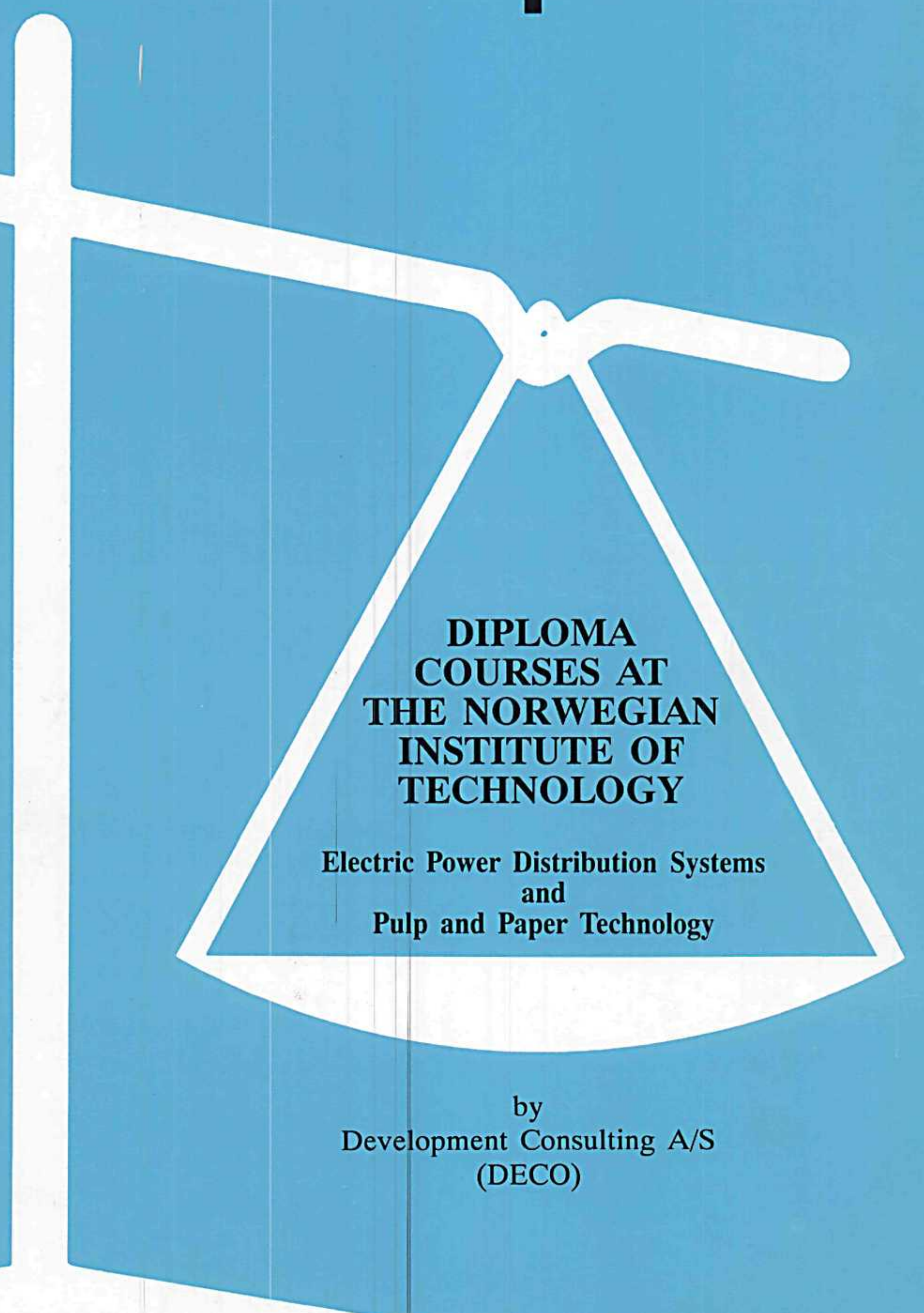


ROYAL MINISTRY
OF FOREIGN AFFAIRS
Norway

Evaluation Report 2.91



**DIPLOMA
COURSES AT
THE NORWEGIAN
INSTITUTE OF
TECHNOLOGY**

**Electric Power Distribution Systems
and
Pulp and Paper Technology**

by
Development Consulting A/S
(DECO)



Evaluation of NORAD Diploma Courses

EPDS and PPT

Final Report

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The views expressed in this report are those of the authors and should not be attributed to the Royal Norwegian Ministry of Foreign Affairs.

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Executive Summary

General

The Norwegian Ministry of Foreign Affairs commissioned Development Consulting AS (DECO) to undertake an evaluation of two of the NORAD sponsored Fellowship Courses in Norway: Electric Power Distribution Systems (EPDS) and Pulp and Paper Technology (PPT).

The EPDS and PPT course participants are recruited from 28 and 18 countries respectively. Tanzania and Sri Lanka were selected for special case studies in order to establish a more comprehensive knowledge of the situation of the electric power distribution and pulp and paper production in two of the main partner countries of Norwegian development assistance. The other countries were covered mainly by a survey to employers and previous course participants.

Main findings and recommendations

Pulp and paper production and electric power distribution represent very important development sectors of Tanzania and Sri Lanka, as is the case in most Third World countries. Following the recognition of electric power sector as having a great impact on the general development, most countries give high priority to electrification programmes, in particular in the rural areas, as an integral part of infrastructure development programmes. Similar high priority is given to development of pulp and paper industries in national development plans in most Third World countries.

It is widely recognized that professional training of personnel is an important condition to maintain and develop pulp and paper industries and distribution of electricity. In spite of this there are no clearly articulated national policies for training of personnel to these sectors at least when Tanzania and Sri Lanka are concerned.

Problems pertaining to development of the two sectors can only partly be attributed to competence of the personnel employed in the industries. There are structural, economical and environmental conditions which only to a little degree can be solved by offering training courses for staff i.e. lack of investment capital, low salaries, inadequate sources of raw material, old and worn out machinery. Lack of adequate solutions to these problems are mentioned as the main obstacles in both Sri Lanka and Tanzania alike; although how these problems manifest themselves in actual daily life may vary between the countries. On the other hand, representatives from industries visited during the evaluation did indicate that staff performance was lower than desired due to lack of motivation, work discipline and little willingness to take on responsibility.

The annual need for candidates to the courses is stipulated to be about 2–3 in Tanzania and Sri Lanka. The need for PPT participants is less than that for EPDS due to the more specialized character of the first course.

Major differences in the structure and organisation of the two courses has lead to different approaches regarding the evaluation, and also in many aspects to diverting conclusions and recommendations.

EPDS – Summary

The objectives of the EPDS course are very general. Still the course contents comply to a high degree with both present and future training requirements and needs of the recipients, and must therefore be regarded as very relevant.

The course is conducted with a high professional and educational standard. With very few exemptions the teaching staff is largely appreciated for their professional qualifications, and most lecturers seem to succeed in transferring their knowledge to the students. The teaching staff has very little or no developing country experience, but this does not seem to affect the quality of the course significantly.

The field study showed that the impact of the course varies a lot among the recipients. The previous participants from Sri Lanka give several examples of acquired knowledge actually being applied for the benefit of their company. Tanzanian participants, on the other hand, seemed to meet more obstacles in their job situation. In short it may be concluded that the absence of positive results may be due to the conditions of the recipient institutions rather than the course itself. Hence, from a professional point of view only there is no reason to suggest any radical changes of the current course.

On the other hand it appears more important to ensure that the course participants are offered the right conditions to practice their acquired knowledge after returning to their companies. To achieve this the course leaders should more actively follow up the course through for instance newsletters, brief seminars or work shops arranged in the regions and promote a closer cooperation with the recipient institutions.

Equally it is important that the right institutions are selected for participation. The field study revealed some examples showing that this has not always been the case, and a main reason for this can be found in the wide definition of target group.

To be more in line with the general Norwegian policy, and also to more clearly define the aims of the course, more specific objectives seem to be necessary. In accordance with a new set of objectives proposed for the course, it should aim at phasing out when the in-house competence in the recipient institutions has reached a level where adequate training can be maintained without foreign support, primarily to accelerate the process of reducing the dependency. In addition some other factors weight in favour of shifting: expectedly reduced costs, practical examples from local conditions.

However, possible new set-ups for the course should be carefully examined in order to ensure that the quality is maintained as high as possible. The high professional level of the teaching staff has a great impact on the performance of the course. These qualities are not easily found in the Third World today. In addition it should be underlined that the course has developed a practical profile owing to the close cooperation with the research institute and industry. By linking the course to a university overseas the risk is high that the course will turn more academic. If so, the course would not be that much in line with the most urgent needs of the recipient institutions.

Summing up, the following is recommended:

1. The course should temporarily be maintained as conducted, with proposed modifications and supplements.
2. In order to comply with general Norwegian policy on assistance to education actions should be initiated to investigate if, how and when the course could be shifted to a Third World country. Such preparations should be included in the long term plans of the course.
3. A set of proposed objectives should be adopted and presented to all course staff as well as the course participants.
4. Following the proposed objectives the cooperation institutions should primarily be limited to the public electric power distribution sector. A close cooperation between the institutions and the course should be promoted.
5. Equally the number of cooperation countries should be limited to approximately ten.
6. Active feed-back to previous fellowship holders should be encouraged, aiming at increasing the abilities and possibilities of practising the acquired knowledge.

PPT – Summary

NORAD has offered the PPT course in Norway for 23 years without remarkable attempts to strengthening educational institutions in developing countries during this period. However, from the point of view of the cooperating countries this has so far been seen as a satisfactory arrangement. Clearly the course has provided services and filled a gap lacking in the respective countries and therefore the attempts to find alternative location or types of courses have not been considered a high priority on the side of the partners concerned.

The implications of offering the course in Norway can be seen from different perspectives:

On the one hand the individual participants themselves have obviously benefitted from the course as such. So far there have been 174 participants completing the course and the majority of them are now working in the pulp and paper industry. In their own opinion they feel that by attending the course they become better qualified for the job, they have gained more self-confidence and the prospects for job promotion have increased considerably after taking the PPT course. Also, the candidates themselves clearly state that the teaching staff is highly qualified and very competent as lecturers and researchers. They do however, lack working experience from pulp and paper industries in developing countries, but the staff has tried to compensate for this by frequent and extensive visits to many developing countries (mostly financed by NORAD) in order to assess the effects of the course and to study the problems in the pulp and paper industry. It is also clear from the evaluation that most students prefer to study abroad, and in particular in Western Europe or USA, allegedly as such studies are more prestigious and hence raise the economic prospects for the students.

But there are other factors than mere immediate benefits for individual students that have to be considered. First, there are other more long-term benefits from a course that will remain in Norway as long as the course is located there e.g. such benefits that are related to long-lasting competence building and experience gained through teaching and research which would basically benefit the Norwegian staff. Furthermore employment generation in terms of salaries to teachers as well as running costs of the course will circulate within the Norwegian educational system instead of in the developing countries. To this it shall be noted that salaries to staff and running costs represent more than half the total budget of the course.

Also the Norwegian context and the way pulp and paper industries are operating in Norway may not be appropriate to the problems these industries face in the developing countries. It is clear from the evaluation that many candidates when returning to their home countries have difficulties in applying in practice what they learnt at the course, because the problems encountered in the actual working situation are of a complete different character and scale than those they have been trained to solve during the course.

Furthermore, the team discovered that some mills in the countries visited have more than 10 previous course participants among its staff. Compared to the situation in Norway mills of comparable sizes would hardly see the need for more than one or two chemical engineers. The rationale behind this seems to be that in absence of other education alternatives, the employers continue to send candidates to the PPT course even though the industry might actually benefit more if staff had been offered training in other fields. This raises certain dilemmas which cannot be solved unless the PPT course is seen in a wider context of multiple needs for education within the sector. In terms of real needs for chemical engineers one must expect that in the future it will remain on approximately the Norwegian level for each mill whereas the need for employees with alternative qualification will probably increase with the growth in the sector.

Education within pulp and paper industry has to be adopted to the local conditions and needs of the local industries. One way of achieving this is by concerted efforts in strengthening institutions to run more appropriate courses. Relocating the PPT course would be a first step in this process followed by expansion of the range of courses to be offered within the sector. In the case of PPT there are evidences that re-locating will not only reduce costs but also enhance the potential for better achievements of the course objectives in a longer term perspective.

In summary:

1. The PPT course has played an important role in providing specialists for the pulp and paper industry in developing countries during the last 23 years.
2. The issues and the objectives of the PPT course are not fully in accordance with Norwegian development policy and the issues and the objectives of the course are only partially in accordance with the needs or policies of the recipient countries.
3. The further existence of the PPT course in Trondheim does not seem to be justified.
4. The objectives of the course can best be met by initiating and supporting similar education in recipient countries.
5. It is time to consider alternatives to PPT course in order to cover the future needs for training of personnel in this field.
6. It is recommended to investigate how and when the course could be transferred to a country of cooperation.

Part I

GENERAL

Chapter 1: Methodology

1.1 Scope

The Norwegian Ministry of Foreign Affairs commissioned Development Consulting AS (DECO) to undertake an evaluation of two of the NORAD sponsored Fellowship Courses in Norway: Electric Power Distribution Systems (EPDS) and Pulp and Paper Technology (PPT).

According to the Terms of Reference (Appendix A1) the purpose of the evaluation is to assess:

- *the educational/pedagogical framework of the courses,*
- *how cost effective the present courses provide and satisfy the need for this type of trained manpower,*
- *the effect of the training on individual job performance and institutional capability and effectiveness as well as the institutional follow up for the utilization of returning candidates,*
- *the relevance of the courses for the candidates and their institutions, including their adaptation to the technical level and the special constraints and problems of the home countries of the participants.*

A full educational assessment of the courses would have involved a very close follow-up during the whole course period (ten months). Neither time nor resources allocated for the evaluation did allow this, and the educational/pedagogical framework of the courses therefore is assessed on descriptions obtained through interviews, as well as written information, course descriptions, list of subjects etc.

A major emphasis has been put in evaluating the quality of the courses on the basis of proven effects and impacts on the individual as well as the recipient institutions. This is also considered to be in line with the intentions reflected in the Terms of Reference, see the above quotation. The fact that field works were included as a substantial part

of the evaluation further underlines the importance of assessing the results from the courses.

The team established to undertake the present evaluation understands its role strictly to study, assess and give recommendations regarding the "developmental aspects" of the two fellowship courses. That is, some of the points raised in a Memorandum to NORAD Board in 1982 (see Chapter 2) relating to other potential positive impacts and effects apart from what is found in the development countries, shall not be much emphasised.

This limitation of the evaluation scope is, according to the evaluation team, necessary – not least due to frames and limits set by economy and time. Nevertheless, there are additional aspects which are worth considering if all the costs and benefits of diploma courses (economical and not so directly economical) are to be assessed. The evaluation team does not have enough information to state whether such "additional aspects" would be in favour or against the present EPDS and PPT course setting.

At this stage there is also a good reason to underline that the present evaluation deals with two different courses. Although many similarities may be found, one should bear in mind that the two courses are quite different in nature and structure, and this will necessarily be reflected in the methods employed for the course specific parts of the evaluation. It also means that one should not expect the same conclusions drawn for the two courses.

1.2 Evaluation Team

The following team was established to undertake the evaluation:

Anders Wirak	Sociologist (DECO AS), Team Leader.
Ludvig Nagoda	Professor in Wood Technology and Utilization (Norges Landbrukshøgskole), Responsible for PPT-evaluation.
Hans Terje Ylvisåker	Electrical Engineer (Bergenshalvøens Kommunale Kraftselskap), Responsible for EPDS-evaluation and final editing.

In addition two local consultants conducted investigations in two selected countries for field works, Sri Lanka and Tanzania. These were:

Mallika R. Samaranayake	Joint Co-ordinator, Intercooperation, Colombo, Sri Lanka.
Suleman Sumra	Associate Dean, University of Dar es Salaam, Tanzania.

The evaluation was coordinated by DECO AS.

1.3 Sources of Information

The present evaluation is based on information collected from different sources:

- existing documents,
- interviews (course leaders and administrative staff, teachers, course participants, NORAD personnel etc.),
- questionnaires issued to previous course participants and recipient institutions,
- field works in Sri Lanka and Tanzania.

Existing Documents

This has been the main source for the review of Norwegian policy (see Chapter 2), and includes White Papers ("Stortingsmeldinger"), NORAD Reports and Memoranda as well as reports on previous reviews of education support in general and diploma courses in particular.

For the course specific parts of the evaluation information has been obtained through annual reports, existing and previous course descriptions, course curricula etc.

Interviews

A series of interviews has been conducted, as specified in the Terms of Reference:

- with course leaders, teachers and NORAD/NTH staff,
- with course participants, both current participants (1989/90 courses) as well as previous participants (from Sri Lanka and Tanzania),
- with NORAD staff in Oslo,
- with personnel responsible for manpower training in recipient institutions (Sri Lanka and Tanzania),
- with personnel from relevant ministries (Sri Lanka and Tanzania),
- with NORAD personnel at Res. Rep. offices (Sri Lanka and Tanzania).

Questionnaires

For the purpose of this evaluation questionnaires were developed for previous course participants as well as their employers. In addition all diploma course participants are requested to respond to a questionnaire during the last weeks of their stay in Norway. Nearly all fellows, starting from 1986 to the course in 1989/90 have replied. One advantage of this source of information is that participants to all courses, and not limited to PPT and EPDS only, have replied. Thus the data material can be utilized to compare results between the courses and the institutions providing training.

Field Works

Two countries recruiting participants to the courses were selected for special investigation, Sri Lanka and Tanzania. The purpose of the field works was to undertake more thorough assessments of the effects and impacts the courses had on individual job performance and institutional effectiveness. In addition the field works also should include reviews of the countries' educational needs and national policies within the pulp and paper and electric power distribution sectors. The latter part was primarily covered by local consultants.

Chapter 2: Policy Framework

2.1 Norwegian Development Policy Assistance to Education

The two fellowship courses under evaluation were established in 1968 and 1976. Since then the Norwegian policy for development assistance has undergone certain changes although the basic principles have been remarkably stable for many years.

The overall aim of Norwegian development assistance is "to contribute to lasting improvements for people in developing countries; economically, socially and politically". The assistance is to be used to have maximum impact on poor segments of the population, and should not create dependence on continued assistance. A "White Paper" from 1984–85 (Stortingsmelding no. 36) identified four priority sectors as part of a strategy to reach the poorest groups, among these: education (and particularly basic education). A few sectors (including the fellowships) are explicitly excepted from the general principle of Norwegian aid of priority to the main countries of cooperation. Other important principles are that aid should be recipient oriented – that the basic point should be the needs, plans and priorities of the recipient countries, that assistance should be untied and unconditional.

In addition to these general policy statements, White Papers, Reports to NORAD Board (Styredokumenter) and internal memoranda formulate more specific guidelines concerning technical assistance and fellowships. The White Paper of 1984–85 states that, with regard to technical assistance, the priority is to build up relevant competence in the developing countries¹. Competence building should first and foremost take place in educational institutions in developing countries, and be based on the existing needs of these countries. However, training can also take place in Norway or in a third country.

Over the years the policy has been to reduce the number of countries receiving diploma course fellowships. The objective is to concentrate to the low-income and middle-income economies and in particular the main partner countries of Norwegian development cooperation.

Norway has been concerned to increase the number of female beneficiaries in its development education assistance. This policy was stressed in the NORAD/DUH: "Norway's Strategy for Assistance to Women in Development" (1985) and the objective was formulated in terms of proportion; one half of the fellowship budget should be channelled to women.

Norwegian development assistance to education has increased in recent years. In 1983 4.8% of bilateral development assistance was classified in this category, while in 1987 it had increased to 7.3%². Of the 376.8 mill NOK to education (bilateral assistance only), approximately 60% was channelled through the country programme,

20% to NGO's and 20% to other. Multilateral assistance to education comes in addition to this. Internationally, however, an opposite development is observed; assistance to education has showed a decreasing tendency, both in total and as percent of total assistance. The most recent White Paper on "Norwegian Cooperation with Developing Countries" devotes a special chapter to competence building. Some of the basic motives for assistance to this sector are emphasised. Knowledge as such is seen as a basic precondition for personal and economic growth as well as for development of democratic government. New production techniques require new knowledge. Education to women is stressed, one argument being the important role of women within health, nutrition and population control in developing countries. Strengthening the level of knowledge is imperative for safeguarding the natural environment and to increase tolerance between countries, but also between different groups of people within the countries³.

Recently one of the main issues in development debates and evaluation reports has been the expatriate experts, consultants and volunteers. Such technical assistance, was initially considered needed for a period of 20–25 years. However, the number of personnel characterised as "technical assistance" is increasing instead of being reduced. In Africa south of Sahara there are now about 90.000 TA personnel, and the number increased with 50% between 1984 and 1987⁴. OECD/DAC and other international and national development organizations have given much attention to the proposal that large scale costs of experts coming from the industrial countries should be transformed to investments aimed at strengthening the recipient countries' own personal resource base. That is for instance assistance to higher education and research, more emphasis in general on transfer of knowledge and improving the efficiency of recipient countries administrations.

2.2 Policy for Diploma Courses in Norway

In 1981 an external consultant gave some recommendations regarding the fellowship assistance in a report to NORAD. His report was later much used as reference in policy matters⁵. Some of the main points given were that fellowship assistance is assistance to the countries and not to single fellows or institutions. To reach the objectives of fellowship assistance the following preconditions should be fulfilled:

- a) the training must be adequate to developmental needs in the home country of the fellowship holder,
- b) the fellow must have the needed qualifications to absorb the training offered,
- c) and then be given the opportunity to, and in reality utilize, the obtained knowledge in the home country.

A NORAD Board Memorandum⁶ in 1982 confirmed these principles in general, but added aspects to be considered in the assessment of fellowship assistance. Apart from the value of the training itself, a fellowship program could have other positive effects: production of research results, strengthening of contacts between institutions in Norway and other countries, establishing interest abroad for Norwegian products,

for general cultural exchange etc. The memorandum finds it legitimate also to stress such aspects, although it admits that impact of the training in the recipient countries must be the main objective.

In 1987 the policies for the education sector were thoroughly discussed in draft Memorandum to the NORAD Board⁷. The main objective is here stated as to assist in the building of a broad and long lasting competence in the countries of cooperation. This implies more concentration to main partner countries of Norwegian assistance and it means that distribution of fellowships according to the principle of "goodwill" should be avoided. Fellowship should be part and parcel of a larger context under the term "assistance to training" where the strengthening of education institutions, governmental and local administration as well as private institutions are in focus.

The main objective will be reached by:

- giving direct support to national and regional educational institutions and in particular to those which are related to other Norwegian development assistance,

The most recent "White Paper" states that the main conclusions in the report "Review of Diploma Courses financed by MDC/NORAD" are in accordance with the present policy of the Ministry of Foreign Affairs. The recommendations and proposals are as follows:

1. No course should be regarded as permanent. There should be a continual turnover of courses, with those currently offered being discontinued, moved overseas, or very radically changed – to make room for new courses in line with changing needs in developing countries and changing Norwegian policies. This process should begin at once.
2. Those courses which are not soon closed or shifted overseas should be strengthened. Proposals for some such improvements are listed.
3. Links with specific institutions in developing countries should be fostered.
4. Contact between Course Leaders and MDC/NORAD (especially the Representations) should be increased.
5. Course Leaders should take an active role in inviting applicants for their courses.
6. Course objectives should be critically reviewed in the light of the new guidelines, and more specifically the present study, and modified where necessary.
7. Course contents should be similarly reviewed and modified.
8. Any course which choose not to be closely linked to MDC/NORAD activities should be offered the chance to "go it alone" with limited or no guaranteed support from MDC/NORAD.
9. Those courses which are supported should be subject to continuing review to ensure that high standards are maintained.
10. More attention should be paid to the social life of study fellows in Norway.

In addition to the above proposals, which relate to the courses themselves, there are a number of other recommendations which are less clearly within the Terms of Reference of the study, but which may be worthy of considerations:

1. Manpower planning and development should be more emphasized, and more closely linked with the crucial issue of technical assistance. More innovatory approaches to both should be considered.
2. Closer contact should be maintained, in the field of technical assistance and training, with governments in the main partner countries, and other donors.
3. Education and Fellowships Division should streamline procedures and provide a very brief handbook to inform, and save time for, staff of the Representations.

- offering fellowship courses in areas where Norway has special competence or are in the process to establish particular competence in relation to problems in the main countries of development assistance,
- assisting different forms of cooperation between higher education institutions (North-South and South-South), preferably within particular areas,
- offering training for institutions/organisations/firms that are outside the framework of Norwegian projects/programmes, but within a broader sector of operation. The responsibility for such training will be given to the NORAD representations abroad.

The Memorandum proposes a strategy for five years (1987-92) during which the fellowship courses should be restructured in order to comprise one half of the total economic frame for education assistance. The support to institutions abroad would be increased to one quarter of the total. Project related training should be included in the budgets of the projects and programmes, while budgets for building of competence within priority areas of Norwegian assistance in the main countries of cooperation will be increased to one quarter of the total budget.

In its description of the fellowship courses in Norway, the most recent White Paper states that in the coming years they gradually will be transformed or discontinued. They will be replaced by shorter technical courses more adjusted to concrete needs in countries of cooperation, or in some instances, where Norway possesses special competence, courses will be extended to two year Master programmes.

The White Paper refers to a recent review⁸ of the Fellowship Courses and states that the main conclusions made in the review are in accordance with the present policy of the Ministry of Foreign Affairs⁹ (see text box). Diploma courses, as they have been organized, will gradually be terminated. There will be developed more flexible models which to a larger extent can be adjusted to the needs, in particular in the main countries of cooperation.

2.3 Policies and Needs in Developing Countries

2.3.1 EPDS

The role of sufficient and reliable power supply in the development of a country cannot be overestimated. This is clearly demonstrated in the set-backs experienced when for some reason the power supply is interrupted, affecting industry, agriculture as well as social conditions.

The distribution network is a crucial and necessary link in the power supply chain from the generating unit to the consumer. In most developing countries the distribution systems of the urban areas are adequate in terms of extension, but often prove to be

poorly maintained and insufficient in terms of capacity. In the rural areas these countries are in the middle of an electrification process, aiming at covering as large parts of the country as possible within foreseeable future.

Following the recognition of this sector as having a great impact on the general development most countries give high priority to electrification programmes, in particular in the rural areas, as an integral part of infrastructure development programmes.

Policies are not so specified when it comes to training of personnel to the sector. It is widely recognised that professional training is an important precondition to establish a proper distribution network. Most power utilities therefore have their own training units for their workmen. However, many distribution networks appear to be bottlenecks for an efficient power supply. This also calls for engineering skills, and a need for training that presently could not be found within the Third World.

2.3.2 PPT

Paper and paper products play an important role in the cultural and industrial development of a nation. After the end of colonial system in 1960's many developing countries have come up with ambitious development plans for education, agriculture and industry. The aim was to mobilize and utilize own human and natural resources as a part of the development process. One important development objectives was to eliminate illiteracy among the population. In this connection the paper was to play an important role. The consumption of paper and paperboard for packaging purposes was also expected to increase as a result of industrialization and export of agricultural products. Pulp and paper industry was thus given a high priority in the national development plans. Many countries have succeeded in their plans by getting assistance from abroad and have now pulp and paper industry for better or worse.

Only a very few of the new mills have reached the stage of successful commercial production. This is particularly true for publicly owned mills. To day, the industry enjoys a high degree of protection through tariffs imposed on imported pulp and paper. The tariffs may be as high as 50 -100 % and still the mills are not able to compete in price and quality with imports. Most of them are running on government subsidies and are a heavy burden on national budgets (Sri Lanka, Tanzania). Because of lack of investments the mills are in bad technical shape and utilize only small part of the production capacity. This is one of main reasons for the high production costs per produced ton of pulp or paper. And the income from the sale of products is often not enough to cover the production costs. Because of out-of-date machinery and old fashioned production equipment, the problems of water and air pollution are in many cases very serious.

Many developing countries are presently following a policy of privatisation of industry. As the process of privatisation is going on there will be need for refinancing and restructuring of the industry. This process may also effect the need for education. It

is expected that the private industry will be more profit oriented and cost conscious than public owned industry. In order to increase the productivity and improve production many different types of specialists are needed. In other words the success of industrial enterprises will depend on availability of trained manpower. It is expected that the private industry will be interested to support local education which can easily be adapted to serve the needs of the industry.

Chapter 3: Common Issues

3.1 Questionnaires – Findings and Interpretations

A large part of the issues discussed in this chapter is based on results from the questionnaires. More details are reflected in Appendixes A6–8.

For the purpose of this evaluation questionnaires were developed for two respondent groups (Appendix A5):

- Previous course participants. Of 236 questionnaires dispatched to previous course participants of the two courses PPT and EPDS 104 questionnaires or 44% were returned duly filled in. This must be regarded very acceptable taking into account problems with mail, wrong addresses, change of work etc.
- Employers of course participants. 129 questionnaires were dispatched and 39 or 30% were returned. Although the percentage here is lower than for the previous course participants the majority of the larger institutions sending their employees for course to Norway, are represented. (The institutions answering the questionnaire employ a total of 187 608 people, of whom 5 353 have a B.Sc. and 1 569 fill the requirements for course entry. The employer respondents hence must be considered to represent large segments of their respective pulp and paper and electricity distribution sectors of the recipient countries.)

In addition results from questionnaires filled in from participants while still staying in Norway were available for the period 1986/87 to 1989/90.

Examining the results one should bear in mind the inherent element of uncertainty in this kind of questionnaire. In most of the questions the answer is made choosing from an assessment list ranking from 1 to 5 (see Questionnaires in Appendix A5). The replies are of course very much depending on each individual's interpretation of that assessment list. It is further reason to believe that respondents tend to be on the "positive side" in their marking simply to be polite and grateful; after all they have been "offered" the fellowship from the Norwegian Government.

Another disturbance in terms of objectiveness of the results is that the general attitude to the course may affect each reply; if the participant's course experience is negative, all replies tend to give a negative score, a result that do not necessarily reflect the "right" answer to specific questions. In the same way a whole group of students may be influenced by each other, this is in Appendix A8 referred to as "course soul".

A very typical feature registered is that previous course participants tend to be more positive than those responding the questionnaires while staying in Norway. Three reasons for this are given:

1. "Fading memory", i.e. people have a tendency better to remember positive aspects;
2. Selection of respondents, i.e. those who do not participate in surveys are more negative than the repliers;
3. Questionnaires were sent through the employers, and there is reason to believe that the employers had an opportunity to read the answers. This might have affected the replies.

All the views above were taken into consideration when assessing the results from the questionnaires. It is therefore reason to underline that no conclusions concerning the future set-up of the courses are made on the basis of these replies only.

3.2 Information

The information about the course is spread through different channels, official and non official. Each year the Norwegian Agency for Development Cooperation invites governments in the Third World to present applications for NORAD fellowships. The fellowships offers are listed in a catalogue issued annually by NORAD¹⁰. In this catalogue brief descriptions of all Diploma Courses, including EPDS and PPT, are listed together with general information. The catalogue is supposed to be distributed among appropriate ministries and institutions through the Norwegian Embassies or Representations in the respective developing countries. The practical procedures for distribution vary from country to country, and also between sectors within the same country.

A prerequisite for a good result of the training and stay in Norway is of course quality of the information obtained by the candidates and their employers before application and selection of candidates. Important questions are whether the information (written or orally) is sufficient for the employer to select the NORAD courses and not other courses offered, (although as we shall see, there are not many similar offers in the "market"). Does the course provide the kind of training needed in the institution and is it clear regarding qualifications required? For the candidates selected it is of paramount importance to know exactly what kind of course they are going to join. What is required from them? Should they for instance bring information from their home countries for the writing of course reports and papers? Most study fellows have not before been in Europe and the information they get in advance about the society they will be an part of for 10 months, including one full winter, is of large importance; what should they expect, where to stay – and with whom, is it for instance possible to bring family along, what to bring to ease the stay? WHO, in a report about "psycho-social problems of students from abroad" stress the importance of information¹¹.

Results from earlier investigations and reports indicate that there is still work to be done regarding the written information provided by NORAD and the course institutions in Trondheim, to bring it up to the mark. In a study of the Introduction Course for NORAD Fellows in 1990¹² it was concluded that only 30 of 126 fellows in Norway at that time were "highly satisfied" with information regarding living conditions in Norway. 54 were "satisfied" and 38 "moderately satisfied" to "very dissatisfied". It was recommended to prepare new, relatively detailed and more realistic information about the student towns, weather conditions, food habits etc., but also about the Norwegian "way to behave". It was proposed to be problem oriented and mention the loneliness and homesickness many fellows experience during their stay. These proposals are in line with recommendations given by the above mentioned WHO report.

Detailed results from the questionnaires regarding course information are presented in Appendix A8.3. The main conclusions are:

- Previous course participants report the course information to be neither poor nor good;
- More than half the employers answering the questionnaire had not received "NORAD Fellowship Offers. Obviously there is much to be done regarding distribution of information about the courses, in order to establish the needed knowledge for the employers to take appropriate actions.

The field works principally support this. Some cases are reported where ministries sometimes forget to send the information further to the relevant institutions so that potential applicant may not receive the information they need in time. Another common complaint received from participating institutions and applicants is that the invitation for applications is received late, and in some instances they have to initiate inquiries themselves.

In this context the role of the NORAD Representations is interesting. The Tanzania and Sri Lanka Representations both claimed that they were supposed to act as "mail-boxes" only. This is probably typical for most Representations, and it means that there is no organism that is really dedicated to the distribution of information where the potential candidates for the course are found. And this probably explains the findings of the questionnaires, see above.

One important and reliable source of information is previous participants. After several years of existence the courses are widely known among potential users and participating institutions. As the courses have a good reputation among the users that is probably a quite efficient tool of marketing of the courses.

3.3 Preparations

From the questionnaires there is reason to conclude that there has been an improvement regarding problems during preparations; last year's participants almost unanimously answered "no problems" (Appendix A7.1).

In order to benefit fully from their studies in Norway, the candidates must have a good working knowledge of English. For those participants coming from non-English speaking countries, the improvement of English language is an important part of the preparation. All applicants, except those from countries where English is an administrative language and those who have previously studied in English speaking countries, are required to undergo one of the following two tests:

TOEFL – Test of English as a Foreign Language, or
ELTS – English Language Testing Service (General section & general
academical module).

Experience has shown that a test certificate is not an absolute guarantee that the applicant has sufficient qualifications in English. There are cases where candidates from non English speaking countries face severe language difficulties in the beginning of the course.

3.4 Selection of Participants

The basic guidelines for selection participants are given in NORAD's pamphlet concerning fellowship offers. Applicants from both public and private sector are eligible for consideration to attend various courses, but they must be nominated by their respective governments.

Candidates may also apply directly to the United Nations' Special Agencies for UN fellowships to attend any of the NORAD courses listed in the catalogue. These fellows receive the same financial support as those participants with NORAD fellowships.

