**Tore Nordenstam & Håkan Törnebohm**

# Research, Ethics and Development

## Summary

We argue that the transmission of "normal science" (in Kuhn's sense) is not enough to secure high-quality research, especially in the underdeveloped parts of the world. We survey some of the problems raised by the role of science (in a wide sense including the humanities and the social sciences) in development. A simple model for "research-practice complexes" is presented. It is suggested that research-practice complexes ought to fulfil the three basic criteria of efficiency, perceptiveness, and sensitivity. The role of joint paradigm discussions in research-practice complexes is particularly emphasized.

# 1. Introduction

Ideas of development have a pivotal place in the prevailing political and economical ideologies both in the industrialized world and in those countries which are trying to speed up the transformation from subsistence economies to modern market economies. Against this background, the initiative of the Khartoum philosophers to convene a conference devoted to the theme of Philosophy and Development must be welcomed.[1] For it is a fact that this is a field which has so far been rather neglected by philosophers. The central role of development in world affairs has not led to a philosophical literature concerned with the various aspects of development; yet it is obvious that traditional branches of philosophy like moral and political philosophy and philosophy of science could be used with advantage to clarify some aspects of the cluster of problems referred to by the phrase "Philosophy and Development". Philosophical skills could be made use of to analyse the notions of improvement of life, of raising the quality of life, etc., which are presupposed in ongoing and planned development projects. Philosophical tools might well be used to clarify and criticize the criteria of rationality and success currently employed by policy makers. Philosophers might very well assume the Socratic task of helping the people affected by development projects to articulate their own views and standards, and by doing so take an active part in the fight against technocratic planning, in the struggle for more democratic ways of improving life.

In the attempt to raise the levels of articulation and rationality, there will be room for both theoretical work and more practical maieutic work. In the present paper, we shall try to highlight some of the general problems raised by the role of research in development and suggest some approaches to the problems. Our basic argument may be summed up in the following way.

If research in the sciences and the humanities shall be able to play its role as an instrument of development successfully, a number of conditions must be met. Research traditions are guided by paradigms, and the grafting of scientific research traditions on African cultures requires the successful transformation of paradigms. In the settled context of European universities, the transmission of paradigms largely takes the form of the building up of "normal-scientific" competences in the recruits of science. We argue that the transmission of "normal science" in this sense is not enough to secure high quality research, particularly not in developing countries which provide rather different settings for research. The building-up of critical, reflective competence in the scientists of developing countries – and elsewhere – assumes vital importance. The development of new research traditions in the developing countries, e.g. on the basis of existing tacit knowledge in the indigenous cultures, similarly makes rather exacting demands on the critical and reflective competence of the researchers.

# 2. A View on Research

The activities within a research tradition are guided by a number of assumptions and previous actions, which may be referred to as the paradigm of research within the tradition in question. It

seems reasonable to assume that the following factors will always be of some importance for the ways in which a research tradition is carried on:

  – general assumptions about the nature of the aspect of the world which is the object of research (the "territory" investigated);
  – a heavily value-impregnated conception or "portrait" of the field of research;
  – a number of precedents, a methodology;
  – a conception of the role of the researcher and of the competence required to play it well.
(We have borrowed the term "paradigm" from Wittgenstein and Kuhn, but our analysis does not coincide with that of Kuhn. Cf. Thomas S. Kuhn, *The Structure of Scientific Revolutions*, esp. the *Postscript* to the second edition (1970).)

The general assumptions about the nature of the territory do not include the hypotheses that the researcher might wish to test. What we have in mind is rather the set of presuppositions, which form the basis for more specific hypotheses. In the realm of the human sciences, the presuppositions may e.g. include some general ideas about the nature of man and society. Human beings may be assumed to be basically egoistical and rational (cf. Hobbes); society may be assumed to be like a closely knit web of mutually dependent elements (cf. Hegel), and so on.

The portrait of the research field includes views on competing schools and traditions within the field and a conception of the school or tradition to which the researcher himself belongs, a self-image.

