professional qualification, regional representation, policy makers, donors, private sector representation and disciplines. More formally this has to be done according to the following criteria:

- No more than one third of the directors should be the respective nominees of the donor community.
- No more than one fifth of the directors should be renowned international experts on science and technology, residing outside Africa, to be nominated and appointed by the outgoing board.
- The balance of the board of directors should be elected by the members from among their own ranks, as resident African members having renown for research publication and management in science and technology.
- There are no national chapter representatives on the board.

As currently constituted these criteria give ATPS board a total of 9 experts consisting of 5 African scholars, 2 international experts and 2 representatives from the donor community. The directors hold office for a term of 4 years and are eligible for re-election for one further term only.

The Review Team is generally supportive of how the Board is constituted and conducts its business. However, it has the following critical comments. First, there appears to be a mismatch between the formal criteria for membership outlined above and the wider aim of having a broad representation of stakeholders. In particular the representation of industry is non-existent. This gives the Board a supply-driven character, which is not suitable for its wider purposes. The second critical point is that the Board should go beyond its current (reactive) annual funding/administrative function and begin to play a more central role in developing a long-term strategy for ATPS. Such a strategy would provide a context for activities of the National Chapters and is in keeping with international trends in research management.

4.1.3 Secretariat

The Secretariat is the hub of the ATPS network and as such plays a key role in its development. Now that ATPS has become an independent body it has moved from the IDRC offices to a separate location in Nairobi. This is both a mark of its progress as an agency and an opportunity for creative development. However, it also means that resources previously provided by the IDRC are no longer available and will have to be raised independently. This will become even more important as the network expands along planned lines leading to greater demands on centre inputs. In addition a range of critical comments outlined below raise issues of resources that will have to be dealt with if the Secretariat is to provide the full range of necessary function.

Just as the Board needs to play a greater pro-active role in the ATPS, so the Secretariat needs to have a more direct role of intellectual leadership. This is not to say that nothing has been happening in recent years. It certainly has, but it has been understaffed with much time spent on necessary administrative functions.

- National Chapters and the Secretariat should be better integrated. By this we mean they should operate more as a genuine interactive network and incentives must be provided to enable them to succeed in this. Only where that happens will ATPS activity be consistent with an *innovation systems* approach to research policy.
- The Secretariat also should act as a reference point with respect to up-to-date information. It should have the capacity to supply on line material, books and other publications on current STP issues. Incentives should be provided for National Chapters to access such material as inputs into their proposal writing and other activities
- The Secretariat should see itself as the pro-active hub of an evolving network and proceed accordingly
- The Secretariat should provide guidance on the changing donor landscape (e.g. donors are now changing how and what they fund. The Secretariat should be aware of this)
- The Secretariat should explore best-practice research management trends internationally and use this experience to guide its operations (e.g. setting up centres of STP excellence in a country, the process being a competitive one. One such could be the growth of SME clusters as an aid to industrialisation. The Nigerian Chapter's experience in Nnewi might act as one of these[xix]).

However, to create and develop a proper network designed to achieve its stated objectives a major academic input is now necessary and to do this it will need more resources. In particular

1. The Executive Director needs administrative support if he is to carry his functions effectively. Accordingly the Review Team recommend the appointment of an administrative assistant whose role it will be to act as an administrative co-ordinator to the network, thereby giving space to the Executive Director to carry out his duties at a more strategic level.

2. ATPS will need to recruit a programme officer of good calibre. Such a person will function as a research resource and not as an administrator. He/she should act as an academic assistant to the Executive Director but be able to function autonomously in carrying out functions.

3. ATPS will need to recruit an information officer who is well trained in modern computer technology

4.1.4 National Chapters

- Leadership appears to be key here and so incentives need to be created to produce this (some resources will be needed here---but possibly not a lot)
- The need for a more coherent long-term strategy is important here since this will give National Chapters a better idea about how to proceed. There should be specific programme guidance
- National Chapters should be encouraged to develop cross country bids according to laid-down rules
- National Chapters should not get involved with project fund-raising as such (since this would disintegrate the network). However, mechanisms need to be found to enable a better sense of "ownership" of projects.
- The Secretariat might consider offering guidelines to National Chapters re what is a "good network".How does joint value added get achieved in terms of authorship, marketing dissemination, links to policy makers etc.

4.1.5 Internal processes of ATPS network

The Annual Workshop

As outlined above the Annual ATPS Workshop fulfils a number of functions. Firstly it is an opportunity for all members of the network to meet and exchange views on chapter activities. Secondly it acts as an occasion where the ATPS Board meets not only to conduct necessary administrative business but also to meet national researchers and to comment on their activities. Thirdly (and relatedly) it is the occasion when final decisions are made on grant applications (see below). Fourthly it is an opportunity for capacity strengthening through workshops and presentations from international authorities on cognate themes.

The annual cycle of proposal vetting is as follows:

(i)   National chapters meet and rank all proposals on a peer review basis.
(ii)   Proposals are then sent to the Secretariat
(iii)   The Secretariat passes these on for consideration at the Annual Workshop though it sometimes narrows down the list through an intermediary peer review process.
(iv)   At the Annual Workshop further peer review evidence is taken before the final list of proposals (and comments) are passed to the ATPS Board
(v)   The ATPS Board meets and takes a final decision on which proposals are to be funded. Often rejected proposals are advised on how proposals might be improved for re-submission.

The Review Team is of the view that these procedures are the right ones to ensure fairness and quality. However, it wishes to draw attention to one particular issue that arose in its investigation. And this relates to the possibility that proposals may not always get to the final stage because they are not actually sent to the Annual Workshop. In this case the Review Team chanced upon a proposal from Ethiopia, which seemed eminently suited to the ATPS remit. This proposal was apparently put into the system but never made it to the appropriate Annual Workshop[xx]. Now there may be reasons behind this failure that are legitimate but the Review Team could not elicit what these are and can only conclude that there may be a weakness in the procedures. It is for this reason that the team recommends that the ATPS Secretariat consider all proposals even if their respective National Chapters give them a low ranking. In addition to ensure that all proposals are given a fair hearing, copies of all proposals should be sent both to the ATPS Secretariat and to the National Co-ordinator[xxi].