Selection of the participants follows several stages. The usual procedure is that individuals apply for the fellowship through the employer who recommend one or several names which are then submitted to the respective ministries for approval. Qualified women are especially invited to apply in order to increase the so far limited participation of women. The authorities send the applications together with letters of recommendations to the nearest Norwegian Embassy, Consulate or NORAD Resident Representative for transmission to NORAD in Oslo. The applications are then sent to the course administration who prepares a priority list of candidates to be approved by NORAD.

The candidates are selected on basis of academic performance and practical experience from among the applicants nominated by different countries. Because each country may apply for at most 2 – 3 participants for each course, they propose only a limited number of candidates, but in return, apparently carefully chosen among well qualified applicants.

Several problems may arise in the selection procedure. The procedure is time consuming and can cause unnecessary delays. In Tanzania, there have been cases where applications from individuals had to be retrieved from the Presidents Office by

NORAD personnel. There is also a possibility of the management favouring particular individuals which are committed to the company, and have demonstrated willingness to stay with the company after studying abroad. Such subjective criteria, although important, can lead to favouritism.

Many companies submit only one application. This is an unfortunate practice leaving little room for NORAD and NTH to make their selection. On the other hand it should be reported that some institutions nominating more than one candidate have expressed their wish to know on what grounds the unsuccessful candidates were rejected so that they should avoid nominating him/her the next time should the same reason apply.

3.5 Administration

NORAD has supported a fellowship programme at NTH for personnel from developing countries since 1963. As from 1973 cooperation between NTH and NORAD was formalized by signing a three years contract which was later periodically extended. The contract defines the cooperation as follows:

NTH will assist NORAD with organizing education and research at NTH and the university as a whole for personnel from developing countries, and provide consultancy in connection with NORAD's aid programmes in developing countries. Furthermore, NTH takes the responsibility, after closer agreement, to assist NORAD with:

- Planning and carrying out courses, seminars, etc. for personnel from developing countries.
- Recruitment and if necessary training of Norwegian personnel for duties in developing countries.
- Assessment and evaluation of how the aid should be administrated and financed.

In accordance with the agreement there was established a Contact Committee NORAD – NTH. It consists of 3 representatives from NTH, 1 from AVH, and 1 from NORAD. The position for the AVH representative was created after extension of the agreement in 1983 in order to make the Contact Committee more representative for the whole University in Trondheim. A Liaison Officer was appointed to coordinate NORAD programmes at NTH (UNIT). He is responsible for day-to-day administration and he functions as secretary and administrator for the Contact Committee.

NORAD/NTH office has two main tasks, scholarships activities and the research projects. The office also provides social services to the scholarship holders.

3.6 Social Conditions

Appendix A7 presents a relatively comprehensive assessment of the course participants' social conditions and their experience from the stay in Norway based on questionnaires. The results quite clearly indicate that the previous course participants are quite satisfied with this part of the course. Some negative comments are registered such as "unfriendly room mates", "closed society", "negative attitudes among Norwegians" etc. And to some extent the results give reason to believe that there actually are some problems related to the social life that might to some degree affect study efficiency. But on the other hand these problems could not be considered as typical for the courses under evaluation; a general feeling of discomfort is often developed among students from abroad or other categories of people staying away from their home countries and family setting for some time.

A feature from the questionnaires that seems to be significant is a registered improvement in course participants' satisfaction of stay in Norway during recent years. This further strengthens the view that the social framework of the Diploma courses is adequate and well organised, a view that was largely confirmed through interviews with previous course participants during the field works.

Notes – Part I:

1. *Stortingsmelding (White Paper) no. 36, 1984–84, p. 36*
2. *Stortingsmelding (White Paper) no. 16, 1990–91, p. 129*
3. *Op. cit. p. 128*
4. *Op. cit. p. 129*
5. *Karl Skjerdal, 7.8.81: "Om NORADs stipendiatvirksomhet"*
6. *Direksjonsnotat from P&S, 23.9.82: "Om NORADs stipendiatvirksomhet"*
7. *Direksjonsnotat, 21.10.87: "Om bruk av opplæringsmidler til videreutdanning"*
8. *DECO AS, Oslo April 1988: "Review of Diploma Courses financed by NDC/NORAD" (ISBN 82-7568-012-3)*
9. *Op. cit. p. 121*
10. *"NORAD Fellowship Offers [Year] – International Diploma Courses in Norway"*
11. *Zwingmann, Charles A.A. and Gunn, Alexander D.G.: "Uprooting and Health. Psycho-social Problems of Students from Abroad". WHO, Division of Mental Health, Geneva 1983.*
12. *DECO, Oslo April 1990: "Gjennomgang av Introduksjonskurs for NORAD-stipendiater", ISBN 82-7568-019-0*

Part II

Electric Power Distribution Systems (EPDS)

Chapter 4: EPDS – Description

4.1 The Origin of the Course

The Electric Power Distribution Systems Course (EPDS) was established in 1976, as an indirect result of Norwegian support to the Department of Electrical Engineering at the University of Nairobi, Kenya. As this assistance was phased out some of the former teachers from NTH proposed that a course within the field of electrical engineering, but with a practical orientation, be introduced at NTH. The original idea was that this course should be recognised as a component of a M.Sc. study at the University of Nairobi, but this proposal did not develop.

Although not clearly stated in the objectives of the course its contents was largely focused on rural electrification. It was given a clearly practical orientation. The background for this philosophy was the fact that most developing countries could benefit substantially from the long Norwegian experience within the field of power supply, knowledge and skills that were not so obviously available locally.

4.2 Participation

In accordance with the practical orientation of the course it was designed to suit the needs for professional training of young electrical engineers, and not for senior personnel or academic staff.

A large number of countries as well as institutions have been represented, see text box. Over the past 15 years there have been 190 participants from 36 different countries. Half of these have been represented by only one or two participants, whereas the seven best represented countries count for 60% of the total number of participants. Of the seven countries two are not recognised as Main Partner Countries, Philippines and Thailand. Normally about one half of the participants each year is

recruited from these seven countries, while the other half is recruited from a total of approximately 30 countries.

Looking at regions, Asia has been represented with 52% of the participants over the years, followed by Africa (39%) and South America (9%).

There are no clear historical tendencies regarding the representation per country. However, it might be regarded significant that countries represented by only one or two participants appear most frequently the first 7 years, indicating that a more limited selection of participating countries has taken place. There is also a slight tendency towards more concentration to main partner countries over the past five years (64% annual average representation in the period 1986-90 against 43% during 1976-85). Regarding representation of

low versus lower middle income economy countries there have been wide variations without any tendency.

Country	No. of participants
Tanzania	27
Philippines	18
Sri Lanka	18
Thailand	15
Kenya	14
Bangladesh	12
India	10
Zambia	8
Colombia	6
Ethiopia	6
China	5
Buthan	5
Pakistan	5
Other (23 countries)	41
Total (36 countries)	190

4.3 Previous Evaluations and Reports

The EPDS course was assessed in 1987/88 as part of a general review of all NORAD financed courses in Norway (see Note 8, Part I). Due to the general orientation of the review no thorough study was made of the course from a professional point of view; the conclusions and recommendations were mainly directed towards general policies on training support and manpower development.

Some of the most important findings regarding the EPDS course should be mentioned:

- There is a great need for training in the field of electric power distribution, and the potential demand for the course is high;
- The course leadership does not maintain necessary overseas links;
- The course should be more oriented to developing countries;
- Environmental issues are not included in the course;
- The content of the course is possibly out of line with Norway's policy in the sector¹;
- There are no close links with specific projects and/or institutions.

Some of the general proposals can be summarised as follows:

- Shifting the courses overseas should be encouraged;
- Links with specific institutions in developing countries should be fostered;
- Course leaders should establish and maintain contact with NORAD Representations;
- Course objectives and contents should critically be reviewed.

As a result of these recommendations representatives from the course leadership and the NORAD-NTH Coordination Committee have made visits to some of the recipient countries, the most recent ones to Sri Lanka and Bangladesh in June 1990. However, no written reports from these visits are available.

Finally there is a continuous monitoring of the fellowship courses taking place based on questionnaires filled in by NORAD Fellowship holders after ending their courses.

4.4 Course Objectives

There are no clearly stated objectives of the course. The aims of the Diploma Courses as described in the information pamphlet² is to

"give key personnel in some professions the opportunity to acquire knowledge and skills relevant to the requirements and problems they are faced with in their jobs in order to broaden their qualifications"

In particular the EPDS Course is

"aimed at providing a fundamental and practical background in planning and design of power distribution networks"

The general Norwegian development policy on assistance to education, as described in Chapter 2, is not reflected in the above statements. Interviews with course leaders indicate that policy requirements are implicitly taken care of through the composition of the course and the selection of participants. Another question is to what extent the course leaders are aware the elements of this policy. The course leaders are closely linked to the professional milieu at and around NTH, and they will principally run the course from a professional point of view.

It is interesting to notice that the aims of the course originally were wider than what appears today. In the first NORAD Fellowship Offers the following statement was added to the description of the aims for the EPDS course:

"to provide a course which could form part of a post graduate study for a degree at foreign universities."

The fact that this part of the description was dropped means a clear recognition of the practical orientation of the course.

In summary it appears that the course has very general objectives. And as such they are not easily available for lecturers and other personnel dealing with the course.

4.5 Target Groups

Regarding the individual participant and the recipient institution the target group is in the information pamphlet described as:

"Public servants and employees associated with the state sector, employees of parastatal sectors, university teachers and staff of research institutes."

[....]

"Applicants from the private sector may also be considered for fellowship awards if nominated by their respective governments."

In particular the EPDS Course is

"primarily intended for young professional engineers and not for senior personnel or academic staff"

The candidates have to meet with admission requirements regarding academic degree (B.Sc. in Electric Engineering), relevant experience (3–10 years) and age (preferably 25–33 years).

The above requirements give relatively wide frames for candidates to be regarded as formally qualified for the course. Course history also shows that a high number of countries as well as a wide range of institutions have been represented. It is however quite apparent that the course, through its composition, is particularly designed for young engineers dealing with planning, construction, operation and maintenance of power distribution systems in public power utilities. This is not reflected in the general course information, and is probably one of the reasons for the great variety of participation.

According to the course leader a limitation is sought through the selection of participants, where the public utilities are given preference. But in some cases this has interfered with a more politically founded wish for participation from certain countries or institutions.

4.6 Course Costs

The total costs of the EPDS course in 1989 was NOK 3.7 million, corresponding to some NOK 240 thousands per course participant^a. This is 2–3 times the cost of an average NTH student. The costs can be broken down as shown in the text box (see Appendix A4 for more details).

The amount paid to the course participants in terms of fellowships (NOK 6 500 per month) and travel expenses (in average NOK 20 000 per participant) counts for approximately 35% of the total costs. The remaining 65% covers teachers' salaries, administration, travel in Norway and other running costs. One might therefore state that this part of the total expenses mainly will remain in Norway.

However, one should be careful to consider the cost aspect from this angle only. The product of the course is transfer of knowledge. And when the purpose of the course is met, this is what the participants will take back to the benefit for their company and their country.

COSTS In NOK thousands:		
I.	BASIC COSTS (Salaries to course administration, fees, travel and per diem expenses, material costs etc.)	1.282
II.	FOLLOW UP AND RESEARCH/DEVELOPMENT	126
III.	GENERAL COSTS (Salaries to NORAD/NTH office, Social Secretaries etc.)	390
IV.	FELLOWSHIPS, TRAVELS	1.327
V.	NORAD – OSLO (Salaries, offices etc.)	215
VI.	NORAD REPRESENTATIONS	342

4.7 Course Contents

4.7.1 Basic Structure

The course is divided into four main elements:

- Basic Subjects
- Applied Subjects
- Laboratory Works
- Individual Research Project

Appendix A9 contains a detailed description of each subject.

Parts of the course are at Masters level, other parts at a lower level.

The structure of the course indicates that the first semester (Fall Term, i.e. September to December) is spent on basic topics, the so-called Basic Subjects, bringing all the students up to the same theoretical level. In addition computer programming and application is taught, as this is an important tool for the student during the course, as well as it is expected to be when returned to his home country.

In this semester the Laboratory Works also are carried out. The experiments are designed to give the students an introduction to modern measuring techniques and also to provide an opportunity to more in-depth studies of specific topics. The

laboratory works are also given a practical orientation, and one of the previous fellowship holders reported that he actually repeated one of the experiments as part of a project in his own power utility.

In the second semester (Spring Term, i.e. January to May) subjects with a more practical approach are taught, the so-called Applied Subjects. These subjects are intended to give deeper knowledge of different components in power distribution systems, in addition to lay-out of stations and domestic and industrial installations.

A major element in the second semester is the Individual Research Project. The intentions are that each student will have an opportunity to perform a thorough study of a topic or problem related to his own company and job situation. The participants and their employers therefore are encouraged to prepare information and data for this purpose before departing for Norway. In many cases this has proved to be difficult, and the project work thus has been carried out with Norwegian data. In addition the course leaders also will assist in finding suitable topics for this project work. They will also, based on the students' choice of project work, provide well qualified advisors available for discussions and consultations during the whole project period. A large part of the advisors is selected from EFI and NTH, a practical arrangement as the very nearby location of these institutions allows easy access to the advisors. The local utilities, industries and consulting companies also provide well qualified advisors.

With very few exceptions the high professional standard of the advisors has been highly appreciated. One previous student reported to have maintained contact with his advisor to be able to proceed with his project work after returning to his country.

At the end of the second semester the students are offered a practical Training Period in power utilities, manufacturer of electrotechnical equipment or consultant companies. Many of the previous participants have reported this to be a valuable experience. The duration of the Training Period has varied from three days to three weeks, but according to the course leaders an optimum duration seems to be one week. On special occasions the Training Period has been prolonged to two months, necessitating a corresponding prolongation of the stay in Norway.

Excursions to power utilities, power supply installations and manufacturers form an integral part of the course. One- and two-days excursions are carried out in both semester. In the Main Excursion, lasting for approximately two weeks at the end of second semester, the students visit several installations and companies in Southern Norway. The excursions offer the participants the opportunity to closely study equipment, technical solutions, routines and methods of high professional standard. This has been pointed out as of great importance by a majority of the previous fellowship holders, especially as they all claimed that this was something they could not be acquainted with unless going abroad to an industrialised country.

The course in general follows the same basic structure as the first course arranged in 1976. A majority of the subjects introduced in 1976 also have remained practically unchanged, apart from modifications due to general professional development and

improvements. However, significant changes in the course contents have been made through additional subjects, principally through initiatives from teachers and course leaders.

Since the general assessment of 1987/88 was carried out, there have been some specific modifications:

- Environmental issues are included in the course through a seminar on "Energy and Sustainable Development";
- A firm institutional cooperation with TANESCO, Tanzania, has been developed.

4.7.2 Third World Orientation

The course could not be described as particularly Third World oriented. Even though it has been especially designed for Third World students, its composition and contents are very general, and it might as well have been given to Norwegian students without significant modifications. On the other hand, the topic of electric power distribution itself appears to be quite general; most techniques, methods and routines applicable in Norway might as well be employed in Africa or Asia.

Still there is reason to point out some parts of the course where a different orientation should be sought, or rather where the Norwegian approach is less suitable for Third World conditions:

- In the course Network Design a method for determining the peak load using the so called "Velanders formula" is introduced. This is a typical Scandinavian method, and is not applicable in Third World countries⁴.
- Some previous students pointed at the problem of the Norwegian low voltage system being totally different from most other systems. This might cause some confusion, especially in the course Installation Power Supply⁵.
- In the most practically oriented course, Overhead Lines, the equipment and technical solutions presented was not always familiar to the students. This should not necessarily be considered as unfortunate, as one of the main purposes of the course should be to introduce modern and rational methods to the students. But as this specific course to a very high degree deals with problems caused by local conditions, particular care should be taken to ensure that methods and technical solutions introduced are suitable for Third World conditions.

However, judging from the questionnaires the course could only be described as adequate and relevant with respect to contents. According to the replies (see Appendix A8.2) both previous and present course participants in average rated the course as being "good" in all questions related to course quality and relevance. This was also the unanimous reply obtained through interviews with previous fellowship

holders, their superiors and the management of the recipient institutions. This gives a good reason to claim that the course contents to a high degree comply with the training requirements and needs of the recipients. Apart from the above statements, there were very few negative comments to the course composition and contents.

4.8 Course Administration and Teaching Staff

The local course administration consists of three people, one Professor in Charge, one Course Coordinator and one Course Assistant. The Professor in Charge and the Course Coordinator both have a broad professional background from universities and research institutions, and both take active parts in the teaching, covering two of the major basic courses. The course assistant will normally be a recently graduated engineer (NTH), and his main duty is the day-to-day running of the course.

The teaching staff consists of some 20 people in addition to the administrative staff, each responsible for one separate subject. They are recruited from various professional milieus:

NTH	3 (approximate numbers)
EFI ⁶	6
Utilities	2
Industries	8
Consultants	3

The number of persons attached to the course is relatively high, a fact that could be regarded as unfortunate. It means that the opportunity to establish fruitful communication between students and teachers in some cases must be limited. Nevertheless, judging from the replies from questionnaires this is not reported to be a problem; the scores are high on questions concerning both "Availability of teaching staff" as well as "Contact with the leaders of the course" (see Appendix A8.2), and the tendency over time is positive. The result should also be seen in connection with corresponding high scores on the assessment of "Lectures".

Results from the field works support the same views: Neither of the previous participants interviewed pointed out this as any negative aspect, with some exceptions: Some of the previous students reported availability of some of the lecturers as a problem. As many of them stay and work in different parts of the country, they are only available for the students during the short period they are teaching. This leaves little room for later consultations. Similar problems of the Course Coordinator being heavily occupied with other duties was also mentioned.

The lecturers undoubtedly are highly qualified in their respective professional fields, many also in an international context. This fact has also been clearly emphasised by all previous fellowship holders; the professional knowledge and experience demonstrated by the lecturers have been highly appreciated.

Whereas there seems to be no doubt about the professional qualifications of the lecturers, some aspects should be stressed regarding the educational qualifications. In general the academic personnel seems to get a higher "score" compared to their colleagues from utilities and industry, a not very surprising finding (It must, however, be added that some of the representatives from the latter group are described as "extraordinarily good lecturers"). In most cases the lack of educational skill is sufficiently compensated by the professional qualifications. However, two negative cases should be reported, as they were pointed out by a majority of the previous fellowship holders:

- The lecturer of one course did not succeed in passing on his subject to the participants. He seems to speak too fast, his level is too high and remote, and it was also reported that he showed an "unserious attitude" towards his task.
- In another course the lecturer was appreciated for his extensive knowledge and experience. Unfortunately he seems to have serious problems with his English, and thus fails to communicate in an appropriate manner. According to the Course Coordinator the problem has been reported for many years, but the situation has not improved significantly.

Another negative comment should also be mentioned, indicating that some of the lecturers were merely "reading from their textbooks".

The teaching staff has very little or no developing country experience. However, some of the lecturers claim that they have obtained substantial knowledge about local conditions and problems through their contact with the fellowship holders, and in particular through their function as advisors on the individual research project.

4.9 Teaching Material, Facilities and Methods

The course offers very adequate and modern technical facilities. The students have a well equipped classroom at their disposal where presently 4 PCs are available. In addition the fellowship holders enjoy free access to the common facilities of the University, e.g. the PC-lab.

The textbooks used for the course are also generally of a high standard. In most cases the textbooks are prepared particularly for the specific course, often by the lecturer himself. This ensures relevance with respect to the subjects dealt with, but it also involves a limitation, as the lecturer not always will cover all aspects of the subject. In addition the students also at the beginning of the course get their own copy of a set of more general technical books and handbooks.

The feed-back from previous fellowship holders with respect to textbooks is generally positive. Many of the books are reportedly consulted frequently for the execution of different tasks. Still according to previous students there is a said discontent with only one of the textbooks, the one given for Overhead Lines. This used to be a textbook

prepared by a Norwegian consulting company, where the emphasis is put on transmission lines, and thus not so adequate in a distribution course. The latest years an english book was used, but this is no longer available. This book also had the disadvantage of using British standards and units.

The composition of teaching methods is approximately as follows:

- Lectures	40%
- Exercises and smaller project works	20%
- Ind. Research Project	25%
- Training Period	5%
- Excursions	10%

As can be seen lectures constitute a major part of the teaching, which can only be regarded as natural as the course generally follows a traditional NTH-profile regarding teaching methods. A somewhat striking feature, however, is the relatively high score given to lectures in the previous EPDS course participants ranking of training methods (see Appendix A8, Table A8.3). This should be regarded as a very clear recognition of the professional qualities of the lecturers, but might as well be a result of the fact that the EPDS students will normally participate more actively than their NTH student colleagues for several reasons:

- The group is relatively small (15 people);
- The participants are socially more close than the average NTH students, spending most of their time in their own classroom;
- All participants have a professional and practical background. This normally generates a high degree of engagement which is an incentive for discussions and exchanges of views when experts present their material.

In general one might say that the course offers a variety of teaching methods that seems to be adequate both from a professional point of view and according to the general opinion of the fellowship holders. The conditions for learning thus should be considered as fairly good in comparison with what Norwegian NTH students are offered.

Chapter 5: EPDS – Effects and Impacts

5.1 Field Study Cases

5.1.1 Ceylon Electricity Board, Sri Lanka

The Ceylon Electricity Board, CEB, is a so-called statutory corporation founded in 1969 with responsibility for the generation, transmission and, to a major extent, the distribution of electricity in Sri Lanka. The company is one of the main contributors to the EPDS course, with a total of 11 participants from 1979 up to 1991.

Electricity distribution constitutes a principal area for CEB activities for two reasons:

1. Existing network is in heavy need for rehabilitation due to high network losses and low reliability;
2. Government policy implies that rural electrification will intensify considerably, aiming at having 50% of Sri Lankan households connected by the year 2000 (presently approximately 27%).

According to the CEB management the EPDS course is now regarded more or less an integral part of the company's training programme. It was described as the only post graduate training within the field of electric power distribution offered on a regular basis. The course was also regarded very much in line with CEB training needs, given the high priority assigned to the distribution network. However, the need for training was obvious in all sectors of the company, also on non-technical issues like management and economy. In particular training of skilled workmen on a supervisory level was pointed out as most urgent at the present stage.

It was clearly stated that Sri Lanka could provide no prospects for in-depth studies within the country due to lack of qualified personnel.

The selection procedure for candidates to the course is initiated through a general announcement within the company after the NORAD fellowship offer is received from the Ministry. Those interested submit their applications to the Training Branch which elaborates a "ranking list" where the candidates are given scores according to their performance on professional skill, seniority, personality etc. The final selection is carried out by a Selection Panel made up by senior engineers of the company.

The procedure seems to work satisfactorily. All engineers are invited to apply, and the arrangement with a Selection Panel reduces the chances of selection by "liking and disliking".

The candidates sent for the course are recruited from all relevant parts of the company, with respect to both geography as well as organisation. In general the

returned engineers will not go back to their previous position, but will be assigned a position within planning, either centrally or in regional offices⁷.

Through interviews with the previous fellowship holders it became evident that their description of the EPDS course as being "very relevant" to their present positions was realistic. Many of them could prove quite specifically that they implemented essential parts of the course in their daily work. In particular this seemed to be the case with the course "Network Design", a subject that deals with methods for planning and designing low- and medium voltage networks.

There was a clear awareness of the importance of the individual research projects within the company, and efforts were made to ensure that the topics of the projects were in line with the needs of the company. An example of this was the engineer selected for next year's course who already had started his preparations through collection of project work data. However, an efficient and organised follow-up seemed to be missing, and some of the previous fellowship holders could not say whether the results from their project works were implemented or not, as they now were occupied in other fields. But there were also examples of very direct application of project work results.

All previous fellowship holders clearly expressed that they were encouraged to implement their acquired knowledge through improving existing methods and solutions and introducing new ones. This was the opinion of the management as well as the engineers, and it should be regarded a very important prerequisite for an optimum utilisation of this kind of training.

Regarding effects and impacts for the company the opinions of the Management were solely positive. In addition to improved technical skills, the trained engineers appeared to be more broad-minded, showed more confidence, logical thinking and better presentation. As a proof of the considerable contribution to general planning at CEB given by previous course participants, it should be mentioned that

- one of the EPDS engineers has set up a planning guide for distribution systems within CEB;
- another was given the responsibility for transmission system planning, and his plans are now being implemented.

These contributions show that the engineers can replace consultants otherwise necessary to carry out this kind of work.

One negative aspect should be reported: "Brain drain" is clearly demonstrated by the fact that out of nine beneficiaries from the EPDS course up to 1990 only four were presently working in the company. Two were on a two-year no-pay leave, and three had left the company. "Brain drain" seems to be a current problem for two main reasons:

1. The unstable political situation of the country encourages well educated people to seek employment abroad for personal reasons;
2. Australian authorities recently invited Sri Lankan electrical engineers to emigrate, as they are in need of engineers with these qualifications.

CEB maintains a bond period arrangement, in which the fellowship holders commit themselves to stay with the company for a period equal to four times the training period. Otherwise they have to pay the company a penalty equal to their salary for the remaining part of the bond period. This ensures a minimum contribution from the trained engineers of nearly four years. But symptomatically enough of the four engineers still working with the company the most senior one joined the course in 1985/86; all previous course participants had left the company temporarily or permanently.

5.1.2 Tanzania Electric Supply Company Ltd. (TANESCO)

TANESCO is a state-owned company responsible of all public generation, transmission and distribution of electric energy in mainland Tanzania. The company is the highest represented institution in the EPDS course, with a total of 16 participants from 1976 up to 1991.

As Tanzania by far is fully electrified, rural electrification is a main field of activity of TANESCO. In addition many of the existing networks are not longer adequate due to load increase and insufficient maintenance, leading to high network losses and reduced reliability. Distribution network rehabilitation therefore is equally important. The priority given to this field within the company is reflected in an extensive programme for rehabilitation and expansion of the distribution network sponsored by the World Bank, called the ESMAP study.

The ESMAP project is an attempt to set up a distribution planning unit to form a basis for the strengthening of the power distribution network. According to TANESCO officials the low quality and even total lack of planning is the major problem of the company when it comes to the distribution network. As one of the TANESCO Directors put it:

"What our engineers first and foremost lack is knowledge in engineering. Up to now we have been expanding by the rule of the thumb"

In this context the EPDS course is regarded to be highly relevant, according to both previous fellowship holders, as well as their superiors and representatives from the management. One of the trained engineers interviewed was actually directly involved in the ESMAP project. Her experience from the EPDS course made her "ahead of her colleagues" as she through the course had obtained a thorough understanding of the basics of the optimisation techniques also used in the ESMAP study. (It should, however, be noticed that training of engineers to be able to perform their own analysis

based on the equipment and software acquired from the World Bank also was a part of the ESMAP project. All engineers in that section therefore got a fundamental training in this field).

It was otherwise a general impression that the EPDS course was very relevant considering the present field of work of the previous participants. Exceptions are the most senior engineers, participating ten years ago or more, that now possess more administrative positions, mainly due to their seniority. All younger engineers were directly involved in distribution planning or construction, and constituted a considerable potential for the implementation of methods and techniques acquired through the EPDS course.

It was very interesting to notice the close and more systematic cooperation between TANESCO and the EPDS course that has developed over the last years, with two senior TANESCO staff visiting NTH in 1989 and 1990. According to a status report of June 1989 TANESCO's intentions are to use the EPDS course

"for general training as well as specialisation (through the individual projects) of its young electrical engineers,

letting the course participants work on problems of direct and immediate interest to TANESCO and/or in areas where TANESCO wants to build up competence over a period of time."

The individual project is supposed to play a key role in the cooperation, and some problem areas were defined to be dealt with by the fellowship holders during their project work in Norway:

- Load flow, short circuit and stability analysis of the TANESCO grid system (present project),
- The planning of local extensions of the network to areas presently without electricity supply, including rural areas (future project).

Most of the engineers interviewed did their individual project on load flow study of the TANESCO grid. It should be noticed that this is a transmission and not a distribution network. As the engineers mainly were dealing with distribution they had little or no knowledge of whether the results of their project work were implemented or not. Two specific cases were reported: In one case the results were irrelevant due to lack of reliable data, in another case the suggestions from the project work were followed, but, according to the engineer, only after a consultant made the same calculations. This is a very interesting statement, especially as one of her superiors claimed that one of the main benefits from the EPDS course would be that TANESCO engineers could replace many of the consultants now involved in planning.

Regarding the implementation of other parts of the course it must be admitted that very few of the trained engineers seemed to be able to turn their knowledge into

practical realisation. The interviews revealed several obstacles for efficient implementation:

- Many of the engineers complained about too little time to go deep into the problems; this very easily lead to plain repetitions of existing procedures without searching for other and better solutions.
- Technical limitations, e.g. unavailability of certain equipment, were claimed to prevent the implementing engineers from handling the problems in accordance with EPDS course methods. However, it was a firm impression that this is an excuse rather than an explanation. Changes very often require willingness to fight for one's ideas. The interviewed engineers seemed to lack the necessary initiative to bring about such changes.
- With only few exceptions the engineers had no or very limited access to computers. This of course prevents them from applying computerised techniques in their work, hence excluding the implementation of some parts of the EPDS course.
- A very clear complaint was that of lacking recognition from their superiors. As these were not familiar with new methods and solutions, many of the engineers expressed that they "did not speak the same language". As a result they met little understanding for their suggestions to new approaches, and this very easily brought them back to the old pattern (This could perhaps also be an indication of lack of initiative and firmness from the engineers; it takes some courage and confidence to fight through one's ideas).
- Especially one of the engineers complained about lack of planning on higher organisational level. Combined with inadequate preferences (priorities given on a personal rather than a technical basis) this caused considerable frustration.

The selection procedure also gives some reasons for comments. The fellowship offer is received through the Ministry, and forwarded by the Training Manager to the relevant department, Distribution and Transmission. The director of this department makes a selection of candidate(s) based on

- age (priority is given to engineers with age closest to the upper limit),
- present position.

The candidates will normally be selected from different Zones, having the responsibility for the distribution network.

There is no "open competition" for the fellowships, and the selection procedure thus seems to give much room for "likings" and "disliking". However, no negative reactions were reported on this, even when talking to engineers not yet in consideration for the course. There seems to be an understanding that each one will have his turn.

Summing up, it seems fair to say that the TANESCO organisation is not fully capable of providing the necessary support to make the trained engineers able to utilise their acquired knowledge. Only when promoted to more senior position they appeared to be given sufficient freedom of action, but when this level is reached, much of the EPDS course knowledge would be "faded". Adding up to this there is also a problem of very low salaries that in many cases forces the engineers to engage in other income generating activities, such as farming etc. In this way less capacity is left for the company.

The course no doubt offers a valuable contribution to the company by increasing the general technical level of the staff, and the course contents are equally relevant for the current technical problems of the company. Still the efficiency with respect to practical results can only be considered as low. It therefore seems to be necessary to take actions in supplement to the course itself to ensure a real benefit for the institution and the country.

5.1.3 State Fuel and Power Corporation, Zanzibar

The State Fuel and Power Corporation (SFPC) was visited primarily as it was the only institution to offer an opportunity to see the EPDS course in connection to a ongoing rural electrification project sponsored by NORAD.

The SFPC is the power utility responsible for power distribution on the islands of Zanzibar and Pemba. Up to quite recently this was limited to two urban distribution networks fed from diesel generating sets. With Norwegian support a high voltage connection with the mainland was established, and following this an extensive rural electrification project was launched, aiming at electrifying major parts of the Zanzibar island. The electrification project is presently in its second phase, but a third phase is planned, also involving the Pemba island. The project is run separately, meaning that SFPC only will take over the responsibility after the distribution lines are commissioned.

Up to now four engineers from SFPC have attended the course, and according to the management this corresponds to the current needs of the company. Of the four one was recently returned, and was not available for interview. Of the three available one was particularly assigned to the rural electrification project as the local coordinator, whereas the remaining two had their positions within the SFPC organisation.

The most interesting finding was the total different attitudes revealed by the engineers. The two working with SPFC could not demonstrate any specific example of course implementation other than a generally increased knowledge on distribution networks. They claimed that they had no influence on the planning process, so what was left for them to do was just implementing what was decided from the "top". In addition the lack of material, as well as little or no knowledge about load development also prevented them from doing an effective planning and design of the distribution network.

The one engaged in the rural electrification project on the other hand showed much more initiative, and seemed very able to implement his knowledge as he actively took part in both planning and design of the new lines. This difference in attitude may be a result of the different individuals, but the working conditions and opportunities offered in their daily work seem to be a very important factor. And again the most striking finding is that the course itself has very reduced value if the participants are not given adequate conditions for applying their knowledge and skills.

Regarding the possible connection between the course and the electrification project the NORAD programme officer in charge of the project reported that there formally was no such connection. I.e. the existence of a Norwegian sponsored rural electrification programme on Zanzibar was not forwarded by NORAD officials as a reason for pre-qualification.

5.2 Selection Procedures

5.2.1 General

The selection of candidates to the course can be referred to three levels: Selection of Country, selection of Institution, and finally selection of the Individual.

The representation per country is wide (see Chapter 4.2). Up to now engineers from 36 countries have participated. The only limitation seems to be that the country should be found among the low income or lower middle income economy countries.

5.2.2 Selection of Institutions

The choice of institutions is to a very high degree depending on the priorities of the recipient country. The fellowship offers will normally be distributed to the institutions through some ministry (-ies). The field work showed some examples of selection of institution that might be regarded as inadequate, primarily when judging from the orientation of the course towards rural and urban power distribution. Examples of this are:

- A ceramics factory (Sri Lanka)
- A petroleum refinery (Sri Lanka)
- A standardisation bureau (Tanzania)

The previous fellowship holders interviewed as well as the management of these companies, claimed that the course was very relevant and beneficial to them. This is probably true from a very narrow professional point of view, as they in very general terms all are related to power supply. However, provided that the objective of the course is to support the public electricity supply in the country, the representation of these companies should not be regarded as a proper disposition of resources. This

does not mean that they are not in the need of training support within this field, but rather that the EPDS course is not the optimum solution, or that it possibly is out of line with the objectives of the course and Norwegian policy.

Still referring to the field work it was revealed an example of a company very relevant to the course that so far had been excluded from participating, the Lanka Electricity Company (Private) Ltd, Sri Lanka⁸. The company is responsible for a substantial part of the power distribution in southern Sri Lanka, and discussions with the management showed that their field of activity corresponded very well with the contents of the EPDS course. They expressed a strong interest in the course, and were only very recently informed about its existence⁹.

The above findings prove that the present selection procedure does not always ensure the representation of the relevant institutions. The responsibility for this can be found in the recipient country as well as in Norway:

- In the recipient country as the institutions selected are not in line with the objectives, partly due to missing knowledge about objectives, partly due to favouritism of certain institution for personal or other irrelevant reasons;
- In Norway as the selection might be made with lacking knowledge about the institutions, and because the objectives and target group of the course might not be specified well enough.

It should also be mentioned that some of the interviewed persons involved in the selection process expressed a strong wish for feed-back from the Norwegian authorities responsible for the final selection. If reasons for rejections were given, the possibilities of making the right selection within the recipient country would improve.