The third component of a paradigm to which we draw attention here – precedents, methodologies – includes previous actions of research which are regarded as musters to be followed or avoided. The rules which are implicit in the precedents may be more or less adequately articulated in the form of an explicit methodology. The role and competence component of a paradigm includes an *ethics of research*, that is views on the rights and responsibilities of the researchers, on what constitutes virtues and vices within the field, and what might be called an *aesthetics of research* (e.g. criteria of elegance), as well as views on the intellectual and practical skills which the cultivation of the field of research demands from the researchers.

Paradigms are like icebergs – only a fraction of them are immediately observable. Some aspects of a paradigm receive verbal treatment by the researchers, other things are left unsaid. Using Gilbert Ryle's distinction (in *The Concept of Mind*), one can say that some parts of scientific competence exist in the form of knowing that; a substantial part of it exists in the form of knowing how. But knowing how can be transformed into knowing that (to some extent); practical knowledge can be articulated and transformed into theoretical knowledge (to some extent). Attempts to articulate parts of the practical knowledge within a research tradition occur particularly in times of crisis. Crises in fields of research are caused by defects in paradigms, for instance by the inability of existing paradigms to cope with new social and economic development or by their inability to do justice to experimental findings. In the following we shall refer to attemtps to clarify, criticize and improve upon existing paradigms as *paradigm discussions*.

Paradigm discussions tend to be particularly intensive in situations in which researchers experience a crisis and are called upon to change their direction of research. In periods of routine research

within stable paradigms, the reflective aspect of research tends to be suppressed. We get what Kuhn has called "normal science". Widespread though the repression of reflection in research may be, we do not think that it is proper to refer to routine research within unreflected paradigms as the "normal" situation for scientists. The repression of reflection is bound to have detrimental effects on the quality of the research, at least in the long run, which is not the same as denying that thoughtless research may be very efficient for reaching certain short-term goals. The repression of reflection in the form of paradigm discussions amongst researchers is bound to have detrimental effects in times of stability, we argue; in times of rapid change and development, the undesirable effects of the suppression of paradigm discussions and other kinds of reflection will be even more harmful.

Therefore, we regard pardigm discussions as part of the normal practice of science, and propose the following thesis:

> The better articulated the paradigm of the researchers is, the more satisfactory their research is likely to be.

Paradigm discussions may be concerned with any aspect of paradigm or group of paradigms. Some paradigm discussions concern the general assumptions about the territory, some concern the competing schools within the field, some are concerned with the articulation and critique of existing methodologies, some with the researchers' responsibilities, and so forth.

To sum up, we are proposing the following view on research : The world of science in a broad sense, including research in the humanities and the social sciences, is a vast complex of fields of research. A field of research consists of two main parts, an inquiring part and a reflective part. The inquiring part of a field of research consists of investigations of some aspect(s) of the real world, the territory of the research field. The inquiring activities within a field of research are guided by paradigms consisting of the components referred to above, and others. The reflective part of a field of research consists of attempts to clarify and improve upon existing paradigms, that is, of paradigm discussions. The reflective part of a field of research may be repressed, thereby jeopardizing the quality of research and, ultimately, the quality of life.

(There are many ways of organizing the world of research into fields of research. For some purposes, it might be advantageous to split traditional disciplines like sociology or economy into a number of fields of research. A field of research need not coincide with any institutionalized research tradition at all. For the points we wish to make in the present paper, there is, however, no need to go into such details.)

Let us finally note the affinities between the reflective parts of fields of research and such philosophical disciplines as ontology, anthropology, and ethics. Paradigm discussions are bound to have a more philosophical character than the inquiring activities within a field of research. We shall have occasion to return to this theme towards the end of the paper.

# 3. Research and Practice

It is customary to divide the world of science into pure and applied sciences. It is not always clear how a dividing line of this kind should be drawn, particularly in the human sciences. We shall try to shed some light on the relations between fields of research and other activities by building a simple conceptual model. Fort this purpose it will be useful to stress the positive analogies between fields of research and other fields of activity.

