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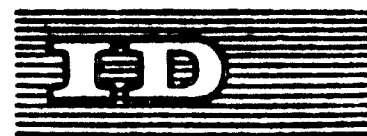
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CO-OPERATION AMONG UNIVERSITIES, INDUSTRIAL RESEARCH ORGANIZATIONS  
AND INDUSTRIES IN TURKEY ✓

by

T.G. Uras\*

\* Secretary General, Turkish Industrialists and Businessmen's Association

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1. It is no longer possible to waste resources. Ways of raising productivity such as improving the main processes through research and development, making the means of production compatible with the requirements of modern technology, improving the forms of production through the process of elimination, achieving better operational methods, putting organization, planning and control on a scientific footing and, finally, increasing the effectiveness of the work force, can only become successful if scientific methods are used.

2. It is well known that scarcity and wastage of existing resources are the two most important problems faced by developing countries. These are closely linked to the problem of productivity mentioned above. To neglect scientific data and to depend solely on traditional forms of production, not to apply technological developments and new inventions to industry, all play a significant role in the wastage of resources in developing countries.<sup>1/</sup>

3. While originally the aim of academic science was to transmit to later generations scientific data accumulated and developed through the ages and to build new syntheses, from the end of the 18th Century this aim was transformed into studying the unknown and to critically re-examining incomplete knowledge. The university of today differs from that of the past in that it plays a more significant role in society. Since Turkey must undergo industrialization in order to develop, it is absolutely necessary for industry to enter into an exchange of information with the universities and for both sides to co-operate over required research activities. Such co-operation can only be built up on the basis of research directed towards making a great contribution to the national economy.

4. In the sphere of science today research has become the perfect means of instruction. It is always possible to formulate concrete laws through simple scientific methods. Most of the problems facing Turkish industry can be solved through such simple scientific methods. In addition, these methods give quick results. Co-operation with industrial establishments and taking a leading role in research activities will help the universities not only to maintain a lively exchange with other institutions but also to continually regenerate themselves. It should also be noted that the level of development of a country is proportional to the funds assigned by it for research purposes. The value of research is further increased when the results of such research are discussed with those who will make use of them.

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<sup>1/</sup> See page 8.

5. Advanced industrial societies are now much more dependent on scientific research than they were previously.

6. Industrial research in Turkish universities is generally inadequate. It lacks co-ordination and does not meet existing needs.

7. Research and development units planned to be set up by public and private institutions are inadequate both qualitatively and quantitatively in creating a milieu of research and answering the needs of these institutions.

8. Before we start to analyse 'Co-operation Among Universities, Industrial Research Organizations and Industries' from the point of view of Turkey, it would be useful to explain certain terms and concepts specific to Turkey.

9. Regarding such co-operation, the attitude, behaviour and expectations of small-scale and medium-scale industries differ from those of large-scale industry.<sup>2/</sup>

(a) Small and medium-scale industries do not yet feel the need and usefulness of such co-operation. Even if they did, they have a limited capacity for taking advantage of it.<sup>3/</sup>

(b) Large-scale industry, like small-scale industry, does not generally feel the need for such co-operation. Even if it did, because the regular and formal channels do not exist, this co-operation could not be realized. <sup>4/</sup>

In this respect the following facts should also be taken into consideration:

- Because of the unorganized state of industrial research services throughout Turkey, some of the large industrial enterprises have set up their own research units for such services. <sup>5/</sup>
- Certain others buy these services from foreign countries either directly or indirectly.
- A few others try to obtain these services directly from unorganized but potential domestic sources.

10. Having distinguished small and medium-scale industry from large-scale industry, it is also necessary to distinguish between the research units serving these different sections. For example, it is difficult for small and medium-scale industrial enterprises to make use of the services of and to communicate with private and public research units established for universities and large-scale industry.

For this reason, a system of technical schools (educational units of a lower standing than universities) would better serve the industrial research needs of small and medium-scale industry.<sup>6/</sup>

11. Another important point is that in a developing country small, medium and even large-scale industrial enterprises are unable to define their industrial research needs even if they feel the need for them. As a result of this, industrial research establishments - universities and others - carry out their activities not according to demands put on them by industry but according to what they see as being the real needs.