5.2.3 Selection of Individuals

Two different methods on how the institutions selected their candidates to the course were demonstrated in the field work:

1. Selection through "open competition" as performed at Ceylon Electricity Board,
2. Appointment by the management as being the routine in TANESCO.

The first method appears to be more fair, as all engineers get the same opportunity to apply. On the other hand, the final selection must in any case be approved by the management, thus the difference may not be significant. What seems to be more important is that the companies select more candidates than what will be accepted. In this way the course leaders have the possibility to select also from an overall point of view, not only considering the qualifications of each applicant but also the composition of the group.

The number of applicants will normally be between 30 and 40. Some of these are rejected as they do not meet with the admission requirements. Those qualified are ranked according to three main selection criteria:

1. Educational background should be B.Sc. in electric power engineering;
2. The employing institution should have power distribution as a main activity, and should primarily be a public company;
3. The relevance of job, i.e. the candidate should be involved in practical implementation of electric power distribution, and not be a member of any administrative or academic staff.

The final selection of candidates is made mainly on a professional basis. To some degree it is influenced by the general Norwegian policy, female applicants are preferred to male colleagues with the same qualifications, and a minimum representation of Main Partner Countries must be ensured. According to the course coordinator, who carries out this selection, there are few examples of conflicts between the professional and policy based grounds for selection.

Still according to the course coordinator he claims that the candidates nominated by their respective governments for inadequate reasons (favouritism) are easily detected, and they will be rejected from participation.

5.3 Effects and Impacts on the Individual

5.3.1 Professional

There should be left no doubt that the fellowship holders benefit substantially from the course in terms of acquiring a profound and updated knowledge on the subject electric power distribution. Both interviews and results from questionnaires show that the course with very few exceptions is highly regarded as being relevant to their present duties, as well as being well taught. There is of course a chance that the attitude towards the professional contents of the course may be mixed with or influenced by the general positive reaction to the opportunity to going abroad, regardless of the professional motives behind the stay. But at least the engineers interviewed seemed able to make this distinction.

Several aspects were mentioned when describing specific professional benefits from the course. The most frequently appearing views were:

- The course gave a rich opportunity to brush up the knowledge acquired at the university some years back. As the engineers through their practical experience had gained a new understanding for their field of work, the outcome of this repetition was high.

- The close contact and cooperation with research institutions (NTH and EFI) gave a unique opportunity to get a very thorough insight in some fields of particular interest, an opportunity they could not expect to find in their home country.
- Being exposed to new solutions, through lectures, excursions and in-plant training, was an incentive for seeking new and improved approaches in their own job situation.

Regarding the impact of the course on the career, the general view is that the course itself will not give any qualifications for promotion. This was clearly stated in all institutions visited during the field work, and is also to a certain degree demonstrated in the information from the questionnaires (see Appendix A8.12). But it was a quite interesting finding, in Tanzania in particular, that all previous fellowship holders today would hold high positions in their company. This could not be regarded as due to seniority only. Hence there is a fairly good reason to believe that attending the EPDS course has a real impact on the engineers' career, although there is no clear evidence to this. (There is of course the possibility that these people in any case would end up in high positions, either as a result of skills, or because of favouritism, and that they for the same reasons would be the first ones to be selected for the course).

5.3.2 Economical

There are in principle two different kinds of economical benefits from the course: Direct benefits from the fellowship itself, and indirect benefits through salary increases or promotions.

Regarding the latter the way of practising this seems to vary from institution to institution. In the CEB neither salary increase nor promotion was offered, whereas TANESCO reported that salaries were "adjusted" after attending the course. But the field work did not reveal any examples of significant economic benefits given for attending the course; this could therefore not be regarded as a reason in itself for applying and participating.

The importance of the financial allowance offered by NORAD, on the other hand, should not be underestimated. Many of the participants openly admitted that the opportunity to save money and to bring home equipment not attainable in their own country was a motive in itself for going abroad. But again there seems to be geographical differences. In Sri Lanka this factor is not given that much emphasis, while in Tanzania it seems to play a much more important role. And quite evidently this reflects the different living conditions: In Sri Lanka the income of an electrical engineer seems to be adequate to live a "decent" life, whereas in Tanzania the same group of people is completely depending on supplementary income to survive.

However, it must be underlined that the fact that the course offers substantial economical benefits for the participants does not exclude the existence of real positive professional effects.

5.3.3 Personal

The stay in Norway for ten months for most fellowship holders involves an exposure to totally different conditions from what they are used to, both in terms of physical, social and cultural aspects. Combined with the participation itself in a course like EPDS, where people from different parts of the world have to cooperate very closely, inevitably must have a significant influence on the individual. This was also observed through the interviews with the previous fellowship holders and their superiors. (Unfortunately this was not a part of the questionnaires; the comments on this point are based on the field work only).

The views that came up through the previous NORAD-fellows were:

- The course gives the participants a great portion of confidence, primarily on a professional level, but this subsequently affects the person's general self-confidence;
- The course offers various opportunities for presenting their works. Several engineers underlined the importance of presentation techniques, both verbal as well as in writing, as an effective means for promoting new ideas and solutions. (This aspect was only mentioned by the Sri Lankan engineers, the Tanzanians put no significance in it).
- One of the engineers clearly stated that she had learnt "how to handle problems", an effect partly resulting from deeper professional knowledge combined with a higher degree of self-confidence, but also most likely as a result of the problem-oriented structure of the course.

5.4 Effects and Impacts on the Institution and the Country

5.4.1 Performance

The effect of the course in terms of improved performance is not easily detectable; there is no obvious measurable indicator. It therefore must be assessed from the method of production rather than the size of the production. Production in this context means planning, design and construction of the power distribution system. Positive effect would thus mean improved methods and solutions resulting from the course.

The employers' views are reflected in the responses of the questionnaires (see Appendix A8.10). A significant feature is the relatively low scores on all questions

related to course effects compared to the scores on the questions regarding relevance of and need for the course, indicating that the course as such is considered to be very relevant, but in many cases the results do not meet the expectations. This tendency fully supports the observations from the field work in general, and Tanzania in particular (see Sections 5.1.2 and 5.1.3).

The main problem in brief therefore seems to be that the relevance and the quality of the course itself is high, but the recipient institutions fail to make fully use of the potential of increased professional skill represented by the trained engineers. This was discussed specifically when describing the two Tanzanian companies, but there is reason to believe that similar situations are typical for many of the other recipient institutions. One explanation may be found in the organisation itself, where mismanagement prevents all attempts of improvements to become successful. Another reason is the general conservatism impeding all kinds of changes. A third explanation is lack of communication and thus understanding resulting from the fact that the new methods are only known to the young engineers and not to the seniors, the decision-makers.

Whatever the explanation it is crucial to ensure more favourable conditions for the implementation of the course.

5.4.2 Attitudes

In the interviews with representatives from the management it was in particular focused on the positive impact of the exposure to the Norwegian work habits, attitude towards work and the work norms, aspects that were also reflected by the fellowship holders themselves. It was widely recognised that one of the most serious problems in Third World companies, and public in particular, was that of low moral and indifferent attitude towards work.

However, neither the previous fellowship holders nor their superiors could point out specific fields where significant improvements had taken place as a result of the attitudes acquired by the engineers. But on the other hand such effects would in any case be very hard to prove, irrespective of institution and country. So what may be concluded with respect to this aspect is that the exposure to the Norwegian conditions has a general, but undefined, positive effect on the institution.

5.4.3 Institutional Cooperation

The only company to report some kind of organised institutional cooperation is TANESCO. However, this cooperation is too recent to give any significant indication of possible effects. Two senior engineers have visited NTH, and had discussions with both course leaders and advisors at EFI. This has given advisors and course leaders a better understanding of the specific problems of TANESCO, and thus created better

conditions for fruitful cooperation on the individual research projects. Further it has given the TANESCO managers the opportunity to direct feed-back to the course leaders.

One foreseeable effect of such a cooperation, where NORAD-NTH is committed to reserve a number of places in each course for this specific institution, is that the institution is given the opportunity to build up a technical milieu, where the engineers have more or less the same technical background, and thus easier can communicate and cooperate for the promotion of new methods and solution. Although a great number of the TANESCO engineers have participated in the course, this effect unfortunately did not seem to be present in the company. This indicates that training the young engineers is not sufficient to bring changes into the system; the senior engineers also must be given the opportunity to participate in this development. An organised institutional cooperation could be the right approach to obtain this.

The idea of institutional cooperation has been enthusiastically promoted by the NORAD-NTH Coordination Committee. One of their reasons for supporting the idea was that through participation in the course the institution could acquire technical competence in order to build up the training bodies within the institution. It should be observed that this aspect was not mentioned in the status report for the TANESCO-NTH cooperation, neither did the field work give any examples where previous EPDS students actively were taking part in training.

The question of to what extent contact with a professional milieu in Norway could be valuable for the institution was also raised in the questionnaires. The results indicate that the impacts of such links are considered to be limited in general, although there are exceptions to the rule (see Appendix A8.13).

5.4.4 Costs

The employer normally will pay the fellowship holder a full salary and other statutory contributions during his leave, to support the family and other obligations in his home country. However, this does not appear to be regarded as any burden on the company.

A more real burden is the absence of the engineer itself. The normal situation in many Third World countries is that of scarcity of qualified personnel. The companies worst off simply cannot afford to let go of an electrical engineer, as there will be no one to replace him or take over his duties. And this leads to the contradiction that the companies that perhaps could benefit most from the course have no possibilities to participate. The public power supply company of Mozambique, EDM¹⁰, may serve as a good example of this: Up to now there has been no participation from this country, and according to the management of EDM it is not foreseen simply because of the scarcity of engineers. This should be regarded a very unfortunate situation,

considering the great need for this kind of training as well as the broad Norwegian engagement in electricity supply sector of Mozambique.

5.5 Impacts on Norwegian Institutions

5.5.1 General

The fact that a number of engineers are invited to stay in Norway for nearly one year contributes to spreading knowledge about the country to other regions of the world. This is an effect that nearly all branches of the Norwegian society may benefit from.

More specifically the course offers some industries a unique opportunity to present their company as well as their products, by participating actively in lecturing specific subjects, by being chosen for excursion purposes or by offering a place for the trainees during their training period. There are no indications of any industry taking advantage of this situation, apart from one case where the lectures were reported to be "too propaganda-like". The situation was discussed, and a new arrangement entered into.

However, there seems to be no reason to claim that this condition has a negative impact on the course. On the contrary, the knowledge and qualifications of these lecturers, as well as the opportunity to visit Norwegian industry, is highly appreciated.

5.5.2 The NTH/EFI Milieu

Arranging a course like EPDS is generally a positive contribution to a university's activities. It participates in the support of the academic staff and to some extent also gives some contribution in terms of equipment and facilities. On the other hand it will also occupy parts of the common facilities of the university, a burden that probably is not fully compensated.

A more important aspects in terms of the university's interest in the course is the possible prestige it may involve. In particular internationalising is said to be one of the aims of the university activities, and in this context a course like EPDS must be regarded a very interesting contribution. However, no indications are found of irrelevant motives dominating the choice of subjects and teaching institution for the EPDS course.

The case of EFI is perhaps more interesting in this connection. As a commercial institution EFI has to offer its services on a purely commercial basis. Considering the extensive participation of EFI personnel in the conduct of the course there is reason to ask the question of to what extent the EPDS course is being exploited to the advantage of the research institution. According to the EFI employed lecturers they have an individual engagement with the EPDS course, meaning that EFI as an

institution is not directly involved in the course. This indicates that EFI has no commercial interests in the course.

When discussing the impacts the course may have on EFI, it seems fair also to underline the very important role the EFI employees have on the course. They represent extensive professional knowledge and skill in their respective field, and should be considered as an extremely useful resource for the course. The feed-back from previous course participants strongly underlines this.

Chapter 6: EPDS – Discussion

6.1 Objectives

It has been observed that the objectives of the EPDS course are not clearly stated. The only written statements are those appearing in the information pamphlet (NORAD Fellowship Offers) which are very generally outlined. This of course makes an evaluation a difficult task as it is very difficult to assess whether the aims are reached or not when these aims are not well specified.

It may equally be difficult to compose and conduct such a course without clearly defined objectives. The course leaders do not regard this as a problem, but would still appreciate more specific objectives to be set up. They in particular see it as a support in the selection procedure, i.e. they see the need of a better specification of what is the target group for the course. As for the aspects regarding the professional aims they regard it implicitly included in the course set-up as it is conducted today, and they do not so easily see the need for guidelines on policy or other more general matters.

The lecturers do not seem to feel any particular need for clear objectives, they teach their respective courses in accordance with what has been discussed with the course leaders regarding the professional contents.

Finally there are the students themselves, and to what extent they could benefit from more clearly stated objectives. According to the course leaders they conduct some discussions and exchange of views regarding the participants roles when they return to their respective institutions. However, the findings from the field work clearly show that turning the engineers' newly acquired knowledge into practical action and the engineers' own attitude towards their new role in the system are key factors to a fruitful outcome of the course. Thus the participant must be familiar with the objectives of the course and in particular know what are their obligations towards their institution and country in order to achieve the aims set forward, as the participants themselves are the tools in this process.

From this viewpoint the need for clearly stated objectives is obvious. The next problem therefore is to specify a set of objectives.

Starting with the Long Term Objectives these must be in consistence with both national needs as well as the general Norwegian policy. Strengthening the electric power distribution system comply with both these requirement. It has earlier been stated that electrification, both urban and rural, is given high priority in all Third World Countries. And with respect to Norwegian policy the support to this sector can be defended through the recognition of a reliable power supply as being crucial for a country's economic development.

One of the elements in Norway's policy for the education sector is "to assist in the building of a broad and long lasting competence in the countries of cooperation". To make the competence long lasting it is necessary to make these countries independent of the continuous support from the industrialised countries. This means that the long term objectives also must contain an element stating the temporality of the course, i.e. the final aim would be to make the cooperation countries themselves be capable of offering this education.

Long Term Objective:

- The course shall contribute to efficient planning, construction and maintenance of an adequate public power distribution system in the cooperation country. The course should be regarded as temporary, and aimed at providing sufficient competence to make the countries independent of foreign support.

To ensure that this objective is reached, there must be a set of Intermediate Objectives. Here the process of reaching the Long Term Objective must be described, as well as the Target Group. In general the EPDS course as having been conducted has proved to be effective to transfer adequate knowledge from Norwegian expertise to Third World engineers. However, the ability to implement the knowledge seems to be weak, and an element describing how to ensure this should be included.

Intermediate Objectives and Target Group:

- The Long Term Objective shall be met by offering post graduate training for electrical engineers from the cooperation country. The participants will undergo an extensive programme providing a fundamental and practical background in planning, design and maintenance of public power distribution networks.

The course shall be designed so that the participants are given the best opportunities to utilise and transfer the obtained knowledge in their home country, and also so that they fully understand their commitments towards their employing institution and their country.

The participants of the course shall primarily be young professional engineers from public power supply companies who in their work are directly related to the public power distribution system.

The number of participating countries and institutions should be limited, and a closer cooperation between the institutions and the course should be encouraged.

The following discussion is made with the basis in the above statements.

6.2 Modifications of the Current Course

6.2.1 General

From an electric power distribution point of view the course could only be regarded as well run. This is also clearly demonstrated through more or less unanimous positive feed-back from previous course participants.

When modifications are suggested these reflect

- contributions to make a good course better, and
- adjustments to make to course comply with the objectives proposed above.

One general remark could be made to the composition of the course: Today it is made up by a large number of subjects, and a corresponding high number of teachers. Even though this has not been reported as a negative aspect, it obviously must be demanding for the course leaders in terms of coordinating the various subjects. The course would therefore most probably benefit substantially if the number of subjects was reduced. This view has partly been decisive for the comments on course contents (see below), where it is specifically proposed to omit four of the existing subjects.

6.2.2 Contents

The overall opinions of the previous participants was that many of the subjects could be extended, in the sense that they appeared to be interesting and very relevant to the course. However, time is limited and the course programme is relatively tight and does not leave room for extensive expansions of the course contents. Still it was claimed, from Sri Lanka engineers in particular, that the first part of the spring term could be filled up more efficiently.

Negative feed-back was only linked to a few subjects. Some of them are so unambiguous that due action should be taken:

Line Parameters

To some extent the subject is relevant, as a background for subsequent courses. Still very few students seem to have benefitted from the course, and it gets a low score in the questionnaires compared to the rest.

It is suggested that the subject be integrated in "Network Analysis" and given a more brief and practical presentation.

Installation
Telecommunication
and
Remote Control

These two subjects get the lowest score of all on the question of relevance in relation to present work. This view is fully supported; neither of the subjects would normally be considered as part of the electric power distribution.

It is suggested that the two subjects be omitted from the course.

Installation
Power Supply

What is said about Installation Telecommunication to some extent also is valid for this subject. It gets a relatively low score in the questionnaires, but by far as low as Telecommunication. The subject deals with low voltage distribution in buildings, and may be justified as this part of the power supply may be the responsibility of some power utilities.

A fruitful solution might be to have Installation Power Supply integrated in the subject "Stations", as low voltage installations form an integral part of both primary and secondary stations (see below).

Some other comments regarding specific subjects based on field work findings, as well as a more general professional opinion:

Introduction to
Computing

The subject was without exceptions highly regarded among all engineers interviewed. But the questionnaire score regarding relevance is modest, indicating that the subject as such is found to be interesting and engaging, whereas the practical implementation of obtained knowledge is more absent. This must be seen in relation to the low availability of computers among a majority of the previous course participants, as well as it probably also reflects a general enthusiasm towards computers, almost regardless of its practical use.

Still it deserves to be included, especially when considering the rapidly increasing application of PCs in almost any context. However it should be modified by omitting the FORTRAN programming, and replace it with worksheet application. (FORTRAN programming should not be regarded relevant tasks for a power distribution engineer according to the description set forth in the objectives proposed above).

Stations

The subject is at present undergoing some modifications, partly due to change of lecturers, but also as a result of negative feed-back. It was by one of the previous participants described as "too propaganda-like".

The subject seems to be very much focused on choice of equipment and pre-made solutions. However, one ought to regard it more as a subject presenting principles and philosophies. In practical planning and design "Stations" is a synthesis of several aspects: configuration, reliability, components, installations etc., elements that are presented isolated in preceding sub-courses.

It is recommended that the contents of the subject be based on this view. To achieve this it is further recommended that the subject be lectured by a practising engineer from a power utility. (It is presently being lectured by representatives from a manufacturer).

Comments to existing courses that should be extended, or new courses to be included in order to comply with the proposed objectives:

Project Management

Today this is a small subject (3 hours) mainly dealing with contract conditions.

As explained in a previous chapter the problem of unsuccessful implementation of the obtained knowledge in many cases is due to mismanagement. If the effects from the course shall increase, the participants must learn not only the technical methods but also managerial methods and routines to be able to organise their work. The field work also revealed this as a major problem.

This could be regarded as Project Management in a wide sense, and should be given much more emphasis in the course. And in addition to a general course in Project Management an element specifically containing approaches relevant for the students to effectively implement their obtained knowledge should be included.

Maintenance

Maintenance is a basic field of activity for a power distribution engineer. A major part of all problems attached to inadequate power distribution systems result from poor maintenance.

Elements of maintenance are included in many of the courses, but general maintenance, philosophy and methods is not taught. Given the vast importance this aspect has in the context of power distribution engineering, it is recommended that maintenance is included in the course as a separate subject.

6.2.3 Teaching Staff

With very few exceptions the teaching staff is highly appreciated for their professional qualifications. When it comes to educational qualifications there are more variations. Still it seems to be the general view that the lecturers succeed in transferring their knowledge to the students.

Two negative cases are reported, see Chapter 4.8: One lecturer not able to adjust to the level of the students, and another failing to communicate properly due to some problems with his English. The course leaders are familiar with the problems, and due actions should be taken to have the lecturers replaced, as previous attempts to improvements have failed.

As mentioned earlier it is considered important that the teaching staff is well aware of the objectives of the course. It is therefore recommended to elaborate an information pamphlet containing the course objectives as well as a verbal description of how to achieve them and give this to the lecturers and other personnel attached to the course. This would ensure a minimum of conformity regarding the way of teaching each single course.

A better knowledge of and experience from developing countries would also be appreciated. However, one has to realise that these are requirements that very few Norwegian electrical engineers can meet.

6.2.4 Teaching Methods

The course offers a variety of teaching methods all appearing to be adequate to this kind of training. However, a way of overcoming the problem of a good coordination between the various subjects is to select a specific case related to electric power distribution, and follow this from beginning to end. This would also compel the different lecturers to relate parts of their material to the same case.

Apart from this only minor modifications are suggested:

- Experience from the Training Period is generally very good. In addition to giving knowledge in the professional field, this exposure also affects the attitudes of the trainees in a positive manner. The course would undoubtedly benefit if the period was extended, provided that adequate institutions and training arrangements were obtained.
- The Excursions are equally appreciated, and offer unique opportunities to study both modern and old equipment and solutions. However, the Main Excursion appears to be too extensive, both in terms of time spent and institutions visited. The visits to power plants and remote control centres could easily be reduced without, as both types of installations are not really parts of the power distribution system. (One or two visits for general information seem reasonable).

6.3 Supplements to the Current Course

6.3.1 Feed-back

Many of the engineers interviewed reported that they missed the contact with the EPDS course after having returned to their home country. This reflects a need or a strong wish to belong to a professional milieu, but also a need for routines and arrangements to be technically updated.

This is an important aspect which should be given emphasis. If the links with previous course participants are maintained, this could also prove to be an efficient means of reminding the engineers of their obligations to implement their knowledge, as well as one could present new methods and techniques (or even refresh the old ones).

There are at least two ways of achieving this, and both should be thoroughly considered:

1. Preparing a "EPDS Course Newsletter" and distribute it to all previous course participants on a regular basis, e.g. twice a year.
2. Arranging Work Shops in the cooperation countries where previous fellowship holders from the region, as well as more senior staff, are invited to participate. This could for instance be a one-week event where it is concentrated on one of the basic fields of the EPDS course. The work shop should be conducted by one of the course leaders in cooperation with a lecturer from the course.

Through such an arrangement one would obtain that:

- The previous course participants are technically updated;
- The same people are encouraged to implement their acquired knowledge;
- Senior engineers get an insight in some of the aspects of the course, hence adopting a more positive attitude towards potential improvements;
- Course leaders and teaching staff get a unique opportunity to familiarise with developing countries' conditions.

6.3.2 Contact with Administrative Staff

The impact of the working conditions of the returned fellowship holders has been described as crucial for his possibility to efficiently apply his acquired knowledge. One cannot possibly solve the problem of "difficult leaders" without regarding these as a part of the total course set-up.

Above it was suggested that these take part in work shops dealing with specific problems. A supplementary solution could be small courses or discussions arranged only for the administrative staff where emphasis is put on managerial matters, in particular in relation to the implementation of improved methods and techniques.

A third possibility is to invite senior engineers to visit the course in Trondheim. This has been tried in the case of TANESCO, but those visits were very much concentrated on the technical contents of the course, and gave less opportunity to discuss how the institution best could benefit from the trained engineer after they returned to their home country.

Whatever method chosen it must strongly be underlined that the importance of active links with the participating institutions should not be underestimated.

6.4 Alternatives to the Current Course

6.4.1 Shifting the Course

In the 1988 Review of Diploma Courses it was stated that "All courses should consider how and when they might move overseas." This view was based on the new policy guidelines pointing out that emphasis in training should be shifted from Norway to the recipient countries. The feasibility and possible effect of such a change is discussed below.

It is regarded beyond the scope of this evaluation to elaborate a complete set up for an alternative course overseas. This would require quite extensive investigations of adequate teaching institutions, teaching staff etc.

Benefits

In accordance with the proposed objectives the course should aim at phasing out when the in-house competence in the recipient institutions has reached a level where adequate training can be maintained without foreign support. One very obvious benefit from shifting the course therefore is that it will contribute to building up a professional milieu and hence accelerate the process of reduced dependency.

One of the negative aspects of the course is the high costs, mostly due to the high living costs in Norway. Evidently some of the costs would reduce considerably if the course were shifted, such as housing, allowances and to some extent travelling costs. These cost reductions must be compared to the extra costs involved in establishing new training facilities. This has not been studied in depth, but there is a good reason to believe that total course costs on a long term would be reduced. And, as a secondary effect, more engineers could be trained without increasing the economic support.

The degree of Third World orientation was discussed in a previous chapter, and some cases were presented where methods and equipment were not adequate for the conditions of the developing countries. Arranging the course in the region would at least ensure relevant practical examples for excursions, in-plant training etc.

Disadvantages

Listing up the disadvantages by shifting the course is equal to listing up all positive effects Norway (or another corresponding country) may offer, that cannot be found in a Third World country:

Availability of qualified staff	This aspect has been thoroughly commented in previous chapter. In particular the NTH environment can offer unique opportunities for close contact and cooperation between the course participants and highly qualified experts. This cannot be expected in any developing country for a long time to come.
Practical examples	Even though Norwegian solution not always are the best for Third World conditions, the Norwegian power system can demonstrate a wide range of examples on different technological levels.
Resources and facilities	The availability of modern equipment, computers and technical facilities ensures an efficient training.
Norwegian attitudes	This has been regarded a very positive effect for the individual, and expected to give corresponding effects on the institutions in the long term.

Feasibility

Arranging a course like EPDS requires a certain minimum of facilities and resources. Some of this can surely be found in existing institutions in many overseas countries. The question of shifting the course was discussed with representatives from the Department of Electrical Engineering, University of Dar es Salaam. They could see no practical obstacles by arranging the course in their university. They also claimed that adequate (academic) personnel with good knowledge in theoretical and practical issues was available.

Still, one could not expect the same results to be achieved by using regional resources only. One therefore would have to rely on lecturers and key personnel imported from Norway or another industrialised country, at least as an intermediate solution.

It should also be mentioned that the question of shifting the course was discussed with all persons interviewed. The previous fellowship holders were all very negative to this option. According to them the main reason for the course being so good was the fact that it was conducted in Norway. The only positive view was expressed by representatives of the personnel staff at TANESCO, as a reaction when confronted with the cost figures of the course: It would be more beneficial for the company if more engineers were trained, even if the quality of training was less. On the other hand the same people found it necessary that the trainees be exposed to the technical and cultural conditions of Norway. Among the recipient institutions one should therefore expect to find a clearly negative, or at best an ambivalent, attitude towards the option of shifting the course to a Third World country.

The question of localisation of the course was also brought forward in the questionnaires, and the results show a tendency of more and more to favour courses to be organised in Norway (see Appendix A8.6).

Summing up it may be concluded that it could prove feasible to arrange the EPDS course abroad, and it surely is desirable to make this shift from a policy point of view. However, possible new set-ups for the course should be carefully examined in order to ensure that the quality is maintained as high as possible.

Conclusions

From a policy point of view it is desirable that the course be shifted to Third World countries, primarily to reduce the dependency on foreign support. In addition some other factors weight in favour of shifting (costs, practical examples).

However, it is doubted whether the quality of the course could be maintained when moved overseas. The main reason for this is the great impact the technically well qualified personnel has on the performance of the course. These qualities are not easily found in the Third World today, and it would not serve the purpose (i.e. to reduce the dependency) to have the Norwegian staff moved to a Third World country.

Again it must be underlined that the course has developed a practical profile owing to the close cooperation with the research institute and industry. By linking the course to a university overseas the risk is high that the course will turn more academic. If so, the course would not be that much in line with the most urgent needs of the recipient institutions.

Summing up it may be concluded that it could prove feasible to arrange the EPDS course overseas. However, possible new set-ups for the course should be carefully examined in order to ensure that the quality is maintained as high as possible. It is therefore suggested that this option be further investigated as part of the long term planning of the course.

6.4.2 Supporting Alternative Courses

Supporting similar courses arranged outside Norway could be a good solution if they proved to be more cost effective than the present EPDS course. However, it has not been possible to identify such a course. According to the administrative staff interviewed there have been some course offers in the field of power distribution from countries like USA, Japan, Germany etc., but these have been closely linked with some ongoing project. In fact the EPDS course was reported to be the only power distribution course offered on a regular basis.

6.5 Selection of Candidates

The selection of institutions and candidates is found to be crucial in order to achieve effects in conformity with the objectives of the course. One of the problems, also underlined by the course leaders, has been to wide frames in the specification of target group.

If the proposed objectives are adopted, the target group will be more easily identified, as the institutions as well as the individuals should primarily be closely linked with the public power distribution system. In addition the number of participating countries should be limited to say the ten best represented countries (counting for 70% of the participation up to now, see Chapter 4.2). The number of institutions should be reduced accordingly.

This approach would promote closer links to be established between the institutions and the course, and preconditions for selection of the right candidates would improve. And again it should be underlined the importance of feed-back to the staff responsible for nominating candidates in the recipient country or institution.

Notes – Part II:

1. *This statement is based on an understanding of the course contents as having been oriented from rural towards urban electrification. This is possibly a misconception of parts of the course.*
2. *NORAD Fellowship Offers 1991/92*
3. *Based on 15,5 participants, resulting from 15 participants in 1988/89 and 16 in 1989/90*
4. *According to the lecturer a new approach to this problem is now being elaborated.*
5. *According to the course leaders this subject is given a more international approach over the last years.*
6. *"Energiforsyningens Forskningsinstitutt A/S", i.e. the Norwegian Research Institute of Energy Supply*
7. *It should be underlined that being located in the capital does not automatically mean that the job duties are linked with urban network. Much of the rural distribution planning is also executed from the main office.*
8. *The company has the official status of "private company", but is 100% owned by state-owned companies.*
9. *The information was given them by the EPDS Course Coordinator on his mission to Sri Lanka in June 1990. They had not received any fellowship offer through governmental channels.*
10. *"Electricidade de Moçambique"*

The first part of the document discusses the importance of maintaining accurate records of all transactions and activities.

This section outlines the specific procedures to be followed when conducting audits.

The following table provides a detailed breakdown of the financial data for the period under review.

The data shows a significant increase in revenue over the last quarter, which is attributed to the successful launch of our new product line.

It is noted that while revenue has increased, there has also been a corresponding rise in operating expenses.

The overall financial performance remains strong, and we are confident in our ability to continue to grow and expand our market share.

The management team is committed to transparency and will continue to provide regular updates on our progress.

We look forward to the continued support and collaboration of our stakeholders in achieving our long-term goals.

Thank you for your attention.

Part III

Pulp and Paper Technology (PPT)

Chapter 7: PPT – Description

7.1 The Origin of the Course

The Pulp and Paper Technology Course (PPT course) is given in Trondheim by NTH, Laboratory for Chemical Engineering. The training programme which is conducted in English is designed for students from developing countries. The course started in 1968 with an annual intake of 6 students. The intake has later increased to 8 students which is the maximum capacity of the course. The programme is sponsored by NORAD.

As a part of industrialisation in 1960's many developing countries have engaged themselves in pulp and paper production. This industry was new to most of the countries, there were no trained personnel and the demand for education was very high. The educational institutions in developing countries were not in position to offer this special type of education for pulp and paper industry. Therefore, the establishment of the course in Trondheim in 1968 came at the time when there were real need for this type of education.

There are many good reasons that Norway decided to offer a pulp and paper technology course to personnel from developing countries. A great part of Norway's land area is covered by forest and the country has accumulated considerable expertise in the manufacture of forest products. And NTH has long tradition in education of pulp and paper technologists.

The NTH's regular pulp and paper technology courses were especially popular after the war. The Norwegian pulp and paper industry was doing well and the industry has financially supported teaching and research activities at NTH. It was at this time NTH received laboratory pulping equipment and a laboratory paper making machine for research and training purposes. However, at the end of the 1960's the intake of Norwegian students dropped dramatically. Therefore, starting of the diploma course

for personnel from developing countries in 1968, came at a very appropriate time for NTH. By establishing the course one could utilize the teaching capacity. In the last few years the interest among Norwegian students for studying pulp and paper technology has increased and the Laboratory of Chemistry and Chemical Engineering is facing shortage of space.

7.2 Participation

The users of the course are pulp and paper industry and related institutions from developing countries. In principle the course is open to all medium and low income countries. In practice some priority is given to main countries of cooperation. The institutions which have been using the course regularly are normally offered one or two study places each year. The cooperating institutions can also specify projects they wish their students should carry out during their stay in Trondheim.

Up to now (1990/91) the course has had a total 174 participants from 18 different countries. Out of this 26 or 15 % are women. In the last 5 years 12 out of 40 participants or 30 % have been women. The largest number of women participants, 6 in all, came from Philippines. The participants are mainly recruited from public institutions and government owned industry. The countries that have benefited from the PPT course are: Bangladesh, Burma, China, Cuba, Ethiopia, India, Kenya, Malaysia, Mozambique, Pakistan, Philippines, Sri Lanka, Sudan, Swaziland, Tanzania, Thailand, Turkey and Zambia.

Some of these countries are "regular customers" of the course. In the last 10 years Bangladesh, Sri Lanka and Tanzania have been represented by one or two participants each year. The cooperating institutions in Bangladesh is Bangladesh Chemical Industries Corporation which controls 4 pulp and paper mills; in Sri Lanka, National Paper Corporation with 2 mills and in Tanzania, Kibo Paper Industries and Southern Pulp and Paper Mills Ltd.

7.3 The Course in 1990/91

The course in 1990/91 has 8 registered participants of which two are female. The number of participants is the same as previous year. The countries represented are Bangladesh (2), Mozambique (1), Nepal (1), Philippines (1), Sri Lanka (1), and Tanzania (1). The students have been chosen from among 20 well qualified applicants. In the selection of the candidates priority is given to women and to candidates from main countries of cooperation.

The Pulp and Paper Technology Group, which is a part of the Laboratory of Chemical Engineering, is responsible for conducting the course. The teaching staff members are: Professor Per Koch Christensen, Professor Torbjørn Helle, Associate professor Per Johan Houen and ing. Asbjørn Øye, who also functions as Course coordinator.

In addition, there are two secretaries: Synnøve Hestnes and Signe J. Talukder. Other staff members are: 2 engineers one chemist, one mechanic, 3 researchers (2 from PFI), one lab. assistant, and one dr.ing. student. The head of the Laboratory for Chemical Engineering is Professor Norvald Nesse.

7.4 Previous Evaluations and Reports

Beside annual reports, there is one previous report on the course from 1989: Monitoring of Fellowships Courses at NTH Trondheim 1986 – 1989. The report is based on questionnaires filled in by NORAD fellowship holders. The questionnaires were divided into two main parts. The first part was related to the general assessment of the fellows' stay in Norway and the fellowship arrangement as such. This part was prepared by DECO and was based on experience with previous course evaluations. The second part dealt with course-specific issues and was prepared in collaboration with NORAD/NTH Liaison Office, DECO and the course leaders.

Annual reports are prepared by the course leader and contain information about participants, organization, teaching activities, experience of the course and accomplishments.

The teaching staff members have been active in continuous evaluation of the course. Prof. Per Coch Christensen has visited various cooperating institutions and mills in Thailand, Bangladesh, India, and Sri Lanka¹. Prof. Torbjørn Helle has visited Tanzania². Prof. Helle's report has as an annex containing questionnaires filled in by previous fellowship holders and their employers.