More generally the Review Team believes that the Annual Workshop plays a crucial role in the development of ATPS as a viable network. However, it would like to make the following recommendations to improve its work in this regard:

- All bids should go to The Secretariat though it is useful to have National Chapter reviews taking place as a capacity-building activity
- Peer reviewing might take place across the network (i.e. across member National Chapters)
- Resource persons should be either themselves research active or deeply involved in relevant policy processes. There are probably too many people being used who are a little out-of -date in their knowledge.
- Client groups might be directly involved as resource groups

Research Project Proposals

The Review Team monitored 30 project proposals submitted between 1998 and 2001 (including 18 new proposals that have been short-listed this year from two countries). From this examination it drew the conclusion that proposals seem to have improved a little on average compared with similar proposals of five years ago but there are still a number of weaknesses, as outlined below

- There are weaknesses in terms of interdisciplinary orientation. Many proposals are clearly informed by a single discipline and little serious attempt is made to broaden the scope of the research in this sense. Quite often lip service is paid to policy implications of the proposed research but it is fairly clear that the researchers are only doing this as a means to getting the proposal funded.
- There is weak balance among proposal sections. By this we mean that literature reviews tend to be too long compared to methodology accounts. Also proposals are not convincing in moving from the literature review to the formulation of the research question to be investigated. In fact often proposals have a formulaic flavour that indicates that applicants are attempting to fit the proposal into a pre-defined "recipe book" structure. The result is that applications lack that "integrative quality" that so often identifies a fundable proposal.
- Methodology sections are still very weak, mainly in the sense of lack of detail provided. Also applicants seem reluctant to anticipate methodological weaknesses that might affect the data collected and hence the results of the research. Improvements are certainly needed here.
- There is little evidence that researchers have consulted potential users in project formulation (only 1 out of 18 proposals gave any indication that proposers had made attempts in this direction)
- There is still too little emphasis on statements about dissemination mechanisms that researchers will employ to propagate research findings. Only 4 out of the 18 proposals made mention of this
- More use could be made of comparative case study research methods. There is still a tendency for proposers to be quantitative for the sake of it. By this we mean that there should be greater efforts made to link proposed methodologies to the nature of the research that will be conducted. This type of organic linkage is still missing in many proposals.
- Although there are examples of comparative work being undertaken across institutions and countries these are a tiny minority and do not make the most of the potential for comparative analysis. A good example here was a project entitled "Socio-economic and Environmental Consequences of Agricultural Technology: A Comparative Study of Small-Scale Irrigation Technology in Nigeria and Swaziland". However, the report provides little evidence of any comparative analysis. One might have expected to see statements comparing topographical, institutional or socio-economic differences across the two countries that had then informed data collection. Instead the report is a descriptive account with little comparative analysis either across country or indeed between the "environmental" and the "economic". The Review Team concludes that there must have been major weaknesses in the research design of this particular proposal.
- None of the proposals examined showed evidence of adhering to specific research themes that had been laid down in advance by the Secretariat. Since the practice of giving greater guidance is now commonplace in modern research funding, the Review Team feels that this may be an area where improvements could be made [see also above]

4.2 Programming Niche

4.2.1 ATPS Niche

The Review Team is of the view that the overall positioning of ATPS programming is broadly correct. Technology policy studies are slowly becoming recognised by those in policy-making positions as vital to the development of the region. However, although ATPS is an evolving network it is too stand alone" at present. By this the Review Team mean two things. First ATPS as a whole should make more efforts to engage with user stakeholder groups. This is so because unless better awareness is promoted, the development value of its research will continue to be compromised. A series of recommendations are made below that might improve matters here. The second point is that the ATPS should begin to link itself more explicitly to international "best practice". By this we mean it should see its clients not only in terms of local industry and government ministries but also international corporations, donor communities, agencies, etc. It should connect more directly into the UN system and link also with equivalent groups in other parts of the Third World. In so doing ATPS will create a more vigorous presence for itself and benefit as a result.

4.3 Output and Impact of Activities

4.3.1 Publications Policies

ATPS national chapters are encouraged to publish and disseminate summaries of their research results, workshop proceedings, policy briefs, newsletters and other such publications that further the mandates of the chapter. However, any publications bearing the exclusive ATPS logo are subject to quality control by the Secretariat. And written permission must be obtained from the Executive Director before a chapter can issue such a publication. The Board of ATPS has authorised the following categories (or series) of publication:

(i)   Research Papers Series (RPS)

These result from the small research grants process or from the regional projects. They are normally subjected to three external reviewers and a positive review from two of them is normally required before a paper can be published under this series. The Executive Director is authorised by the Board to provide an additional honorarium of up to US$500 to any researcher whose paper is published under this series.

(ii)   Special Papers Series (SPS)

Papers published under the SPS are commissioned by ATPS as concept papers, think pieces, leading ATPS conference papers, keynote addresses. Such papers normally address significant policy questions relevant to the work of ATPS and/or support the Southern voice or an African perspective. Theoretical papers that advance knowledge of technology policy issues are also considered. In all cases the aim is that authors see value in the wider distribution of their work.

(iii)   Working Paper Series (WPS)

Papers published under the WPS are those produced from the ATPS small grants process or from regional projects but do not meet the strict requirements set out under the RPS. The aim here is partly a capacity-building one to enhance skills that make most of ATPS research outputs to be published under the RPS. Researchers are encouraged to produce their final drafts in a publishable manuscript form that is shorter and easier to read.

(iv)   Technopolicy Briefs

Technopolicy briefs are short summaries of papers published under (i) – (iii) above and are written with a busy policy maker in mind. In this way answers to key questions addressed in a larger paper may be presented in a user-friendly fashion, using simplified language with simple charts or illustrations for easy of reading and which will draw attention to some important messages. This tool will be extremely useful for the greater advocacy role envisaged under the new ATPS plan.

