OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

United Nations Industrial Development Organization

Distr.
RESTRICTED

ID/WG.2/R.15
8 July 1967
ORIGINAL: ENGLISH

Workshop for Managers of Industrial
Research Institutes in Developing
Countries
Athens, Greece, 4 - 18 July 1967

AIMS AND ACTIVITIES OF THE ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

by Robert Major

Administrative Director of the Council

AIMS AND ACTIVITIES OF THE ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

by Robert Major

Adm. Director of the Council

Prepared for delivery at the Workshop for Managers of Industrial Research Institutes in Developing Countries,

arranged by the United Nations Industrial Development Organization in Athens 4 - 18 July 1967

.....

In this paper a description will be given of the aims and activities of the Royal Norwegian Council for Scientific and Industrial Research. This is a semi-governmental organization which, since the end of the last world war, has been charged with the task of promoting scientific and industrial research as a tool in the economic development of the country. Before describing the organization and its work I shall, as a background, give a brief description of the natural resources and economy of the country and the overall organization of scientific and industrial research activities.

National Resources and Economy

Norway has an area which is approximately as big as the United Kingdom or Italy, but its population is less than one tenth of theirs, that is 3,7 millions. Approximately 25 % of the country is covered by forests, but only 4 % is tilled soil, the rest being mountains, lakes, glaciers etc. The mountains provide some ores, mainly iron, copper and titanium, but what is more important today is the water power, the value of which has grown steadily during the last decades. Along the coastline there is a continental shelf with considerable fish and now also with possibilities for oil or gas.

The gross national product (G.N.P.) was in 1966 approximately 60 billion Norwegian kroner or about 8,5 billion dollars, and the average growth rate during the last decade has been approximately 5 %. Income per capita is considerably lower than in the United States and Canada, but compares favourably with most European countries.

From the table below you will see how activities calling for research and development contribute to the G.N.P.

Industry and Mining	25 %
Electricity production	2,5 "
Building and Construction	7,5 "
Shipping	10 "
Other Communication	6 "
Agriculture	4 "
Forestry	1,5 "
Fisheries	2 "
Others	41,5 "
	100 %

Compared to other industrialized countries I think there are particularly two characteristic features:

The one is the high contribution of electricity production. Thanks to our relatively cheap water power we produce more electricity per capita than any other nation, and the harnessing of water power has been the basis for relatively strong electro-chemical and electro-metallurgical industries.

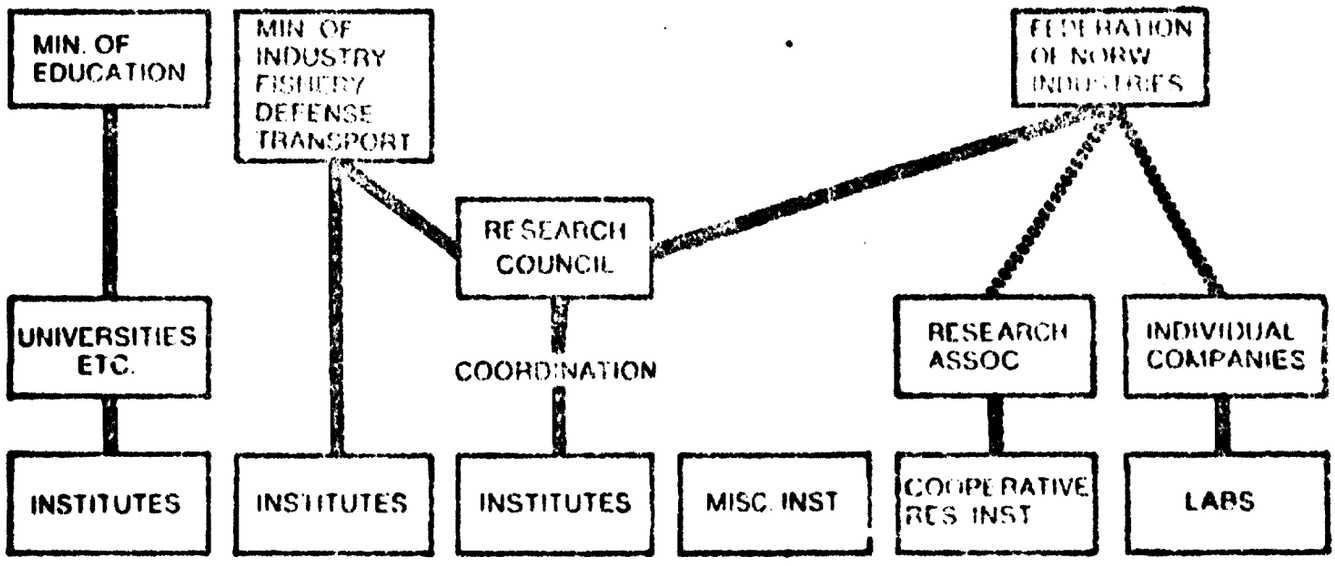
The other characteristic feature is the great contribution of shipping due to the fact that Norwegian shipowners operate nearly 10 % of world merchant shipping.

Apart from these two features the picture is not very different from the one you find in other industrialized countries. The tendency is for the contribution of the primary activities agriculture, forestry and fishing to decrease, whereas the contribution of service occupations increase correspondingly.

Overall Research Activity and Organization

The main types of research institutions and how they tie up with the general administration of the country will appear from the diagram in figure 1. The institutes shown comprise the universities, Government research institutes, research councils with their institutes, research associations and industry's own research laboratories. I will mention them all briefly.

Organization of Scientific and Industrial Research in Norway



TOTAL NUMBER OF PERSONNEL

Fig. No. 1

Universities

As in all other countries, the basic institutions for promoting science in Norway are the universities, which have the important function of training our scientists and engineers and are also responsible for the greater part of basic research.

There are in Norway two universities with science faculties, one in Oslo and one in Bergen. Further there is an Institute of Technology in Trondheim, which trains our engineers and an Institute of Agriculture just south of Oslo, both with university status. They are all state institutions financed almost exclusively over the state budget.

As in most countries the recruitment and training of a sufficient number of highly qualified scientists and engineers have become a question of primary importance both for research and for the utilization of research results in our economic life.