Professor Helle discusses the need for varied education within Pulp and Paper industry. He concludes that the type of education that is needed is so specific for each country, that it can best be solved by local educational institutions. However, he does not go so far as to recommend that the course be transferred to Tanzania.

7.5 Course Contents

The course consists of two main parts:

Pulp Technology, Basic and Advanced Subjects, and
Paper Technology, Basic and Advanced Subjects

The content of the course is more or less identical to the one given to Norwegian fourth year students specializing in pulp and paper technology. Here follows a short description of subjects:

Pulp Technology, basic subjects

The lectures cover basic properties of wood and non-wood raw materials as well as chemicals and chemical processes involved in pulp production. The physical and chemical properties of raw materials are put in relation to pulping processes. The ligno-cellulosic materials such as cellulose, hemicellulose, lignin and extractives are treated in detail. Different cooking methods (sulphite, sulphate, semi-chemical, chemi-mechanical), chemistry of bleaching of pulps are discussed. The economical and technical problems related to pulp washing waste water treatment are also covered by lectures.

The course gives the students a solid general understanding of properties of wood as raw material and the chemical processes applied in pulp industry. But non-wood raw materials, which are important for many developing countries, seems not to be satisfactorily covered by lectures. The course leadership are aware of this shortcoming. The need for adjustment has been pointed out in annual report for the course 1987/86. There is also stated that adjustment of the course in direction of non-wood raw materials would require a considerable effort because staff members have no experience in this area.

Pulp Technology, advanced subjects

Wood handling, chipping, storage and treatment before cooking or defibration are included in the lectures. These topics are important for production of quality pulps. The other main topics are sulphite, sulphate, semi-chemical, chemi-mechanical, thermo-mechanical and groundwood pulping, bleaching and bleaching equipment, screening and further treatment of pulp. Recovery of the cooking chemicals and properties of paper making pulps with special reference to the raw material and the pulping process are also covered.

Water and air pollution and environmental protection problems, though very important, make only a minor part of the course.

Paper Technology, basic subjects

The course gives background for understanding of the structure of paper-making fibres, their chemical constitution and surface properties, their swelling in water and various chemical solutions and their behaviour during the drying process. An important part of the course are theories of beating of paper pulps, the fibre network and flow characteristic of pulp suspensions, the nature of paper bondings, and the optical requirements for various end uses.

Most of the topics seem to be well covered by lectures and exercises. However the emphasis is put more on wood than non-wood fibres. It would be desirable to treat non-wood fibres more in detail.

Paper Technology, advanced subjects

There are many technical topics included in this section. Various unit processes for paper making can be considered as the main part of the entire course. The units are: The stock distributor and headbox system, the forming section, the press section, the dryer section and calendering and reeling system. The subjects covered are refining and its effects on fibre and drainage properties, process problems of paper manufacturing, filler materials, their functions, characteristics and effects on paper properties. The function of various types of sheet-forming machines, analyses of the mechanisms involved in technical sheet formation are discussed. Various paper grades and their relation to process variables and user requirements are also covered. The other important topics are printing processes, fibre recovery and pollution control.

This part of the course is moulded upon advanced paper making technology and is supposed to give the students inside information about the possibilities and shortcomings of modern technology.

Laboratory work

The lectures are followed by laboratory work which is done individually or in groups of two or more depending on the nature of the exercises. The laboratories are well equipped. There is amongst other equipment a unit for continuous production of high yield pulps and an experimental paper machine. The laboratories are of great help in the instruction.

The participants spend a large part of the time in the laboratories both in connection with exercises and when they are working on special projects. The laboratory work may be considered as one of the most important parts of the entire course.

Excursions

The excursions are an important part of the course as they are the only possibility for participants to come in close contact with pulp and paper industry in Norway. It would be desirable to increase the number of excursions. The course has now 7 days of excursions. A longer stay at each mill or practical work would be desirable in order to get some industrial experience. This is, according to the course leader, not easy to realize. (See Annual report for PPT course 1986/87 and T. Helle's Travel report to Tanzania 1987).

General remarks

The course is reasonably well balanced between theoretical and practical subjects. It seems that the needs of different countries have been taken into consideration as far as possible in connection with the choice of subjects, exercises and project work. However, there are still some parts that can be improved. The course seems to function well from a professional point of view.

7.6 Teaching Staff

Teaching staff for this course consists of four key persons: Professor Per Koch Christensen who is in charge of the course, Professor Torbjørn Helle, Associate Professor Per Johan Houen and engineer Asbjørn Øye who is course coordinator. All staff members have long teaching experience. Professors Helle and Christensen have been teaching in this course since its beginning in 1968. They are well known as specialists and lecturers at numerous international meetings, conferences and seminars. The teaching staff is highly qualified and very competent as lecturers and researchers.

As far as we know the staff members have no working experience in pulp and paper industry from developing countries. But they have made frequent and long lasting visits to many developing countries in order to evaluate the course and to study the problems in pulp and paper industry.

7.7 Teaching Facilities, Materials and Methods

The University has large enough space to accommodate up to a maximum of 8 students. There are suitable lecture and seminar rooms and a small library. The laboratories are well equipped and spacious. The staff offices are situated close to the laboratories and library, which makes communication between the students and staff easy. The laboratory is equipped with cellulose and paper making facilities. These facilities are of special value to participants for conducting practical training and research projects.

Teaching is carried out as lectures, exercises and laboratory work. The course consists of 4 main subjects. Each subject has a weight of 4 lecture hours and 2 hours for exercises per week. The laboratory work is going on parallel with lectures, in both fall and spring semester. The students are required to write a report on each project. The laboratory work also includes an individual research project in cellulose chemistry or paper making. Participants can choose the theme for the special project, and they usually make cellulose and paper out of raw material of their own choice. The student are encouraged to work two together on special project in order to benefit from each others experience.

Excursions are an essential part of the course. In all there are 7 days of excursions to different pulp and paper mills.

There are textbooks that cover all main parts of the course. In addition there are lecture notes prepared by the teachers which cover special subjects. The participants are receiving all the course literature free of charge.

The majority of students seems to be satisfied with the way the course is taught, and they appreciate the services and the attention they receive from the teachers and other staff members at the Laboratory.

7.8 Course Costs

The total cost of the PPT course is approximately NOK 2.1 million (See Appendix A4). This sum includes teachers salaries, scholarships, allowances and travels, NORAD's and NTH's administration costs, etc. As there are 8 participants the cost per participant is NOK 263 000 for 10 months or NOK 26 300 per participant per month. The scholarship amounts to NOK 6 500 per month.

For comparison the paper technology course in Markaryd, Sweden, has a budget of SEK 45 000 per participant per month (BITS, 1990)³. However, this is not a regular university course. The lecturers are invited from the industry and the participants are accommodated in hotels during 5 weeks period of practical training.

The cost of higher education of regular university students in Norway varies from NOK 15 000 for law students and up to NOK 390 000 per student and year for odontology students (KUD). NTH calculates with an average cost of NOK 81 000 and NLH (The Agricultural University of Norway) with an average cost of NOK 100 000 per student per year. The average cost for all institutions of higher education in Norway is approximately NOK 50 000 per student per year⁴.

The University of Dar es Salaam and the Sokoine University of Agriculture, Morogoro have a budget of NOK 13 000 (TSH 400 000) per student and year. Fees and other financial responsibilities for undergraduate course at Sokoine University of Agriculture are NOK 3 700 (TSH 110 000) and postgraduate fees NOK 14 000 (TSH 420 000). (SUA Prospectus 1990).

Employers costs of sending employees abroad for studies are considerable. The employer is paying local salary and providing the housing and medical care for the family members while the candidate is abroad. The candidate is supposed to get a study leave and because each position at the mill is usually staffed by several persons there is normally no need to fill the vacancy. As there are only one or two employees sent for studies their departure is not seen as a burden on the company. The candidate's expenses abroad are covered by NORAD scholarship which includes travel by air from and to the study fellow's home, installation allowance and a monthly allowance to cover food, rent and other ordinary living expenses. The management considers that benefits of the training by far outweigh the local costs involved.

Chapter 8: PPT – Discussion

8.1 Objectives

8.1.1 General

The PPT course is a part of NORAD development aid programme. As such it is supposed and expected to contribute to building up a sustainable development process and competence in the main countries of cooperation.

According to the course description in the booklet "NORAD Fellowship Offers 1990/91", the main objective of the course is to provide education in pulp and paper technology which is needed in developing countries. This objective is primarily related to the individual participant; to give them a basic education and it is supposed that the knowledge they acquire will help them to improve their job performance. It is further believed that the participants will disseminate the knowledge when returning home by training others in skills they have acquired. In the long run the course is supposed to contribute to the sustainable development of a competitive pulp and paper industry which will make developing countries less dependent on foreign aid.

There are also certain social values and aspects of the course that need to be mentioned. The participants get an unique opportunity to meet a different culture, other people and experience a new environment. For many of them it may be the first and only travel abroad.

8.1.2 Fulfilment of Objectives

One of main objectives of the course (see above) is to provide education at graduate level for young professional engineers working in pulp and paper industry. This objective is clear and fully achievable.

The course is providing knowledge and skills to the participants and thus it is clearly contributing to cover immediate needs of pulp and paper industry for trained personnel. The participants improve their knowledge and skills and they are in better position to improve production processes and increase productivity in their mills.

The main objective of NORAD policy which is contribution to sustainable development is only partly fulfilled. The pulp and paper industry in developing countries continue to be depended on the course after 23 years of its existence. Because the course is providing services they need, not enough efforts have been made on the side of developing countries to find alternatives. Nobody is taking into consideration that this education offered at NTH will not exist for ever.

Because the course is not oriented toward cooperation with educational institutions, no teaching capacity has been build up in developing countries. It means that the countries of cooperation have not fully benefited from the course. The reason is that the valuable side benefits of the course (Teachers' salaries, running cost of the course, competence building and experience gained through teaching and research, etc.) have remained in Norway. (Only salaries of the staff and running cost represent more than half of the total budget of the course).

The alternatives to NORAD's course can be found within national educational systems. Support of national education can best solve the shortage of trained manpower in the years to come. The training can easily be adapted to fit local needs. (Helle, in his report of 1987, came very close to the same conclusions). One can further assume that once a local education is established, it will have a chance to continue after NORAD's aid is withdrawn.

8.1.3 Accordance with NORAD's Policy

The PPT course is not fully in accordance with NORAD's policy statement whereby the main objective is to assist in the building up of a broad and lasting competence in the main countries of cooperation. This objective is only partly achieved.

The course is to some extent strengthening the industry and it meets recipient countries' immediate needs for special education. However, it does not contribute essentially to strengthening educational institutions which have potential to continue education after NORAD's aid is withdrawn. Thus, the course does not help developing countries to become independent on this special type of education. And the most important issue of the policy, which is sustainable development in main countries of cooperation is not achieved.

8.1.4 Accordance with the Needs or Policies of the Recipient Countries

A course given outside own country can be valuable, but it can never be the same as a course given locally. The latter can more easily be adapted to special needs. The pulp and paper production is based on relatively advanced technology and there is need for specialists with different educational background. The type of education offered in Trondheim is one among many specialities needed to run such complex industry. However, this course is of special interest to the industry because similar type of education is at present not available in developing countries, with the exception of India which has a Paper Technology Institute in Saharanpur. After 23 years of existence the PPT course is well known in developing countries and they are eager to use it.

The issues and objectives of the course are of great concern and interest to recipient countries. But it is difficult to find a link between policies and needs for education. The countries visited by the evaluation team, Sri Lanka and Tanzania, have no clear policy on issue of higher education. It seems that such a policy have never been worked out, and the ministries handling higher education matters have no guidelines to follow. Because the capacity of higher education institutions is limited one is happy for every opportunity of sending students abroad for further education. One is not in position to think what is the best for the country because there are no money to support the local institutions. To send students abroad is a cheap way to get education which is needed at the moment and is not available at home. But it may not pay in the long run because the countries will remain dependent on foreign educational institutions.

Sending students abroad is beneficial because the students get exposed to industrial culture in industrialized countries. On the other hand such exposure creates problems when the candidates return home and do not find working environment they got used to. Those benefiting from the PPT course agree that studies overseas and the exposure to new technology is mostly positive. Participants are becoming more confident and management stated that the participants have done much better in their work after attending the course. One evidence of this is that most returners have been promoted to higher positions after few years of work. Although this is positive, promotion has often led the participants away from technical jobs, for which they have been trained, to more administrative jobs.

The raw material for production of pulp and paper varies from country to country. In some countries agricultural waste, such as rice straw, jute and bagasse are important raw material, in others only wood is used. It is difficult for a single course to cover needs of all countries equally well. However, the majority of the countries of cooperation are using non-wood raw materials in the pulp and paper production. This should justify to change the course accordingly.

The PPT course seems to be too theoretical in relation to the actual needs of developing countries. The problems in the running of the mills are as rule not of theoretical but practical nature. There is need for a more practical oriented course whereby the students can be exposed to industrial experience in a developed country.

The participants wish the course be extended for few months and given a status of Master degree. They have many good reasons for this proposal. A Master's degree is more prestigious than diploma level course. Salaries are higher and advancement possibilities are better for persons with degree than those who have diploma. However, there are other important aspects to be considered. For the country and the industry a diploma course is more beneficial than a Master's degree. It is cheaper to run, takes shorter time and one can train more people with the given resources.

For industrial training a diploma level course is more flexible and can easily be adopted to fit the training needs. A Master level course is more appropriate for academic purposes. A diploma course is adequate to meet present needs of the recipient countries.

8.2 Social Aspects

The course participants are coming from different parts of the world, and for most of them it is the first time they are being exposed to foreign culture. It is natural to expect that they will face certain problems, or at least make some strange experiences. However, there are no serious complains. The weather was mentioned by many participants not as complain but a kind of strange experience. The same was meeting with the Norwegians which they think are strange and shy and not specially polite.

The majority of students find their stay in Norway interesting and awarding. There is nothing that indicates that social conditions disturb or reduce benefits of the course. Most of the students take their study seriously and are busy occupied with course work. There is only little spare time left to enjoy social life. As one participant said: "I went there to study and not to socialize with the Norwegians". The contact between Norwegian and foreign students is normally informal but friendly. The participants did not feel problems of racism. The limited contact between the participants and Norwegians could be a result of the nature of the course. As all of the students at this course are foreigners there is a tendency to stick together. They know each other and have common professional interests which bind them together.

This phenomena is well known also among Norwegian students studying abroad. The other reason for participant's modest social involvement is that it cost much to be social. Norway is a high cost land. The scholarship they receive per month is more than their annual salary at home. It is tempting and rational to save the money by not going out.

8.3 Effects and Impacts

The effects and impacts of the course on the job performance are discussed on the basis of interviews. Participants feel that by attending the course they become better qualified for the job. The knowledge acquired gives them self confidence, and the prospects for job promotion increase after taking the course.

When the candidates return to their institutions they find conditions which in most cases are not conducive for them to utilize what they have learned. There may be lack of laboratory equipment or proper understanding on the side of top management for problems in the production that stops creative efforts. The other important obstacle is salary level. The salaries are low and insufficient to support the family. As some of employees stated: "We have a months contract, but we are only paid for one week. When I am working in the mill, I forget the production and think how to get enough food for my family". Such working conditions can hardly be called conducive to them to utilize what they have learned.

Employers in Sri Lanka and Tanzania are using PPT course, and other training offers abroad, as a part of a management development programme. Candidates selected

under this programme are those who have been assessed as having potential to fill positions as leaders and administrators. Few years after returning home the participants are usually promoted to higher administrative positions. That is positive, but the negative side of this is that promotion leads the participant away from the technical position he or she has been trained for.

When the candidates return home they are only occasionally used to conduct training for other employees. Such training if properly organized may be important for transfer of knowledge.

In Tanzania, when considering local and overseas courses, the guiding principle is that local courses will be given priority if the quality of both courses is assessed as being similar. Certainly the local courses or institutions will likely be more adopted to suit local requirements. However, the candidates prefer to study abroad, preferably in Western Europe or USA. The reason is that overseas study gives more prestige and better economical prospects.

The problem of international brain drain is not a serious issue for PPT course graduates. Out of 17 Tanzanians who were trained in Norway only one has left the country to work in Canada. In Sri Lanka none of the 10 participants has left the country. There is some competition between mills within the country. Some employees have left their companies to join other similar mills. The tendency is that mills located in isolated rural areas have more difficulties in retaining their trained personnel than those located in urban areas.

By studying abroad the participants improve not only their skills but also general knowledge about things they see in other countries. It is therefore likely that one impact of course participation is improvements of individual job performance but this is not possible to measure in increased production efficiency. The production efficiency is not only a question of knowledge, the total working environment is what counts.

The recipient institutions are willing to adapt new techniques and production routines presented at the course. But it does not mean that it often happens in practice. Introducing innovations in the processes requires investments which are not easily available in developing countries. Lack of investments may affect production quality more than lack of knowledge. It is well known that the quality of pulp and paper produced in developing countries is in most cases far below expectations.

What concerns the productivity in the pulp and paper industry, the statistics show clearly that in most cases less than 50 % of the production capacity is being utilized. Reason for that is most likely not lack of knowledge and technical skills, but rather poor management and lack of infra-structure, administrative set up, etc. The most critical educational problem seems to be not a transfer or level of specific technical knowledge but attitude. Working habits and attitudes are of special importance. To put it in the words of Southern Paper Mill director⁵: " We must get out of the habit of fighting fires and continuing to look elsewhere for problems and solutions. Without a

single day of more formal training, you have the ability to become good managers and make SPM successful."

There is need to build up "industrial" culture and sense of responsibility in all levels of production. There is no course that can solve this crucial problem. The type of education that is needed is so specific for each country, that it can only grow up in close connection and cooperation with the industry.

8.4 Modifications of the Current Course

- If the PPT course in Trondheim is to continue it should remain a diploma level course.

Desirable modifications of the course are:

- Give more attention to non-wood raw materials.
- Give the course a more practical profile by including few weeks of industrial training whereby the participants can take the responsibility to run a paper machine together with the Norwegian operators.
- Put more emphasis on water and air pollution problems.

8.5 Supporting other Corresponding Courses

There is no doubt that the course was useful in the initial stage of development of pulp and paper industry in developing countries. During its 23 years of existence the course has had 174 participants. The majority of these are now working in the industry and some mills have more than 10 employees that have been through the course. This is a very large number compared to our industry where there are only one or two chemical engineers in each mill⁶. On the other hand there is need for many other types of education, and these needs can not be solved by continuing the course in Norway. The education within pulp and paper industry has to be adopted to the local conditions. This can be best achieved by helping to establish appropriate courses in the countries of cooperation.

The NTH course was rated by the students and the management as the best they can get. So, if the alternative is to give scholarships to students from developing countries and send them to other countries in Europe or USA then answer is no. However, if the alternative is to support similar education in developing countries the answer is yes. The objectives of the course can be better met by supporting or initiating similar courses in NORAD's main partner countries.

Many universities in Canada, Europe and USA offer regular courses in pulp and paper technology and most of these are open to students from the third world. Also NTH runs regular courses in pulp and paper technology which can be made available to students from developing countries. There is an overcapacity at the universities in Europe and USA and universities are keen to obtain students from developing countries.

It is not known to us if the same type of diploma course as in Trondheim is offered at any other place. But there are certainly very similar type of courses offered at many universities.

The Netherlands and Sweden offer special short courses in pulp and paper technology aimed at students from developing countries.

In Sweden, the Swedish Agency for International Technical and Economic Co-operation, (BITS), is responsible for international training programmes. The courses are held mostly in the Educational and Training Centre of the Swedish Forest Industries in Markaryd. The training is organized in a number of technical and administrative fields, primarily in the form of short-term courses and seminars. The training programme is designed for those holding positions as mill manager, production manager, research and development engineer, laboratory chemist or process engineer in a paper mill.

In the Netherlands a Course on Industrialisation and Management is offered by the Netherlands International Institute for Management (RVB), Maastricht. The course lasts one year.

The training in Sweden and the Netherlands attracts many participants from developing countries. These courses are considered to be supplementary to NTH course. After finishing NTH course one can then apply for those courses.

As mentioned above, there are many alternatives to the course in Trondheim. Pulp and paper industry in developing countries have possibility of sending their employees for further education to many different universities and special training institutions.

However, most developing countries have their own technical schools and universities which are not fully utilized. They offer different technical subjects inclusive chemistry and engineering, which are basic for further study in the field of pulp and paper technology. Most of the participants at PPT – course have their basic education from national learning institutions and universities. Further development of local education in accordance with the needs of the local industry may be a far better alternative than continuing PPT course in Trondheim. In the long run it may also be cheaper and the objective of the course could be better achieved.

There are several training programmes available in Tanzania and Sri Lanka that are suitable for training of manpower for pulp and paper industry if further developed. The

potential institutions may be requested to prepare special courses to meet the needs of the industry. The institutions of interest are as follow:

- The National Institute of Productivity (NIP)
- Eastern and Southern African Management Institute (ESAMI)
- The Institute of Finance Management (IFM)
- The Institute of Development Administration (IDM)
- The Sokoine University of Agriculture (SUA), Morogoro
- The University of Dar es Salaam
- The Arusha School of Professional Accountancy
- The Forestry Training Institute, Olmotonyi

All these institutions have some potential to offer one or another type of training of interest for the pulp and paper industry. In Tanzania the industry is keen to utilise local institutions for training of their employees. Many of these institutions have already been asked to prepare special courses for training various categories of personnel for the pulp and paper industry⁷.

The institutions of special interest which have potential to develop a similar course as PPT in Trondheim are: University of Dar es Salaam (UDS), Faculty of Engineering, Department of Chemical and Process Engineering and Sokoine University (SUA), Faculty of Forestry, Department of Wood Technology and Utilization. UDS have plans to offer courses in pulp and paper technology, but because of economical reasons these have not been realized. SUA, Department of Wood Technology and Utilization give basic courses in wood technology and utilization including wood anatomy, fibre composition and structure and pulping and paper making principles. Together, these two institutions have a great potential to be developed to an educational centre of pulp and paper industry. They have physical facilities such as laboratories but they don't have trained personnel in this field. NORAD has been supporting both institutions for number of years. The Department of Chemical and Process Engineering is currently also receiving Swiss and German support.

Establishment of pulp and paper technology course in the Department will help to create a closer cooperation between the industry and the Department. It will also fulfil the main objectives of the PPT course and NORAD's policy.

(The Department of Chemical and Process Engineering has for long time had ready plans to introduce a Master's programme where pulp and paper technology course is supposed to be one of the options. However, for the time being the Department does not have a person who has specialized in pulp and paper technology. This is a very strange situation taken into consideration that NORAD has been supporting both the Department and the PPT course in Trondheim).

Starting of a course in Tanzania will require training of lecturers and in initial stage also teachers from Norway or other countries to run the course. Further, there will be need for laboratory equipment. Offices and laboratory space are available at the Department.

There is a great interest by the industry for the course in Tanzania. One is hoping to establish a coordinating unit which will run short courses at the University and on mill sites. The industry is willing to cover costs of such short courses and also local costs of any external lecturer that may be necessary for establishing such a unit.

The costs of establishment a diploma course and its running costs, have to be covered by foreign aid. For the course to be cost effective it will need at least 10 participants. Tanzania alone has a need for 2-3 student places. The other places can be offered to the students from other developing countries. The costs per students in Tanzania are very low comparing to Norway. Though the initial costs of establishing the course may be high, the future running cost will be low, much lower than corresponding costs per student for the present course in Trondheim.

In Sri Lanka the availability of local education is not as good as in Tanzania though the number of students attending institutions of higher education is relatively very high. Sri Lanka has 8 universities and approximately 40 000 students). For comparison, Tanzania has 2 universities and approximately 4 000 students.

Out of 8 universities in Sri Lanka, 6 have faculties of science and only one has faculty of engineering (University of Moratuwa). The university of Paradeniya is known for high standard of teaching in the field of industrial chemistry. This university is keen to develop new courses to cover the needs of the pulp and paper industry. The University already offers Master degree programme in chemistry. This programme is given on an individual basis. With a little additional money the Department could introduce a Master's programme whereby pulp and paper technology subjects will be one of the options. The course does not need to be the same as one in Trondheim. It can be adapted to local needs.

The other alternative for Sri Lanka and the other countries in the region, is to send their students to the Institute of Paper Technology (IPT), Saharanpur, India, for further education. NTH/NORAD and IPT have recently signed a cooperation agreement.

The regional institution which has potential for the PPT course is the Asian Institute of Technology (AIT) in Bangkok. Provided that the need exists for the course, the AIT should be able to commence the programme with the package of support offered for the purpose. This possibility has not been explored in depth.

Notes – Part III:

1. *P.C. Christensen, 1983: "Studiereise til Thailand, Bangladesh, India og Sri Lanka"*
2. *T. Helle, 1987: "Kursvirksomhet som utviklingsassistanse til tanzaniansk treforedlingsindustri"*
3. *Markaryd. Swedish Agency for International Technical and Economical Cooperation. BITS.*
4. *Kirke- og undervisningsdepartementet, Oral information*
5. *SPM, Staff Magazine – Today, October 1990*
6. *N.A. Soteland (PFI), 1990. Oral information*
7. *SPM, Management Development and General Training Programme*

- 1. Introduction to the study of the history of the world.
- 2. The world in the 15th century.
- 3. The world in the 16th century.
- 4. The world in the 17th century.
- 5. The world in the 18th century.
- 6. The world in the 19th century.
- 7. The world in the 20th century.
- 8. The world in the 21st century.

Part IV

Recommendations

Chapter 9: Recommendations

9.1 General

In the preceding chapters the two courses, Electric Power Distribution Systems (EPDS) and Pulp and Paper Technology (PPT), are discussed separately. The discussions to a high degree reflect that the two courses are quite different in many aspects. And not very surprisingly the conclusions and recommendations regarding the courses in some aspects turn out to be diverging.

One obvious difference is characterised by the product of the "processes" covered by the courses:

- PPT deals with pulp and paper production technology, and very closely related to the manufacturing process. This promotes links directly to the industry, i.e. to specific paper mills. Such industry can be found in many Third World countries.
- EPDS deals with a system composed of various elements, where the product is design of each specific system, and the selection of components to make up the system. The production of components only modestly take place in Third World countries.

A second difference is the number of potential "customers":

- A large part of paper mill employees from the cooperation countries have been through the course (see chapter 8.5), and one seems to approach a kind of "saturation" regarding participation in the PPT course.
- In the electric power distribution sector, on the other hand, there seems to be an almost unlimited need for training and specialising of younger engineers.

A third difference that can be pointed out is the role of the course in relation to the local situation at NTH:

- The group dealing with pulp and paper technology at NTH is relatively small; apart from the PPT participants only a few Norwegian students are attached to this activity. The PPT course is an integral part of this activity, and therefore seems to be a prerequisite for maintaining the activity at NTH.
- The EPDS course is run isolated from the ordinary activities of the respective department at NTH. And apart from the course assistant all staff is attached to the course as a part-time activity. The existence of the course therefore has no impact on the ordinary activity at the Electrotechnical Department.

The above statements imply that the two courses cannot be evaluated equally, a fact that is reflected in the recommendations below.

9.2 EPDS Recommendations

The general impression of the EPDS course is clear: The quality of the course is high, and its contents is relevant and well adopted for its target group. In order to further improve the course, the following is recommended:

- i. **The course should temporarily be maintained as conducted, with the modifications and supplements as proposed in chapter 6.2 and 6.3.**
- ii. **In order to comply with general Norwegian policy on assistance to education actions should be initiated to investigate if, how and when the course could be shifted to a Third World country. Such preparations should be included in the long term plans of the course.**
- iii. **A set of specified objectives as proposed in chapter 6.1 should be adopted and presented to all course staff as well as the course participants.**
- iv. **Following the proposed objectives the cooperation institutions should primarily be limited to the public electric power distribution sector. A close cooperation between the institutions and the course should be promoted.**
- v. **Equally the number of cooperation countries should be limited to approximately ten.**
- vi. **Active feed-back to previous fellowship holders should be encouraged, aiming at increasing the abilities and possibilities of practising the acquired knowledge (see chapter 6.3.1).**

9.3 PPT Recommendations

The findings regarding the PPT course can be summarised as follows:

- i. The PPT course has played an important role in providing specialists for the pulp and paper industry in developing countries during the last 23 years.**
- ii. The issues and the objectives of the PPT course are not fully in accordance with Norwegian development policy.**
- iii. The course has only partially fulfilled NORAD's development policy objectives.**
- iv. The issues and the objectives of the course are only partially in accordance with the needs or policies of the recipient countries.**
- v. The further existence of the PPT course in Trondheim does not seem to be justified.**
- vi. The objectives of the course can best be met by initiating and supporting similar education in recipient countries.**
- vii. It is time to consider alternatives to PPT course in order to cover the future needs for training of personnel in this field.**
- viii. The functions of the PPT course should as soon as possible be transferred to recipient countries.**
- ix. The Department of Chemical and Process Engineering, University of Dar es Salaam and the Department of Wood Technology and Utilization, Sokoine University have potential to take over the role of PPT course in Trondheim. The mentioned universities are keen to initiate such programme. A course in Tanzania can cover the needs of whole Africa.**
- x. The University of Pradeniya, Sri Lanka, has potential to develop Master's degree programme with options within pulp and paper technology. The other alternative for Sri Lanka and for other countries in the Asian region is to send the students to the Institute of Paper Technology, Saharanpur, India.**
- xi. It is recommended to investigate how and when the course could be transferred to a country of cooperation.**

9.4 Concluding Remarks

The above recommendations deal with each course separately. However, there is reason to point out some findings from the field works that in some way or another may affect all Diploma courses:

- i. All relevant recipient institutions do not receive the NORAD Fellowship Offers, and are hence excluded from applying for participation. More active local involvement from the NORAD Representations or corresponding institutions should be encouraged to ensure that the relevant target groups are reached.
- ii. Rigid organisations and administrations often are reported to be obstacles for an efficient implementation of knowledge acquired during the course. This also calls for active local involvement so that participation at the courses may be linked to general recognition and acceptance of ideas, methods and routines brought forward through the courses.
- iii. The local social conditions may also be a real obstacle for efficient implementation. In many cases one will find that due to low salaries previous course participants cannot "afford" to spend full time in their ordinary job. This of course prevents them from applying their knowledge satisfactorily.
- iv. Where applicable the participation of the courses also should be linked to ongoing projects. This is not always the case (e.g. the Zanzibar rural electrification programme, see chapter 5.1.3).

All the above statements call for more local involvement even if the courses are maintained in Norway. It is therefore strongly recommended that the courses to a higher degree become an integral part of NORAD's local activities.

Appendix A1

Terms of Reference

EVALUATION OF
THE ELECTRIC POWER DISTRIBUTION SYSTEMS COURSE (EPDS)
AND PULP AND PAPER TECHNOLOGY COURSE (PPT)
AT THE UNIVERSITY OF TRONDHEIM

1.0 Background

Since NORAD was established in 1963 it has supported a fellowship programme at NTH (as well as at other Norwegian Universities and institutions) for personnel from developing countries. More than one thousand graduate engineers and natural scientists and a few technicians have been at NTH as NORAD fellowship holders during these 26 years.

To begin with most of the fellowship holders were "individual fellows". Later it was decided to concentrate more on one year post-graduate diploma courses than on individually designed study and research programmes (with a notable exception for staff development programmes as part of more extensive cooperation projects). Several courses were then started.

The PPT course has been offered since 1968. During the last 22 years this course has had 166 participants. The annual intake is now 8. The large majority of the participants are (chemical) engineers or chemists from pulp and/or paper factories – usually publicly owned – or from applied research institutions.

The EPDS course started in 1976 and has had 180 participants. The annual intake is now 15. The majority of the participants are from public electric distribution companies.

A summary of NORAD's general guidelines and policies regarding assistance to higher education was presented to the NORAD Board of Directors 21.10.1987. According to the document the main objective is to assist in the building up of a broad and lasting competence in the main countries of cooperation. This objective implies that fellowships should be granted as part and parcel of a plan where the strengthening of educational institution, governmental and local administration, institutions and firms in the recipient countries is in focus. Further it is stated that it is the recipient country's need for education offers which has to be the point of departure for Norwegian assistance.

Diploma courses are offered in areas where Norway possess special competence or where Norway has, or is establishing, special competence regarding application of the subject taught

in particular in the main countries of cooperation.

Criteria for assessment of fellowships or fellowship programmes are indicated to be:

- * Assistance should primarily be directed to institutions rather than to persons.
- * The training should to the largest extent possible take place in the home countries of the candidates, in order, as a secondary effect, to assist educational institutions in these countries.
- * Education in Norway or other industrialized countries should be limited in time and extent, but is considered needed in the areas where the development countries have few or no offers.

In addition the policy paper states that the relevance and benefit of the education, as well as the pedagogical methods, are to be assessed. In general the traditional borderlines between subjects are to be torn down. Protection of environment and culture represent insights which should be considered more or less in all subjects. Finally, assistance to degree studies should be balanced against need for shorter courses. The decisive factor here is the needs of the institutions.

This means more emphasis on activities in the main countries of cooperation and a critical review of the diploma courses in Norway, with the aim partly to restructure them, partly make the offers more relevant for the situation in the developing countries.

According to the same document the objective to assist in institution building in the countries of cooperation implies a limitation of the number of courses offered in Norway. Courses for women, or courses which are able to include more women participants are given priority. It is advocated to develop more flexible

course models which to a larger extent can be adjusted to the needs of the main countries of cooperation.

The guidelines of the Education Division during the years 1987 to 1992 are proposed to include a restructuring of the diploma courses in Norway, partly by terminating courses which do not correspond to needs of the main countries of cooperation, partly to try out new courses for women. In some cases courses should be extended to include a Master's Degree while in other cases courses should be limited to a shorter period of time, for instance 3 months. The new guidelines are not stated in a formal document, but have been part of the process and discussed and shared among the parties involved since the review of the diploma courses in 1988. The guidelines will be made known to the recipient governments and relevant authorities.

2.0 Objectives

The purpose of the evaluation is to assess:

- * the educational/pedagogical framework of the courses,
- * how cost effective the present courses provide and satisfy the need for this type of trained manpower,
- * the effect of the training on individual job performance and institutional capability and effectiveness as well as the institutional follow up for the utilization of returning candidates,
- * the relevance of the courses for the candidates and their institutions, including their adaptation to the technical level and the special constraints and problems of the home countries of the participants.

3.0 Project description

3.1 Mode of Work

The evaluation will collect information from various sources using different methodological approaches. The methods include: Interviews with staff responsible for administering and conducting the course, relevant NORAD staff, participants at the 1989/90 and 1990/91 courses, employers of course participants in a sample of recipient institutions as well as personnel in policy positions and other resource people in these countries. Questionnaires or structured interviews to a sample of participants and their employers. Review of relevant documents (policy papers, reports, budgets etc). Assessment of course material and training methods.

Separate studies will be undertaken in selected recipient countries.