12. At this point two restraints of a social nature should be mentioned:

- (i) When industrial research involves individual firms the question of industrial secrets arises. Taking an individualistic attitude, firms are very sensitive on this issue and avoid such research.
- (ii) As a result of the development of socialist tendencies and particularly anti-capitalist currents, members of university staff avoid such co-operation with industry for fear of losing face with the 'student body' and for fear of being dubbed as having 'sold-out' as a result of doing business with and receiving money from the big bosses and the capitalist sector. 1/

13. In addition, there are problems arising out of technical inadequacy, discontinuity in the flow of technical and economic information and problems of lack of responsibility:

- The proposals put forward by the universities and other industrial research institutes are generally unrealistic because they do not have first-hand experience of all the problems encountered by industry. This fact shakes the industrialists' confidence in such establishments.
- Universities as well as all other profit and non-profit organizations are responsible only for submitting their work to industry. However, the industrial enterprises who are going to implement these findings take on not just the profit but the risk involved as well. Consequently, research establishments naturally do not feel a real sense of responsibility and pressure of risk involved in the implementation of their findings. However, if research were to be carried out within the industrial establishments themselves the researcher would more keenly feel the responsibility for risks. 8/

14. Within these general constraints, the question of 'Co-operation among Universities, Industrial Research Organizations and Industries in Turkey' may be examined in two main sections:

- (1) Economic Research (including feasibility studies).
- (2) Technical Research.

15. The aim of such research is to enable the industrial entrepreneur to make the correct decisions and

- to ensure that optimum use is made of scarce resources;
- to prevent the misuse of resources;
- to achieve the best utilization of national resources and the country's potential;

and, so that the final goal of profit maximization can be reached:

- to make the correct decisions on investments, management and production;
- to operate at full capacity;
- to aim at perfection with regard to cost and quality so as to be able to enter into industrial competition.

16. Here we should note that in developing countries the functions of stockholder-entrepreneur-manager are combined in one person who lacks industrial information. Such persons or groups who would be expected to feel the need for industrial research, start off with good intentions but do not even know where, in what and how much to invest or which technology to use. For this reason feasibility studies must form the first stage of industrial research in developing countries. Naturally feasibility studies must cover technology which carries great weight in industrial research. 'Which technology should be used and why?' An entrepreneur or a group of entrepreneurs cannot be expected to act consciously on this question if they are new in the field. Yet erroneous decisions on this question will harm both the national economy and the success of the group of entrepreneurs themselves. The economy as a whole and not just the entrepreneur will have to foot the bill.

17. Therefore industrial research should be carried out at the outset and even considered as a basic component of the stages of economic research and decision-making and not just as a factor to be thought of after foundation.

18. In Turkey the questions of industrial training and research are dealt with separately. The problem of training in industry may be grouped according to its special features as follows:

- Continuous, regular industrial training
- A temporary need for special training necessitated by new technology being brought in from outside.

The technical school capacity in Turkey is sufficient for supplying the industrial sector with qualified workers.<sup>2/</sup>

19. The need for specialized training necessitated by new production technology is generally met in or outside the country by the firm exporting the machines either directly through courses or through on-the-job training.<sup>10/</sup>

20. We must here point out another important source of industrial research and training for industry - that of other industrial enterprises of a similar type. The most widely used method in Turkey is to employ the personnel of those Turkish or foreign companies producing similar goods and using similar technology or to obtain directly or indirectly their experience.

21. In Turkey it is not possible to draw a sharp dividing line between the economic and technical research provided by industrial research organizations. Yet it can be said that private establishments are generally organized in the form of economic research and engineering bureaus. Although the demand for foreign experts is not significant at present, with a view to the expanding market these firms are establishing direct or indirect links with foreign consultants' firms.