After the last war there were so many tasks of reconstruction that it was for a long time difficult to achieve the necessary support from Government for the building out of universities to meet the growing demand. As a consequence of this a considerable part of our engineering students had to go abroad for their education. During the last 20 years approximately 40 per cent of our engineers have thus been educated abroad. This has of course in many ways been a great help, but it has the drawback that approximately one third of these students have found their occupation abroad.

With regard to the scientific study the situation was different. Up until 10 years ago we had less than 100 new scientists a year, and this appeared to be much too low. In the middle of the fifties we therefore modernized the curriculum system for the study and spread brochures about the science study and future possibilities for scientists among the pupils in the schools. In the latter part of the fifties the number of freshmen for scientific studies thus quadruppled, and the bottle neck was now the teaching capacity of the universities.

At this time the situation in the country, and the education expotion which we experienced in other countries, convinced the Government that much higher priority had to be given to the development of the universities. In 1961 a bill suggesting the doubling of the university capacity thus

passed Parliament, and we have since then had a period of rapid university expansion. It is now fully recognized as a task of high priority to make sure that the universities can give a sufficient number of students an education of ever growing quality.

Government research institutes

In fields where there had been a national need for concentrated research efforts Government research institutes have been established. The oldest one is the Geological Survey in Trondheim studying our mineral resources. In Bergen there are two fishery research institutes, the one studying the life of fish and the other fish technology. Attached to the Ministry of Agriculture there are various institutes studying questions related to agriculture and forestry. There are also research units attached to the Government administration of roads, railsways and telecommunication.

The newest of the Government research institutes is the Norwegian Defence Research Establishment. The main activities of this institute are in the military field. Under its terms of reference it may also promote civilian production through research work of joint military and civilian character.

Research in industry

Since 1962 we have made detailed annual statistical surveys of the volume of research and development activities in industry. This survey shows that in 1965 out of approximately 19 000 bigger and smaller industrial units approximately 400 spent money on research and development. These industries spent in 1965 approximately 150 million Norwegian kroner or about 21 million dollars for research and development, of which 130 million Norwegian kroner was spent in the companies themselves, the rest invarious research institutes.

The activity is mainly concentrated in the bigger companies, and 50 % of the R & D work is concentrated in 17 firms. The most comprehensive research efforts are found in the electro-technical branch including electronics, and in the chemical and metallurgical branches.

The money spent corresponds to approximately one per cent of the value added by manufacture, which is on the lower side when we compare with the situation in the strongly industrialized countries. During the last years

there has, however, been an actual increase of approximately 10 % a year, which to some extent is believed to be due to the merging of smaller companies into bigger ones.

In some industrial branches there has been created research associations to undertake co-operative research for the companies in the branches. There are altogether 15 of them, and industry spends approximately 10 % of its R & D money in these institutes.

National research councils

An entirely new feature within Norwegian research organization was the establishment of research councils after the last war. There are three of them:

The Royal Norwegian Council for Scientific and Industrial Research, attached to the Ministry of Industry

the Norwegian Agricultural Research Council, attached to the Ministry of Agriculture, and

the Norwegian Research Council for Science and the Humanities, attached to the Ministry of Education.

They have the tripple task of promoting research, co-ordinating activities and initiating the development of an overall research policy within their fields.

You may be interested to know that an important source of income for the research councils, specifically for the two last mentioned, has been the profits of the Football Pools. The Football Pools were just after the war organized as a semi-governmental agency. According to the present rules 65 % of its revenue is distributed among the three research councils. This represents approximately 10 % of the overall national R & D expenditure.

Recently there has also been established a Ministerial Committee for Research, chaired by the Prime Minister with the Ministers of Finance, Education, Industry and Agriculture as members. This Ministerial Committee will deal with the main questions related to the overall science policy of the country. To advice this Committee there has been appointed an advisory committee, the so-called Main Committee for Norwegian Research, with 20 members mainly from research. It is as yet too early to know how this new committee will function.

Overall R & D Expenditure

Altogether we spend now annually close to 500 million kroner or approximately 70 mill. dollars for our overall research and development activities. This is close to 0,9 % of the gross national product. Approximately 70 % is spent in the scientific and industrial field, and from figure 2 you will see how this is distributed amongst the various types of research institutes and industrial laboratories. In the scientific and industrial field approximately 1/6 (19 %) is spent for fundamental research, approximately 1/3 (29 %) for applied research and about 1/2 (52 %) for development work.

The sources from which the money comes, have been illustrated in figure 3. You will see that by far the two most important sources are the state budget and industry. Each of them contributes approximately 43 % to scientific and industrial R & D. The rest comes from the Football Pools, from levies, foundations and sources abroad.

On the basis of this general picture I will now give a more detailed description of the Royal Norwegian Council for Scientific and Industrial Research.

Royal Norwegian Council for Scientific and Industrial Research

Just after the last war when we all realized that radical steps had to be taken to develop research activities in the country, the Government appointed a committee to make proposals regarding measures to be taken.

After having studied conditions in other countries and viewed various alternatives, the committee recommended the establishment of a research council with the task to promote scientific and industrial research and ensure that the results are being used in trades and industries.

This Council, which is called the Royal Norwegian Council for Scientific and Industrial Research, is an independent body, or if you will, a semi-governmental agency. As you will see from figure 4, it consists of 28 members of which approximately 1/3 represents interested government departments, 1/3 industry and shipping, and 1/3 research institutions, mainly universities. The co-operation of these three parties in the Council is considered as rather important and extremely useful.

From figure 4 you will also see how the Council is constituted and its various functions. I shall try to describe them briefly.