3.2 Tasks to be undertaken

The consultants shall:

- 1) Outline the policy framework within which the courses are set and the relevance and effectiveness of NORAD's policy guidelines and administrative followup
- 2) Provide information about the nature of the current courses, and the development of the courses since their inception.
- 3) Assess the extent to which the courses strengthen the knowledge of participants in their fields of work so as better to equip them for carrying out their duties. This should include an assessment of
 - the course curriculum,
 - the quality of the teaching materials (lecture notes, exercises etc.)
 - the training and experience of the teaching staff,

- the suitability of the teaching methods used.

4) Discuss the relevance of the course content for the recipient institutions and the impact of the training on the development of the respective fields.

5) Assess the social framework in which the training takes place

6) Assess the existing arrangements for administering and conducting the course with respect to

- academic/professional aspects, including institutional cooperation and procedures for recruitment and selection of candidates,
- timeliness and accuracy of budgets and accounts including the level of cost incurred, and the reporting procedures

7) Survey similar courses offered in other countries

8) On the basis of the foregoing:

- assess the overall quality and relevance of the course, which improvements should be considered and how they should be implemented. This assessment should include professional/academic as well as economical aspects,
- indicate possible alternatives for consideration of NORAD.

4.0 Implementation

4.1 Evaluation team

The evaluation will be undertaken by DECO, who establishes a team consisting of two experts with relevant experience from developing countries and pedagogical experience and one of the consultants who participated in the review of Diploma Courses in 1988 and expert(s) in one or two recipient countries to undertake case studies.

4.2 Work programme

The consultants shall:

Phase 1. (Finalized)

Prepare work plan and budget for the evaluation. Identify consultants. Visit Trondheim: Interview participants at the 1989/90-course, course leaders, NORAD/NTH-staff. Collect and study existing documents relating to the course, including teaching materials. Prepare questionnaires to former participants and employers. Prepare information from questionnaires issued to participants in PPT and EPD courses from 1986/87 to 1989/90. Draft Terms of Reference

Phase 2.

Conduct interviews in Oslo, with NORAD staff and lecturers. Issue questionnaires/letters to selected former participants and employers of former participants. Organize and analyze data. Select two countries for special investigation, prepare Terms of Reference for the investigations, find and employ local experts to undertake the work. Conduct detailed interviews with the teaching and administrative staff involved in the course. Interview participants at the 1990/91-course. Assess teaching practice (as time permits). Review the facilities provided for participants.

Phase 3.

Undertake field work in two countries recruiting participants to the courses. Interview personnel responsible for manpower training in fellows' institutions and previous course participants. Interview resource personnel in the Government responsible for manpower development and education, and

personnel from relevant technical ministries.
Interview NORAD personnel at Res. Rep. offices
Review and assess relevant documents

Phase 4.

On the basis of the foregoing, the consultants shall prepare an Interim Report for consideration by the Ministry of Foreign Affairs.

Phase 5.

After receiving comments from MoFA the consultants shall prepare a Final report.

4.3 Language

The report shall be presented in English.

Appendix A2

Country Report – Tanzania

An extract of a report prepared for the EDPS/PPT evaluation by Mr. Suleman Sumra, Associate Dean, Faculty of Education, University of Dar es Salaam.

A2.1 Importance of the two Sectors

The importance of the electric power sector in Tanzania cannot be overemphasized. The country has no large deposit of good quality coal and most of the fuel is imported. It is a fact that the country cannot develop industrially without developing its electric power resources. Given poor quality of coal found in the country and high costs of imported fuel, electric power will have to be hydro electric for some considerable time in future. The country simply does not have the resources to import large amounts of fuel. However, the national importance of the electric sector needs to be put in perspective. Only 3,5 per cent of Tanzania's population use electricity for domestic purposes, and almost all of these people live in urban areas. In rural areas most of the energy needs like for cooking is met by the use of charcoal and wood. Hydroelectric potential exists on several of Tanzania's rivers, and different sources have estimated that as much as 1315 to 3800 MW of hydro electricity might eventually be produced. Most of the country's electric power is generated, transmitted and distributed by the parastatal Tanzania Electric Supply Company (TANESCO), which has been completely government owned since 1964. Between 85 and 90 per cent of all power sold is distributed through the national grid system which extends westward and northwards from Dar es Salaam. This is the main industrial area in the country. This however limits expansion of industries in other areas outside the grid system. In areas where thermal electricity is provided, the supply is irregular given old worn out machines and irregular supply of fuel. But even the grid supply is irregular. Industrial sector has suffered considerable losses in production as a result of irregular power supplies in the country. Irregular supplies were mentioned as one of the reasons for Southern Paper Mill running at loss. Similar problems with supply were faced by Kibo Match factory and Kibo Paper Industries. There is no figure put on the losses suffered by the country as a result of power cuts but it will run into billions of shilling a year.

Rural electrification is of high concern in Tanzania. Under the programme the target was to supply power to small townships and villages subject to the availability of

resources. The need to supply electricity to the villages result from the fact that the majority of the population, over 90 per cent, live in rural areas. Even more important is the fact that rural development needs electricity to establish small scale industries and in agriculture. Rural electrification is also important from ecological point of view. Currently large amounts of forests are cut annually to meet fuel needs of the rural population. Policy guidelines made in 1970 stated that in trying to achieve rural electrification, social consideration should be given priority over economic considerations. The rise in oil prices in 1970's increased substantially the cost of rural electrification. This coupled with the downward trend in the economy have led to almost suspension of the project.

Paper industry in the country is a new industry. Until 1980 most of the paper needs of the country for educational, cultural and packaging was met through imports. The Southern Paper Mill project was one of the largest industrial project undertaken in the country. High hopes were placed on the establishment on the Southern Paper Mill. However since its inception the company has been at a loss. Kibo Paper Industries is also currently running a loss but has been making profit in the past. The only company that is on sound financial footing is the Kibo Match Factory. They have very innovative management. They are currently exporting sisal pulp to Japan. The future of the paper industry does not look very bright as the local demand is small and export markets are highly competitive.

A2.2 Main Problems of the Sectors

Pulp and paper sector

The differences in the way the public and private sector operate were clearly exemplified by the operation of Kibo March Factory on one hand and SPM and Kibo Paper Industries on the other. Kibo Match is a private firm managed very efficiently by COMCRAFT a management consultant group. They had a small efficient workforce. Although the machinery which they had was not as sophisticated as at SPM, some of it was obtained second hand from Norway, the production capacity was utilized more fully. This had clear implications for education. Low production in public companies may not be as a result of lack of technical skills but could be result of lack of management skills. Technical skills should go hand in hand with management skills. Participants in the courses should be given some courses in management. Kibo Match also had diverged in to other areas of operation like salt production showing enterprising nature of private enterprises. Bureaucratic procedures that go with public institutions hamper initiatives of the management. The general manager of Southern Paper Mills at Mgololo informed us that plans were being discussed to make the management of the company independent of government bureaucracy. This will give the management greater freedom in making decisions about the operation of the company. Lack of regular water supply was mentioned as the main problem for Kibo Paper Industries which is located in Dar es Salaam. The company was in the process of having their own supply by drilling bore holes. For Southern Paper Mill the main problem was irregular supply of electricity. For Kibo Match Factory the main problem

was high cost of electricity in the country. The cost of electricity per ton of paper produced was \$ 106.00 and the cost of fuel consumed per ton was \$90.00. Some of the problems may not respond to education and has more to do with national ideology and policies.

Another problem mentioned at SPM was the current technology of the machinery used. Most of these machines are based on complex electric circuits. As a result those who have had their training in mechanical engineering often failed to repair these machines due to lack of competence. It might be useful to give a more generalized training that included components of electrical engineering knowledge.

For electric power sector the problem is geographical. Where as most of the population is located on the edges of the country, leaving vast areas in the middle empty, the power generation (mostly hydro) is concentrated in the middle part of the country. Generators therefore supply very long transmission lines some of which are lightly loaded. System stability (both dynamic and transient) now appear to be an issue of concern. Frequent system outages, prolonged blackouts and unexpected plant failures are also very common. The solutions to these could be

- substantial investments in terms of network reinforcements with enough reserve units
- Scientific system planning and operation is also essential because even if funds and materials are available, one will still have to decide on where to install what, and at what capacity. The ability of making these decisions require continuing education for engineers. To date no systems studies have been carried out in the country, this is where training could play a big role.

Main problems mentioned by participants was the low salary levels. Salaries were enough to meet the needs for not more than a week. As a result many had to engage in other income generating activities. These activities included farming, keeping chicken, cattle etc. Without the income form these activities the families could not survive. The regular work for which they have been employed and trained suffers as a result. Individual companies like SPM and Kibo Paper Industries cannot raise the salaries of their workers as they fall under schemes followed by all government employees. Morals of the work force was found to be very low. Private companies are allowed to set their own salary structures. Most of the problems mentioned have no educational implications as they are related to national policies and the state of the economy. It seems that a course in management of institutions under socialist societies may provide some of the answers to the problem of low productivity in public institutions.

A common problem for both the companies was frequent break down of machinery. Often the break down was the result of lack of maintenance. The problem of lack of maintenance is a problem to most of the public enterprises. A course on machinery maintenance could be useful. The course should device to instil in the participants the need for regular maintenance of say transformers, switches etc. The sense of proper care for expensive machinery should be built through proper training.

A2.3 Existing Possibilities for Education Within the Sectors

EPDS

Although the course is not currently being taught in any university within the region, capacity exists at the University of Dar es salaam to mount such a course. Department of Electrical Engineering is considered to be one of the best staffed and equipped department in the field in the region. The department has well qualified personnel in the area of power distribution. Currently they have Prof. J. Stroney and Prof. H. Kadete who specialize in the field of high voltage power systems. Other members of the Department who are currently undergoing doctoral studies abroad are expected to return soon. As far as the manpower is concerned, the Department is well staffed to run the course. The Department was very enthusiastic for shifting the course from Norway to the Department.

Capacity

The Department of Engineering can mount a Master level course (or a diploma course leading to Masters) for between 10 to 15 students. It was considered uneconomical in terms of resources to run a course for a smaller number of candidates. As the demand on a yearly basis from within the country is not that high, the course will have to be regionally based. Possible regional basis could be SADCC or PTA groupings.

National Need

TANESCO currently requires 30 electric engineers, three fourth of them in power distribution. The annual requirements are five engineers. Most of the candidates selected for the course come from TANESCO. As the course is a postgraduate course the number of candidates that can be released by TANESCO cannot exceed two or three at the most per year. However if the course is made broad in its scope, to include power distribution within plants then the pool of candidates can be larger. Interest in the course was shown by the Training Manager of Southern Paper Mills at Mgololo.

PPT

The Department of Chemical and Process Engineering, Faculty of Engineering University of Dar es Salaam is keen to house the course on Pulp and Paper Technology. In fact such a recommendation was made in earlier years when a professor from Trondheim was making an evaluation of the course. Nothing on this has been heard from NORAD since then. The Department has excellent facilities which can form the basis of the transfer. NORAD has been a major donor for the Department to make it a centre of excellence in the region. NORAD has been supporting the Department for the last ten years and has agreed to support for further four years starting 1992. Five million kroner per year will be available for the support. Currently 90 per cent of the Department budget comes from NORAD support. The Department is currently also assisted by Swiss and German support. The programme officer in the NORAD office, Dar es salaam, Mr. Hetland, had a very high opinion of the Department and the personnel within it. Introduction of Pulp and Paper Technology

course in the Department will help create cooperation between the paper industry and the Department. In fact such a cooperation is the recommendation of the recent evaluation report carried out for NORAD¹. The Department is currently planning to introduce a Masters programme where Pulp and Paper Technology course will be one of the options. However, currently the Department does not have a person who has specialized in Pulp and Paper Technology.

Transfer of the course in the initial years will mean training of a member of the staff in Norway as well as getting a person from Norway or other country to run the course. There was a great deal of interest by the industry for the Department to establish a coordinating unit which will then run short courses on Pulp and Paper on mill site. The General Manager of Kibo Match Factory showed willingness to sponsor a Chair in Pulp and Paper in the Department. He was willing to meet the local costs of any external personnel that may be necessary for establishing such a unit. I think the establishment of such a unit will go a long way in establishing closer working relationship between the Department and the industry. Such short courses, say of three months, be run during University vacations. Participants in such courses will give the lecturer a closer look at the practical problems of the industry.

Capacity

For the course to be cost effective it will need between 10 to 15 students. With only three paper mills in the country it is unlikely that they can sponsor more than a candidate each every year. Therefore the course will have to be regional in its conception, with candidates coming from other countries.

Needs

As there are only three pulp and paper mills in the country, the need for pulp and paper engineers is limited. The training so far provided by NORAD has met the most critical demand. The need therefore does not exceed two from each factory, giving a total of six. Soon however the sector will be staffed with training engineers. Therefore the training needs will be to meet wastage replacement.

In terms of facilities and manpower these courses could easily be transferred to the University of Dar es Salaam and the courses will be taught in environment similar to those found in most third world countries, such courses will be relevant to the needs of the recipients. However, there are other issues that need to be considered. First, courses overseas provide unique opportunity for a person to "live" a different culture, to see different ways of doing work. This is an important aspect. The General Manager of Southern Paper Mills stated that the major problem for the workforce at his mill was the lack of working culture. In plain terms, there was no sense of responsibility on the part of the workforce. Of course, sense of responsibility is product of different factors, but an experience abroad gives an idea of how work is performed in industrialized countries. Experience outside also exposes a participant to new technology, and as west is going to be the leading producer of technology in the foreseeable future, studies abroad is one way of knowing about new developments in the field.

A solution may be to have the course taught in Tanzania with a short visit (two or three months) to Norway or other developed country. In the initial years there will be resistance to studying in the country as part of the reason for wanting to go abroad has to do with future economic security. Most Tanzanians who study abroad return with goods like pick-ups, deep freezers, photo copying machines which are used to making incomes outside the regular work. In current economic situation this income on the side is important for survival and does prevent, to a certain extent, local and international brain drain. On site training has been difficult to run. The Training Manager at SPM stated that attendance was a problem for local training courses unless material benefits were attached to these courses. Attendance in the courses was rewarded by giving two salary increments to participants.

One aspect which the course participants argued that cannot be replicated in any developing country was the quality of lectures for some of the optional courses. These lecturers were often drawn from related industries. For example, a person from a cable company will lecture in the course on cables. Certainly a person who has spent his life working on producing cables will be best suited to lecture on cables. As there are very few companies producing machinery in countries like Tanzania such skilled lecturers cannot be drawn upon. However there is a negative side to recruiting persons from industries. They can, consciously or unconsciously, act as sales agents for their companies. As students will be exposed to the products of the companies from which lecturers are drawn from, certainly in very positive light, the students on their return are likely to insist on procuring products from these companies. The practice of drawing lecturers from industries end up benefitting more the companies than the students.

These courses, if that is the policy of NORAD, should be shifted to a developing country as soon as convenient. Currently there are no universities in East and Southern Africa where these courses are taught, but capacity should be built up this area. The courses could be run in cooperation with Trondheim in initial years.

Notes – Appendix A2:

1. *Jon Sigurdson and Regis Cabral, Research Policy Institute, University of Lund and Venance Fupi, Chief Government Chemist, Ministry of Health Tanzania): "A Second Review of NORAD Support for the Department of Chemistry and the Department of Chemical Engineering at the University of Dar es salaam, Tanzania." NORAD.*

Appendix A3

Country Report – Sri Lanka

An extract of a report prepared for the EDPS/PPT evaluation by Mrs. Mallika R. Samaranayake, Joint Co-ordinator, INTERCOOPERATION, Colombo, Sri Lanka.

A3.1 National Policy and Importance of the two Sectors in the National Economy

Present policy

Sri Lanka is presently following a policy of privatisation of industry. The National Paper Corporation is being offered to foreign investors. In the energy sector, the Colombo Gas and Water Company has already been privatized resulting in its major share sold to a Norwegian company. A private company has already been formed to handle electric power distribution although the shares are yet held by the state. It is only a matter of time before the shares of the Lanka Electric Company Pvt. Ltd. are sold to local and foreign investors. The Ceylon Electricity Board will eventually be privatized. However, due to the heavy investments on power generation and distribution systems financed from international borrowing, it may delay the privatisation due to production difficulties.

Role of the two Sectors in the National Economy

Pulp and Paper

The annual consumption of paper in Sri Lanka is approximately 95.000 tons. The National Paper Corporation production has been as follows:

1986	-	26.533 tons
1987	-	27.041 tons
1988	-	24.993 tons
1989	-	18.058 tons

The installed capacity in the two mills is 37.500 metric tons per annum. Due to dependence on imported pulp, waste paper and chemicals the average feasible production would be around 26.000 tons or approximately between 20.25% of the

annual consumption. From a point of view of per capita consumption, 95.000 metric tons is a very low rate. However, due to the constraints there does not appear to be any prospect for appreciable expansion of the mills or increase in domestic production unless privatised industry makes the investments.

It is also noted that the protection afforded to the NPC in the form of high tariff of 50% on imported paper is a bone of contention. Despite the Government subscribing to a market economy, protection in the above form has been afforded to the National Paper Corporation. It is feared that a rational reduction in the tariff could force the NPC to bankruptcy.

Electricity – power generation and distribution

Power generation continues to be a state owned venture. Due to the very heavy investment required and the long gestation period, power generation in Sri Lanka would not be attractive to the private sector. Hydro-power generation systems have been developed as multi-purpose projects with a component of irrigation, land development and agriculture. This also is a reason why power generation will continue to be a state venture.

The major power distribution network, too, is a high investment activity offering relatively little attractions to the private sector. Furthermore major distribution systems as component element of power generation systems are on a whole founded by international borrowing made by the Government of Sri Lanka.

Power distribution in given localities has been handed over to the Lanka Electrical Company. At present 100% of the shares are owned by state organisations. Eventually these shares are expected to be sold to local and foreign investors in the share market. But LECO will necessarily have to continue to be dependant on the CEB as it is now. Electric power distribution continues to be an important activity in view of the Government's priority infrastructure development in the rural areas and the ambitious Rural Electrification Programme, which are actively supported by international lending institutions and donor countries.

A3.2 The Main Problems of the Sectors and the Role of Education in this Context

Problems of investment capital, inadequate sources of raw material and competition from products from abroad have been main problems faced by the paper and pulp industry. These factors have resulted in retarding or the growth of the industry and confined the operations of the National Paper Corporation to two mills.

The original expectations of utilizing paddy straw for pulp have resulted in failure due to the inability to overcome the problem of black liqueur, an affluent which had defined

attempts at recovery, and has created an enormous problem of environmental pollution. As a result the two mills are now compelled to operate on imported pulp, local wood pulp in small quantities and waste paper, major quantity of which is also imported.

As such, to the problems faced in this sector, education as such has not been a problem. In the sphere of electricity where both power generation and distribution are concerned, major problem areas have been investment capital. The industry has been able to attract and retain engineering and technical cadres offering them comparatively attractive packages of remuneration and benefits. As a result the universities have been failing to attract or retain adequate numbers of qualified graduates in their staff. Accordingly education has not been a constraint to the growth of the electricity industry.

A3.3 National Needs for Education of Electric Power Engineers and Pulp and Paper Engineers

The Peradeniya University educates an average of about 40 Electric Engineers per year, all of whom are being absorbed by industry and academic institutions. The Moratuwa University produces about 80 Electrical Engineers annually. As far as the national needs are concerned, the numbers are adequate, although due to effects of "brain drain", the industry faces shortages at varying times.

The impact of "brain drain" in the field of Pulp & Paper technology is virtually non-existent. It is demonstrated by the fact that out of all the PPT post-graduate fellows who qualified in Trondheim, the NPC has lost only two persons out of a total of ten. The national need for pulp & paper engineers is adequately met with an average of two engineers being provided with the fellowships.

A3.4 Education

Sri Lanka has a system of state schools spread throughout the island imparting general education from primary to collegiate levels, and subscribes to a policy of universal free education. As a result, education is one of the major social investments of the country, resulting in a literacy rate of 86,5%.

Higher education is provided for through seven full fledged universities. One university college, one university campus, one open university and seven institutes, three of which are part graduate institutes. They have nearly 20.000 internal students and more than 10 faculties conferring 10 different degrees. The permanent academic staff is nearly 2000 in number.

The open university of Sri Lanka established in mid 1980 is an academically autonomous institutions. Its courses are designed to enable persons of over 18 years

of age to pursue studies leading to a basic or post-graduate degree or diploma certificate, or other awards in a range of disciplines.

There are twenty technical institutes and colleges providing technical education. In addition there are middle level technical/vocational courses conducted by Ministries of Labour, Youth Affairs etc. The National Apprentice Board has a scheme of training of Apprentices through the active participation of over 200 industrial establishments. Besides these, various ministries/departments and public corporations have their own in-house training establishments providing in-service training to their employers, provided at their own technical training centres e.g. Technical Training Centre of the Ceylon Electricity Board.

A3.5 Existing Possibilities for Education within EPDS in Sri Lanka and the Region

The primary beneficiaries of the EPDS in Sri Lanka are the Ceylon Electricity Board and Lanka Electricity Company both of which are state owned. In the past the Ceylon Petroleum Corporation owned Refinery Project and the Ceylon Ceramic Corporation had made use of the EPDS course. The relevance of the EPDS course to these two organisations is questionable. The EPDS being a specific branch of specialization provides limited job opportunities to graduates in the field. Therefore it is fitting that it remains a postgraduate study as a component of in-service study programme for engineers already engaged in EPDS work.

The discussions with officials of the CEB and LECO and the Ministry of Power and Energy revealed that the numbers of engineers who could be released for the EPDS course in any given year should not exceed two or three. Therefore conducting an EPDS course in Sri Lanka may not be relevant. In any case the capacities of the two universities conducting Course in Electrical Engineering being as they are, no possibilities exist in Sri Lanka for post-graduate education in this field.

The only known institution in the region which possesses the capacity is the Asian Institute of Technology, Bangkok, with its infrastructure, professional staff, funding and organisational capacity to undertake such programme.

The only other alternative is for either Peradeniya University or the Moratuwa University to establish a post-graduate institute on the lines of the already established Post-Graduate Institute of Agriculture at Peradeniya or the Post-Graduate Institute of Medicine in the Colombo University. But it would entail heavy investment on infrastructure facilities and recruitment of qualified academic staff and sustained funding sources in order to cater to Sri Lanka needs as well as needs of the region.

A3.6 Existing Possibilities for Education within PPT in Sri Lanka and the Region

The only Sri Lankan beneficiary of the PPT course is the National Paper Corporation (NPC) with two mills, one at Valachchenal in the East and the other at Embilipitiya in the South. The first, established in mid 1950's is now primarily engaged in recycling waster paper. Embilipitiya Mill uses wood pulp both imported and local timber. Its use of straw is limited due to the problem of black liqueur disposal/removal. The PPT course has therefore been relevant for engineers working at the Embilipitiya Mill.

According to the officials of the NPC, graduates in Chemistry in the employ of the Corporation are provided with the opportunity to follow the PPT course as inservice training after a period of on the job training in the mill. The numbers who could be released in any given year cannot exceed two or at most three persons. The average intake of Chemistry graduates to the corporation does not exceed two or three in a given year. Therefore it has not been found worth while for the universities to conduct specialized courses in Paper and Pulp Technology, nor has it been of such priority. The regional institution which has potential for the PPT course is the Asian Institute of Technology (AIT), Bangkok. Provided a demand exists for the course in other countries in the region, the AIT should be able to commence the programme with a package of support offered for the purpose. However the feasibility has to be studied in depth.

A3.7 Capacity of the Education Institutions within EPDS and PPT fields of Study

The universities of Peradeniya and Moratuwa which conduct Bachelor degree courses and MSC courses in Electric Engineering and Chemistry are conducting them with difficulty due to financial, personnel (academic staff) and infrastructure constraints. Therefore, the institutions are not capable of undertaking post-graduate courses in EPDS and PPT.

University Education in Sri Lanka is heavily academically biassed. Even specialization courses cover academic subjects areas. This is the result of the low capacity of the economy and industry to absorb graduates with job-oriented specialization. The attempts made by the universities of Colombo and Jayewardenepura to conduct job oriented degree courses have not been as successful as envisaged. Potentially interested students may find it risky to follow a job oriented narrow specialized degree course due to limitation for the specific discipline in the job market. A holder of general degree or a degree with subject specialization has greater employment potential and is preferred by the employer. The employer prefer to compensate lack of technical specialization with "on the job training" initially followed by in-service training at different stages in the career of an employee.

The universities themselves are faced with constraints in expanding their operations into job oriented specialization courses on account of limitations of funds, infrastructure constraints and inadequacy of staff.

The Department of Electrical Engineering at the Peradeniya University operates with only 12% of the staff and is hardput to it providing adequate instructional services to around fifty graduates who follow the Bachelors Degree Course in Electrical Engineering.

The Moratuwa University in the suburbs of Colombo is not better placed. The Department of Electrical Engineering has only the top rung and the lowest rung of academic staff – namely professors at one end and assistant lecturers freshly recruited at the other end. The middle rung have left for better pastures.

The staffing problem appears to arise from a number of factors, namely the relatively low remuneration, marginal research opportunities and more lucrative employment opportunities available locally as well as abroad. The annual allocation of funds by the state to the universities have over the years remained static or declining. With the purchasing power getting reduced due to the fall in value of the Rupee and the escalation of prices universities have been compelled to cut down on their purchases of books and journals as well as equipment for the laboratories. The capacity of universities to venture out into new fields is affected by these factors.

A3.8 National Policy of Sri Lanka regarding Higher Education and Adult Education

Sri Lanka places a high priority on higher education and adult education. It is demonstrated by the fact that higher education is provided free to all citizens. Provision has been made for adult education programmes ranging from literacy classes to technical education programmes and bachelors/master degrees through the Open University.

The administrative reforms commission which submitted its report in early 1990, emphasizes the importance of training and higher education, for the various categories of state sector employees. This report has been accepted by the Government totally and it forms part of Government policy. In-service training and education, locally and overseas is considered an important aspect of personnel development of public servants and corporation employees.

Appendix A4

Course Costs

What are the actual costs of running the fellowship courses, or of one fellowship month in Norway? Answers to these questions are crucial in order to enable relevant comparisons with alternative existing course offers as well as the option to develop new training models.

The following calculations necessarily will be rough estimates as there are no simple way to derive to precise answers. However, sources of information are given and the basis for calculations indicated.

COSTS

	PPT	EPDS
I. THE COURSES "PURE" 1989 (1)		
This includes: Salaries to course administrators, fees for visiting teachers, tests, individual guidance, examination, laboratory assistance, travels and per diem for visiting lecturers, excursions, training material, running costs etc.	860.743	1.281.827
II. FOLLOW-UP AND RESEARCH/DEVELOPMENT 1989 (2)	65.172	126.272
III. GENERAL COSTS 1989 (3)		
Includes salary to NORAD/NTH-Office in Trondheim, office, running costs, Social Secretaries, social activities, Introduction Course etc	197.996	389.471
IV. FELLOWSHIPS, TRAVELS ETC. (4)		
Includes fellowships, travel, luggage, insurance etc.	685.052	1.327.287
V. NORAD - OSLO		
Salaries, employer's fees (5)	55.842	108.195
Offices, cleaning, guards etc (6)	9.314	18.040
Running costs, telecommunication + part of the general		
NORAD-administration, (7)	27.149	52.602
Information work (8)	2.220	4.299
Winter Seminar subsidy (8)	16.583	32.130
VI. NORAD REPRESENTATIONS		
Salaries, house rent, and overhead costs at the representations (9)	176.000	341.912
TOTAL I - V1	2.096.071	3.682.035
Costs for one course participant	262.009	237.551
Costs for one study month (10)	29.112	26.395

(1) Source: Accounts from NORAD/NTH

(2) Source: Accounts from NORAD/NTH, calculated on the basis of totally 71,5 fellows divided by 8 in PPT and 15,5 in EPDS

(3) Source: Accounts from NORAD/NTH, calculated on the basis of totally 71,5 fellows divided by 8 in PPT and 15,5 in EPDS. Some of the expenses for "general costs" relates to individual fellows not attending the courses. Thus this figure should be reduced.

(4) In 1989 NORAD/NTH–Office in Trondheim paid the travel costs. The practise has however, changed from year to year. Previously NORAD was in charge of travel costs, later the NORAD representations took over. In 1989 NORAD/NTH paid, while for 1990 costs are divided between representations and NORAD/NTH.

(5) The figures are from 1987, but are not expected to have changed much from 1987 to 1989 (there were salaries increase stop in the period). The figures derive from a total of salaries to NORAD/Oslo employees in 1987 of NOK 84.9. mill, 314 employees. i.e. NOK 270.000 per person. Employer's fee added gives NOK 316.440. In 1989 the Education Division had about 7 employees and according to the Division one can calculate approximately 3 man year for work with all fellowship courses. This gives a total of NOK 949.320. Assuming there were 136 course fellows in total, and that the work load for each was about the same, the costs for PPT and EPDS has been calculated.

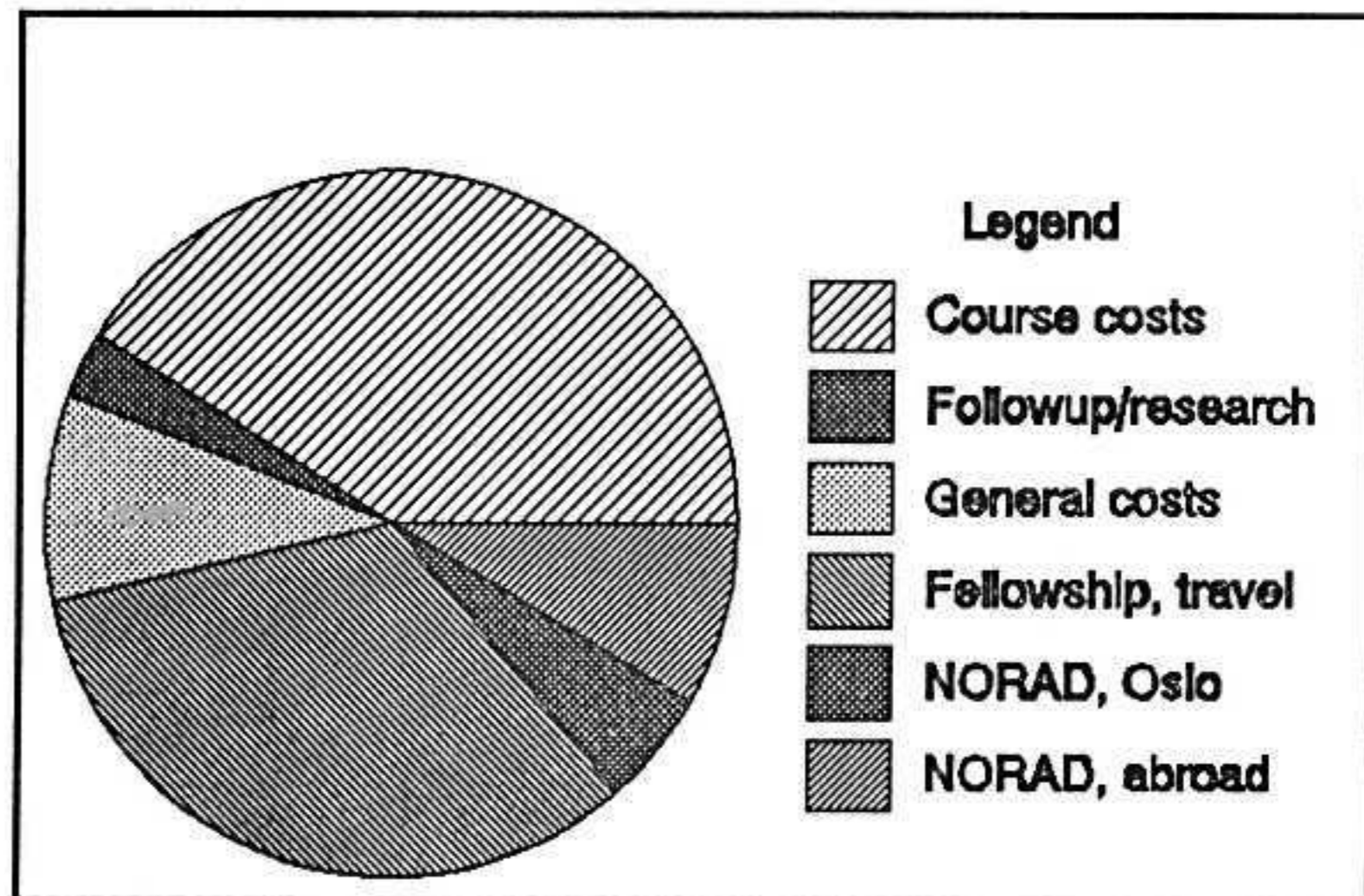
(6) In 1987: NOK 16.574.000 for NORAD. Multiplied by 3/314 and 8/136 for PPT and 15,5/136 for EPDS (see (5))

(7) The calculation is based on estimates made in the evaluation of the Volunteer Service. (Year: 1987) For 13 employees in the Volunteer Division the costs were found to be approximately NOK 2.000.000. This figure is then multiplied with 3/13 and then with 8/136 and 15,5/136 respectively for the two courses.

(8) Information from Education Division, NORAD, 17.10.1990

(9) Calculated low on the same bases as the Evaluation of the Volunteer Service (VS) for 1987. No NORAD employee at the representations deal with Education/fellowship only, and the fellowship courses represent a relatively small part of total work load, it is assumed. In the VS–evaluation the amount totalled very approximately NOK 10 mill for 10 NORAD–employees. If calculating with 10 man years, and that all fellowship courses in Norway represent 30% of the work load, the same procedure as above is applied.

(10) The course lasts from 1 September to 15 June. Subtracting for Christmas and Easter vacations the effective course period is about 9 months.



Costs for the PPT Course



100%
 80%
 60%
 40%
 20%
 0%

The following table shows the distribution of the total amount of \$100,000,000.00. The total amount is divided into five categories: Total, Other, General, Special, and Miscellaneous. The percentages are as follows: Total (100%), Other (80%), General (60%), Special (40%), and Miscellaneous (20%).

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Appendix A5

Questionnaires

A5.1 Questionnaire for previous Fellowship Holders

**EVALUATION OF THE PULP AND PAPER TECHNOLOGY COURSE
QUESTIONNAIRE FOR PREVIOUS FELLOWSHIP HOLDERS**

The Norwegian Ministry of Foreign Affairs has decided to evaluate two fellowship courses financed by NORAD and organized in Norway; the Pulp and Paper Technology Course and the Electric Power Distribution and Development Course.

As a part of the evaluation previous fellowship holders and their employers will be requested to be so kind and fill in questionnaires. The consultants responsible for the evaluation on behalf of the Ministry of Foreign Affairs guarantee that information contained in the questionnaires will be used by the evaluation only and solely for administrative purposes. Only summary information will be made available in the evaluation reports.

The respondents should feel free to give critical comments. If you prefer to be anonymous, leave name and personal information blank. PLEASE USE CAPITAL LETTERS.

THANK YOU VERY MUCH FOR YOUR COOPERATION.