(v)   Newsletter

ATPS plans to produce a quarterly Newsletter in order to keep members of the ATPS family informed of the activities of the Network. It will highlight the activities of the Board members, the Secretariat and the National Chapters. The Newsletter will serve as a vehicle for announcements including job opportunities, consultancies, and other brokerage functions performed by ATPS. The Newsletter will be packaged in such a way as to reflect the ideals of ATPS.

4.3.2 Output and Activities

(i) Research Grants

Appendix gives details of all research grants awarded over recent years broken down by subject, amount, country and theme. A number of conclusions are evident from these data. Firstly there is a severe imbalance in the geographical distribution of awards. Thus 3 countries (out of 13) have obtained nearly 80% of awards. These are Nigeria (46%), Kenya (25%) and Ghana (10%). Of course, to a large extent this position must reflect both the number and quality of proposals considered. Nevertheless, such a severe imbalance is not a healthy one and it is necessary for the ATPS as an organisation to seek mechanisms to remedy the situation. A second feature of interest is the number of funded projects dealing with gender issues. Here a total of 20 (out of 109 during the 1994-2001 period) are gender related. The Review Team is of the view that this is rather a high proportion amounting to nearly 20% of awards. It is doubtful whether most donors would show a similarly high proportion and wonder about the rationale for this trend

(ii) Research Direction

The Annual Meeting should give greater research direction to National Chapters by indicating where they would welcome proposals. This could be decided as part of workshop sessions and might relate to major issues currently affecting Africa. For example the areas of genomics policy and IT policy spring to mind as ones that are presently exercising the minds of many African governments.

4.3.3 Capacity Building

This is clearly an area where much more needs to be done, especially in the area of research methodology. The Review Team is strongly of the view that the practice of submitting research proposals according to a pre-digested formula is not an efficient use of its limited resources. While the use of a handbook is a necessary condition for soliciting proposals, it has to be supplemented by appropriate training. Accordingly the Review Team recommends that:

- National Chapters should conduct regular workshops during the period between the Annual meeting. All of these workshops should explicitly touch on methodological issues even if they also deal with other topics.
- The Annual Meeting should have at least one session devoted entirely to methodological issues.
- Other (what?)

4.3.4 Institutional Growth

As outlined above there are plans to widen the geographical coverage of ATPS and the Review Team endorses these plans. However, this will increase the institutional strain on the organisation. To some extent further staff recruitment at secretariat level will do much to help things along but the Review Team believes that much greater use should be made of ICT in the future. Indeed the provision of e-knowledge should become a central function of the Secretariat. Also peer reviewing could be conducted on line.

4.3.5 Brain Drain

Frequently the enhancement of national capacities is criticised on the grounds that benefits are subsequently leached away. Trained personnel either moves into more lucrative jobs in the private sector (including consultancy activities) or seeks employment overseas. On both points the Review Team believes such fears to be exaggerated. On the first point staff lost to the Higher

Education/Research (HE/R) sector can often make equally useful contributions in other parts of the economic system. Indeed they often become more productive in the sense that they are then not constrained by the bureaucratic rules and regulations often encountered in the public sector. Moreover to the extent that they maintain links with HE/R organisations their work can inform and enhance best practice. Conversely the Review Team would argue that it is the HE/R sector itself that needs reform and African Governments must do more in this direction. The issue of the Brain Drain has been much discussed but again may not be an important issue. There are many advantages in placing distinguished Africans in senior professional positions overseas. As such they often create a "Diaspora" which can assist Africa in many ways. Indeed the more international ATPS becomes the better for ATPS for obvious reasons. Accordingly the Review Team recommends that measures to restrict the Brain Drain are not the responsibility of ATPS and should be avoided.

5 Conclusions

Based on this review the Review Team believe that the following benchmarking indicators may be suggested:

- Numbers of submitted proposals by year, country. A list of titles for these would be very useful
- Numbers of successful proposals by year and country. These data should include titles categorised into specific research themes. However, the nature of such themes is a matter for Secretariat/Board decision.
- Indicators of ATPS output citation. This may be hard to do but would be a measure of influence in the wider community.
- Numbers and names of ATPS research personnel who go on to take up positions within policy-making. Developing such a database requires immediate action.
- Annual budget for ATPS over the period
- Numbers of established National Chapters over the period concerned.
- Periodic reviews of ATPS popularity. For example it would be useful to ascertain how many people in client groups know about ATPS

APPENDIX I Questionnaire to National Chapters

Dear

Review of the African Technology Policy Studies (ATPS) Network

The IDRC on behalf of ATPS has asked us to conduct an evaluation of the African Technology Policy Studies (ATPS) Network. This evaluation will cover the ATPS organisational structure, its programme, the output and impact of its activities and suggest recommendations for its future activities in all these respects. As an ATPS National Co-ordinator we are sure that you have views on all these factors and accordingly we would be grateful if you could find time to share these with us.

In order to simplify the task we list below a series of questions to guide your replies. Please answer as fully as you feel able. Some of these questions are factual and you may not know the answer. If so just indicate this in your response. In other cases the questions are designed to elicit your views. In these cases please respond as completely as you can. Naturally we shall respect the individual confidentiality of your response.

We realise that responding to these questions will take a little time and effort but hope you will appreciate the importance of your replies to a proper evaluation of the ATPS Network as a whole. A prompt reply would be much appreciated, but in order to meet our timetable we would be grateful if you could respond by the 1st September at the latest.

Yours sincerely

John Mugabe   Norman Clark

Questions

A. Origins and evolution of ATPS

In your view:

1. Why was ATPS originally established? And why as a network?
2. Who was responsible for its establishment?
3. In your National Chapter who were/are its primary stakeholders? Who are its main "clients"?
4. What has been the programmatic focus of ATPS? Has it changed over the years? If so, why and in what direction?
5. How has the ATPS network changed in quality and quantity since its inception? What factors have influenced or determined this change or these changes?
6. How have donors (and financing generally) influenced programmatic and organisational changes within ATPS (both generally and with respect to your own National Chapter?)