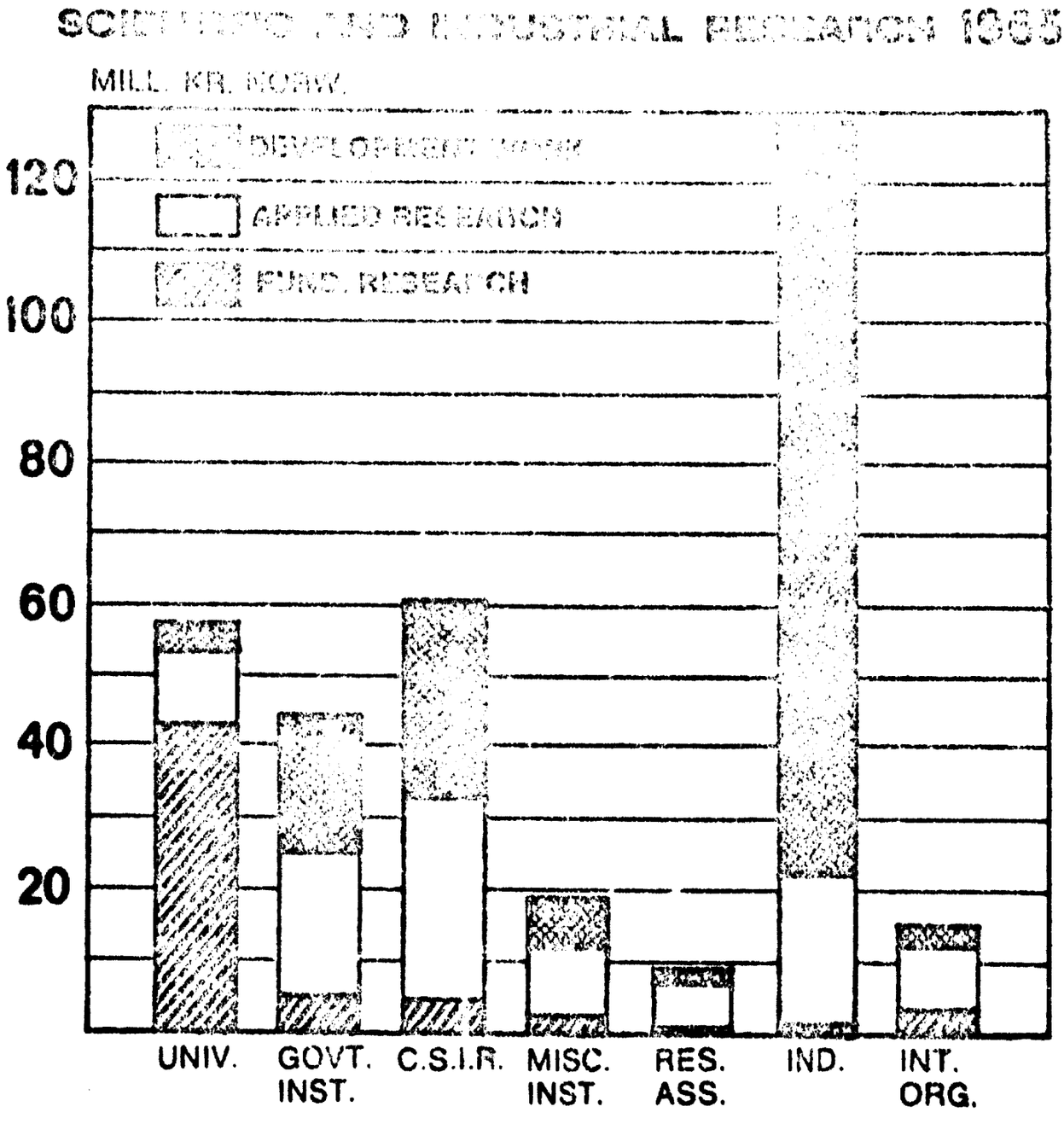

SCIENTIFIC AND INDUSTRIAL RESEARCH 1965
MILL. KR. NORW.
DEVELOPMENT WORK
APPLIED RESEARCH
FUND. RESEARCH
120
100
80
60
40
20
UNIV.
GOVT. INST.
C.S.I.R.
MISC. INST.
RES. ASS.
IND.
INT. ORG.