1. Family name: First name:		2. Sex: Female/ Male	
		3. Year of birth: 19__	
4. Year of attending the PPT Course, (please indicate):			
1 - 1968/69	5 - 1972/73	9 - 1976/77	13 - 1980/81
2 - 1969/70	6 - 1973/74	10 - 1977/78	14 - 1981/82
3 - 1970/71	7 - 1974/75	11 - 1978/79	15 - 1982/83
4 - 1971/72	8 - 1975/76	12 - 1979/80	16 - 1983/84
		17 - 1984/85	21 - 1988/89
		18 - 1985/86	22 - 1989/90
5. Present employer's name:			
6. Present employer's address:			
7. Present employer category:		8. Please specify the main duties in your present job:	
1 - Governmental			
2 - Parastatal			
3 - Private			
4 - Other, specify:			
9. Employer at the time of attending the course.			
1 - As above (go to question 13)			
2 - Other, name:			
10. Category of employer at the time of attending the course:		11. Please specify the main duties in your job at the time of attending the course:	
1 - Governmental			
2 - Parastatal			
3 - Private			
4 - Other, specify:			
12. Please mention the main reason for changing employer:			

13. Your highest education at the time of attending the course:
 1 - Less than B.Sc.
 2 - B.Sc., subject:
 3 - M.Sc., subject:
 4 - Other, specify:

14. Additional education after having attended the course:
 1 - No
 2 - Yes, other fellowships
 3 - Yes, other, specify:

15. What are your plans for the future regarding further education?

16. The diploma offered in the course is not directly related to, or comparable with, international academic degrees or standards. What is your opinion about this?

17. What were the main reasons for your institution to select you to apply for the scholarship and participate in the course?

18. In general terms, when you consider what was taught in the Course, to what extent has it been of relevance for your later work?

Cannot answer	No at all	Very limited	Some	Rather much	Very much
0	1	2	3	4	5

Your comments:

19. Do you think that your employer gave you enough opportunity to utilize what you learned in the course?

Cannot answer	Not at all	Very limited	Some	Rather much	Very much
0	1	2	3	4	5

Comments:

20. Have you had opportunity to teach other employees about what you learned?

Cannot answer	Not at all	Very limited	Some	Rather much	Very much
0	1	2	3	4	5

Comments:

21. In general terms, when you consider your career, how would you say your participation at the PPT Course has affected your advancements/ salary levels etc.?

Cannot answer	Negative effect	No effect	Little effect	Some pos. effect	High pos. effect
0	1	2	3	4	5

Your comments:

22. To what extent did you come in contact with a professional milieu in Norway that has been of value for your work?

Cannot answer	Not at all	Very limited	Some	Rather much	Very much
0	1	2	3	4	5

Comments:

23. The techniques you learned in the course, have they proved to be useful in your work?

Cannot answer	Not at all	Very limited	Some	Rather much	Most useful
0	1	2	3	4	5

Comments:

24. Please specify any improvement/changes in your institution that you would say are results of your advices, based on what you learned in the course:

25. Have you recommended the PPT Course to anybody else?

No answer	Not at all	Very seldom	Often
0	1	2	3
		4	5

26. Do you know of anybody else from your country that has participated in the course?
 1 No
 2 Yes, in my present work institution, number: _____
 3 Yes, in other institutions, number: _____

27. Do you know of any other similar courses elsewhere?
 Please specify the countries (and training institutions if you know):

28. If the necessary support (such as provision of staff and equipment) were provided by NORAD, would the benefit of the course be better if it were arranged in your home country, or another country in the third world? (Please select only one alternative:)

1 better in Norway
 2 better in my home country
 3 better in another Third World country
 4 not sure

Cannot answer	Very dissatisfied	Highly satisfied
0	1 2 3	4 5

Your comments:

29. In general terms, when you evaluate your stay in Norway, were you satisfied or dissatisfied? (Please indicate:)

No answer	No	Perhaps	Yes
0	1 2	3 4	5

Your comments:

30. Would you have accepted the fellowship if you knew more about it beforehand?

No answer	No	Perhaps	Yes
0	1 2	3 4	5

Your comments:

Please indicate your degree of satisfaction in the following aspects. We also ask for your comments

31. Norwegian society

No answer	Very bad	Bad	Medium	Good	Very good
0	1	2	3	4	5

Your comments:

32. Accommodation:

No answer	Very bad	Bad	Medium	Good	Very good
0	1	2	3	4	5

Your comments:

33. Some NORAD fellowship holders have reported that they find the stay in Norway difficult due to social, climatic or other reasons that are not under control of the course management itself. In some instances such problems have negatively affected the study work. We ask you to select the formulation you feel is closest to your own opinion, among the following alternatives: (Please tick only one)

1 - Such problems do affect NORAD fellowship holders to a relatively high degree in the sense that their study efficiency is much reduced.
 2 - Such problems do affect NORAD fellowship holders to some degree and their study efficiency is somewhat reduced
 3 - Such problems do affect NORAD fellowship holders to some degree, but has no impact on study efficiency
 4 - Such problems are very rarely found and can not be said to have a significant negative influence on study performance

Your comments:

PLEASE INDICATE YOUR SATISFACTION AND DISSATISFACTION CONCERNING THE FOLLOWING ASPECTS OF THE COURSE

	Cannot answer	Poor	Satisfactory	Very good
34. Variety and range of programme offered	0	1 2	3 4	5
35. Quality of course in your field of specialization in terms of theory	0	1 2	3 4	5
36. Quality of course in your field of specialization in terms of practical application	0	1 2	3 4	5
37. Course content in general as seen in relation to your work	0	1 2	3 4	5
38. Availability of teaching staff for help and consultation	0	1 2	3 4	5
39. Contact with the leaders of the course	0	1 2	3 4	5
40. Access to comprehensive study material for self study	0	1 2	3 4	5
41. Training methods	0	1 2	3 4	5
42. Language used in training	0	1 2	3 4	5

A5.2 Questionnaire for Employers

EVALUATION OF THE PULP AND PAPER TECHNOLOGY COURSE

QUESTIONNAIRE FOR EMPLOYERS

The Norwegian Ministry of Foreign Affairs has decided to evaluate two fellowship courses financed by NORAD and organized in Norway: the Pulp and Paper Technology Course (PPT) and the Electric Power Distribution and Development Course (EPDS).

As a part of the evaluation previous fellowship holders and their employers will be requested to be so kind and fill in questionnaires. The consultants responsible for the evaluation on behalf of the Ministry of Foreign Affairs guarantees that information contained in the questionnaires will be used by the evaluation only and solely for administrative purposes. Only summary information will be made available in the evaluation reports.

The respondents should feel free to give critical comments.
PLEASE USE CAPITAL LETTERS.
THANK YOU VERY MUCH FOR YOUR COOPERATION.

(NOTE: The term "institution" in the questionnaire refers to the factory, plant, office or other organization in which the fellowship holders worked at the time of receiving the NORAD fellowship.)

1. Name of institution:	
2. Address:	
3. Country	4. Year of establishment:
5. Institution category:	
1 - Governmental	
2 - Parastatal	
3 - Private	
4 - Other, specify:	
7. Number of employees in institution, in total:	
8. - of which with higher education:	
9. - of which with B.Sc. or higher education in chemistry or chemical engineering:	
10. The admission requirements for the PPT Course are stated as "...the candidates should have a B.Sc. in chemistry or chemical engineering and some experience from pulp or paper industry. The course is intended for young plant operating engineers in pulp and paper mills (not conversion plants) and not for senior personnel or academic staff. Candidates from pulp and paper research and development organizations may also be admitted". In addition working knowledge of English is essential, and age preferably 25-33 years. How many employees in your institution would you say fill these requirements?	

1

11. Have employers from your institution received fellowships for graduate or postgraduate studies from other sources?

___ No
___ Yes, please give name of source:

12. Are there to your knowledge any other post graduate courses providing training within the same subjects as are taught at PPT?

___ No
___ Yes, please give name and country:

13. Please give the following information about previous fellowship holders to the PPT course coming from your institution:

Family name	First name	Year of course attendance	Position before course participation	Position at present

14. How many previous PPD course participants have left your institution?

15. If positive answer to the previous question, what were the main reason for leaving the institution?

16. Please state the main criteria applied by the institution for nominating candidates for fellowship abroad

17. From where do you get information about the NORAD fellowship and the course.

___ From Central Government/Ministry: name: _____
___ From NORAD Representative in your country _____
___ From NORAD in Norway _____
___ From the course organizers/NTH/Trondheim _____
___ Other, specify: _____

2

NCRAD has produced some information booklets about the Fellowship offers. Please indicate below whether your institution has received the information, and give your assessment of the contents:

Title of booklet	Please indicate regularity of reception	Please assess content
NORAD Fellowship Offers	18 ___ Has not received ___ Received some years only ___ Received relatively regularly ___ Received regularly ___ Do not know	19 ___ Insufficient, need improvement ___ So and so ___ Sufficient ___ Do not know
Practical Guide and Regulations for NORAD Fellows	20 ___ Has not received ___ Received some years only ___ Received relatively regularly ___ Received regularly ___ Do not know	21 ___ Insufficient, need improvement ___ So and so ___ Sufficient ___ Do not know

22. Please give any additional comments about the information provided

23. Do the nominated candidates receive the above pamphlets and information?
 ___ Yes
 ___ No, why not _____

24. Please briefly mention the main training/manpower development needs of your institution:

We want you to indicate below the degree of relevance of the course for your institution regarding the following:

	Cannot answer	Not at all	Very limited	Some extent	Rather much	Large extent
25. - technology level	0	1	2	3	4	5
26. - appropriateness in relation to the day-to-day problems	0	1	2	3	4	5
27. - the resource base	0	1	2	3	4	5

Your comments:

28. Is there at present a need for the course in your institution?

Cannot answer	No at all	Very limited	Some extent	Rather much	Large extent
0	1	2	3	4	5

Your comments:

We want very much to have your opinion about impacts on the institution as a result of course participation. Please fill in your assessment for each of the criteria mentioned below. To what extent have previous course participants:

	Cannot answer	Not at all	Very limited	Some extent	Rather much	Large extent
29. - contributed with proposals and initiatives in general	0	1	2	3	4	5
30. - contributed in order to improve effectiveness of the production	0	1	2	3	4	5
31. - contributed to improve administrative routines	0	1	2	3	4	5
32. - contributed to introduce new technology	0	1	2	3	4	5
33. - been utilized to teach other employers	0	1	2	3	4	5
34. - contributed with proposals and initiatives in the field of environmental protection and control of pollution	0	1	2	3	4	5

Your comments:

35. Please mention any negative impact of previous course participants in your institution:

36. Considering competence building/manpower development for middle/high level technical personnel, please describe the main problem(s) as you see it within Pulp and Paper Production in your institution.

37. If relevant, please assess the role of NORAD's fellowship offers and courses in the context of the above stated problem(s).

38. Considering the career of previous NORAD fellows, have their participation in the course affected their advancements/salary levels etc.?

Cannot answer	Insignificant	Very limited	To some extent	Rather much	Large extent
0	1	2	3	4	5

39. Has there, as a consequence of employees participation in the PPT course, been developed institutional cooperation/links between your institution and institutions in Norway?

Cannot answer	Insignificant	Very limited	To some extent	Rather much	Large extent
0	1	2	3	4	5

40. If answering 3, 4 or 5 to the question above, please describe briefly the institutional cooperation/links (with whom?, what purpose? and what result?)

The PPT Course has over the years covered a number of topics, some of them are listed below. Please indicate, for each topic, the rate of relevance for your institution

	Cannot answer	Not relevant	Medium	Highly relevant
41. Fiber raw materials	0	1	2	3
42. Fiber and pulping chemistry	0	1	2	3
43. Pulping technology	0	1	2	3
44. Bleaching technology	0	1	2	3
45. Washing and screening	0	1	2	3
46. Paper additives	0	1	2	3
47. Paper technology	0	1	2	3
48. Paper machine technology	0	1	2	3
50. Finishing and upgrading paper	0	1	2	3
51. Environmental problems	0	1	2	3

52. According to the training needs of your institution, are there any of the above topics that you find could have been left out?

53. Are there any other topics that would have been more relevant to your institution?

54. Laboratory work and individual research projects including production of paper on the experimental paper machine has been a major part of the course. Please rate the relevance of this work in relation to the work of your institution.

Cannot answer	Not relevant	Medium	Highly relevant
0	1	2	3

55. Some NORAD Fellowship Holders have reported that they find the stay in Norway difficult due to social, climatic or other reasons that are not under control of the course management itself. In some instances such problems have negatively affected the study work. We ask you to select the formulation you feel is closest to your own opinion, among the following alternatives: (Please tick only one)

- Such problems do affect NORAD fellowship holders to a relatively high degree in the sense that their study efficiency is much reduced.
- Such problems do affect NORAD fellowship holders to some degree and their study efficiency is somewhat reduced
- Such problems do affect NORAD fellowship holders to some degree, but has no impact on study efficiency
- Such problems are very rarely found and can not be said to have a significant negative influence on study performance

Your comments:

56. If the necessary support (such as provision of staff and equipment) were provided by NORAD, would the benefit of the course be better if it were arranged in your home country, or another country in the third world? (please select only one alternative:)

1 better in Norway
 2 better in my home country
 3 better in another Third World country
 4 not sure

PLEASE GIVE ANY OTHER INFORMATION OR COMMENT!

Appendix A6

SUMMARY OF QUESTIONNAIRES FROM COURSE PARTICIPANTS Course Specific Aspects

A. Pulp and Paper Technology Course

This appendix gives a summary of results from the course specific part of the questionnaire which is distributed to course participants before their departure from Norway. The questions are to a large extent formulated by the course leaders.

RELEVANCE OF COURSE TOPICS

The questions reads: "The course covers a number of topics, some of them are listed below. Please indicate the rate of relevance for your personal training needs in relation to each topic below. Open space to the right for your additional comments." Then the 10 course topics are listed with answer alternatives from (1): "Not relevant" to (5): "Highly relevant". The following tables give the results for the four year period in question.

TABLE A8.1 PPT ASSESSMENT OF RELEVANCE OF COURSE TOPICS

	Averages				
	1986/87	1987/88	1988/89	1989/90	Tot
Fiber Raw Mat.	4.25	4.38	3.71	4.75	4.29
Fib./Pulp.chem	4.63	4.75	4.14	5.00	4.65
Pulping Tech	4.38	4.88	4.29	5.00	4.65
Bleaching Tech	4.13	4.88	4.43	5.00	4.61
Wash./Screen.	4.00	4.88	4.29	4.50	4.42
Paper Addit.	4.25	4.63	4.43	4.13	4.35
Paper Tech	4.38	5.00	4.71	4.25	4.58
" Mach. Tech	4.13	4.88	4.29	4.00	4.32
Finishing and Upgrading Pa.	3.88	4.50	4.00	4.00	4.10
Environ. Prob	3.88	4.75	4.14	4.88	4.42

RELEVANCE OF EXCURSIONS

Question: "To illustrate the various applied aspects of pulp and paper technology there have been 5 study tours to pulp and paper mills. Please rate the relevance of these excursions in relation to the study programme". The study tours are then listed with a ranking from (1): "Not relevant" to (5): "High degree of relevance".

The results are as follows:

TABLE A8.2 PPT ASSESSMENT OF RELEVANCE OF EXCURSIONS

	Averages				
	1986/87	1987/88	1988/89	1989/90	Tot
Ranheim	3.88	4.14	3.00	4.50	3.90
Adresse Avisen	3.13	3.57	3.43	3.88	3.50
Skogn	4.38	4.29	3.57	4.88	4.30
Follafoss Ind.		4.29	3.71	4.88	4.32
Oslo area	4.29	4.29	3.43	4.75	4.21

PRESENTATION OF COURSE PROGRAMME

The course participants are asked to evaluate the presentation of the various parts of the programme, from (1): "Poor" to (5): "Excellent".

TABLE A8.3 PPT ASSESSMENT OF PRESENTATION OF PROGRAMME PARTS

	Averages				
	1986/87	1987/88	1988/89	1989/90	Tot
Pulping Chemistry and Technology	3.88	4.43	4.00	4.75	4.28
Paper Tech. Laboratory	4.25	4.75	4.14	4.75	4.48
Courses	3.75	4.25	3.83	4.75	4.17

LABORATORY WORK AND INDIVIDUAL RESEARCH PROJECTS

Question: "Laboratory work and individual research projects including production of paper on the experimental paper machine is a major part of the course. Please rate the relevance of this work in relation to the study programme and your work in your country". The fixed answer alternatives are: (1) "Not relevant" to (5) "High degree of relevance".

TABLE A8.4 PPT - RELEVANCE OF LABORATORY WORK AND INDIVIDUAL RESEARCH PROJECTS

	Averages				
	1986/87	1987/88	1988/89	1989/90	Tot
Lab.work/ individual research rel. to study	4.38	4.25	3.86	4.75	4.32
Lab.work/ individual reseach rel. to work	4.38	4.25	4.14	4.63	4.35

B. Electric Power Distribution Systems Course

RELEVANCE OF COURSE TOPICS

Question: "According to the course plan, 19 sequences are listed. Please indicate the rate of relevance for your personal training needs in relation to each sequence below." Same answer alternatives as for the PPT course.

TABLE A8.5 EPDS - ASSESSMENT OF RELEVANCE OF COURSE TOPICS

	Averages				Tot
	1986/87	1987/88	1988/89	1989/90	
Line Param.	4.07	3.86	4.00	4.07	4.00
Network Anal	4.87	4.64	4.50	4.69	4.68
Project Work	4.67	4.64	4.60	4.64	4.64
Netw. Design	3.58	4.29	4.82	4.40	4.27
Ins. Materials	4.07	4.46	4.71	4.40	4.40
Ins. Coord.	4.47	4.64	4.86	4.50	4.61
Int. to Comp.	4.15	4.31	4.47	4.67	4.41
Overhead Lines	4.00	4.36	4.53	4.67	4.39
Power Cables	4.13	4.50	4.47	4.71	4.45
Power Circuit					
Breakers	4.40	4.31	4.47	4.79	4.49
Switches/Fuses	4.40	4.57	4.67	4.79	4.60
Insulators	4.07	4.36	4.40	4.69	4.37
Stations II	4.07	4.14	4.40	4.60	4.31
Transformers	4.47	4.43	4.64	4.6	4.55
Protection	4.40	4.43	4.33	4.47	4.41
Instal/tele.	3.33	3.79	3.53	3.79	3.60
Instal.					
/Power Supply	4.00	3.79	4.07	4.40	4.07
Management	3.53	4.08	4.07	4.07	3.93
Remote Control	3.27	3.85	3.40	3.73	3.55

COVERAGE OF THE TOPICS.

Question: "In the table below, please indicate to what extent you find the various subjects well covered." The answer alternatives here are from (1): "Very poor", (3): "Well covered" to (5): "Too much". This means that both the top and bottom extremes of the scale are negative and "3" the best rating. Results from these questions are therefore presented in a different way.

TABLE A8.6 EPDS - ASSESSMENT OF COVERAGE OF SUBJECTS

Coverage of Line Parameters

	1986/87	1987/88	1988/89	1989/90	TOTAL
v106					
Very poor	35.7	8.3	15.4	14.3	18.9
-	7.1	25.0	38.5	14.3	20.8
Well covered	28.6	41.7	15.4	42.9	32.1
-	21.4	0.0	23.1	21.4	17.0
Too much	7.1	25.0	7.7	7.1	11.3
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	12	13	14	53

Coverage of Network Analyses

	1986/87	1987/88	1988/89	1989/90	TOTAL
v107					
-	6.7	0.0	7.1	0.0	3.6
Well covered	33.3	33.3	14.3	13.3	23.2
-	60.0	25.0	57.1	66.7	53.6
Too much	0.0	41.7	21.4	20.0	19.6
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	12	14	15	56

Coverage of Project Work

	1986/87	1987/88	1988/89	1989/90	TOTAL
v108					
Very poor	7.7	0.0	0.0	0.0	1.9
-	7.7	0.0	7.7	0.0	3.8
Well covered	30.8	50.0	38.5	33.3	37.7
-	46.2	25.0	46.2	46.7	41.5
Too much	7.7	25.0	7.7	20.0	15.1
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	13	12	13	15	53

Coverage of Network Design

	1986/87	1987/88	1988/89	1989/90	TOTAL
v109					
-	21.4	8.3	14.3	0.0	11.1
Well covered	42.9	33.3	14.3	28.6	29.6
-	28.6	50.0	71.4	50.0	50.0
Too much	7.1	8.3	0.0	21.4	9.3
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	12	14	14	54

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Insulation Materials					
v110					
Very poor	6.7	0.0	0.0	0.0	1.8
-	0.0	0.0	7.1	0.0	1.8
Well covered	40.0	30.8	7.1	20.0	24.6
-	53.3	23.1	71.4	66.7	54.4
Too much	0.0	46.2	14.3	13.3	17.5
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	14	15	57

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Insulation Coordination					
v111					
Very poor	6.7	0.0	0.0	0.0	1.8
-	0.0	0.0	14.3	0.0	3.6
Well covered	53.3	46.2	21.4	28.6	37.5
-	40.0	15.4	64.3	57.1	44.6
Too much	0.0	38.5	0.0	14.3	12.5
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	14	14	56

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Introduction to Computing					
v112					
Very poor	28.6	0.0	0.0	0.0	7.5
-	35.7	40.0	35.7	6.7	28.3
Well covered	21.4	40.0	42.9	33.3	34.0
-	14.3	10.0	14.3	46.7	22.6
Too much	0.0	10.0	7.1	13.3	7.5
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	10	14	15	53

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Overhead Lines					
v113					
Very poor	20.0	0.0	7.7	0.0	7.1
-	20.0	15.4	7.7	0.0	10.7
Well covered	26.7	61.5	38.5	46.7	42.9
-	26.7	15.4	46.2	53.3	35.7
Too much	6.7	7.7	0.0	0.0	3.6
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	13	15	56

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Power Cables					
v114					
Very poor	7.1	0.0	7.7	0.0	3.6
-	35.7	15.4	7.7	6.7	16.4
Well covered	28.6	53.8	46.2	26.7	38.2
-	28.6	15.4	38.5	60.0	36.4
Too much	0.0	15.4	0.0	6.7	5.5
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	13	13	15	55

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Power Circuit Brakers					
v115					
Very poor	7.1	0.0	7.7	0.0	3.6
-	14.3	38.5	15.4	6.7	18.2
Well covered	42.9	30.8	46.2	33.3	38.2
-	35.7	15.4	30.8	53.3	34.5
Too much	0.0	15.4	0.0	6.7	5.5
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	13	13	15	55

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Switches and Fuses					
v116					
-	13.3	15.4	7.1	0.0	8.8
Well covered	40.0	53.8	42.9	26.7	40.4
-	46.7	15.4	50.0	66.7	45.6
Too much	0.0	15.4	0.0	6.7	5.3
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	14	15	57

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Insulators					
v117					
Very poor	6.7	0.0	0.0	0.0	1.8
-	20.0	7.7	7.1	0.0	8.9
Well covered	40.0	61.5	35.7	21.4	39.3
-	33.3	15.4	57.1	71.4	44.6
Too much	0.0	15.4	0.0	7.1	5.4
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	14	14	56

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Stations II					
v118					
Very poor	7.1	7.7	0.0	0.0	3.6
-	50.0	30.8	15.4	6.7	25.5
Well covered	28.6	38.5	46.2	46.7	40.0
-	14.3	15.4	38.5	46.7	29.1
Too much	0.0	7.7	0.0	0.0	1.8
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	14	13	13	15	55

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Transformers					
v119					
Very poor	0.0	8.3	0.0	0.0	2.1
-	26.7	25.0	33.3	0.0	18.8
Well covered	46.7	33.3	16.7	26.7	33.3
-	26.7	16.7	50.0	66.7	39.6
Too much	0.0	16.7	0.0	6.7	6.3
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	12	6	15	48

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Protection					
v120					
Very poor	0.0	8.3	0.0	0.0	1.9
-	20.0	16.7	33.3	6.7	18.5
Well covered	53.3	33.3	41.7	26.7	38.9
-	26.7	25.0	25.0	60.0	35.2
Too much	0.0	16.7	0.0	6.7	5.6
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	12	12	15	54

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Instal./Telecomm.					
v121					
Very poor	6.7	0.0	7.7	7.1	5.7
-	40.0	18.2	38.5	7.1	26.4
Well covered	33.3	54.5	38.5	42.9	41.5
-	20.0	18.2	15.4	42.9	24.5
Too much	0.0	9.1	0.0	0.0	1.9
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	11	13	14	53

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Instal./Power Supply v122					
Very poor	13.3	7.7	23.1	0.0	10.7
-	26.7	23.1	23.1	0.0	17.9
Well covered	26.7	38.5	23.1	46.7	33.9
-	33.3	23.1	30.8	53.3	35.7
Too much	0.0	7.7	0.0	0.0	1.8
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	13	13	15	56

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Management v123					
Very poor	33.3	10.0	8.3	6.7	15.4
-	26.7	30.0	50.0	13.3	28.8
Well covered	26.7	40.0	25.0	53.3	36.5
-	13.3	0.0	16.7	26.7	15.4
Too much	0.0	20.0	0.0	0.0	3.8
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	10	12	15	52

	1986/87	1987/88	1988/89	1989/90	TOTAL
Coverage of Remote Control v124					
Very poor	13.3	9.1	7.7	0.0	7.4
-	26.7	27.3	38.5	6.7	24.1
Well covered	40.0	45.5	38.5	46.7	42.6
-	20.0	9.1	15.4	40.0	22.2
Too much	0.0	9.1	0.0	6.7	3.7
TOTAL:	100.0	100.0	100.0	100.0	100.0
N=	15	11	13	15	54

ASSESSMENT OF EXCURSION

Question: "To provide a general insight into the various applied aspects of electric power distribution there have been study tours to power supply companies and manufacturing industries in Norway. Please rate the relevance of these excursions in relation to the study programme". Answer alternatives from (1): "Not relevant" to (5): "High degree of relevance"

TABLE A8.7 EPDS - RELEVANCE OF EXCURSIONS

v2	v125-> One day Excursion		Main Excursion	
	Average	No.	Average	No.
1986/87	3.60	15	3.85	13
1987/88	3.43	14	3.57	14
1988/89	3.92	13	4.21	14
1989/90	4.33	15	4.53	15
Total	3.82	57	4.05	56

** Included: 57 ** Excluded: 2 ** Total: 59 **

PRESENTATION OF VARIOUS PARTS OF THE PROGRAMME

On a scale from (1): "Poor" to (5): "Excellent" the fellowship holders are asked to assess the presentation of the various parts of the programme. Unfortunately one page of the EPDS-questionnaire was missing during the 1989/90 assessment. The results from the previous years are however given in the following table:

TABLE A8.8 EPDS - PRESENTATION OF SUBJECTS

	Averages			
	1986/87	1987/88	1988/89	Total
Line Parameters	2.27	3.31	2.53	2.67
Network Analysis	4.73	4.71	4.73	4.73
Project Work	3.64	4.31	3.86	3.93
Network Design	4.15	4.08	4.29	4.18
Insulating Mater	4.27	4.50	4.60	4.45
Insulation Coord	4.00	4.50	4.40	4.30
Intr. to Computing	2.71	3.85	3.73	3.43
Overhead Lines	2.87	3.71	3.07	3.20
Power Cables	3.20	3.93	3.53	3.55
" Circ. Breakers	3.29	3.46	3.00	3.24
Switches and Fuses	4.57	4.07	4.13	4.26
Insulators	3.60	4.21	4.40	4.07
Stations II	2.93	3.62	3.86	3.45
Transformers	4.07	3.64	3.67	3.84
Protection	4.07	3.79	3.60	3.82
Inst./telecomm.	3.27	3.50	3.40	3.39
Inst./Power supply	3.47	3.57	2.79	3.28
Management	3.00	3.54	3.07	3.19
Remote Control	3.33	3.62	3.00	3.30

Appendix A7

Assessment of Stay in Norway

Based on Questionnaires

A7.1 Problems during Preparation

Judging from the replies given by present fellows EPDS and PPT Course participants seem overall to have few problems when they prepare to come to Norway. In the 1989/90-assessment all respondents in the two courses indicated "no problems". As the following tabel shows this is a significant improvement in this regard compared to previous years' assessments.

	86/87	87/88	88/89	89/90	Total
No/none of importance	56.5	83.0	76.1	89.9	80.9
Yes - bureucracy/delays	17.4	3.8	6.5	4.0	6.0
Yes - due to NORAD	0.0	0.0	0.0	1.0	0.4
Yes - personal/family	13.0	3.8	4.3	0.0	3.4
Yes - language	0.0	1.9	7.6	2.0	3.7
Yes other	13.0	7.5	5.4	3.0	5.6
N	23	53	92	99	267
<u>EPDS, last 4 years</u>					
No/none of importance	60.0	85.7	93.3	100.0	84.5
Yes - bureucracy/delays	13.3	7.1	0.0	0.0	5.2
Yes - personal/family	13.3	0.0	6.7	0.0	5.2
Yes other	13.3	7.1	0.0	0.0	5.2
N	15	14	15	14	58
<u>PPT, last 4 years</u>					
No/none of importance	50.0	85.7	100.0	100.0	83.3
Yes - bureucracy/delays	25.0	14.3	0.0	0.0	10.0
Yes - personal/family	12.5	0.0	0.0	0.0	3.3
Yes other	12.5	0.0	0.0	0.0	3.3
N	8	7	7	8	30

Table A7.1: Problems during preparation to come to Norway. Last 4 years. All courses, and EPDS and PPT Courses.

A7.2 Satisfaction of Stay in Norway

A range of questions in the different questionnaires relate to the aspect of "staying in Norway". In the following the main findings will be presented. The course participants, while in Norway, are asked to assess their stay in the country by the question: "In general terms, when you evaluate your stay in Norway, are you satisfied or dissatisfied?" according to a scale from 1 to 5 (from "Very dissatisfied" to "Highly satisfied"). The results for the 269 participants who have replied give a total average of 3.87. Both EPDS and PPT respondents' averages are below this.

	Aver.	No.
HPD	3.62	42
PPT	3.67	27
PERE	3.67	45
EPD	3.71	55
SLS	4.00	11
FBM	4.20	15
MCE	4.21	28
PRS	4.28	46
	3.87	269

Table A7.2:
Assessment of satisfaction
of stay in Norway

	All resp.		EPDS		PPT	
	Aver.	Tot.	Aver.	Tot.	Aver.	Tot.
1986/87	3.59	22	3.57	14	3.63	8
1887/88	3.44	48	3.27	11	4.00	5
1988/89	4.01	95	3.93	15	3.00	6
1989/90	4.01	104	3.93	15	4.00	8
Total	3.87	269	3.71	55	3.67	27

Table A7.3: Satisfaction of stay in Norway, - Years

The results split for years are shown in table A7.3, first for all respondents, then for EPDS and PPT respondents respectively.

The tables confirm other data indicating that there has been an improvement in course participants' satisfaction of stay in Norway during recent years. Female respondents in the PPT course give an average score of 3.29, compared to their male study colleagues': 3.80. In EPDS the difference between sexes is insignificant.

However, there is reason to believe that respondents tend to be on the "positive side" in their marking. They are in Norway as "guests", receive fellowship from the Norwegian Government and many of them are coming from cultures where anything but giving highest score would be considered not polite. It is also quite clear that the regimes in some countries, for whom the course participants more or less are official representatives, would not allow anything but good rating. Finally, questionnaire as a method is also not very common in some of the participants countries, and guaranteed anonymity nothing really to trust.

	Aver.	No
Thailand	2.57	7
Nigeria	3.33	3
Egypt	3.43	7
Kenya	3.50	8
Pakistan	3.67	6
Zambia	3.75	4
Sudan	3.78	9
Ghana	3.80	5
Philippines	3.83	12
India	3.87	15
Burma	3.88	8
Tanzania	3.90	39
China	3.91	23
Sri Lanka	4.00	26
Costa Rica	4.00	4
Bangladesh	4.04	24
Ethiopia	4.08	12
Peru	4.13	8
Nepal	4.25	8
Mozambique	4.33	3
Turkey	4.67	3
Nicaragua	5.00	8

Table A7.4:
Assessment of stay In Norway
- Country. Present Particlp.

respondents are not included to prevent the possibility of identification of individual fellowship holders.

Respondents are free to give comments to their assessment of "staying in Norway". 143 fellows utilized this chance, and the answers are interpreted and grouped in a number of categories, together with the results, in table A7.5.

There are differences in the structure of assessment between female and male respondents. The female fellows stress relatively more often nature/climate and "missing family" in their negative remarks than the males. The males, on their side, are more critical to the course itself.

A7.3 Satisfaction of Accommodation

The accommodation provided is assessed by course participants on a scale from 1 to 5 (from "very bad" to "very good"). It is no doubt that the student town and the accommodation is a central "arena" for the fellows during their stay in Norway. In the weekends and most holidays for a period of about 10 months this is the resort place, it defines possibilities to meet other people, to study and to rest.

In this light one should be very careful to overestimate the relatively high scores. Used with care, however, the data could be used for comparisational purposes (between courses, sex, etc).

The same question formulation were used in the survey for previous course participants. Very interesting, but perhaps not so surprising, one finds that the assessment of stay in Norway has become better over the years. It seems as if time span after the studies in Norway itself is a decisive factor: negative aspects tend to diminish from the mind. 100 previous course participants have answered, their rating being 4.39 and 4.50 for EPDS and PPT courses respectively and, split for sexes: 4.36 and 4.41 for females and males.

"Satisfaction of stay in Norway" split for countries of respondents and for present course participants gives large differences between lowest scores under 2 and highest close to 5. But due to the fact that several countries have only sent one participant during the four year period "one vote" counts very much. What is relatively clear from the data is that representatives from countries who have sent few participants to the EPDS course give low score. Fellows from Sri Lanka, Philippines and Bangladesh (7, 4 and 5 participants respectively) give highest score. Countries with 1 or 2

	EPD	MCE	PERE	PPT	HPD	SLS	FBM	PRS	Total
Generally negative	6.1	8.3	0.0	6.7	3.1	0.0	0.0	0.0	3.5
Neg. course/soc.	3.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	1.4
Neg. course	6.1	8.3	4.8	6.7	3.1	0.0	14.3	10.5	6.3
Neg. social, people	21.2	0.0	23.8	6.7	6.3	25.0	0.0	5.3	11.9
Neg. nature/climat	3.0	0.0	0.0	26.7	3.1	0.0	0.0	0.0	4.2
Neg. language	0.0	0.0	4.8	0.0	3.1	0.0	0.0	5.3	2.1
Neg. missing family	12.1	8.3	9.5	6.7	12.5	0.0	0.0	10.5	9.8
Neg. other	3.0	8.3	9.5	6.7	18.8	25.0	14.3	5.3	9.8
Generally positive	24.2	33.3	23.8	20.0	28.1	0.0	42.9	42.1	28.0
Pos. course/soc.	0.0	0.0	4.8	13.3	3.1	25.0	14.3	10.5	5.6
Pos. course	15.2	16.7	9.5	0.0	0.0	25.0	14.3	5.3	8.4
Pos. social, people	0.0	8.3	0.0	0.0	6.3	0.0	0.0	5.3	2.8
Pos. nature/climat	3.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	1.4
Pos. co./neg. soc.	3.0	8.3	4.8	6.7	6.3	0.0	0.0	0.0	4.2
Pos. soc./neg. co.	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N=	33	12	21	15	32	4	7	19	143

Table A7.5: Comments to assessment of stay in Norway. Present Course Participants

	Aver.	No.
PPT	3.65	31
PER	3.67	46
EPD	3.73	59
HPD	3.86	42
FBM	3.88	16
SLS	4.09	11
PRS	4.13	46
MCE	4.26	27
Tot	3.87	278

Table A7.6: Assessm. of Accommod. Present Participants.