B. Demands on ATPS

Again in your view:

1. What kinds of demands are ATPS' clients making? (research? advisory? training? other?)
2. How are such demands articulated and by whom (governments? Industry? NGOs, academic bodies? Other?)
3. How has your National Chapter responded to these demands?
4. What constraints do you experience?
5. Do you plan changes in this regard? And if so what and why?

C. Outputs and quality management

Again in your view:

1. What are the kinds of outputs that ATPS typically generates? Have there been any changes in the nature of these outputs both generally and with respect to your National Chapter? (e.g. emphasis on working papers and not books? Or balance with respect to gender, discipline and theme?)
2. What is the process of generating these outputs (from proposals---and by whom?)
3. What dissemination mechanisms does your National Chapter use? (e.g. workshops, stakeholder meetings, newsletters, advice to government etc.)
4. How could the Network's publication be improved in the light of its existing and potential resource base?
5. How is your programme developed? By whom? (e.g. do you target specific types of proposals or do you simply respond to whatever proposals are sent to you?)
6. What is the level of client involvement in project proposals? And how is this solicited? Do you use the extent of client involvement as one of your criteria to judge proposals?
7. What are your peer review policies and procedures? How are they implemented? (e.g. do you peer review at National Chapter level or do you leave this to final Network Secretariat decision?)
8. What guidance to you elicit from Network Secretariat in the course of vetting proposals?
9. What feedback mechanisms has your National Chapter established to ensure that the quality of its products meets clients' demands/needs? How could this be improved?
10. How adequate is national policy research capacity? What steps do you take to build such capacity?
11. What roles do the members of your National Chapter play in national policy formulation? Is this adequate and if so how could it be improved?

D. Organisational

Again in your view:

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1. How satisfied are you with regard to current organisational arrangements, both within your own National Chapter and with respect to relations with the ATPS Network Secretariat?
2. What suggestions have you for improvement in this regard?
3. Do you consider the structure and composition of the current Board appropriate? And if not how should it be improved?
4. How frequently do the members of your National Chapter meet? Is this adequate and if not what are your constraints in this regard? To what extent does electronic interaction help matters?
5. How could the Network Secretariat improve its assistance to your National Chapter?
6. How satisfied are you with regard to current organisational arrangements, both within your own National Chapter and with respect to relations with the ATPS Network Secretariat?
7. What suggestions have you for improvement in this regard?
8. Do you consider the structure and composition of the current Board appropriate? And if not how should it be improved?
9. How frequently do the members of your National Chapter meet? Is this adequate and if not what are your constraints in this regard? To what extent does electronic interaction help matters?
10. How could the Network Secretariat improve its assistance to your National Chapter?

E Other Comments

Please feel free to make any other comments you believe are relevant either to the operations of your own National Chapter or to the ATPS Network as a whole.

APPENDIX II Questions to Selected Clients

Review of the African Technology Policy Studies (ATPS) Network

Questions to be put to Client Groups

Attached below are a series of suggested questions that might act as the basis for assessing the views of ATPS clients. However, you may well ask others that occur to you either in the meeting itself or having discussed things with colleagues. In general the following client groups should be investigated/surveyed:

1. Government departments (particularly ministries of industry and ministries/ commissions of science and technology—but other ministries might also be usefully canvassed as well)

2. Groups/individuals associated with national parliaments (e.g. select committees and the like)

3. Industrial/agricultural trade associations in the private sector

4. Other stakeholder groups that may have relevant views that should be considered (e.g. within the research sector, NGOs etc.)

In all cases the overall aim should be that of assessing:

- How well ATPS is known
- How relevant ATPS is to client groups
- How effective ATPS is carrying out its functions
- What improvements should be made

Suggested Questions

1. Is your organisation of ATPS aware of the ATPS?
2. Do you know what its objectives are? If so,
3. What kinds of demands do you make on the ATPS? (research? advisory? training? Publications? other?)
4. How successfully are such demands met?
5. What constraints do you experience?
6. Do you suggest changes in ATPS activity?
7. And if so what and why?

8. Are you ever asked to assist in pre-project formulation, attendance at workshops or dissemination activities?
9. If so how frequently does this occur?
10. What is your view on the role of research bodies in helping to formulate public policy and private profitability goals?
11. How could this be improved through the use of networks like ATPS?

APPENDIX III Questions Put Directly to the ATPS Secretariat

1. Factual Data Needed from Secretariat

a) Value of grants awarded 1994-2001 (broken down by recipient institution and country)
b) Number of grants awarded 1994-2001 (broken down by recipient institution and country)
c) Time taken to complete funded projects [i.e. what delays are there and is this a serious problem?]
d) Publications since 1994
   - Books
   - Journal Articles
   - Research Papers
   - Special Research Paper Series (SPS) Publications
   - Working Paper Series (WPS) Publications
   - Technopolicy Briefs
   - Newsletters

2. Other Data from Secretariat

   - What is the membership of the ATPS General Assembly?
   - How is this membership chosen?
   - What is the composition and standing of the General Assembly?
   - How does the General Assembly function? [i.e. number of meetings, consultations etc]
   - How does the ATPS Board get chosen? [i.e. criteria of choice, period of service etc]
   - What is the justification for this procedure?
   - What is the current policy regarding National Chapter representatives on the Board?
   - How has the ATPS governance structure changed in the past 8 years?

3. People Interviewed in Connection with this Review (mostly from JM)

4. Procedures Involved in Submitting Proposals
   - Please acquire a copy of relevant guideline documents and any other relevant information on changes over the period 1994-2001
   - Are all proposals submitted to ATPS THE SECRETARIAT in Nairobi?
   - If not how is short listing carried out?
   - What ranking procedures are carried out at National Chapter level
   - How does this vary across countries?
   - Is there any evidence of targeting research themes on the part of the Secretariat?
   - Is there any evidence of funding cross-country projects?