Fig. No. 2

Expenditure for scientific research and development in Norway 1962

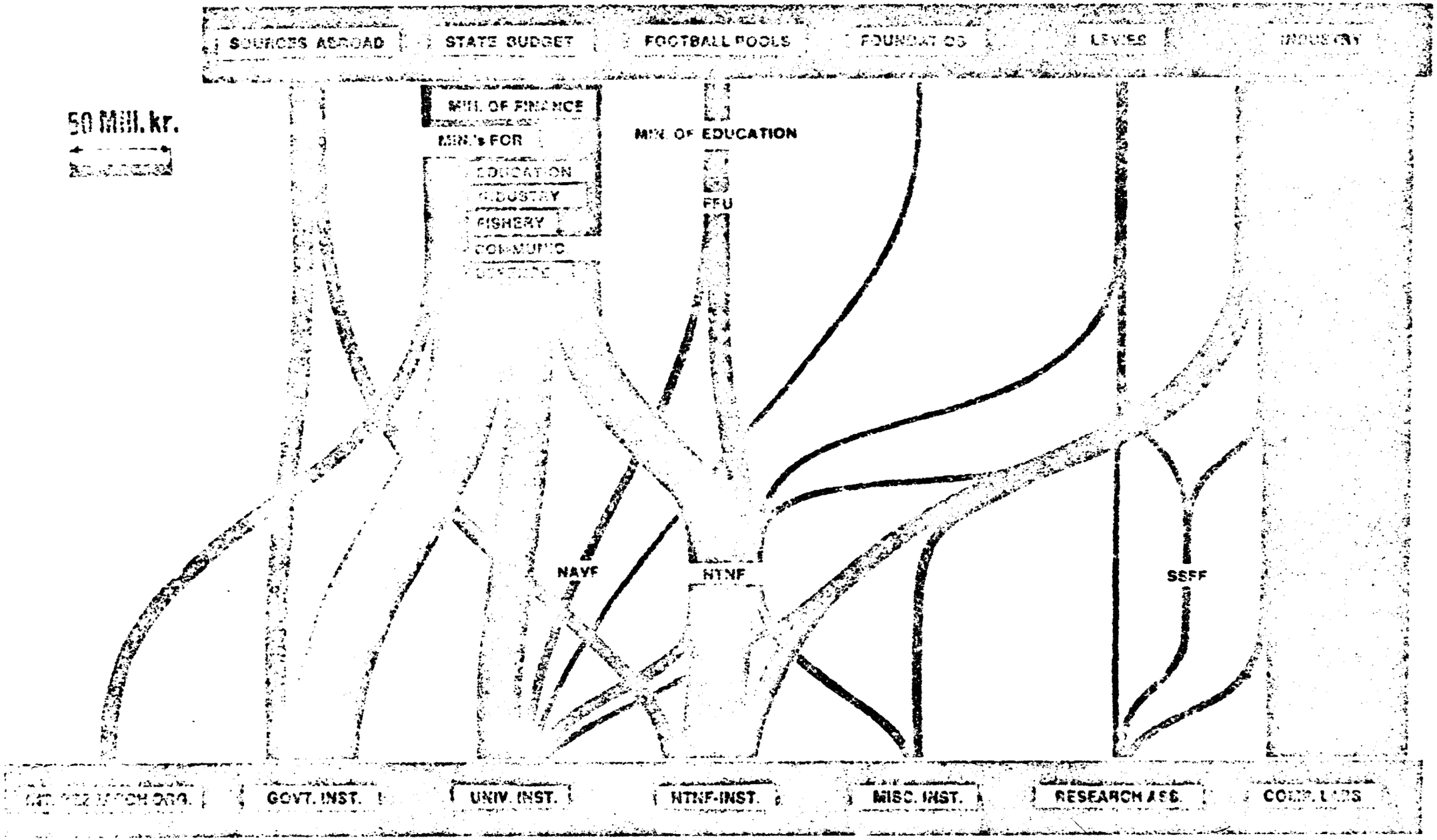
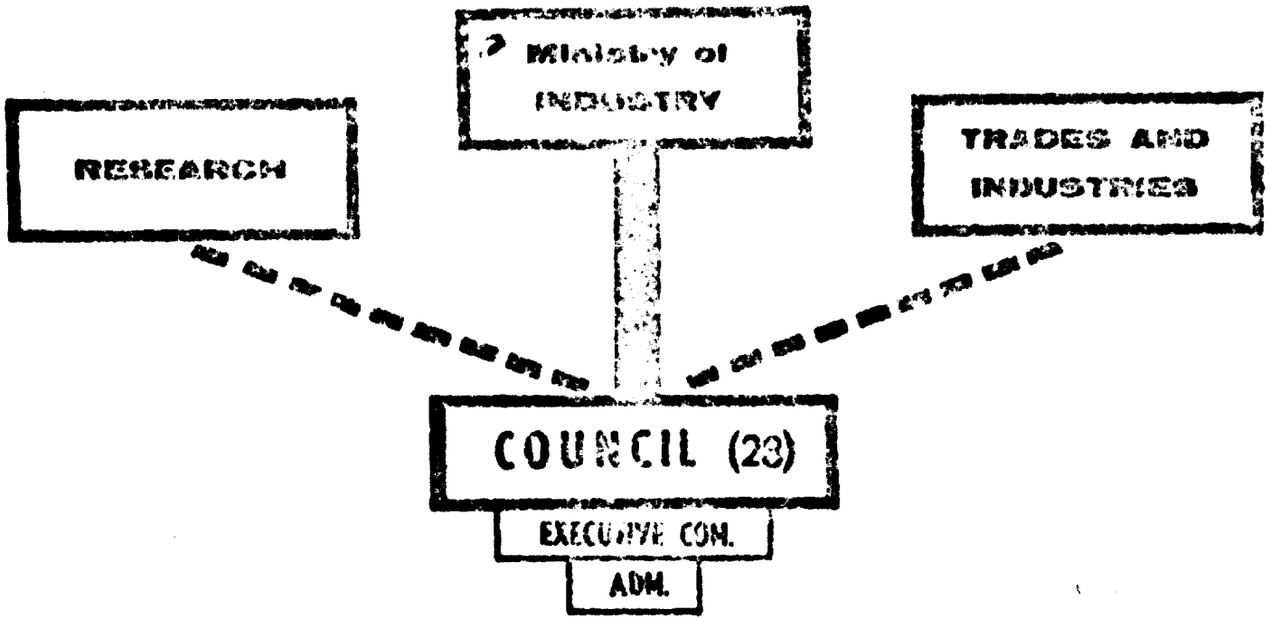


Fig. No. 3

ROYAL NORWEGIAN COUNCIL
for Scientific and Industrial Research



RECRUITMENT - GRANTS - INSTITUTES - COMMITTEES

STIMULATION - PLANNING - CO-ORDINATION

Fig. No. 4

The Council has been actively engaged in the recruitment-policy within its field of activities. It has made thorough studies of the demand for and supply of scientists, engineers and technicians, and has thus contributed greatly to the plans for the development of the science faculties, the Institute of Technology and the technical schools.

To encourage recruitment to research activities it has established fellowship programmes for advanced studies, and we have now reached the stage when approximately 50 % of all students choosing a research career can have a fellowship for at least one year's postgraduate study at selected institutes abroad. About 600 selected students have now had a fellowship for a year's advanced study abroad from the Council, and they play now an important part in Norwegian research activities. We consider this a very good investment, and have so far lost less than 5 % of the fellows to other countries.

There has recently also been established a postdoctorate fellowship programme for foreign scientists with a doctor's degree, whereby we have attached many distinguished young foreign scientists to our research institutes.

The second type of activity I would mention is the grant programme. There are at the universities usually professors and others who have got ideas and initiative to do much more than their part of university budget allows for. They can send in a programme to the Council and apply for a grant. The projects are evaluated and screened by committees, and the best are selected for support. In this way the scientific environment at the universities is stimulated. Little by little this grant giving programme has been supplemented by what I may call a research project programme. The projects are usually bigger programmes suggested by institutes for applied research or by the Council's committees. They are usually more comprehensive and of a more applied character. Altogether the Council now spends about 16 million kroner or nearly 2½ million dollars a year for this grant and project programme.

In fields of national interest where it was considered to be a need for a concentration of research effort over a longer period, the Council has established new research institutes. There are now altogether 18 of them employing some 1500 people of whom approximately 1/3 are qualified research workers. I cannot here go in detail, but I will mention some of the more important fields in which these institutes work.

In the industrial field the Council has established what we call the Central Institute for Industrial Research just outside Oslo. This is an institute for sponsored research, working on the same principles as for instance the Batelle Memorial Institute in Columbus, Ohio. The institute works under contract with various interested industries, and the sponsors of the research projects, who pay for the research work, have all rights to the results.