In analogy with fields of research, we conceive of a *field of activity* as consisting of a practical part (activities within an institutional framework or social system) and a reflective part (discussions of the practical activities). The activities within a hospital ward, for instance, may be divided into practical activities like making diagnoses and treating patients and reflective activities like critical discussions of the ongoing practical activities and attempts to work out plans for improvements.

We shall also include the persons concerned by the activities in a certain area in the definition of the field of activity. The practicians in the hospital ward are the doctors, nurses, and other members of staff; the interessees are the patients and others who have an interest in what is going on in the hospital. By a "field of activity" we shall mean, then, a complex consisting of practical activities within an institutional framework or social system; discussions of those activities; practicians; and interessees. We shall sometimes use the letters "IPS" to refer to such complexes, where "I" stands for the intressees and their interests, "P" stands for the practicians and their practical and reflective activities, and "S" stands for the framework or social system.

The practicians in any field of activity have paradigms composed of factors analoguous to the constituents of research paradigms. We may accordingly talk of the paradigms of workers and professional men, of doctors, lawyers, engineers, architects, teachers, and so on.

Such paradigms are composed of the same kind of factors as research paradigms. The activities within any field of activity are governed by general assumptions about the nature of the territory of the field, be it sick people or pupils in a school or an ecological system. (Following the sociologist Edmund Dahlström one could talk of the "social cosmology" of, say, doctors or teachers). There is a strongly value-loaded portrait of the field of activity, including a self-image and views on competing traditions within the field. There is a number of rules and precedents orienting their work, which correspond to the methodology part of a research paradigm. And there is a conception of the roles that are played and should be played within the field and of the competence required to play those roles well. There is a professional ideology including a more or less well articulated professional ethics.

Like fields of research, other fields of activity may run into difficulties, which tend to generate paradigm discussions in the field. Such discussions may be more or less suppressed in times of stability or slow development. Like research paradigms, other paradigms may be more or less well articulated. Largely, they exist in the form of practical knowledge, knowing how rather than knowing that, in the minds and bodies of the practitioners of the field. The practicians in a field of activity may be influenced by scientific work which has not been deliberately oriented to meet their interests. They may e.g. be affected by the results of pure research, or they may make use of spin-

off effects of research which has been planned to meet other interests. Here we shall be particularly concerned with another kind of situation, situations where practicians within a field of activity are influenced by research which has been planned explicitly to meet their particular interests. When research is deliberately oriented so as to serve the interests of the practicians and intressees in a field of activity, we shall say that it is part of a *research-practice complex*. We shall sometimes use the letters "RIPS" to refer to such complexes, where "R" stands for the researchers and their interests ; etc.

We claim that all applied research is linked to practice within the context of at least one research-practice complex. A theory of applied research is essentially a theory of RIPS-complexes.

A number of questions may be raised concerning research-practice complexes, e.g.
 – What kind of paradigms must researchers have to be able to serve a field of activity well?
 – How do researchers orient their research in well-functioning researchpractice complexes?
 – Under which conditions do practicians in a field of activity make use of resources created by research?

In response to these questions we propose the following theses:

> (1) The paradigms of the researchers in a field of research serving a field of activity have to be adapted to the field of activity in order for their work to be beneficial for the whole complex.

> (2) The paradigms of the practitioners in a field of activity served by researchers have to be adapted to the relevant fields of research in order for their work to be able to benefit properly from the contributions of the researchers.

In other words, there is a need for *joint paradigm discussions* if a research-practice complex is to be able to function well.

In support of the theses, considerations of the following kind may be adduced. Research is often prompted by internal academic considerations rather than by considerations of outside interests. Researchers with such inclinations tend to orient their research in such a way that none but their colleagues will be pleased with their results. Tasks prompted by difficulties facing the practitioners outside the research field are likely to be transformed into very different tasks of a kind which the researchers are competent to carry out well. The outcome of their work will then more likely than not be entirely unhelpful to the practicians. Similarly, the practicians in a field of activity may be ignorant about relevant fields of research or they may hold unrealistic views on what can be expected from the researchers; then it is not to be expected that they can be served by research no matter how service-minded the scientists are. It seems plausible, then, to assume that a well-functioning research-practice complex must include paradigm discussions, in which researchers, practicians and intressees participate. Only such discusssions can bring about the needed accommodations within the complex.