There are relatively large variations between courses regarding the scores given by participants in the annual survey, while they still are in Norway. As the results show, EPDS and PPT course participants represent the low range of the scale – even though they are lodged in the same places as fellows to the Marine Civil Engineering Course (MCE), who have the highest scores.

Previous course participants, are in their scores more positive: they seem to be more satisfied with the accommodation provided in Norway after some years have passed. The results for the 102 previous course participants who have replied are 4.17 for EPDS and about the same; 4.19 for PPT. Females are slightly more satisfied than male respondents.

The questionnaires contain open space for extra comments in addition just to "tick the mark". 115 course participants commented their assessment of accommodation (in the annual general surveys). The comments have been divided into 12 categories, and most comments seem to fill into these. Negative comments often are related to the room mates – among all comments 21% include this. The comments indicate that room mates – most often Norwegian students – have a tendency to behave unfriendly or even discriminating. The table shows that "room mates" are mentioned by 31% of the EPDS, and 25% of the PPT fellows who have given their comments. In 1988/89 as many as 50% of the comments given by EPDS-fellows included "room mates". However, there are large differences from year to year and the total number of comments is too small to rely too much on percentages.

There are also negative comments about spacing of the room and the flat (too crowded, too many people for one kitchen) and these replies naturally also can be seen in relation to the "room mate problematic". EPDS fellows, for some reason, complain more often than others on small size of bed. This, and other seemingly trivial details often commented on, could be explained by some sort of general feeling of discomfort. A WHO study¹ mentions such behaviours as symptoms of "uprooting", which often is developed among students from abroad or other categories of people staying away from their home countries and family setting for some time.

	EPD	MCE	PERE	PPT	HPD	SLS	FBM	PRS	Tot
General negative	0.0	0.0	5.3	0.0	10.5	0.0	0.0	11.1	4.3
Neg. mates	30.8	10.0	26.3	25.0	31.6	0.0	14.3	0.0	20.9
Neg. standard	3.8	0.0	10.5	0.0	15.8	0.0	0.0	5.6	6.1
Neg. space	3.8	0.0	10.5	16.7	5.3	0.0	0.0	11.1	7.0
Neg. localization	7.7	0.0	0.0	0.0	0.0	0.0	14.3	0.0	2.6
Neg. size of bed	19.2	10.0	5.3	0.0	0.0	0.0	0.0	11.1	7.8
Neg. noise	0.0	10.0	10.5	0.0	5.3	0.0	0.0	0.0	3.5
Neg. other	7.7	10.0	10.5	25.0	5.3	0.0	28.6	11.1	11.3
General positive	15.4	30.0	10.5	25.0	15.8	100	28.6	38.9	24.3
Pos. mates	3.8	20.0	5.3	8.3	5.3	0.0	0.0	11.1	7.0
Pos. standard	0.0	10.0	5.3	0.0	5.3	0.0	14.3	0.0	3.5
Positive other	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Total:	100	100	100	100	100	100	100	100	100
N=	26	10	19	12	19	4	7	18	115

Table A7.7: Comments to accommodation, Present Course Participants

Split for years, there seems to be an improvement in the sense that there are fewer negative comments about room mates. There are also more positive comments about room mates among female respondents than among males (21.4 and 5.1 % respectively). Also females seem more often than the males to give positive remarks regarding standard of the accommodation (14.3% and 3% respectively).

A7.4 Assessment of the Norwegian Society.

A very broad question is posed in the questionnaire; assessment of the "Norwegian society". It is broad in the sense that what study fellows mean by "society" of course varies much. During the approximately 10 months stay in Norway, the course represents a safe arena, with defined roles and a structured system which it is easy to relate to, at least so it seems for most respondents. Also the student towns could be described as such, to some extent. But how do the respondents consider and assess "life outside"?

Relatively many fellows comment that the exposure to the society has been minimal. Some regret this, others find it natural and right: they are in Norway primarily to study, and seem not to have invested much efforts in discovering "Norwegian society". Some, who have tried, have found many friends also outside the course framework

	Avr.	N.
SLS	3.36	11
FBM	3.69	13
EPD	3.79	48
HPD	3.85	41
PPT	3.93	30
PERE	4.10	41
MCE	4.24	25
PRS	4.35	43
Total	3.98	252

and student home. Others have failed and found that Norwegians are cold, difficult to come in contact with. And some conclude that the Norwegians do not like foreigners, words like "racists" are unfortunately not too seldom seen.

On the scale from 1 to 5, where 1 is "very bad" and 5 "very good", the averages are given in table A7.8.

Although the average scores divided by sex are about the same, (3.92 for female and 3.98 for male), the structure of replies varies: Only 19.4% of the women indicate "very good" compared to 27.3% of the men. On the other hand no women respondents rate "very bad" or "bad" (2% of the men).

Table A7.8:
Assessment of Norwegian Society. Present Course Participants.

Also there are differences in opinion about the Norwegian society depending on where the course is organised: Ås: 3.36, Bergen: 3.69, Trondheim: 3.96 and Oslo highest with 4.35. This is based on 252 questionnaires, but with few respondents at Ås and Bergen (only 11 and 13 respectively).

Results from the survey organised as a part of this evaluation are more positive in the sense that the previous course participants give better scores also to their assessment of the Norwegian society. Here the scores are 4.38 for PPT and 4.17 for EPDS, 4.09 for females and 4.24 for males.

	EPD	MCE	PERE	PPT	HPD	SLS	FBM	PRS	Tot.
Gen. negative	12.5	0.0	13.0	8.3	10.0	20.0	0.0	11.1	10.4
Closed soc.	34.4	25.0	8.7	8.3	20.0	20.0	42.9	5.6	20.0
Language prob	3.1	0.0	0.0	8.3	5.0	0.0	14.3	0.0	3.2
Neg.attitudes	15.6	25.0	17.4	25.0	10.0	20.0	14.3	0.0	14.4
Neg.political	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.8
Neg.food	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	1.6
Pos./neg.	9.4	0.0	4.3	16.7	20.0	40.0	0.0	5.6	10.4
Generally	3.1	37.5	26.1	0.0	25.0	0.0	0.0	22.2	15.2
Pos.nature	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Pos.people	15.6	12.5	21.7	16.7	5.0	0.0	28.6	38.9	18.4
Pos.safe	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.8
Other positive	3.1	0.0	4.3	0.0	5.0	0.0	0.0	11.1	4.0
Total:	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
N=	32	8	23	12	20	5	7	18	125

Table A7.9: Comments about the Norwegian Society. Present Course Participants.

125 questionnaires filled in by course participants while they still are in Norway include comments to the assessment of the Norwegian society:

The first 4 categories of comments; generally negative, "closed society", language and attitudes to foreigners could all be said to be related to how well Norwegians take care

of their guests. Among the respondents who made their comments in 1987/88, more than 66% gave this kind of comment. For 1988/89 and 1989/90 the percentages are 45.3 and 48.0 respectively. Split for course location, all years, 51.6% of Trondheim respondents commented in this category. Ås and Bergen fellows were even higher (60 and 71,5%), but the number of respondents is too small to rely on. It is also important to remember that the percentages refer not to total number of respondents, but to number of comments given. But actually this is no "excuse". The fact that for instance 16 respondents in Trondheim in this kind of "formal" assessment have indicated "negative attitude to foreigners" is very serious. The data seem also to indicate that female respondents more frequently than their male colleagues, emphasise "closeness" and "negative attitudes to foreigners".

5 of the 37 fellows from the PPT course giving their comments to the survey for previous course participants mention that Norwegians are shy, difficult to mix with, reserved, cold and finally one respondent state that it was difficult to mix with the natives and that more time for communication skills improvement is called for. Overall, however, course participants tend to be more positive after some years have passed.

For 1989/90 the questionnaire included questions regarding number of new friends participants have got during their stay in Norway. Unfortunately the Shipping Course in Oslo (PRS) used the old formula and is therefore not included. There seem to be correlation between "satisfaction indexes", assessment of Norwegian society and number of friends. Trondheim scoring better than Ås and Bergen. But still the number of respondents is too small to draw any conclusion. There are also large differences between the courses in Trondheim; for the HPD participants more than 3 Norwegian student friends is average, while for PPT the number is close to 9 new Norwegian student friends.

The most recent questionnaire to former participants and their employers included the following question:

"Some NORAD Fellowship Holders have reported that they find the stay in Norway difficult due to social, climatic or other reasons that are not under control of the course management itself. In some instances such problems have negatively affected the study work. We ask you to select the formulation you feel is closest to your own opinion, among the following alternatives:"

- 1: "Such problems do affect NORAD fellowship holders to a relatively high degree in the sense that their study efficiency is much reduced"
- 2: "Such problems do affect NORAD fellowship holders to some degree and their study efficiency is somewhat reduced"
- 3: "Such problems do affect NORAD fellowship holders to some degree, but have no impact on study efficiency"
- 4: "Such problems are very rarely found and can not be said to have a significant negative influence on study performance".

22% of previous EPDS participants state "2" – somewhat reduced study efficiency, but only 8% in the PPT group give this answer. Split for sex, females significantly more often indicate this, while employers for EPDS fellows are, interesting enough, more

positive (only 5.3%) than the employers of PPT fellows. This might reflect the fact that PPT fellows comes from smaller institutions, often laboratories and research centres, with better contact between employer and employees. The most positive reply is indicated by half the PPT-fellows, but only 28% of the EPDS fellows. Females are significantly more positive than males (46 and 34%).

As previously shown, previous course participants tend to be more positive than the present ones. The results referred to above give reason to believe that there actually are some problems in the fields of "social life in Norway" and that these problems do affect study efficiency.

Notes – Appendix A7:

1. *Zwingmann, Charles A.A. and Gunn, Alexander D.G.: "Uprooting and Health. Psycho-social Problems of Students from Abroad". WHO, Division of Mental Health, Geneva 1983.*

Appendix A8

Assessing the Courses and Effects/Impacts

Based on Questionnaires

A8.1 Course Assessment – Summary

One part of the questionnaires to course participants, both in the annual survey to course participants while they still are in Norway, and to previous participants as a part of the present evaluation, contains assessment of the courses. (Reference is made to Appendix A5). The questions are divided in two; one includes questions relevant to all courses, such as "variety and range of programme offered", "course content in relation to future work", "availability of teaching staff" etc. The same questions have been used since 1986/87 and cover all NORAD courses organised in Norway (with a few exceptions.) The other kind of questions are more course specific; related to the course sequences etc.

In addition the survey for employers and previous course participants includes a number of questions related to course assessment and effects/impacts.

In order to distinguish between the different groups of respondents, we will in the following refer to "present participants" (from annual surveys while the fellows still are in Norway) "previous participants" (from survey as part of the evaluation to earlier participants and "employers").

A8.2 Assessments of important Course Aspects

Table A8.1 presents results of the surveys to present course participants regarding general aspects of the courses. Results for EPDS and PPT are given as well as averages of all courses in order to enable comparison.

Question/ Course	86/87	87/88	88/89	89/90	Fem.	Male
Variety and range of programme offered						
EPDS		3.08	4.07	4.27		
PPT		3.88	3.33	4.38		
Average all courses		3.48	3.87	4.07	3.91	3.87
Quality of course in field of specialization – theory						
EPDS		3.54	4.60	4.33		
PPT		4.13	3.86	4.88		
Average all courses		3.78	3.82	3.99	4.03	3.89
Quality of course – practical application						
EPDS		2.92	4.07	3.87		
PPT		4.25	2.86	4.63		
Average all courses		3.48	3.74	3.72	3.82	3.67
Course content in relation to future work						
EPDS	3.57	3.46	4.13	4.20		
PPT	3.38	4.50	3.57	4.50		
Average all courses	3.50	3.80	4.01	4.15	4.13	3.96
Availability of teaching staff						
EPDS	3.85	3.71	3.80	4.47		
PPT	4.13	4.25	4.00	4.63		
Average all courses	3.95	3.75	4.02	4.07	4.03	3.98
Contact with the leaders of the course						
EPDS	3.62	3.57	4.33	4.47		
PPT		4.25	3.43	4.75		
Average all courses	3.62		4.33	4.35	4.09	4.25
Access to study material for selfstudy						
EPDS		4.14	4.27	4.33		
PPT		3.63	3.29	3.88		
Average all courses		3.88	3.76	4.09	4.00	3.97
Training material						
EPDS		3.23	3.87	4.20		
PPT		4.00	3.29	4.50		
Average all courses		3.57	3.76	4.02	3.97	3.81
Language used in training						
EPDS	4.21	4.07	3.93	4.33		
PPT	4.13	4.25	3.86	4.63		
Average all courses	3.55	4.11	4.14	4.12	4.19	4.10

Table A8.1: Assessment of course specific aspects, Present Participants.

Some comments to the table:

Improvement over the years

Table A8.1 indicates a general tendency of improvement in rating over the years for most questions. There is no reason to believe that the course participants have

become more "kind and soft" in their assessments. Neither have selection procedures of participants during the latest years changed in a way to include more "positive" fellows. The procedures of filling in questionnaires have been the same during the period, i.e. the changes in opinions are hardly related to systematical errors of data collection.

The reason for improved rating could be that NORAD has become more active since the mid-eighties. Aspects of control and a certain pressure of the course milieus were introduced. As a part of this process, annual assessments of the courses using questionnaires were initiated in 1986/87. Each year results from these assessments have been published as reports and spread to course leaders and other resource people in course milieus. There are reasons to believe that these assessments, as a part of NORAD's more active strategy, were instrumental to improve the courses.

Difference between courses – "course soul"

Another interesting phenomenon which can be read from the table is that some courses, in certain years, show significant drops or increases in ratings. Course leaders certainly confirm the fact that "something" in the composition of the participant group itself is decisive for a good spirit or soul of the course. The PPT course in 1988/89, for instance, has a significantly low score on many indicators compared to the average of all courses or the PPT courses the year before and after. The same can be seen from this course rating of "satisfaction of stay in Norway", which was 3.00 (compared to 4.00 both the year before and after).

There can be many decisive factors involved in the creation of "good spirit" of a course group. It has to do with course organisation, changes in course staff, particular incidents etc., but in this case it is reason to believe that the composition of the group itself was unfortunate. The present study does not have enough information to make recommendations on how to prevent this in the future, but course organisers and NORAD should make an effort to find explanations and if possible regulate recruitment procedures accordingly.

The previous course participants, answering the same questions, gave the ratings presented in table A8.2.

Comparing the two tables, one see that in the first, the female course participants, for all questions but one, are more positive than their male colleagues. (The exception is "contact with course leaders".) In the second table, however, out of the nine questions, male respondents are most positive.

Question/Course	All Countries	Sri Lanka	Tanzania	Fem.	Male
Variety and range of programme offered					
EPDS	4.09	3.57	4.00		
PPT	3.94	4.00	3.71		
Average both courses	4.04	3.67	3.90	3.73	4.06
Quality of course in field of specialization – theory					
EPDS	4.18	3.71	4.07		
PPT	4.57	4.33	4.43		
Average both courses	4.32	3.90	4.19	4.27	4.31
Quality of course – practical application					
EPDS	3.88	3.57	3.93		
PPT	4.05	3.67	4.00		
Average both courses	3.94	3.60	3.95	3.82	3.94
Course content in relation to future work					
EPDS	4.09	3.43	4.00		
PPT	4.16	3.67	3.86		
Average both courses	4.12	3.50	3.95	4.18	4.09
Availability of teaching staff					
EPDS	4.00	3.29	4.07		
PPT	4.58	5.00	4.67		
Average both courses	4.21	3.80	4.25	4.20	4.19
Contact with the leaders of the course					
EPDS	4.18	3.57	4.21		
PPT	4.38	5.00	4.43		
Average both courses	4.25	4.00	4.29	3.82	4.31
Access to study material for selfstudy					
EPDS	4.24	4.00	4.00		
PPT	3.83	3.67	4.29		
Average both courses	4.10	3.90	4.10	4.09	4.10
Training material					
EPDS	4.15		4.29		
PPT	4.14		4.00		
Average both courses	4.15		4.19	3.91	4.18
Language used in training					
EPDS	4.12	4.14	4.00		
PPT	4.43	4.33	4.57		
Average both courses	4.23	4.20	4.19	4.00	4.26

Table A8.2: Assessment of course specific aspects, Previous Participants.

Training methods

The assessments of the various aspects of training methods in the courses are discussed earlier in the present report in the chapters about EPDS and PPT courses respectively. The score to lecturers at the PPT course during the first two years is

Question/ Course	86/87	87/88	88/89	89/90	Fem.	Male
Lectures						
EPDS	3.79	3.64	4.20	4.33		
PPT	4.25	4.75	3.71	4.63		
Average all courses	3.95	3.89	3.91	4.08	4.00	3.97
Exercises						
EPDS	4.00	3.50	4.13	4.13		
PPT			3.00	4.75		
Average all courses	4.00	3.67	3.91	3.92	3.85	3.95
Group activities						
EPDS		3.64	3.33	3.93		
PPT		4.13	3.14	3.75		
Average all courses		3.52	3.59	3.64	3.67	3.59
Excursions						
EPDS	3.57	3.92	3.93	4.60		
PPT	2.75	3.38	2.28	3.75		
Average all courses	3.27	3.92	3.90	3.98	3.77	3.89
Participants contribution						
EPDS	3.83	3.38	3.77	3.85		
PPT		4.38	2.67	3.75		
Average all courses	3.83	3.54	3.51	3.80	3.68	3.65
Practical training						
EPDS	3.60	3.00	3.53	4.07		
PPT	4.17	3.88	2.83	3.38		
Average all courses	3.76	3.19	3.27	3.46	3.61	3.33
Project work						
EPDS				4.40		
PPT	3.75			4.50		
Average all courses	3.75			3.95	4.10	3.92

Table A8.3: Assessment of Training Methods, Present Participants.

quite high, and well above average for all courses. EPDS, for the same years scores below average. However, in the case of EPDS, there is a marked increase for the last two years, while the score for PPT in 1988/89 jumps down (this is previously described as a "special course" in several ways) before it again, for the last year climbs up far above the average score for all courses.

1989/90 participants in EPDS view "excursions" as a method more positive than previous fellows. Teaching methods used in PPT came out less favourable than EPDS, and are even ranged below the average courses for nearly all methods used. The exception is "project work" where both EPDS and PPT score high compared to average for all courses.

A8.3 Information about the course and the situation in Norway

Course participants (while in Norway) were asked to assess the information they receive before coming to Norway. The question is split in "information about content of the course" and "information about living conditions in Norway". Assessment ranks from 1: "poor" to 5: "very good". The results from 1989/90 are presented in the table. There are marked differences in scores between the lowest (HPD) and the highest (PPT and SLS) for the two questions. For the first, regarding information about the course, difference partly could be explained by the difference in the way the information itself is presented. However, the difference in assessment of information about living condition is more odd: All fellows receive the same information booklet and other publication from NORAD. The respondents indicate in the questionnaires that they are informed by other sources as well; NORAD Representations, Norwegian Embassies, previous course participants etc., and the difference in assessment might reflect this.

Respondents from the PPT Course assess the information given about the course significantly better than the information about living condition, while there seem to be an opposite pattern in assessment for the SLS Course participants.

Employers of previous course participants were asked several questions regarding information about the course offers. First, they were requested to indicate the main source of the information, secondly to assess regularity of reception of two important written information pamphlets: "NORAD Fellowship Offers" and "Practical Guide and Regulations for NORAD Fellows" and thirdly the employers were asked to assess the contents of the same pamphlets and finally whether the nominated candidates receive the written information. In addition there were open space for employers to give any additional comments about the information.

The main contacts (sources) regarding information about the course are the relevant local ministries, (68% and 82% of EPDS and PPT employers respectively). None of the PPT employers indicate NORAD Resident Representatives as main source of information (14% in EPDS). Only 6% of the PPT employers receive information directly from NORAD in Norway (while no one gives this answer among the EPDS employers.)

What about the regularity of reception of the information? The majority of employers, both in PPT and EPDS state that they have not received "NORAD Fellowship Offers". (See pie graphs). The same results are found regarding the "Practical Guide and

CONTENTS OF THE COURSE

	Course Aver.	Tot
HPD	2.64	14
SLS	3.45	11
PERE	3.46	13
FBM	3.50	8
EPD	3.80	15
MCE	3.85	13
PPT	4.13	8
Total	3.51	82

LIVING CONDITIONS IN NORWAY

	Course Aver.	Tot
HPD	2.36	14
FBM	3.00	8
PPT	3.38	8
EPD	3.47	15
PERE	3.54	13
MCE	3.77	13
SLS	4.00	11
Total	3.35	82

Table A8.4:
Assessment of Course Information. Course participants while in Norway.

Regulations for NORAD Fellows". In total 37 employers answered these questions. Therefore one has to conclude that there is much to be done regarding distribution of information about the courses, in order to establish the needed knowledge basis for the employers to take appropriate actions.

3 of the employers in PPT and 4 in EPDS answer "do not know" when they are asked to assess the contents of "NORAD Fellowship Offers". The rest, although not receiving the information booklets regularly, must at least have seen them: In the PPT course 6 find it sufficient while one employer indicate "so and so". For the EPDS course 2 indicate "insufficient", one "so and so" while 6 find it sufficient. The results regarding assessment of contents of "Practical guide" are very similar. This confirms the conclusion that more work is needed regarding the contents of the NORAD information booklets.

If available, the large majority of the employers state that the nominated candidates will receive the information.

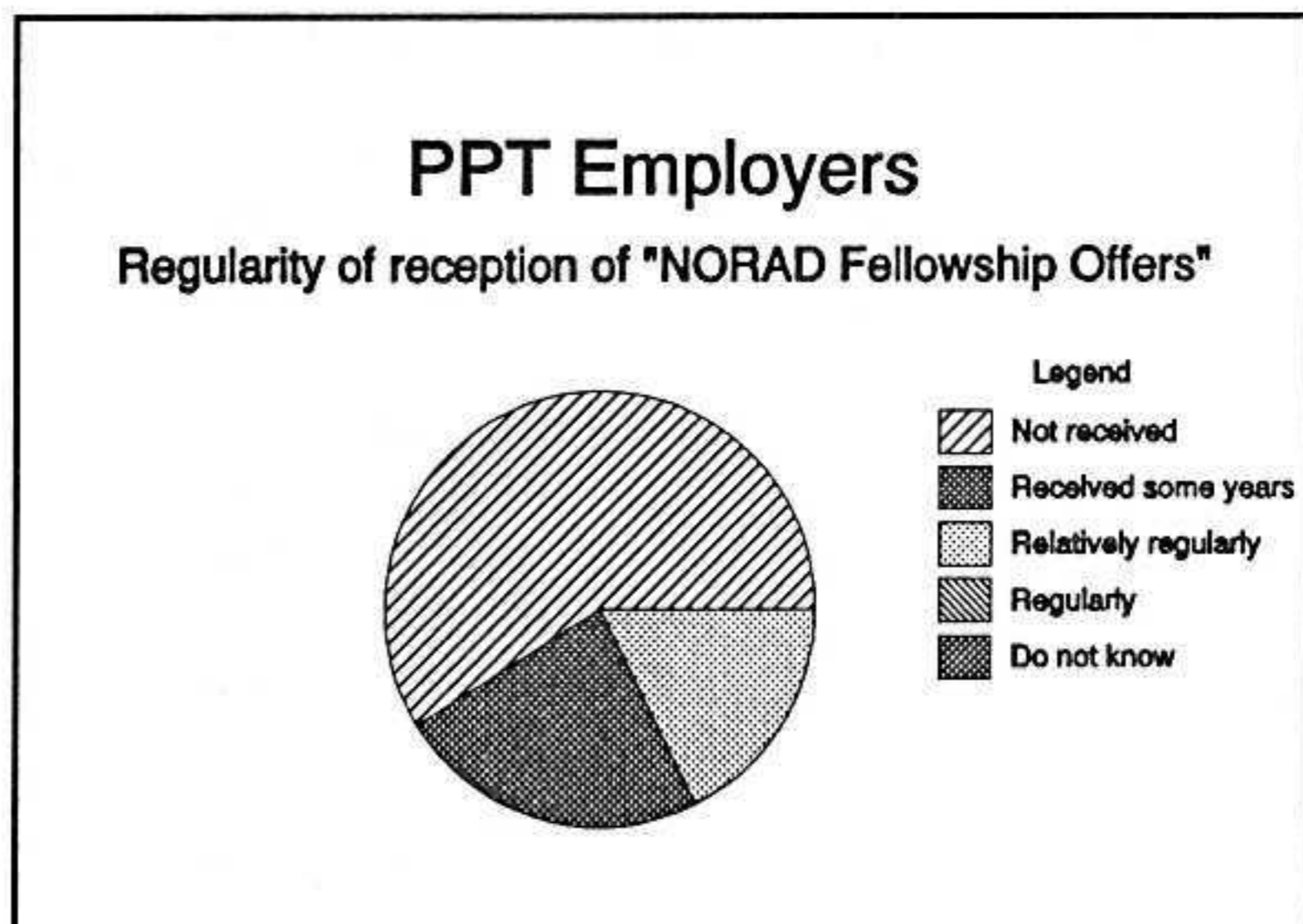


Figure A8.1: Regularity of Reception of "NORAD Fellowship Offers". PPT Employers.

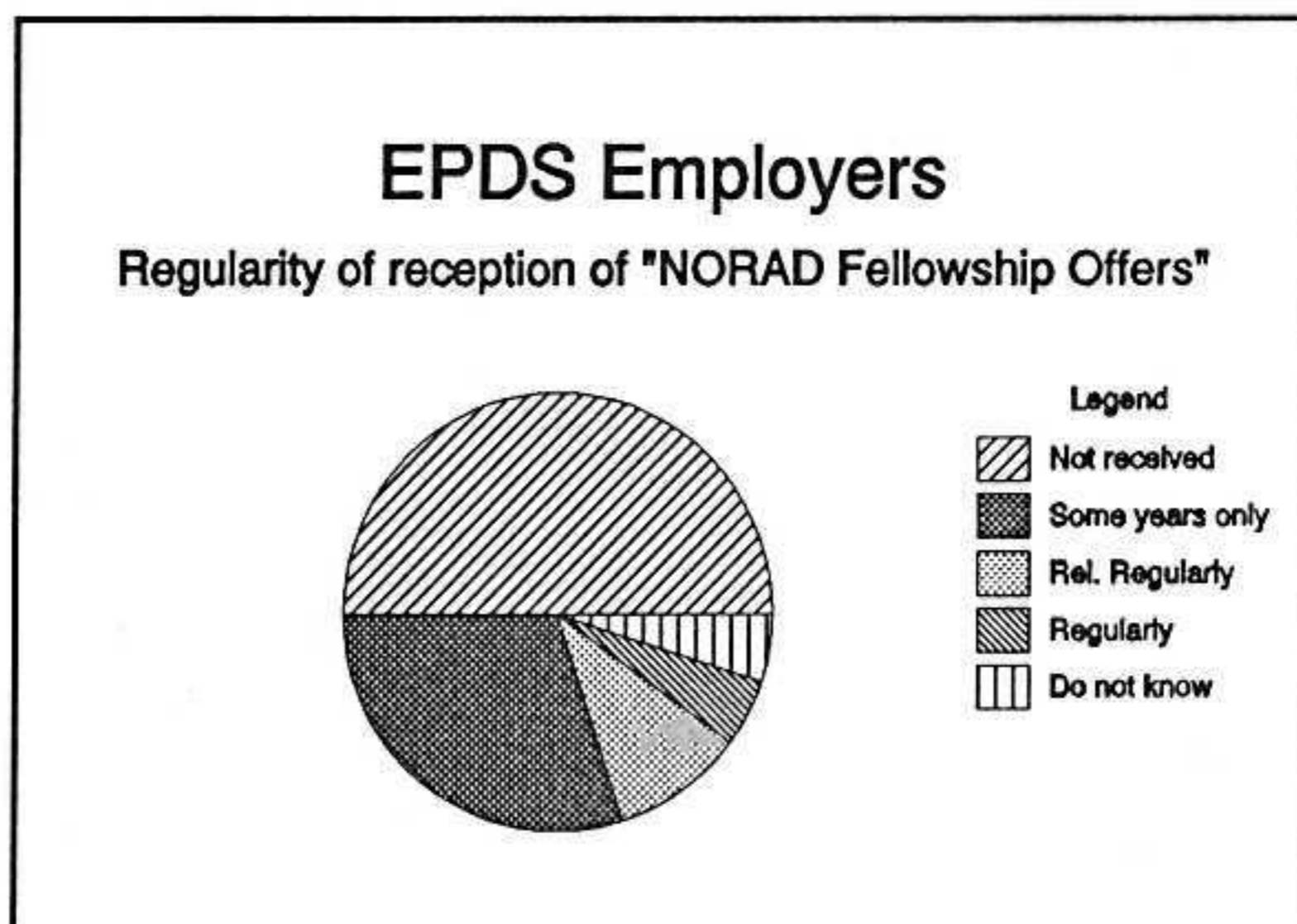


Figure A8.2: Regularity of Reception of "NORAD Fellowship Offers". EPDS Employers.

A8.4 Course recommended to others?

	Aver.	No.
SLS	4.22	9
PER	4.29	45
EPD	4.31	58
HPD	4.36	42
PPT	4.38	29
PRS	4.63	46
MCE	4.71	28
FBM	4.81	16
Total	4.44	273

Table A8.5:
Recommend the course to colleagues? Present Participants.

The degree to which course participants would recommend the course to their colleagues is one of the indicators of overall satisfaction with the course. However, there are a few problems related to the question: Fellows coming from small institutions would not likely have many colleagues to give recommendations to. But also there are reasons to think that although course participants are satisfied with the course, some would not give too many recommendations to colleagues (and competitors?).

Previous course participants give high ratings, on a scale from 1 to 5 the averages for the EPDS and PPT results are nearly identical, 4.42 and 4.44, with higher scores in Sri Lanka than in Tanzania. (In particular for PPT).

A8.5 Acceptance again?

	Av.	No.
EPD	4.00	55
PPT	4.13	30
HPD	4.31	42
PER	4.33	45
SLS	4.36	11
MCE	4.69	26
PRS	4.71	41
FBM	5.00	16
Total	4.37	266

Table A8.6:
Acceptance again if knowing more before. All courses, all years. Present Participants.

The course participants, both while studying in Norway and after returning to their home countries, were asked whether they would have accepted the fellowship again if they knew more about it before hand.

According to the present author anything less than top score to this question: 5, should be considered as negative. Present course participants in the PPT and EPDS courses seem to give lower scores than their colleagues in the other courses.

There are no significant difference between male and female scores. Table A8.7 shows that there has been an improvement over the last years for the EPDS Course, from an average of 3.67 for the 1986/87 course to 4.80 for the

	Av.	No.
86/87	3.67	15
87/88	3.45	11
88/89	3.93	14
89/90	4.80	15
Total	4.00	55

Table A8.7:
Accept again if knowing more before? EPDS. Present Participants.

last course (1989/90).

The tendency for the PPT course is not as clear as this, with an average of 3.74, 4.57, 3.57 and 4.63 for the 4 years respectively.

The previous fellows, on the other hand are much more positive when ticking their answer alternatives in the questionnaires. Among 102 respondents, the average is 4.71 (EPDS 4.80 and PPT 4.54).

A8.6 Where to organize course?

Provided assistance was given, where would the course participants, and their employers, prefer the course to be organized? The question and the answer alternatives were as follows:

"If the necessary support (such as provision of staff and equipment) were provided by NORAD, would the benefit of the course be better if it were arranged in your home country, or another country in the third world? (please select only one alternative:)"

1. better in Norway
2. better in my home country
3. better in another Third World country
4. not sure"

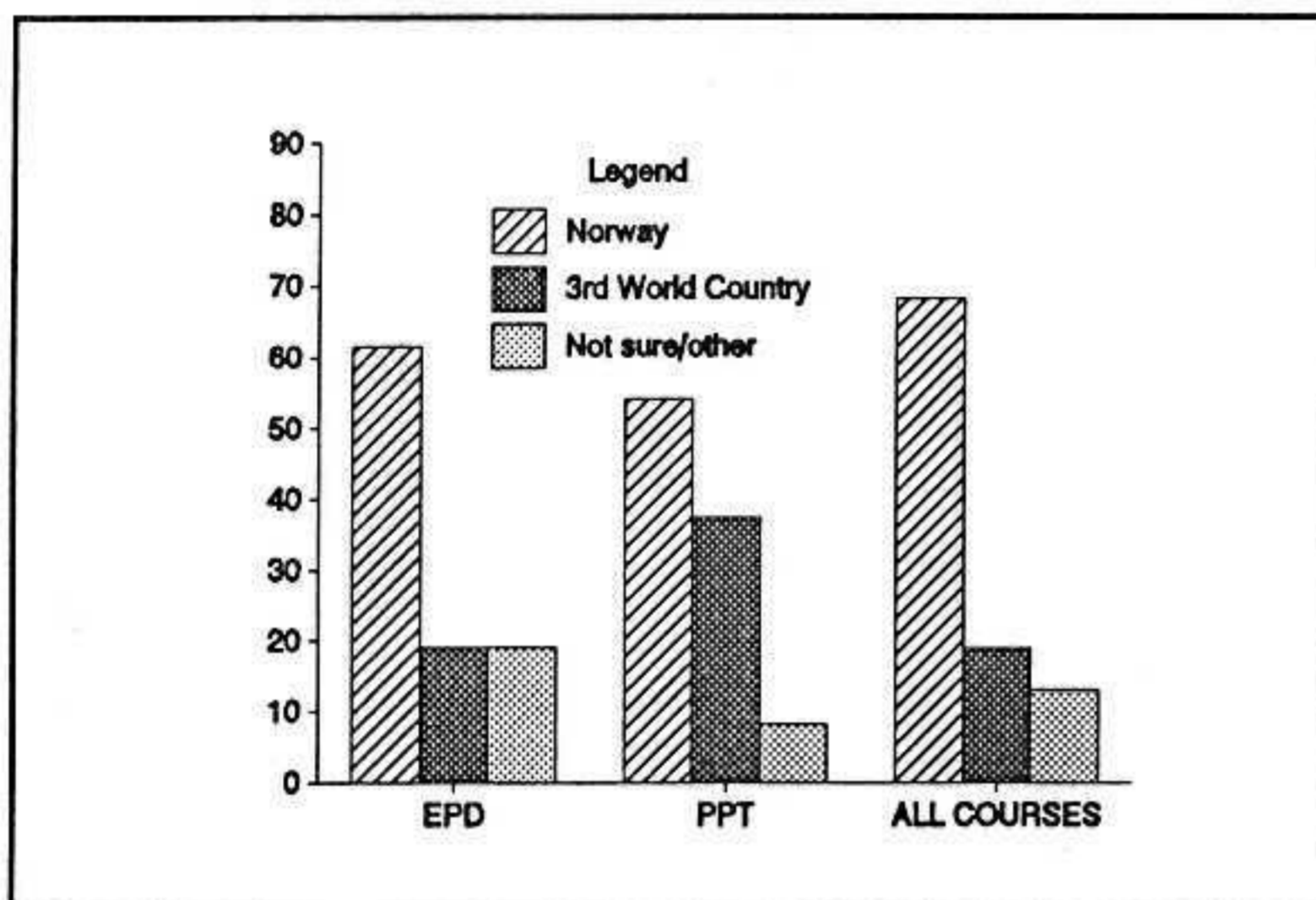


Figure A8.3: Preferred location of course. % of Present Participants.