Two similar, but somewhat smaller sponsored research institutes, have been established independently of the Council in Trondheim and Bergen. All three institutes get a financial contribution from the Research Council. These three institutes together with the Research Associations which I previously mentioned, make up a system of applied research institutes serving all interested branches of Norwegian industry. Their combined volume of work is approximately 1/3 of the total research and development activities in the industrial companies.

As you will know, there have been discussions as to which system is the best, sponsored research institutes, mainly developed in the U.S.A., or co-operative research institutes mainly developed in the European countries. To my mind this question is not relevant. The co-operative research institutes work on problems of mut al interest to many companies, that is on problems open to the whole branch on which the various companies can agree to join forces. They also function as technical information centres for the whole branch. The sponsored research institutes, however, work on confidential basis for particular firms and are thus a link in a competitive system. They are in a way an extension of the companies' own research laboratories. The two systems complement each other and there is thus room for both.

Other fields where the Council has established research institutes are:

the building and construction branch, where there is one institute for building research, one for soil mechanics research and one for rock drilling problems.

the electro-technical branch where an institute to study problems related to production, transfer and consumption of electric energy has been established,

the shipping and ship building branch with an institute in rapid expansion,

the transportation branch with an institute for transport economy studying all kinds of transport.

There are also institutes of a more general character such as:

a computing centre with the aim of introducing the use of computers in administration, trades and industry, and

a central technical information unit for the development of information techniques and methods and general information activities.

The biggest of the institutes is the Institute for Atomic Energy. This has been a particularly vigorous institute. Because of our cheap water power and the hesitation of Norwegian industry to engage strongly in this field, it is, however, our intention in the coming years to give a relatively higher priority to the development of research activities in the other fields mentioned.

The establishment of the institutes mentioned above has usually followed approximately the following pattern: When the need for an institute has been recognized, a committee has been appointed to submit a plan for the institute. This plan has been studied and evaluated by the Council. If accepted, the work has started at a small scale. The speed of its development has been dependent upon the needs and the quality of the work.

All the institutes are controlled by the Council, which deals with their programmes, budgets, reports and accounts. They have, however, their own boards appointed by the Council, and are not under daily supervision of the Council. Within their terms of reference they are expected to take strong initiatives.

The most important decision when establishing such an institute is, no doubt, the appointment of the leader. If he is good, he will recruit the right type of personnel and make the institute a success. If he is not the right man for the job, there are, I think, small hopes for good results.

All the institutes, except the Institute for Atomic Energy, have an annual financial contribution from the Council which varies from 30 - 80 % of their overall budget, averaging some 50 %. The other 50 % are usually covered by research contracts with trades and industries, Government agencies etc. The contribution from the Research Council is used partly to build up a research potential or to solve longterm problems of a national character. The contract work is fully paid for by the sponsors.

The research programmes of the institutes are established on the basis of inputs from several sources. The majority of the ideas is usually put forward by the staff of the institutes on the basis of contracts with trades and industries, and the programmes are established after screening and evaluation by advisory groups of various types and in the end by the boards of the institutes.

The financing of the Council and its activities will be seen from figure 5. The main sources of income are the following:

1. The state budget. This income has grown continously and is now about 60 million kroner a year or approximately 9 million dollars. A part of this money is earmarked for atomic energy.

2. Football Pool money. As previously mentioned 65 % of the profits of the Football Pools are used for research, and the Council for Scientific and Industrial Research gets about 1/3 of this. The amount has grown, not fast, but steadily, and is now approximately 15 million kroner or 2 million dollars a year.

3. Levies. These are mainly levies put on building activities for building research and also on electricity production, of which electro-technical research gets a part.

4. Contribution from trades and industries. This is partly membership fees to various institutes and partly occational contributions.

5. Income from sponsored research. This is payment from trades, industries and Government agencies to the institutes for research contracts. As you will see, this income grows steadily.

6. Contributions from other countries. These are mainly contributions to joint projects in the fields of atomic energy and space research.