5. Capacity Building

   - What are the various mechanisms used by ATPS to build S/T policy capacity analysis? [i.e. training courses, workshops, other]
   - How frequently does each mechanism occur in-country and at THE SECRETARIAT

APPENDIX IV People/Institutions Interviewed by the Review Team

Professor Lynn Mytelka
Director
UNU/INTech
Maastricht
Netherlands

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Dr Banji Oyeyinka
Senior Researcher
UNU/INTech
Maastricht
Netherlands
[and] National Co-ordinator
ATPS National Chapter
Nigeria

APPENDIX V Documents Consulted

B Oyelaran-Oyeyinka (1997) *Nnewi: An Emergent Industrial Cluster in Nigeria* (Technopol Publishers, Ibadan)

Chang, Ha-Joon (Undated) *Who Benefits from the New International Intellectual Property Rights Regime? And What Should Africa Do?* African Technology Policy Studies Network (ATPS) Technology Policy Brief

Mani S (2001) *Globalisation, Markets for Technology and the Relevance of Innovation Policies in Developing Economies* UNU/INTECH, January

ATPS (Undated) *African Technology Policy Studies Network (ATPS) Grant Application--Phase IV* IDRC, Nairobi.

ATPS (1994) *Guidelines for the Presentation of Research Proposals*, IDRC, April

Chudnovsky D and L Makhubu (1996) *Evaluation of the African Technology Policy Studies Network*, IDRC, August

ATPS (1997) *African Technology Policy Studies Network: A Strategic Framework for the ATPS in the Next Decade,* IDRC, October

APPENDIX VI ATPS research grants issued (1994–2000)

	Recipient(s)	Title	Amount (CAD$)
1.	Badekale, A.J.	*"Women And Engineering In Nigeria: Towards Improved Policy Initiatives And Increased Female Participation"*	20,340
2.	Bamiro, O.A.	*"Financial Institutions And Science And Technology Development"*	21,000
3.	Brew-Hammond, A	*"Electric Power Utilities And Technological Capacity Building In Sub-Saharan Africa: The Case Of Volta River Authority, Ghana"*	16,040
4.	Bwisa, M.H. and Gacuhi, A.R.	*"An Investigation into Factors that Influence the Diffusion and Adoption of Inventions from Research Institutes and Universities in Kenya"*	28,080
5.	Dube, M.A.	*"Linking Indigenous Knowledge To Appropriate And Sustainable Agricultural Technology In Swaziland"*	22,934
6.	Foundation for Economics Education	*"Policy-induced Local Sourcing Of Raw Materials And Technology Development In Nigerian Industry"*	28,100

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	Recipient(s)	Title	Amount (CAD$)
7.	Laditan, G. O.	*"Technology Absorption And Indigenous Technological Capabilities: A Comparative Study Of The Two Integrated Fertilizer Plants In Nigeria"*	17,420
8.	Madaya, P. and Nuwagaba, F.	*"The Impact Of Economic Liberalization Policies On Technologies In Enterprises Processing Agricultural Produce: The Case Of Kampala And Dar-es-salaam"*	33,956
9.	Madukwe, C.	*"Issues In Agricultural Technology Transfer Policy To Farmers In Nigeria: A Study Of Yam Minisett Technology"*	22,400
10.	Mwamadzingo, M. and Ndung'u, N.	*"Development Of Science And Technology In Kenya During Periods Of Structural Adjustment"*	23,150
11.	Ngahu, C.W.	*"Technologies Developed/used In The Creation Of Enterprise With Minimal Resources: Implications For Policy"*	21,000
12.	Nnebe, E. H.	*"The Effects Of Economic Reforms On The Quality Of Manpower Development In Nigeria: Focus On The Polytechnic"*	20,800
13.	Nyambura, M.S.	*"Technology And Social Change: A Cross-cultural Study Of Women's Indigenous Knowledge Pertaining To And Use Of Food"*	19,300
14.	Oduol, W.	*"The Gender Variable In Agricultural Technology: A Case Study Of Rural Farmers In Machakos District, Eastern Kenya"*	25,362
15.	Ogun, O.	*"Technological Dynamism And Export Performance: A Study Of Nigeria's Textile Industry"*	27,692
16.	Olokesusi, F.	*"The Technological Impact Of Environmental Standards And Practice Relating To Pollution Control On Nigerian Industries: A Case Study"*	26,800
17.	Oyeyinka, O.	*"Technology And Institutions For Private Small And Medium Firms: The Engineering Industry In Nigeria"*	16,300
18.	Aina, O.I.	*"Domestic Energy Crisis In Nigeria: Technological Implications And Impact On Women And Family Welfare*	19,830
19.	Anyakoha, E.U, Ozoh, R.,O. and Mama, R.O.	*"Appropriate Technology Utilization By Rural Women In Nigeria: Obstacles, Enhancement Strategies And Implications For Technology Policy"*	17,233
20.	Eboh, E.C.	*"Institutional Reform, Price Deregulation And Technological Change: A Study In Nigeria's Small Farms Sub-sector*	16,097
21.	Ezenwe, U, Dike E., Ihuoma, A. and Duru, M.	*"Technological Capability In The Nigerian Leather Industry: A Firm-level Case Study"*	18,205
22.	Fosu, K.Y.	*"Economic Policy Reform And Agricultural Technology in Ghana 1983-94*	20,500
23.	Jamiru, T.	*"Promotion Of The Production And Utilization Of Ceramic Roof Tiles In The Informal Sector Of The Housing Industry In Sierra Leone"*	15,250
24.	Murage, F.G. and Kirimi, J.B.	*"Economic Policy Reforms And Technology In Kenya: The Case Of Maize Yield Technologies In Kenya-phase I*	28,165