Joint paradigm discussions are an aspect of the mutual training and joint learning which is required if research is going to be able to serve its potential intressees. In our experience this is a laborious

task, which requires a considerable amount of time and much good will from all sides, particularly if one is interested in assisting groups which traditionally have made little or no use of research facilities (like trade unions and people living in subsistence economies). In practice, one will also fairly soon find out that the conceptualizations we are working with here lie on a such a general plane that they cannot be immediately translated into maieutic strategies. When we say for instance that research fields consist of two main parts, a reflective one and an inquiring one, and that such fields can be parts of research-practice-complexes, consisting of certain components, we wish to make certain points (about the role of reflection in research, etc.) rather than proposals for procedures in casework. Similar considerations are applicable to the notion of paradigm discussions. In practice, the mutual training and joint learning procedures which are required to ensure sensitive and perceptive results will include more than purely verbal discussions. We learn by doing things together.

## 4. Efficiency, Perceptiveness and Sensititivy

Science is one of the main productive forces of our time. This means, amongst other things, that research-practice complexes have become a major force of development. A philosophy of development must therefore include a philosophy of research-practice complexes (a theory of applied research).

The activities within a country may be regarded as a vast complex of fields of activity. In modern countries, many fields of activity form part of researchpractice complexes. An abundance of examples may be found in the industrial, military and medical sectors, for instance.

In a research-practice complex of the type which is most typical nowadays, we may distinguish three kinds of activities. First, we find attempts to build up a realistic picture of recent trends and present states of affairs in the territory of the field of activity. We shall refer to such activities as intelligence activities. The role of intelligence officer is one of the roles which are commonly assumed by researchers engaged in applied research. Secondly, we find a number of people concerned with setting goals or guidelines for the development within the territory in question. We shall refer to such activities as policy-making. Policy-makers perform several tasks. They write scenarios, they draw pictures of possible future states of the territory. They assess the desirability of one or more of the future states for groups of intressees in the territory. They assess the realizability of one or more future states. They assess the costs of implementation. They assess the risks incurred in attempts to implement a policy, trying to estimate the amount of unintended and undesirable effects which may accompany the intended effects. The policy-maker is another of the roles commonly assumed by researchers today. Thirdly, there is the implementation of policies. The implementation of a policy is not entirely controlled by a declared policy. It has to be submitted to continual control, which serves to protect the territory form harmful effects. Implementation of a policy may be confronted with unexpected difficulties, which call for the cooperation of researchers, for instance in the form of joint paradigm discussions.

The roles which are commonly assumed by researchers today in applied research thus include both cognitive and critical tasks. The cognitive tasks form the undisputed hard core of the researcher's role, whereas opinion is divided on the question of what kinds of critical tasks that the researcher should engage in *qua* researcher. Before we attempt to shed some light on these ethical issues, we want to suggest some criteria that research-practice complexes ought to fulfil. With the criteria at hand, we can then comment on the prevailing practice of researchers who engage in applied research.

We suggest three criteria which a research-practice complex ought to fulfil:

– it ought to be *efficient* for reaching the set aims,
– it ought to be *perceptive* in the sense of paying attention to the salient features of its area of operation,
– it ought to be *sensitive* to the legitimate interests of the people affected by the activities of the complex.

Sensitivity may be regarded as a special kind of perceptiveness; the interests of the people certainly belong to the salient features of the territories of many research-practice complexes. We prefer, however, to list sensitivity separately because of its importance for the ethics of applied research.