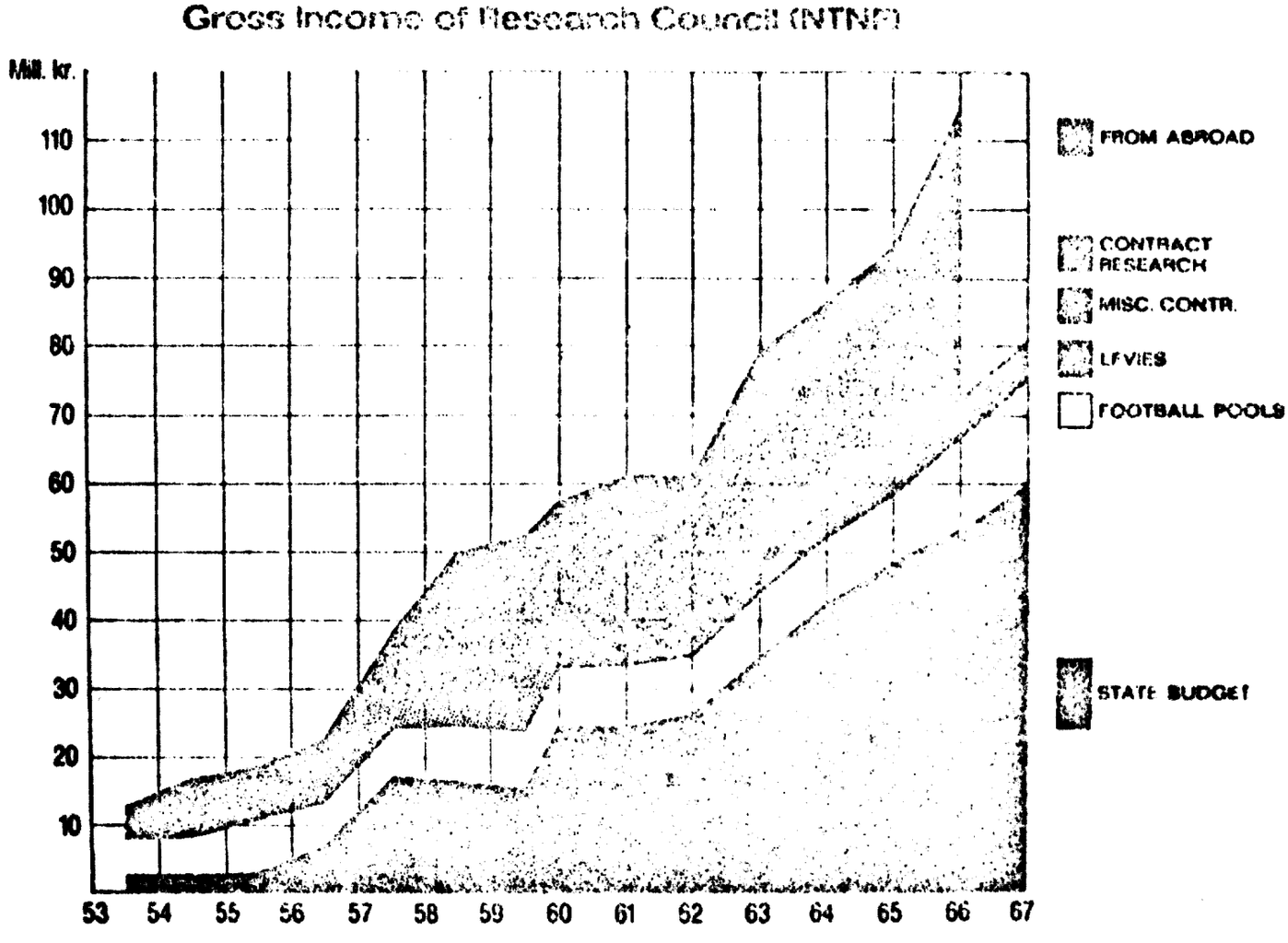

Gross Income of Research Council (NTNF)
Mill. kr.
110
100
90
80
70
60
50
40
30
20
10
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
FROM ABROAD
CONTRACT RESEARCH
MISC. CONTR.
LEVIES
FOOTBALL POOLS
STATE BUDGET

Fig. No. 5

Altogether the gross income of the Council and its institutes will this year be approximately 130 million kroner or approximately 19 million dollars. I think it is important to note that apart from the money for atomic energy and sponsored research, which is ear-marked, most of the money is at the free disposal of the Research Council for its various programmes. This gives great flexibility in the use of the money.

As you will understand from the above, there is great flexibility in the system. This applies also to the salary system, Being a semi-governmental institution the personnel is not civil servants and the Council has been allowed to develop its own salary system. This does not mean that the salary level is particularly high. The personnel is, as a matter of fact, paid slightly better than corresponding positions in universities due to the greater restrictions in the work, but somewhat lower than corresponding personnel in industry. The important thing is, however, the flexibility of the system which allows for the salary of each individual scientist to be determined not according to age or number of years of service, but according to the way in which he performs his duties. This flexible system also makes it possible for us to keep the key people which is so vital for the efficiency of a research organization. It is, however, an established policy that one of the tasks of the institutes is to train personnel for trades and industries, and when an institute has been well established, there is a policy that a certain number of personnel shall pass over to research or other activities in trades and industry or in university. The general turnover of personnel varies according to age and character of the institutes, but the average turnover is now approximately 12 % a year. This will probably increase somewhat in the coming years.

A very important part of the Research Council's work is the co-ordination of existing activities and planning of new ones. The boards of the institutes and a system of advisory committees contribute substantially in this work. There are altogether about 300 people serving on the Council, on boards and on the various committees. They are leading personalities from research,, trades, industry and Government and contribute very strongly to the work of the Research Council.

We believe very strongly that co-ordination must be done in a positive way. Very much can be achieved through proper planning and good exchange of information.

As an example of a co-ordinating measure I would mention the establishment of the Industrial Research Centre at Blindern just outside Oslo. Around 1950 both the Research Council and industry were establishing new institutes. In a small country like ours many of these would be so small that they would not be units, capable of effective research work if they were dispersed through the country. We therefore planned to get them together in a Research Centre. We chose to place this Centre in Oslo, which is the gravity centre of industrial activities, and got a site close to the science faculty of the University. This should facilitate contacts both with trades and industries and with fundamental research at the University.

As a nucleous in the centre we put the Central Institute for Industrial Research which I have already mentioned. At this institute we also placed expensive instruments and apparatus like electron microscope, spectroscopes etc. and organized work so that these could also be used by all the other institutes and interested industrial companies. The main building gave accomodation for the Central Institute, and all those institutes which were at the time so small that they wanted to hire their premises, altogether 12. The area was so big that these institutes could later build their own buildings leaving space in the main building for the others to expand.

Whilst we built up the buildings in the Research Centre, the institutes were started at a small scale in preliminary barracks at the university campus. Under these circumstances we recruited the nucleous of a staff from individuals who came to do a good job rather than to have a good position. We also made our beginner mistakes at a small scale.

In 1956 the first building was ready, and since then the centre has grown even faster than expected. There is now six big buildings in the centre, which have 20 institutes and approximately 1200 people. Some of the institutes are Research Council institutes, some belong to industry, but in the centre they all co-operate. It is easy for the people from different institutes to meet each other, and several of the projects are joint projects where two or more institutes are involved.

Forward planning and policy making have become an ever more important activity for the Research Council. As an example of this I will describe the work on a Research Report which the Council recently has prepared. The

report was made upon request from Parliament, which asked for a survey of all research activities in the scientific and industrial field, and plans for the future work.

The Executive Committee of the Council was made responsible for the report. They could draw on the advisory committees of the Council and appointed also some ad hoc committees. Altogether 22 sub reports were presented and some 250 people from research, trades and industry took part in the work.

In the report the role of research in a modern society and its importance for economic growth, social development etc. was first explained and emphasized.

Secondly research activities and its organization in various countries were discussed.

Thirdly a survey of research activities in Norway with statistical data was given. This showed that Norway spends only 0.9 % of its G.N.P. for overall research and development activities, whereas many industrialized countries now spend 1½ and 2 and up to more than 3 %. It was pointed out, however, that how much we should spend in our own country must be decided from an evaluation of the needs in our own trades and industries. In the next chapter of the report a discussion of our various trades and industries and their future potentialities was therefore given.