The figure A8.3 presents results for EPDS, PPT and all courses (totally 281 respondents) for present course participants. Here category 2 and 3 in the answer alternatives are grouped together. As one sees PPT fellows seem to a larger extent than their colleagues in EPDS, and the average fellow from all courses, to prefer the course to be organised in their home country or another Third World country.

The most striking phenomenon is, however, the change of opinion over time (figure A8.4). Whatever reason, the tendency is more and more to favour courses to be organised in Norway.

Among the previous course participants 74% are in favour of having the course in Norway, 12% in their home country, 3% in other third world country and the rest is not sure. The differences in replies between the two courses are small. There is however a more significant difference between the males' and females' replies: For males 76% are in favour of Norway, but only 55% of the women give this answer. More than 27% of the women respondents are "not sure". Although the number of female

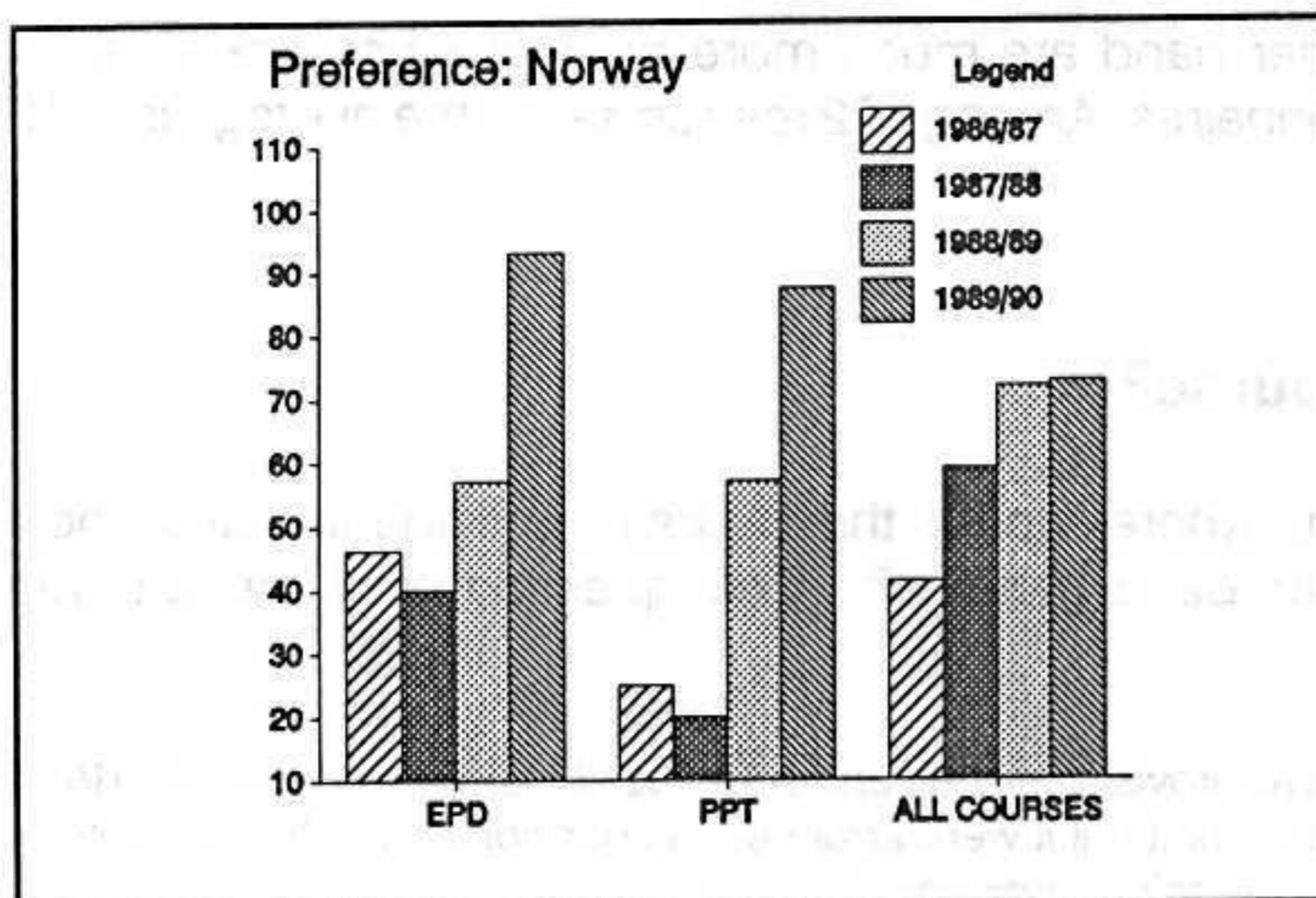


Figure A8.4: Preferred location of course in Norway - years. % of Present Participants.

respondents is low and that this can affect the statistics, there are reasons to think that these answers point to a question which ought to be studied: is it more in the interest of female fellowship holders to organise the course in their home countries, or neighbouring countries? Would the moving of the courses out to the recipient countries in itself strengthen the possibility of having more female applicants to the courses?

Given the chance to choose location of the courses, the employers also prefer Norway, although there are differences between employers of the two courses. EPDS employers seem, in comparison with PPT, to be more in favour of a local solution, with as many as 24% for arranging the course in home country, 5% in other 3rd world country and more than 9% "not sure".

A8.7 Relevance of Course

	Aver.	No.
HPD	3.95	43
EPD	3.96	57
PER	3.98	44
SLS	4.00	10
PPT	4.00	31
PRS	4.24	45
MCE	4.43	28
FBM	4.63	16
Total	4.10	274

Table A8.8: Usefulness for fellows' work of techniques learnt. Present Participants.

The course participants while in Norway are asked whether they think that the techniques learnt in the course will be useful in their work. Answer alternatives are from (1): "Not at all", to "very limited", "some", "rather much" and (5): "most useful". The results from 274 fellows' ratings are given in next table.

The tendency during the 4 year period seems to be relatively positive, i.e. the percentage of fellows replying "rather much" and "most useful" is increasing. The tendency is particularly significant for the PPT course where only 25% of the respondents answered in these categories in 1986/87, but as many as 87.5% in 1989/90. (For EPDS: 66.7% and 86.7% respectively).

The previous course participants seem to be even more positive in their assessment of "relevance of course for later work". On the scale from 1 to 5 the results are 4.36 for EPDS and 4.46 for PPT. The male participants of the EPDS course are more positive than the females, whereas in PPT there is no variation between sexes. But all

respondents in general terms find that what they have learned in the course is "rather much" or "very much" of relevance to their work.

The question to employers of course participants was formulated differently. They were asked to assess the degree of relevance of the course for the institution regarding technology level, appropriateness in relation to the day-to-day problems and to the resource base. (The last alternative seem to have been misunderstood by many respondents, and is not included in the results below.) Answer alternatives ranged from 1: "Not at all" to 5: "Large extent". In general the assessment made by employers are below that of the course participants, and the EPDS employers' ratings are slightly below PPT employers, but all ratings must still be said to be high.

The employers seem to find the "technology level" of the courses more relevant than their "day to day" appropriateness. But the number of respondents is small, and thus broad conclusions may be difficult to draw.

A8.8 Improvements/Changes as Effect of Course

The respondents were asked to mention improvements/changes in their work as a result of what they learned in the courses. Previous course participants were asked to answer the following question: "Please specify any improvement/changes in your institution that you would say are results of your advices, based on what you learned in the course".

There were 30 answers from PPT participants, (five respondents left the question open), two replied "no comments" and "no", and one said that "present job is irrelevant to the subjects I'd studied at PPT course." The rest are giving general or detailed replies, emphasising production increases, pollution control measures, introduction of new raw materials etc. The replies are presented in full text in text box.

EPDS respondents were more modest in their answers: Of the 64 fellows that had returned their questionnaires 13 left the question open, one answer is categorized as not relevant, eight answered negatively, i.e. for instance "there is no specific improvement/changes", "I can not specify", "I really cannot say this because I'm only a small part in the institution, I only do my best". 10 previous fellows stated that it was too early to specify concrete results. ("It will take time for getting result").

50% of the respondents (32 previous fellows) gave answers pointing at concrete or general improvements in their institutions. These replies are presented in text box.

It could be concluded from these replies that many previous course participants can show to specific improvements in their institutions as a result of the courses. These statements from the employees are in most cases confirmed by ratings to different questions by their employers.

However, the organisational structure of the PPT and EPDS institutions seem to be very different. EPDS fellows, more often than the PPT fellows, are not able to point at direct impacts and results. They are to a larger extent "small parts in a large system" – and this is often reflected in the questionnaires. PPT course participants seem more frequently to be working in smaller institutions, and they also seem to have stronger direct impact (more concrete and visual perhaps) on production processes, research and training. These organisational and structural differences in the two sectors make it unfair to compare survey results directly. But also within the two sectors, for instance the sizes of the production institutions varies much. And the considered impact of each previous course participant seem to a large extent to be a consequence of the size of the institution.

Positive environmental benefits are more often mentioned by previous PPT course participants.

PPT

Production increase – new technology

- Fibre savings from back water system, economical use of steam/condensate, good retention ensured of paper making materials etc.
- Improved effectiveness of the production & introduced new technology (2 replies)
- In cooking cycle, advises for separate cooking of raw materials
- Jute cooking conditions are changed as a result yield improved
- The quality of paper manufactured in my plant are much improved as I can take charge of the quality control section.
- Suggested for process improvement in pulping, e.g. E/O bleaching, Cl₂/ClO₂ bleaching
- A lot to deal with regarding quality improvement, capacity enhancement, trouble shooting and safety,
- Updated the methods of pulp evaluation and paper testing in laboratory
- Paper machine production increased, stock preparation improved
- Controls in Kappa numbers, especially when using hardwood
- Buying of a double disc refiner for refining virgin pulp
- Pulp (furnish) recipes and closed system set up,
- What I advised to the original employer – they have started to implement it after I left. With new employer I am initiating the research with paper orientation
- I brought CMP process to cooking the wood and new technology to improve research in pulping and paper making in my institute
- The quality of paper and board produced in our mill has been improved
- (together with 3 other fellows) – tried to produce mechanical pulp.....

Production increase and pollution/environmental control

- Earlier we were using 114% alkali on bad bagasse & 10% chlorine on B.D. Pulp for cooking and bleaching respectively, but according to my suggestion it reduces to 11% & 6% – saves costs and pollution
- Introduce a new fibrous raw material as Albesia
- Reduction of cooking chemical percentage in pulping and straw
- New fibrous raw material introduction in the company as Albesia, Kakuna instead of straw
- P & P testing procedures and quality standards, environmental monitoring and control
- 1. Use of H-factor (kraft pulping), 2. pulping with low sulphidity, 3....improving soda the pulping system

Cost reduction

- No expatriate consultants are engaged for planning and implementation of projects in paper sector, rather an own house team of experts has been organised for this purpose

Training others, better general understanding etc.

- Give lecture to student about paper properties, and improve the bleaching experiment
- It has improved my own teaching level; improvement in the area of fibre morphology and identification have been made
- Own new research agreement with other university unit
- Understanding of both theoretical and practical aspects have been most useful

Other answers

- "No comments", "no",
- No answer, (5 respondents)
- My present job is irrelevant to the subjects I'd studied at PPT course.

EPDS

Specific

- ...helpful in preparing specification
- Improving the distribution systems reducing voltage drop and in protection system using correct capacity relays etc.
- The construction of power lines and distribution of power supply etc., were substantially upgraded with the help of new technology gained through course
- Computer application
- Electrical losses control
- 1. Economic & technical evaluation of projects, 2. loss reduction programme
- 1. Selection of quality materials, revision of maintenance techniques and the end result was that the substations became very reliable. 2. Proper use of lightning arresters
- Partial/indirect of my advises: reduction of insulation levels and guard cable use
- Design criteria improvement
- We are more selective with the quality of material. That we are using computer age has now come to our institution
- Power factor correction as a primary tools for system loss reduction and substitution protection on the secondary side because of lightening phenomena
- Improvement in tech. support and training of coop personnel
- Fitting in IEC manufactured equipment into an electric system built according to ANSI standards; improved specifications of substation equipment; reduction of short circuit levels; better lightening protection for substations,
- Our lightening protection program is currently being reviewed by me to incorporate new developments in insulation coordination
- Extension of secondary sub stations in the main grid system
- Augmentation of power plant & synchronising with national grid system in the refinery
- To use correct equipment & protection settings
- Planning and design of distribution networks
- Formulation of proper maintenance procedures and routines for our high voltage transmission lines
- 1. Distribution system voltage reinforcement, 2...
- .. Data collection for town system to be used in load flow study..
- Concept about lightening protection of .. distribution system
- How to explain power lines failure or outage due to lightning phenomena
- Underground distribution power system
- Protection in the capacitor bank, insulation co-ordination and insulating material
- Insulation coordination, relay coordination

General

- I think directly and indirectly I have contributed some of my new ideas acquired during my course
- I use my knowledge not only learned in Norway but also in my college to do work
- It is difficult to list the various items, but it has been quite useful in the performance of duties related to myself in particular and to the authority in general
- Some design philosophies were changed
- To solve day to day eng. problems
- We are now planning and designing the distribution networks beforehand so that we don't get any problems during implementation

Negative replies:

- Not relevant (1 respondent), - No answer (13 respondents),
- Negative (i.e. "there is no specific improvement/changes" 8 respondents)
- "Too early to say" (10 respondents)

A8.9 Opportunity to utilize what learnt

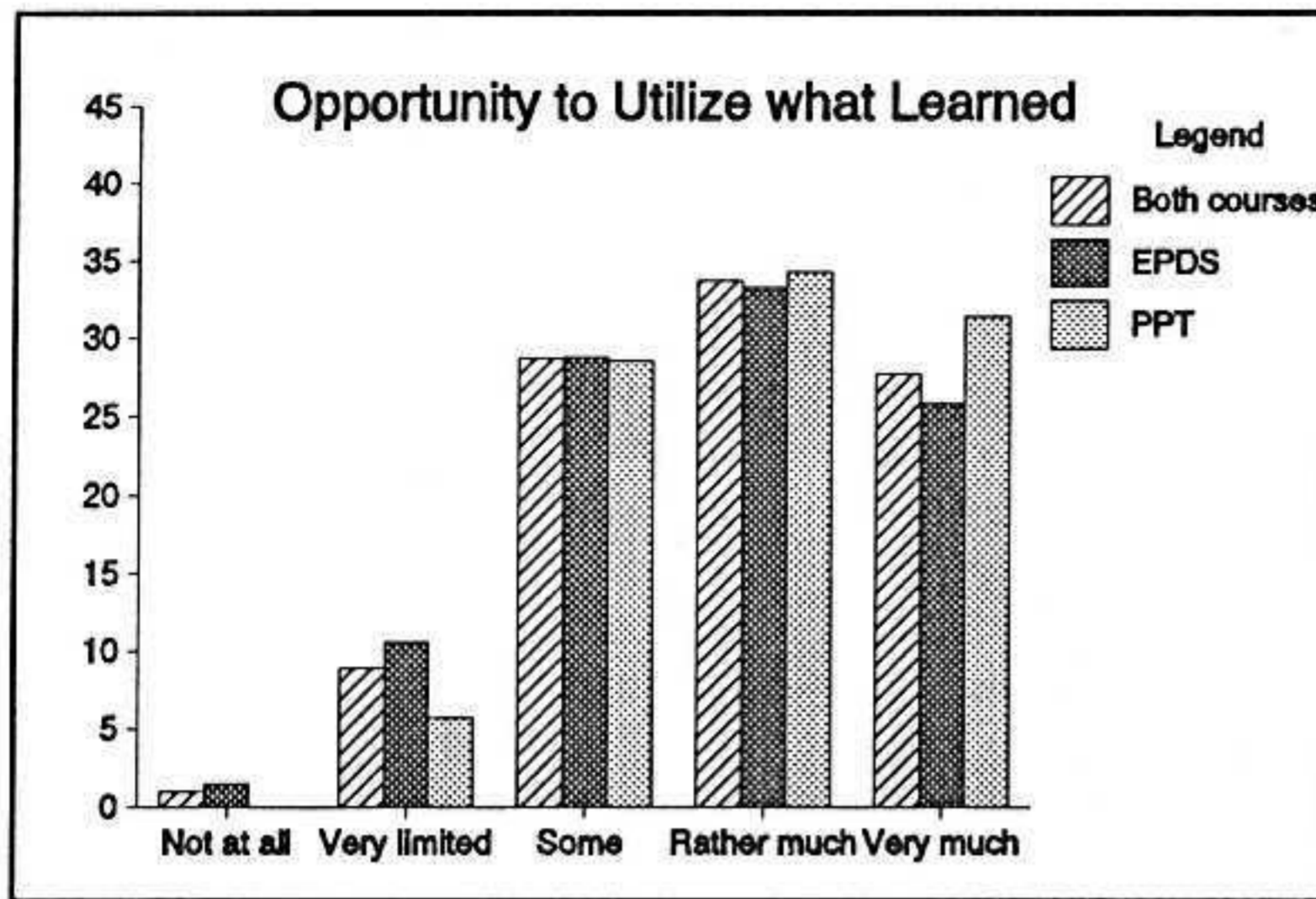


Figure A8.5: Opportunity to Utilize what learned In Course. Previous Participants.

Even though fellowship holders increase their technical knowledge in the courses, this will have little development effect unless they have opportunity to utilize this knowledge in their work. While previous course participants give very positive answers to the question about relevance of course for later work, they are much more critical when asked directly whether they in reality have been given the opportunity to utilize what they have learned. In average the answers fall

between the categories of "some" and "rather much". PPT fellows are most positive, with an average of 3.91. Female respondents are significantly more critical than the men. Although there are only four female respondents in the EPDS course, their average score is 2.75, i.e. between "very limited" and "some".

A8.10 Employers' Opinions of Impact on the Institutions

The employers were asked about their opinion on impact on the institution as a result of course participation. Six criteria were given:

- contributed with proposals and initiatives in general
- contributed in order to improve effectiveness of the production
- contributed to improve administrative routines
- contributed to introduce new technology
- been utilized to teach other employers, and
- contributed with proposals and initiatives in the field of environmental protection and control of pollution

The results are presented in table A8.11.

Criteria		Not at all	Very limited	Some extent	Rather much	Large extent
Proposals and initiatives in general	EPDS	0,0	9,1	36,4	27,3	27,3
	PPT	0,0	6,7	46,7	13,3	33,3
Improved effectiveness of production	EPDS	0,0	9,1	31,8	31,8	27,3
	PPT	6,7	6,7	46,7	6,7	33,3
Improved administrative routines	EPDS	0,0	22,7	54,5	9,1	13,6
	PPT	14,3	21,4	42,9	7,1	14,3
Introduced new technology	EPDS	4,8	4,8	42,9	23,8	23,8
	PPT	13,3	6,7	26,7	20,0	33,3
Utilized to teach other	EPDS	14,3	19,0	38,1	19,0	9,5
	PPT	0,0	12,5	18,8	43,8	25,0
Proposals initiatives /environmental protection, pollution	EPDS	10,0	45,0	20,0	20,0	5,0
	PPT	13,3	33,3	33,3	13,3	6,7

Table A8.11: Employers' assessment of Impact of Fellows. Per cent (horizontal).

It must be noted that the formulation "impacts on the institution" naturally will have an impact on the structure of the answers, in the sense that there are less chances that employers of large institutions to have significant impacts compared to smaller scale institutions.

The average scores indicate about equal assessment of the two courses regarding "proposals and initiatives" (3.73). EPDS employers appreciate previous course participants role to "improve effectiveness" slightly higher than PPT. The same is due for "improving administrative routines". This is given low weight in the PPT course: 2.86. However, regarding "environmental protection" the employers seem to find the role of previous course participants relatively marginal (averages 2.66).

A8.11 Opportunity to teach Others

The previous course participants were asked whether they "had opportunity to teach other employees about what you learned?". Answer categories are from 1: "Not at all", through "very limited", "some", "rather much" and finally 5: "very much". The results were averages of 3.33 for EPDS and 3.69 for PPT, much lower for the female participants of the EPDS course (2.00 compared to 3.42 for men) while the difference between men and women in the PPT course is insignificant. Again, one reason of these results could be that EPDS fellows more often than PPT come from large institutions with hundreds and sometimes thousands of employees. Female workers within PPT industry seem also to have a higher position in general, compared to the

EPDS sector. (More laboratories and research institutions?) The difference between employees in Sri Lanka and Tanzania is very small.

The employers were asked whether previous course participants have been utilized to teach other employees. Their replies confirm the findings referred to above; that there is a significant difference between the PPT and EPDS institutions in this respect. (Averages 3.81 and 2.90 for the two courses respectively).

A8.12 Impact on Career

Have the courses affected, in the opinion of previous participants, their career, advancements, salary levels etc? The score averages made by respondents to this question are identical in the two courses. But again there are differences when splitting for sex: Female participants in the EPDS course answer "no effect" more often than their female study colleagues in the PPT course. This again may be due to the same reasons as indicated above.

Also the employers are asked whether course participation in itself has affected their advancements and salary levels. The employers rate 2.68 and 3.25 for EPDS and PPT respectively. That is, there is a relatively large difference in the opinion of the employers also between these sector as to how the courses affect the career of employees. On the other hand, one can not make simple conclusions based on this. If it is so that participating in courses abroad leads to advancements, and perhaps change of work from technical to more administrative, this may have a negative effect on the industry. The courses' contents are basically technically oriented, and directed to the assumed need for technical knowhow at that level. The knowledge taught may not be relevant at higher positions in the institutions' hierarchies. The phenomena of employees position to be at the level above what they actually qualified for, is well known also in Norway and other industrialized countries. There are hardly any means to prevent this, and it is at least not the duty of the development assistance organizations to try to prevent it. What could perhaps have been done, however, is to strengthen aspects of administration/organisation in the course contents.

A8.13 Contact with Professional Milieu.

Strengthening of developing countries' institutions has more and more come into focus in the development debate. Establishing stronger contacts between institutions in Norway and in the recipient countries of development assistance can sometimes be a way to strengthen the latter institution wise. Contacts between institutions very often are initiated as a result of personal relations between individuals. The courses could be seen as a potential setting for establishing such relations.

In addition one of the arguments often heard in favour of organising NORAD courses in Norway is that the course participants will benefit from experiencing "industrial

efficiency", work morale etc. of the industrialised countries. A precondition is that the course participants really get a chance to see these qualities practised – in production, research or otherwise. The course participants are asked to what extent they have got in contact with a professional milieu that could be valuable for their further work in their countries. Answer alternatives from (1): "Not at all", "very limited", "some", "rather much" to (5): "very much".

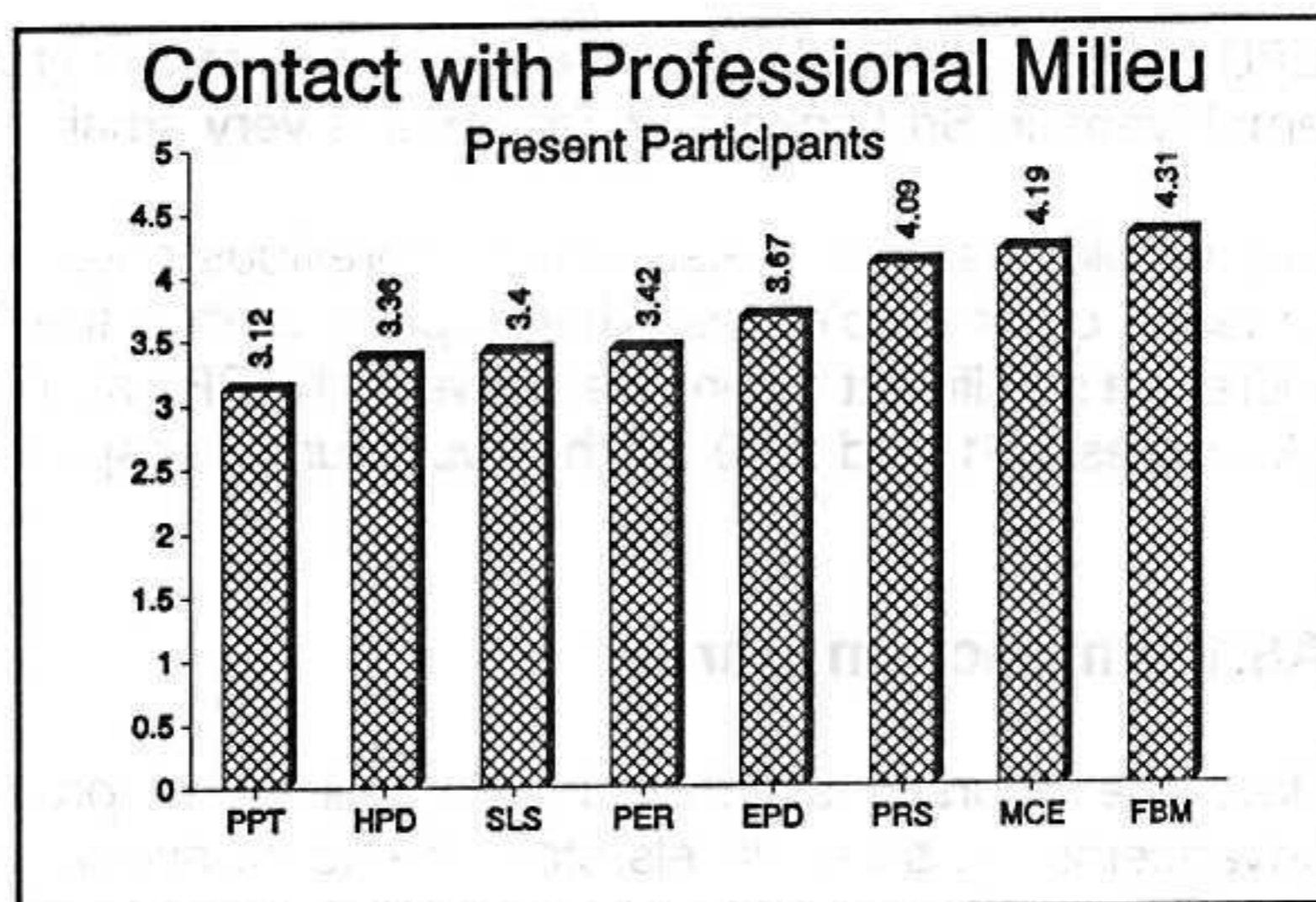


Figure A8.6: Assessment of Contact with Professional Milieu. Present Participants

As figure A8.6 indicates previous PPT course participants give lowest scores of all courses to the question. EPDS participants' score is as average of all courses. Also there seem to be relatively large differences between the courses in this regard. The results are of course dependant on what the participants consider to be "professional milieu". The FBM Course (Fisheries Biology and Management) is a mainly research oriented course, and the course is organised within the framework of one of the main Norwegian research institutions dealing with FBM-related activities. This could explain the high rating for this particular course. When PPT participants assess their contact with a professional milieu so low, it reflects their opinion about contact with paper industries and research institutions in Norway.

After the course, however, the assessments among the two groups of previous course participants are changed; the PPT fellows now have become more positive, EPDS, on the other side, more negative. The female respondents are significantly more negative than the males, (average of 3.18). There are also indications that the type of institution recruiting fellows have a say regarding assessment of contact with professional milieu in Norway; fellows from private institution (although few) have an average score of 4.14 compared to governmental institutions' low average scores of 3.38. Parastatal or semi-governmental institutions are in between. There are also significant differences between the two countries under special consideration in this evaluation: For the EPDS course, participants from Sri Lanka give a low score of 2.86, while their study colleagues from Tanzania are much higher: 3.64.

Concluding that the assessment among present and previous fellows is rather negative to the question of whether they have come in contact with professional milieus, it is not surprising to see that the employers also assess this element of limited value:

The employers are asked whether there are developed institutional cooperation/links between their institutions and institutions in Norway, as a consequence of employees participation in the courses. The replies are most often in "insignificant" or "very limited" categories. (Averages 1.50 for EPDS (!) and 2.06 for PPT). Thus one could say that the role and impact of the courses for establishing links with the recipient institutions are limited in general, although there are exceptions to the rule.

The first step in the process of identifying a problem is to define the problem clearly. This involves identifying the symptoms and the underlying causes of the problem. Once the problem has been defined, the next step is to gather information about the problem. This can be done through a variety of methods, including interviews, surveys, and observation. The information gathered should be used to identify the root cause of the problem and to develop a plan of action to address the problem.

Appendix A9

EPDS – Description of Subjects

A9.1 Basic Subjects

To provide a good basic knowledge some fundamental subjects are given in the Fall Term:

Subject/Description	Hours
Power System Analysis Includes the main subjects and calculating methods the engineer ought to know while managing an electric power system, and consists of three parts: Line Parameters Calculations of line constants, parameters and voltage drops, and establishing of equivalent circuits for transmission lines. Network Analysis Network equations, leading from component descriptions to a network description. Deriving the basic equations for a power network using matrix notation and matrix algebra. Introducing the concept of symmetrical components. Network equations are used to form algorithms for performing load flow analysis. Newton–Raphson and Gauss–Seidel methods are introduced. Project Work A project where each student run a separate load flow program on a computer.	(80) 8 48 24
Network Design Design of distribution networks on technical and economical basis. The introductory part describes the theoretical background, problem formulation and premises of distribution network design. The main objective is the presentation of an extensive investigation of both design of underground cable network in urban areas and design of overhead lines in rural areas. The analysis is mainly focused upon the low voltage network. Practical exercises and minor project works will be examined and discussed.	40

Subject/Description	Hours
Insulating Materials and Insulation Coordination	
Insulating Materials	22
A survey of gaseous, liquid and solid dielectrics. The subject deals mainly with electrotechnical characteristics and properties of the materials, such as breakdown phenomena, partial discharges, aging and lifetime, besides calculation of the stresses when used in high voltage apparatus.	
Insulation Coordination	22
A description of switching, lightning and temporary overvoltages and traveling waves. A detailed description of the construction and function of the surge arrester is given and the protection of transmission lines and stations against overvoltages is dealt with.	
Introduction to Computing	
35	
The aim of this course is to give an introduction to computing in such a way that the student can use it as an implementation in her/his work. It consists of:	
Basic Definitions	Data and information, computers, algorithms, flow charts, the binary system and programs.
DOS	The use of personal computers using the operating system DOS (Disk Operating System). The most important operating statements and commands, file conventions, naming conventions, the use of mass storage, single user versus interactive mode etc. are dealt with.
FORTRAN	Elementary programming development using the language FORTRAN 77.
Word Processing	A small course in how to use WordPerfect 5.1

A9.2 Applied Subjects

This part contains dimensioning and practical construction of different components in a distribution system, as well as layout of primary and secondary stations and on domestic and industrial installations. The subjects are all given in the Spring Term.

Subject/Description	Hours
Lines, Cables and Breakers	
Overhead Lines	16
A survey of overhead lines concerning types, plotting of profile, transportation of poles and materials, foundation, preservation, maintenance. A description of the design and dimensioning of conductors, insulators and towers with respect to stresses of mechanical, thermal and electrical origin is given.	

Subject/Description		Hours
Power Cables	A description of the different types of cables and construction, load capacity under different environmental conditions, practical considerations with respect to laying, terminations, splices and maintenance.	15
Switches and Fuses	A brief introduction to both load break and line switches and fuses. Both high and low voltage fuses are dealt with, their construction, application and selectivity criteria. The construction and design of different kinds of switches are covered, together with the selection, application maintenance and service experience for this type of switchgear. A background for the theory behind current interruption in general is given.	15
Power Circuit Breakers	A discussion of the range of technologies involved in a power circuit breaker design. With a starting point in the physics of circuit breakers arc, different types of breakers are presented. Weight is put on the choice of breakers and on supervision and maintenance.	8
Insulators	A short presentation of overhead line insulators, cable terminations and bushings. The insulator design is discussed and their characteristics described.	8
Stations and Electrical Installations		(63)
Stations I	A survey of the planning and design of a substation (132/22 kV). Some examples of switchgear layout, including metal clad SF ₆ switchgear, as well as reactive compensation equipment are briefly presented and discussed. Calculation of thermal and mechanical stresses on busbars under short circuit conditions is performed.	12
Stations II	A description of network stations and typical network configurations at medium voltage level. Configurations and transformer arrangements are presented for both overhead network and cable network systems.	8
Power Transformers	A short description of the construction of a transformer. The greater part of the course deals with the transformer as a component in planning, constructing and operating a station, including transport, maintenance and supervision.	12
Protection of Power Systems	A description of the basic principles for protection of power lines, cables and transformers, including the use of current- and voltage transformers. The usage and settings of different types of relays are described.	12
Installation Power Supply	A description of low voltage installations and earthing systems mainly in buildings. Some examples of power supply to industry and hospitals and buildings automation are given.	6

Subject/Description		Hours
Installation Telecommunication	A relatively broad introduction to installation of telecommunication, giving a systems approach to the topic.	4
Project Management	Introduction of basic problems of planning and conducting projects. International recommendations for " <i>Conditions of Contract for Electrical and Mechanical Works</i> " are discussed.	3
Remote Control	An introduction to remote control of mainly power transmission installations, such as power stations, substations, power lines etc.	

A9.3 Laboratory Work

Approximately one afternoon per week of the Fall Term is spent on laboratory experiments. Of five different assignments the students have to carry out two.

The experiments all deal with aspects covered in the Basic or Applied Subjects:

1. Traveling waves on transmission lines
2. Impulse voltage distribution on insulator strings
3. Current transformers and feeder protection by overcurrent relays
4. Basic data for power transformers
5. Fault finding on power cables

It is expected that the student will spend about 54 hours working with laboratory experiments.

A9.4 Individual Research Project

The subject of the project work may be chosen according to the interest of the student and his/her employer, or from a list presented by the course management.

At the end of the project period the student shall present a report which will be evaluated with respect to the system solution and the use of components.

The course management will establish contact with an advisor from the electricity supply, the power industry, a consulting company or a research organization with competence within the chosen area. The advisor will be available for discussions during the whole project period.

It is expected that the student will spend about 175 hours working with the project.

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