The activities going on in a field may be very efficient for reaching the aims set by the authorities, for instance, while at the same time violating the interests of at least some of the interessees. The clash between efficiency on the one hand and perceptiveness and sensitivity on the other hand may be the result of sheer ignorance. But it may also be the result of attempts to satisfy certain interests at the cost of other interests. Technocratic research-practice complexes - which are predominant nowadays - tend to violate the criteria suggested above, particularly the sensitivity criterion. What conclusions should we draw from this with regard to the roles of the researcher who wants to engage in a research-practice complex within some area of society?

## 5. The Ethics of Research

If the paradigms of the researchers in a field of research are formed independently of a particular field of activity, then it is likely that their contribution to the intelligence work will be less satisfactory than it ought to be. The researchers may do too much in some respects and too little in other respects. Their picture of the territory of the field of activities they are serving may be very detailed in some parts and nearly blank elsewhere. We conclude that researchers must be willing to adapt their paradigms to the needs of the research-practice complex they are taking part in in order to secure perceptive intelligence work.

The same kind of readiness to adapt and to learn is necessary to secure that their work will be sensitive. The researchers must be willing to learn about the interests of the people in the territory of the field of activity in question, for instance by means of what we have called paradigm discussions in which researchers, practicians and intressees participate. Researchers are thus called

upon to play major roles outside the inquiring part of their field, if they are going to serve their intressees perceptively and sensitively.

It may be difficult for a research-practice complex to fulfil its obligations towards its intressees because some intressees have difficulties in explaining what their interests are. Tribesmen living in an area which is planned to be flooded in connection with a new irrigation scheme might find it difficult to envisage the consequences this will have for their own mode of living and to decide on priorities in a hypothetical and unfamiliar kind of situation. In such cases a simple Gallup poll will not give adequate insights into the interests of the people affected by the plans. The inhabitants will only be able to articulate their real preferences as the result of a laborious process of training. It is obvious that researchers who are anxious not to violate the sensitivity criterion must be prepared to assume new obligations, including the obligation to increase one's own competence to solve this kind of task well.

Similar considerations are applicable to the policy-making aspect of research. If only the value norms of the practicians are taken into account in the writing of scenarios, for instance, or if the policy-makers decide on other people's behalf what they wish, then the work of the researchers is bound to be insensitive. Policy-makers who have had no personal contact with the people affected by their plans are similarly likely to be less perceptive and sensitive than they ought to be.

It is sometimes argued that a researcher has got a responsibility for finding out what the facts are and that his responsibility ends when he has handed over the results to the people in charge of the implementation of policies. With reference to the sensitivity criterion, we find this position unacceptable. If a researcher really wants to safeguard the legimate interests of the people in a certain territory, then it might well happen that he cannot limit his activities to purely cognitive tasks. To take a illustration from our own experience: a couple of years ago, one of us made a survey of the conditions of part-time and home workers in certain industries in Sweden on behalf of a trade union. The working conditions of the home workers, we found, were utterly unacceptable. The obligation to see to it that the situation is improved will rest on the researcher no less than on the leaders of the trade union and other intressees until changes have taken places. There is no time limit to this kind of obligation. (From this it does not follow that all the parties involved in a research-practice complex have the same kind of responsibilities. The researcher and the trade unionist may have a common onus of obligation, but the ways in which they can work for improvement necessarily differ).

We conclude that if research is going to fulfil the criteria of perceptiveness and sensitivity in addition to the criterion of efficiency, then the researcher must be prepared to undertake cognitive and critical tasks in the intelligence work, in the policy-making, and in the process of governing and controlling implementations.

Most of the development which takes place in the world today is the result of technocratic planning, which means that it scores badly on the perceptiveness and sensitivity criteria. It seems reasonable to assume that the efficiency is also sometimes lowered on this account. How could the situation be changed? We shall consider one aspect of the cluster only, which has directly to do with the ethics of research.

If the responsibilities of researchers to those who might be affected by their research are to become operationally efficient, they must be institutionalized. Moral injunctions will be followed by some and not by others. Therefore, a sense of responsibility has to be built up in the recruits of research, and incentives for following the ethics agreed upon must be established. Ethical competence, like other aspects of scientific competence, has to be built up.