It was emphasized that the manufacturing industries in Norway yet to a great extent were based on the exploitation of raw materials with a relatively limited degree of refinement. As the possible increase in the supply of raw materials will be rather limited, and expansion of the manufacturing industries will have to take place mainly through the development of research based industries. Mechanical industries including electronics, electro metallurgical and electro chemical industry and fish processing were mentioned among those branches where the most rapid growth could be expected.

Regarding shipping it was mentioned that whereas boldness and commercial ability for many years had been the most important factors for shipping, we had now entered an era where the ability to exploit the technical development in shipping would be a factor of ever growing importance.

It was further pointed out that in the building industry it was an unwanted split between the projecting and contracting firms and too many firms were needed even for the errection of small buildings. There was not the right type of economic incentive for efficient building procedure. If all this could be corrected the possibilities for exploiting the results of modern technology in this important sector could increase considerably.

The transportation system was studied, and the need for cost analyses for the various types of transport was strongly emphasized.

In addition to these studies of the various trades and industries certain topics were made subject for special studies. The first was automation and the use of electronic computers. It was made clear that we were here just in the beginning of a development which could rationalize activities both in administration and in practically all trades and industries.

The second was Atomic Energy Research. As mentioned earlier, because of our abundance of water power and industry's reluctance to enter into the field, we decided at the present time not to increase activities in this field, but not expand them strongly.

Finally the danger of destroying our free nature through pollution of various types was described, and the need for more research activities to master those problems was emphasized.

On the basis of all these studies the report ended up with recommendations for activities in the research field which I will briefly summarize:

1. First of all it was pointed out that the structure of our research organization seemed to be fairly well fitted for our present activities and also for the expected activities in the nearest years to come.

2. The importance of education for research and use of its results was emphasized. It was strongly recommended that the plans which have been worked out for the development of the educational system should be followed up with great vigour. It was particularly mentioned that the curricula system will have to undergo a contineous change to meet the requirements of the future, and great emphasize was given to the stimulation of creativity in the educational system.

3. It was mentioned that even if most results of fundamental research from other countries were freely available, it was a necessary part of the nation's research activities. Fundamental research has a cultural value in itself, is necessary as a basis for higher education

and is a stimulus for applied research activities. It was mentioned that the relation between fundamental research and applied research in the country did not seem to be out of balance and that fundamental research had to be strengthened as part of the general expansion of research activities. High priority should be given to those branches of fundamental research which would support expanding applied research fields.

4. As for applied research and development activities it was underlined strongly that greater R & D activities in the industrial companies should be encouraged. To stimulate this development in industry three suggestions were made:

   a. A development fund with risk capital that could be placed at disposal for firms having valuable development ideas, should be established. The companies should be given loans with up to 50 % of the costs of the project. If the project was a success, it should be paid back with ordinary commercial interests. If the project was a failure, the loan should be waved. The fund will thus be a sort of risk bank, sharing risks with companies in their endeavours to develop new processes and products.

   b. It was recommended that Government agencies purchasing technical equipment should use research and development contracts to enable Norwegian industries to develop new products and thus compete on the markets. This should be done only in selected fields where the prospects for competitive production were good.

   c. It was also suggested that the Research Council, which had so far used its money only in research institutes, should be allowed to finance research projects also in industry or as joint projects between research institutes and industrial companies when this was the best way to build up new knowledge of national interest. The general results of this research, paid for with Government money, should be available to other interested firms.

5. It was further suggested that our system of applied research institutes should be further expanded, specifically in those fields where a strong effort for the various trades and industries was needed. In this

connection the need for an ever growing collaboration between research and industry was emphasized.

6. It was mentioned that in a small country most of the technological knowledge would come from other countries. There would therefore be a need for an expansion of our technical information system to make new knowledge available in the right form, for the right man, at the right time.

7. It was pointed out that a small country like ours could greatly benefit from international research collaboration, both between individuals, institutes, industrial companies and international organizations. It was, however, emphasized that international collaboration usually was very time-consuming, and that it would therefore be necessary to concentrate the work in the more important fields where effective methods of collaboration could be developed.

8. In the report it was further emphasized that for the results of the research activities to be transferred into products and processes there was a need for Government and organizations of trades and industries to prepare the ground for know how based industries and to accept and develop conditions which give research based industries the right conditions for growth. An adjustment to research based industries demands changes in organization, production planning and sales procedures and the establishment of a staff capable of transferring the results of research into production. Change must not be considered an enemy - it must be recognized as a difficult friend.

9. Finally it awas suggested that on the basis of the analysis made it was necessary to give research activities a new dimension. The limitation of the speed with which we could move would probably be restricted by the number of highly qualified research personnel available and the ability to administer big research projects. Taking this into account it was suggested that the national expenditure for research and development should be doubled over a period of 4 years.

This Research Report, which is the first real attempt in our country to harmonize research activities with the future needs of trades and industries in order to secure a satisfactory economic growth, got a verygood reception.

It met with support both from trades and industry and from research institutions and organizations and has recently been discussed in Parliament in a 9 hours encouraging debate.

Several of the suggestions put forward in the report have already been put to work. As an example I could mention the development fund, which has been established with a capital of 40 million kroner or approximately 6 million dollars, and has taken up its activities.

I think on the whole it is right to say that the Research Report has been an important step in our work to develop a well conceived national policy for the overall activities in the scientific and industrial research field.

To be able to meet the new demands coming out of the report, the Research Council is now building out its organization. The present set up will be seen from figure 6. The headquarters is being expanded considerably, the institutes developed and the system of advisory committees and ad hoc committees considerably strengthened. At the same time more responsibilities have been transferred from the Council to the executive committee and the H.Q. and further through the system. We are thus in a period of a re-grouping of our forces to meet the future challenge.