	Recipient(s)	Title	Amount (CAD$)
25.	Odebiyi, A.I. and Soriyan, B.	*"Impact Of Computer Technology On Banking Operations In Nigeria"*	16,425
26.	Olusi, J.O.	*"Impact Of Agricultural Technology Adoption On Smallholder Farmers: Policy Options In Nigeria"*	15,584
27.	Soetan, F.	*"From The Grassroots: Indigenous Non-governmental Organisations (NGOs), Technology And The Empowerment Of Rural Women In South-western Nigeria"*	15,206
28.	Ugwu, D.S.	*"Adoption Of Agricultural Technologies By Rural Women In Enugu State, Nigeria"*	16,031
29.	Adeyinka, F. M.	*"Technological Response Of Electronic Firms To Telecommunications Development In Nigeria".*	21,294
30.	Afonja, A. A, Oni, S.A. and Straku-Lartey	*"Engineering Education For Industrial Development: Comparative Studies Of Nigeria, Ghana, And Zimbabwe".*	34,245
31.	Ezeh, D. N.	*"Gender Differences In Small-scale Rice Farmers: Access To Technological Inputs And Its Implications For Output In Enugu State Of Nigeria".*	21,095
32.	Masenya, W.	*"Small And Medium Scale Enterprise Viability Under Conditions Of Conventional Energy Deficiency: The Case Of Botswana".*	25,370
33.	Mbanefoh, N.	*"Sustaining Existing Rural Women Small Enterprises In Nigeria: A Case Study Of Palm Oil Processing".*	24,801
34.	Olusegun, H. D.	*"The Technological Impact Of Nalda On Agricultural Productivity In Nigeria: The Case Of Kogi State*	23,211
35.	Wagah, A.	*"Technology Transfer: Socio-economic Implications For Women In Agricultural Production And Home Economics In Kenya".*	23,075
36.	Abakah, E.M.	*"Technological Choices And Industrial Waste Management In sub-Saharan Africa: The Case Of Ghana's Food Processing Industries And Cleaner Production Technologies"*	14,175
37.	Akerele, W.O.	*"Technology Acquisition And Technological Capabilities Accumulation In The Pulp And Paper Industry In Nigeria"*	11,870
38.	Akinbinu, A.F.	*"Industrial Clusters And Innovation Networks In Nigeria: A Study Of Firms In The South West And Northern Nigeria"*	13,500
39.	Antonio, F.	*"Financing Technological Innovation In Sub-saharan Africa: The Case Of Development Finance Institutions In Ghana"*	*14,100*
40.	Botchie, G.	*"Technology And SME Development In Ghana: The Case Of The Gratis Project"*	*14,250*
41.	Chima,R.I, Onwioduokit, E.A. and Ogoh,	*"Oil Technology Research Transfer, Acquisition And Government Policy In Nigeria"*	*13,270*
42.	Chipika, S.	*"Technological Accumulation Among Indigenous Small And Medium Scale Light Engineering Firms In Zimbabwe"*	*15,000*

	Recipient(s)	Title	Amount (CAD$)
43.	Davies, V.A.B.	*"Structural Adjustment And The Substitution Of Indigenous Technology Among Small And Medium Scale Enterprises In Sierra Leone"*	*14,250*
44.	Faborode, M.O. and Afeikhena, J.	*"Innovation In The Agricultural Machinery Sector In Nigeria: Determinants And Socio-Economic Consequences"*	*13,500*
45.	Kajogbola, O.D. and Ajifekure, I.S.Y.	*"The Impact Of Information Technology On The Manufacturing And Service Sectors In Nigeria"*	*12,380*
46.	*Karembu, M.*	*"Small Scale-farmers Adoptive Response To Banana Biotechnology In Kenya: Implications For Policy"*	*14,670*
47.	*Karugu, W.N.*	*"An Assessment Of The Effects Of Technology Transfer On Gender Roles Within A Community: The Case Of The Development Of Tea And Coffee Production In Kiambu District, Central Province, Kenya"*	*15,000*
48.	Keregero, K.J.B .and Dlamini, M.P.	*"A Study Of Women's Access To And Use Of Appropriate Technology In Rural Swaziland"*	*15,000*
49.	Kiriti,T.W,Kabubo,J. W, Mugo,M. Mwangi, M. and Chacha,R.N.	*" Economics Reforms, Technology Transfer And The Acquisition Of Technological Capabilities: A Case Of Export Processing Zones In Kenya" Clustered With "Export Processing Zones And Their Technological Implications For Kenya"*	*18,000*
50.	*Lubowa,D.*	*"Woodlot Agroforestly Technology And It's Socio-economic Impact In Uganda"*	*14,250*
51.	*Mbajiorgu, N.M. and Ugwu, F.M*	*"The Impact Of The 6-3-3-4 System Of Education On Technological Capability Development In Nigeria"*	*13,500*
52.	*Mbatha, C.M, Kioko, M.M., and Ndolo, U.M.*	*"Investigation Of Technical, Social And Economic Consequences Caused By The Production And Use Of FCR Tiles And Stabilized*	*15,680*
53.	*Musani, S.K. and Rono, P.K.*	*"The Impact Of Privatization Policy On The Livestock Sub-sector In Kenya: A Case Study Of Artificial Insemination Technology On Small Holder Dairy Production In Nakuru, Kericho And Nandi Districts, Kenya"*	*17,720*
54.	*Mutuku, M., Ombati, J.M. and Ngesa, F.U.*	*"Small-scale And Medium-scale Enterprise Development: A Study Of The Current State And Potential Technology Extension Services To Small And Medium Size Firms In Kenya"*	*15,000*
55.	*Namusonge, G.S.*	*"The Role Of Financial Institutions In The Acquisition Of Technological Capabilities By Small Medium Enterprises In Kenya"*	*14,250*
56.	*Odero, K.O. and Oduma. A.E.*	*The Potential Contribution Of Science Park Ventures For Technological And Industrial Development In Africa"*	*14,880*
57.	*Okorie, A. and Mabuza, K*	*"Donor Funding And Sustainability Of Rural Water And Sanitation Technologies In Swaziland"*	17,710
58.	Okoye, C.U. and Okpala, A.O.	*"Employment And Income Effects Of Biotechnology In Nigeria: The Case Of Cocoa Butter Substitutes"*	*13,560*
59.	Yemene, G.	*"Agricultural Research And Delivery System In Highland Ethiopia: The Case Of Sg. 2000"*	*13,385*