How should one start a process of building up ethical competence within a field of research? A common way of tackling ethical problems in research is to set up a committee to investigate the problems and to draft an ethical code for research within the field in question. The proposal is then submitted to representatives of the professional body for acceptance or rejection. This way of tackling the issues might be warranted in certain situations, but as a general method for solving the problems of the ethics of research it has serious  drawbacks. In the first place, the interests of the intressees of the field of research might not be taken duly into account. Codes of professional ethics often have the character of defenses of the interests of the profession rather than of instruments for protecting the interests of all parties concered. In the second place, a general code of ethics (for instance in the form of a list of "commandments") is likely to remain on a vague and general plane which gives little guidance in problematic cases. It is not enough to learn the general rules; one must also have learned to apply them. This requires judicium, ethical competence.

The obvious starting-point for building up the ethical component of the researchers' competence is paradigm discussions, which (we argue) belong to the normal practice of science. An adequate conception of what one is doing and why one is doing it is a necessary presupposition of ethical competence. In the course of the paradigm discussions, which should be part of the normal job of any researcher from his student days onwards, there will also be a place for critical reflection on the norms and values which – explicitly or, more often, implicitly – form part of the paradigm of research within the field in question.

A first step towards the necessary institutionalization of the ethics of research is, therefore, the introduction of paradigm discussions as a regular part of all scientific training programmes in universities and similar institutes of education.


## 6. Innovation and Protection


One may divide IPS- and RIPS-complexes into two groups in the following way:

  – *innovative complexes*, whose task it is to produce innovations in their territories,
  – *protective complexes*, whose task it is to protect their territories from harm.

Research-practice complexes operating in the industrial area with the objective of producing economic growth belong to the first group. Research-practice complexes concerned with the protection of ecosystems belong to the second group. Complexes concerned with health may be said to belong to both groups.

The historical evolution of the industrialized part of the world is characterized by a strong dominance of innovative complexes. It may therefore be tempting for a research politician in a developing country to try to copy the development in Europe and the    United States as quickly as possible : "We are the responsible authorities in this developing country. We want to bring our country away from its present state of stagnation in traditional moulds into a state of rapid growth in important areas. We shall therefore give the highest priority to the fields of applied research which are of the innovative type. Let us take research-practice complexes of that type in a highly developed country as our models. If a system of that type is satisfactory, let us copy it and install it in the corresponding area in our own country".

Will a copy of such a system in a developing country share the admirable properties of the original? This is by no means certain. The territory in the developing country may differ in significant respects from the corresponding area in the industrialized country. It follows that a picture of the territory of the complex, which is realistic in the industrialized country, may be a very poor picture of the corresponding territory in the developing country. Then the effects of introducing the copy are likely to be rather different. In particular, the legitimate interests of the intressees of the territory may be significantly different in the industrialized country and the developing country. The copy may therefore score considerably lower on the sensitivity criterion than its original in the industrialized country.

Further, the admirable effects of innovative research in the industrialized world are balanced by serious drawbacks. The innovative research-practice complexes in the industrialized world have almost always been of an extractive kind, leading to overexploitation and serious ecological problems. And the interests of the people affected have rarely been taken properly into account.

There are thus good reasons for not continuing current practices in the area of applied research. This applies to the industrialized part of the world no less than to the developing countries. There are some further reasons why one should hope that the developing countries will not simply repeat the mistakes of the industrialized part of the world when they set out systematically to modernize their countries. One of them is that the countries now trying to convert themselves into parts of the industrialized world find themselves in another historical situation than Europe did in the 19th century. The industrialization of Europe built on the existence of colonies which could be exploited. The developing countries today face the different task of converting themselves into modern nations without being able to rely on cheap labour and cheap products from elsewhere. Another reason why one should hope that the developing countries will not neglect the protective side of development to the extent that their predecessors have done is the vulnerability of many of their ecosystems and cultures. According to the distinguished ecologist Caj Curry-Lindahl, the ecosystems of the tropics are fare more vulnerable than those of the temperate zone. In view of the cultural diversification of most African countries, technocratic centralized planning may lead to highly insensitive results. Cultures and ecosystems can only be examined where they are, and only people with experience of a culture can appraise it from the point of view of the insiders.