St. 2505
RM/MJ
8/7-67

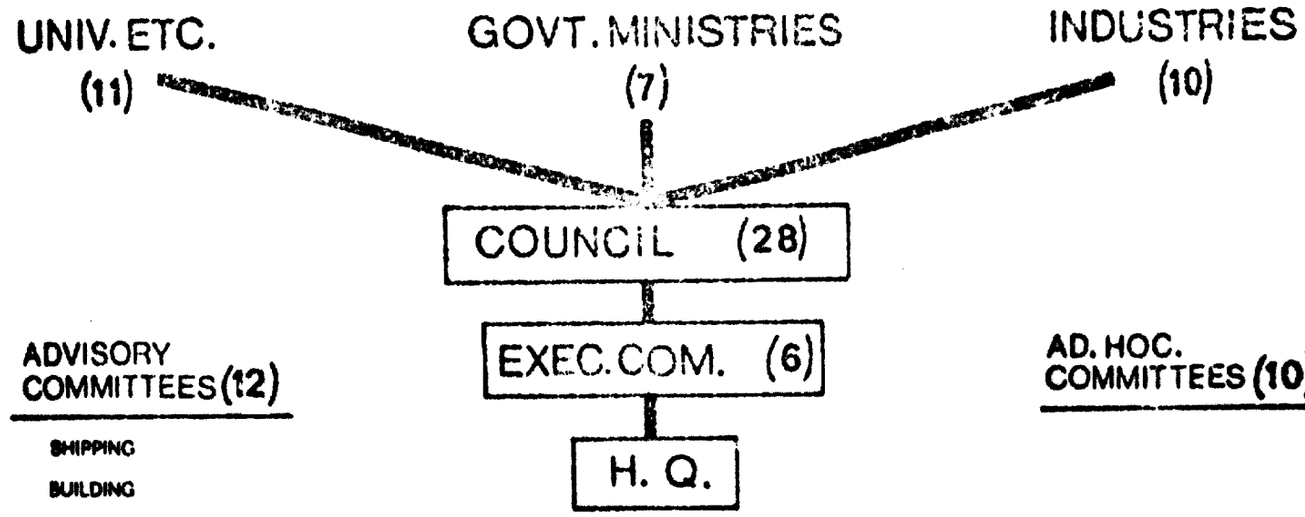
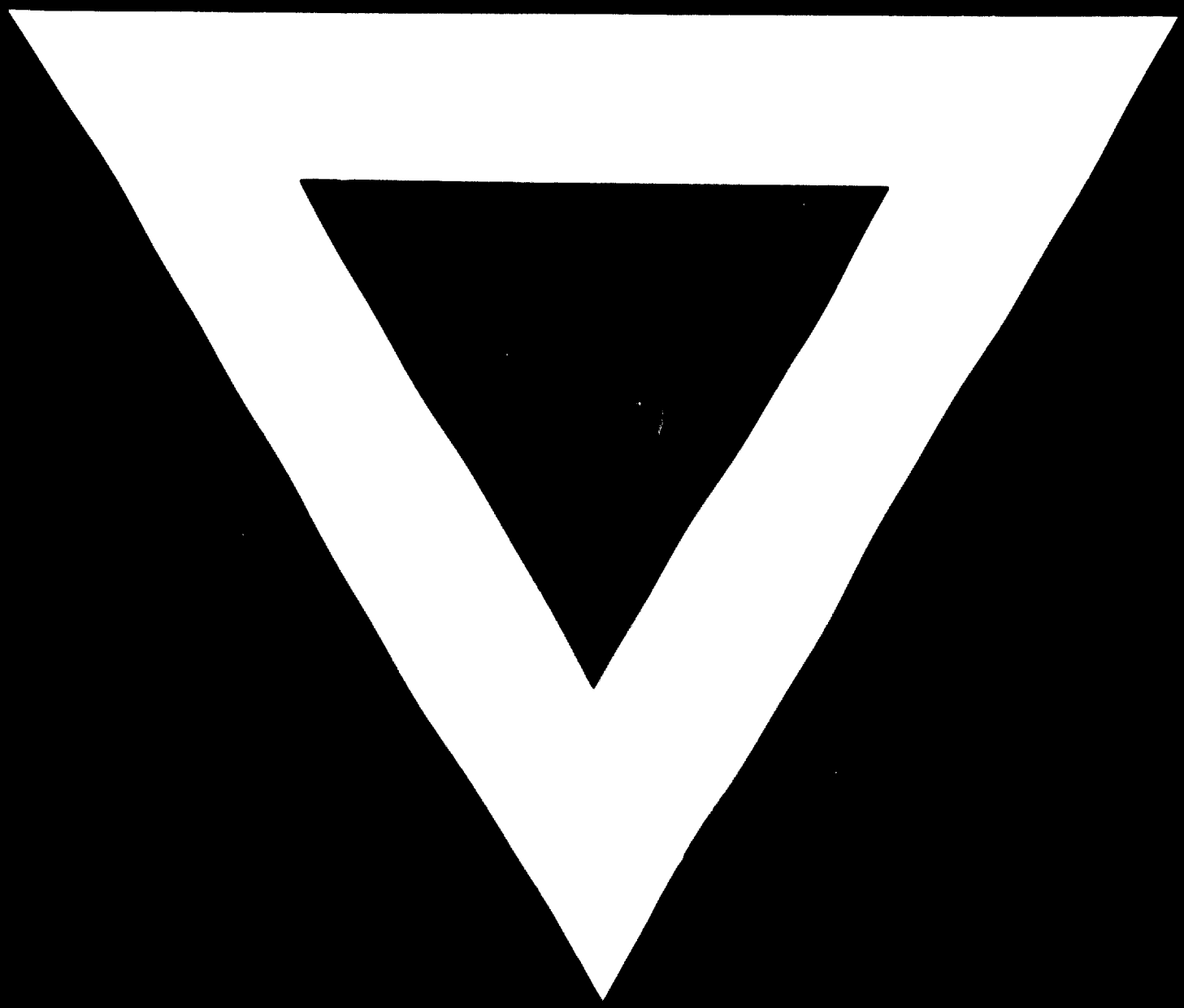

UNIV. ETC.
(11)
GOVT. MINISTRIES
(7)
INDUSTRIES
(10)
COUNCIL (28)
EXEC. COM. (6)
H. Q.
ADVISORY COMMITTEES (12)
SHIPPING
BUILDING
CHEMISTRY
METALLURGY
ENGINEERING
ELECTRONICS
AUTOMATION
ELECTRICITY
SPACE
PERSONELL
INFORMATION
AD. HOC. COMMITTEES (10)
INSTITUTES (18)
INDUSTRY (5)
BUILDING (3)
ELECTRICITY (1)
SHIPPING (1)
TRANSPORT (1)
ATOM. ENERGY (1)
POLLUTION (2)
MISC. (4)

Fig. No. 6



27.10.71