	Recipient(s)	Title	Amount (CAD$)
60.	Olomola, A.S.	"Adoption Of Animal Traction Technology And Effects On Farm Output Supply And Resource Use In Northern Nigeria"	12,903
61.	Obasi, I.N.. and Soludo, C.C.	"The Aba And Nwewi Technological Phenomenon: A Study Of Copy And Indigenous Technology In Nigeria"	13,500
62.	Udegbe, I.B. and Bamgbose, O.A.	"Effects Of "High-tech" Work Demands On Women's Reproductive Behaviour"	13,500
63.	Urama, K.C. and Mwendera, E.	"Socio-economic And Environmental Consequences Of Agricultural Technology: A Comparative Study Of Small Scale Surface Irrigation Technology In Nigeria And Swaziland"	23,520
64.	Wonani, C.M.	"Project And Intervention Strategies: To What Extent Is Technology Transfer Gender Responsive: The Case Of Zambia"	15,000
65.	Uyanga, J.	"Indigenous Desertification Coping Strategies - Environmental Conservation Policy Implications in Northeastern Nigeria"	13,500
66.	Bwisa, H.M. and Gacuhi, A.R. "	An Inventory of Inventions and Innovations originating from Publicly Funded Institutions of Research in Kenya"	15,000
67.	Madukwe, M. C. and Okoli, E.C.	"Analysis and Comparison of Socio-Economic Impact of Agricultural Technology Transfer Approaches in Nigeria"	16,490
68.	Mukmik Consultants	"Technology Needs Assessment (TNA): A Survey of the Manufacturing Sub-Sector of Kenya's Small Scale Enterprise (SSE) Sector"	14,250
69.	Owuor, P. O .et al	Assessment of Technological Adoption and Policy Factors Impending the Production of Green Leaf in the Small Holder Tea Farms of Kenya Industry	18,600
70.	Matete, M. et al	Technology Adoption and Cereal Productivity in Lesotho	20,050
71.	Alimba, J. O. and Mgbeda, J. U.	Social-economic Consequences of Technological Change of the Rural Igbo Women Non-farm Entrepreneurship of South Eastern Nigeria: Implications for Farm and Non-farm Linkages	16,141
72.	Asante, V. O.	Policy Impact on Technological Progress in the Non Traditional Export Economy of Ghana	18,343
73.	Mulenga, S. B.	Privatisation Foreign Direct Investment and Technological Activities in Zambia. The Case of Manufacturing Firms	17,140
74.	Mwangi, E	Impact of New and Emerging Biotechnology on the Livestock Industry in Kenya: Policy Perspective	16,450
75.	Oruwari, Y.O.	Acquisition of Technological Capability and Technical Change in Africa: a Comparative Study of Indigenous Building Material. Industrial Firms in Nigeria and Swaziland	22,500
76.	Buyinza, P.	Multi-sensor-space-borne Data Synergism and Simulation Modeling for Sustainable Management and Conservation of Natural Forest Reserves in the Lake Victoria Crescent of Uganda	18,302

	Recipient(s)	Title	Amount (CAD$)
77.	Manyatsi, A. M. and Dube, M. S	Determination of the Use of Geographical Information Systems (GIS) to Manage Resources in Swaziland: Implications for Policy Development	15,650
78.	Ng'ambi, J. W.	Evaluation of Extent and Effect of Adoption of Technologies to Improve the Feeding of Crop Residues for Angora Goats in the Low Lands of Lesotho	17,700
79.	Ocen, G. W. And Dlamini, B. J.	Utilization of Crop Residues, Agro-industrial by Products and Poultry Wastes as Emergency Feeds for Ruminant Livestock During Drought: Appropriate Technological Intervention	18,900
80.	Silla, M. S	Electricity Conservation and Efficiency as a Strategy for Induced Electricity Supply in Small Developing Countries : The Case of Sierra Leone	15,094
81.	Dike, E.	Indigenous Entrepreneurship and Dynamic Industrialization in Post Adjustment Sub-saharan Africa	19,582
82.	Akanji, B. O.	A Baseline Study on the Patterns of Gender Responsibility in Export Crop Production in Nigeria and Implications for Technology Development	13,462
83.	Diyamett, B. O. and Mabala, R. S.	From Innovators to Innovation	16,067
84.	Eboh E.	Skills Accumulation, Technical Change and Entrepreneurial Behaviour Among Nigerian Urban Artisans: An Empirical Study	15,500
85.	Edjekumhene I.	Participatory Learning and Action in Small-Scale Metal-Working Industries in Ghana	15,038
86.	Odek W.	Enhancing the Growth and Expansion of Urban Informal Sector Micro-enterprises through Credit: Effect and Implication for Policy: A Case of Building Construction, Leatherwork and Agricultural Processing Sub-Sectors in Nairobi, Kenya	17,136
87.	Kirai P.	Improving Profitability and Environmental Performance in Small Scale Industries - Strategies and Policy Implications	16,450
88.	Lemchi J.	Land Scarcity, Market Access and Technological Change in South-Eastern Nigeria: Study of Farmers' Technological Responses to Changing Socio-economic and Environmental Conditions	15,972
89.	Wawa-Jeiteh S.	Performance Review of Irrigated Rice Development Projects in the Gambia (1965-95)	(16,967)
90.	Karikari P.	Women Dominated Livestock Production and Processing Enterprises in the Kumasi District of Ghana: A Study of Technology and Socio-economic Issues	15,140
91.	Osinem E.	Determinants of Adoption of Soil Conservation Technologies Among Farmers Participating in National Agricultural Land Development Authority (NALDA) Programmes in South-Eastern Nigeria	15,200
92.	Owino P.S.	Mainstreaming Gender in the Adoption of Malaria Control Technology (MCT): The Case of Nyanza and Coast Provinces	18,918