## 7. The Fundamental Role of the Human Sciences

A transition from an IPS-complex to a RIPS-complex with the same territory may be regarded as an attempt to raise the adequacy of the IPS-complex with regard to its efficiency, perceptiveness and sensitivity. That research in a society can have such effects is one of the main reasons why responsible authorities should make investments not only in applied research but also in pure research, not least in the humanities and social sciences.

Research consists of inquiring activities and reflective activites. The reflective part of a field of research or a scientific discipline consists of discussions of the main factors of the paradigm guiding the inquiring activities within the field or discipline. Such discussions include critical reflection on the basic assumptions about the nature of the world, of man, of society, and on normative issues. We can begin, then, to see the fundamental role that the human sciences play in the world of research and science: all research and science has a philosophical and humanistic aspect, the suppression of which can only lead to harmful effects for the people concerned.

The reflective parts of fields of research are tied up with themes which are treated systematically in philosophy and neighbouring human disciplines. In the course of paradigm discussions of the general assumptions about the nature of the territory, problems of an ontological kind are likely to turn up. The ontological themes may be related to competing worldviews or to issues of what one could call "social ontology", social philosophy and philosophical anthropology; ethics is obviously relevant for the role factor of paradigms; and so on.

In view of the close relations between philosophy as a discipline and fields of research outside philosophy, we may describe the reflective parts of fields of research as their philosophical parts. The reflective part of a field of research could be characterized as a philosophy *in* science. The branch of philosophy called the philosophy *of* science may be said to have the task of reflecting systematically on the philosophy in science.

We conclude that one of the ways in which philosophers might make significant contributions to development is by helping to raise the level of articulation and rationality in the world of research by systematic and critical reflection on existing philosophies in science.

## Note

[1] This paper is based on our joint contribution to the Panafrican Conference on Philosophy and Development, University of Khartoum, Oct. 30 - Nov. 4, 1977.

# Bibliography

Bunge, M.: *Scientific research*, Vol. I & II. New York 1967.

Curry-Lindahl, C.: *Conservation for survival. An ecological strategy*, New York 1973.

Dahlström, E.: *Samhällsvetare och praktiker*, Forskningsrapport nr 38, Sociologiska institutionen vid Göteborgs Universitet, 1976.

Easlea, B.: *Liberation and the aims of science*, London 1973.

Göranzon, B., Nordenstam, T. & Åberg, R.: *Deltidsarbete och hemarbete*, in: *Löneformer och lönesystem/Deltidsarbete och hemarbete*. Specialrapporter, Svenska fabriksarbetarförbundet, Förbundskongressen 1976.

Nordenstam, T.: *Sudanese Ethics*, Nordiska Afrikainstitutet / Almqvist & Wiksell, Uppsala 1968.

Nordenstam, T.: *Afrikas universitet*, Nordiska Afrikainstitutet / Wahlström & Widstrand, Stockholm 1970.

Nordenstam, T.: "Forskningens yrkesetik - ett kompetensanalytiskt perspektiv", in Göranzon, B., ed., *Ideologi och systemutveckling*, Studentlitteratur, Lund 1976, s. 86-96.

Nordenstam, T.: "Förändring genom förståelse", *Ekonomen*, No. 12, 1976.

Sandberg, Å.: *The limits to democratic planning*, Stockholm 1976.

Törnebohm, H.: *En systematik över paradigm*, No. 85, Reports from the Department of Theory of Science (R.D.T.S), Göteborg 1976.

Törnebohm, H.: *Om forskningsfält. III. Tematiska diskussioner*. No. 83, R.D.T.S, Göteborg 1976.

Törnebohm, H.: *Paradigms in fields of research*, No. 93, R.D.T.S., Göteborg 1977.

Törnebohm, H.: *Undersökande system, paradigm och tematiska diskussioner*, No. 76, R.D.T.S, Göteborg 1975.