	Recipient(s)	Title	Amount (CAD$)
93.	Ennin S.	Promotion of Improved Technologies for the Production and Utilization of Soybean: Combatting Protein Energy Malnutrition in Women and Children in Ghana	15,285
94.	Ifeoma S.	Impact of Information Technology on the Secondary Tier of Nigerian Educational Sector: A Case Study of Special Science Schools in Nigeria	15,500
95.	Durojaiye A.	Adoption of Geographical Information Systems Technology in Planning Service Provisions in Nigerian Cities: A Case Study of Water Supply in Port Harcourt	15,410
96.	Oti-Boateng P.	Technology Transfer between African Countries: A Study of Policy Issues on Jatropha Oils as a Substitute for Diesel Fuel	16,450
97.	Osuji Rose	Energy Consumption Pattern of Women in Nigeria: Implications for Energy Technology Planning and Policy	17,200
98.	Jamiru,T,	The Evaluation & Selection of Suitable Technologies for the Establishment of Small-scale Foundries in Sierra Leone	16,395
99.	Njoka, N.	Improving the Supply of Dairy Products to the Urban Centres in Kenya: The Role of Appropriate Technology	21,075
100.	Agodzo, S.K., Asum, K.A., & Adu-Boateng K.	Irrigation Technology Policy Changes in Ghana Between 1960 and 2000	21,600
101.	Obua, J., & Odokonyero, G.G.O.	A Study of Indigenous Wood Processing Technologies and their Impact on Forest Utilization, Management and Policy in Uganda	19,875
102.	Abiola, B.	Management of Technology for Small Ruminants Production Systems in Nigeria	20,475
103.	Kalusopa, T.	The Utilization of Information Communications (ICTs) in Agricultural Development of Zambia	19,800
104.	Kwendakwema, N. J., Mulenga, O. & Chileshe, J. M	Investigation of Constraints on the Adoption of Improved Maize Storage Structures in Zambia	21,450
105.	Vilane, B.R.T. Shongwe, V.T.	The Adoption of Post Harvest Technologies by Small Holder Farmers in Swaziland	19,050
106.	Bhasin, V.K.	Technology and Efficiency of Women Entrepreneurs in the Informal Food-Processing Sub-sector of Cape Coast	21,375
107.	Kuponiyi, F.	Transforming Small Scale Farmers Through Private Sector Agricultural Extension Delivery System: The Case of Nigerian Tobacco Company	18,675
108.	Makokha, A., Wamocho,L. & P. Sichagi, P.	Technology and Policy Constraints in the Small Scale Horticulture Production, Preservation and Processing in Kenya	20,175
109.	Maruping, M.	Factors Influencing Participation of Girls and Women in Science and Technology Education in Lesotho	18,225

APPENDIX VII Geographic and thematic distribution of ATPS funded projects:[1994-1999]

ATPS THEMES.	SW	NIG	KEN	GH	UG	SIR	BOT	ETH	ZIM	LES	TZ	ZA	GAM	TOTAL
Economic reform	-	5	4	3	-	1	-	-	-	-	-	1	-	**14**

	SW	NIG	KEN	GH	UG	SIR	BOT	ETH	ZIM	LES	TZ	ZA	GAM	GRAND TOTAL
and technology.														
Technology issues of SM	1	8	7	2	1	3	1	-	1	-	-	-	-	**24**
Consequences of technological change.	2	26	10	5	1	-	-	1	-	2	1	1	1	**50**
Implications of new technologies for Africa.	2	6	1	-	1	-	-	-	-	-		-	-	**10**
GRAND TOTAL	**5**	**45**	**22**	**10**	**3**	**4**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**98**

Key:- SW --SWAZILAND   -ETH   --ETHIOPIA
- NIG --NIGERIA   -ZIM   --ZIMBABWE
- KEN --KENYA   -LES   --LESOTHO
- GH --GHANA   -TZ   --TANZANIA
- UG --UGANDA   -ZA   --ZAMBIA
- SIR --SIERRA LEONE   -GAM   --GAMBIA
- BOT --BOTSWANA

NB: data obtained from ATPS 1999 annual report.[page 43, Annex vi]

[i] See sources cited in reference 10, below.

[ii] See for example Nicholas (1971), Chapter 1 for a discussion of this point.

[iii] Clark (1985) discusses this in some detail. See Chapters 7 & 8.

[iv] See for example Solow (1957)

[v] See World Bank (1989)

[vi] See Snow (1963) and Bernal (1969)

[vii] See Lundvall (1992) and Edquist (1999) for detailed discussion of this concept. There is actually a burgeoning literature on the topic but these two sources provide a comprehensive review.

[viii] http://www.worldbank.org/poverty/data/trends/regional.htm#afr

[ix] World Bank, 2000. *Can Africa Claim the 21st Century?,* p. 134. The World Bank, Washington DC.

[x] UNDP, 2001. *Human Development Report 2001*, p. 3. United Nations Development Programme (UNDP), New York.

[xi] WHO, 2000. *World Health Report 2000.* World Health Organization, Geneva, Switzerland.

[xii] OAU, 2001. *The New African Initiative: A Merger of the Millennium African Renaissance Partnership Programme (MAP) and the Omega Plan*, p. 5. Organization of African Unity.

[xiii] UNDP, 2001. *Human Development Report 2001*, p. 2. United Nations Development Programme (UNDP), New York.

[xiv] This is still an issue today

[xv] See ATPS (1997), p. 9.

[xvi] See Chudnovsky and Makhubu (1996). Op cit. p.

[xvii] Ibid. p. 13.

[xviii] See Chudnovsky and Makhubu (1996), p. 17

[xix] See Oyeyinka (2001)

[xx] What was especially worrying is the fact that very few proposals of any kind appear from Ethiopia in comparison with say Nigeria and Kenya (see Table). The fact that this proposal seemed, after examination by the Review Team, to be quite a good one and still did not get reviewed by the ATPS Board raised a number of questions in our minds.

[xxi] In the Review Team's interviews with stakeholders there was some confusion about the division of labour here. Some interviewees said that short listing of proposals sometimes take place at National Chapter level.