22. When they cannot solve their industrial research problems in Turkey companies turn to suppliers firms, from which they purchase machinery, or to these firms' Turkish representatives. There is potentially a large market in this field but at present demand, although high, comes only from the public sector. The services of foreign industrial research firms are hired for public infrastructure projects and for the planning, construction and production stages of State Economic Enterprise investments which call for new and imported technology. This has not been the case with private projects up to the present.<sup>11/</sup>

23. Therefore, excluding foreign industrial research organizations, those institutions operating in Turkey are listed below:

Industrial training and research institutions:

- technical trade schools
- universities<sup>12/</sup>

Research Institutes:<sup>13/</sup>

- public organizations
- non-profit research institutions
- commercial bureaus
- individual consultants.



24. The attitude of industry towards using these facilities is interesting. The state pushes and encourages and in many instances pressurizes small and medium-scale industry into making use of these available facilities.

25. Large-scale industry on the other hand is trying hard to have these services developed and especially to have the universities undertake industrial research and prepare educational programmes with industry in mind.

26. Within this uninstitutional system a significant amount of knowledge has been accumulated. For example, today Turkey has the industrial research and training potential for aiding other developing countries in certain classical forms of industry:

- Sugar factories
- Cement factories
- Textile mills
- Vegetable oil extraction machinery and plants
- All kinds of food production technology
- Iron and steel works up to 1 million tons
- All kinds of metal construction
- Shipbuilding
- Tractor and truck production (including casting and finishing of motor blocks)
- Hardboard production
- Production of small machines (universal lathes included)
- Ceramic products and sanitary ware.

27. Since in Turkey normal market conditions regarding industrial research have not yet developed, the prices of such services have not been fixed in the normal way.

A charge is made according to the type of demand. Recently universities have been fixing man/hour prices for their services.<sup>14/</sup>

28. What can be the contribution of international institutions (such as UNIDO) to the development of such services?

As a first step, an inventory is needed which will record the facilities as well as needs of various countries and this will provide the basis for such international co-operation. As a second step, a market should be set up where the needs and facilities can be exchanged. UNIDO can fulfil the function of such a market.

FOOT-NOTES

Explanations

1/ The III. Five Year Plan of Turkey.

2/ Contrary to traditional beliefs the university is not an institution which is separate and independent from the social structure, from the general level of the society and other social institutions. Its isolation as well as the inward-looking attitude of various of its faculties has resulted in the university being formed by outside pressure into a functional integration with society. In general the concept of the university, or rather the classical concept of the university has changed. In the framework of this development the university can be classified as follows:

The German University:

The German university was conceived as a 'free centre for pure research'. This type of university was created by Wilhelm von Humboldt. According to von Humboldt the university is 'an institution for scientific endeavour'. In founding the University of Berlin in 1809-1810 von Humboldt reconciled with a new humanism and absolute liberalism the principles on which the University of Göttingen was built in 1730. According to von Humboldt the university is an immaculate world of justice, virtue and beauty which ignores social pragmatism. This type of university which seeks pure truth without paying any attention to social needs is known as the 'Humboldt university'. It must be pointed out that such an institution which completely divorces itself from the needs of society no longer exists even in Humboldt's own country.

The American University:

The American university is conceived of as a real 'information production' centre. Setting out to serve not any certain group or profession but the whole of society, this type of university has the most advanced relationship with industry.

The Soviet Type University:

This type of university is in the service of society. The extent and areas of university-industry co-operation are determined by central planning and according to the requirements of the socialist economy. These two sectors, i.e. the university and industry, are considered to be two aspects of a single whole.

Others:

Apart from the German, American and Soviet type universities one could mention the British university which, although criticised for producing gentlemen only, is gradually being transformed into the American-type university and the South American university which is a fertile ground for political activity.

When universities are classified according to their ties with industry and when this classification is based on national lines, misunderstandings might arise. As a matter of fact, it is possible to distinguish between two types of university: those having the motto 'science for science sake' which ignore the needs of society and industry and are in search of the absolute truth, and those which are orientated towards the needs of the society and especially industry. According to this generalization those in the first category are said to be 'universities of general theory' and those in the second 'functional universities'. Even in Germany, the birthplace of the university, as a result of the university taking a closer interest in the dynamics of society, pure research of the Humboldt type has undergone a change in favour of the developing industry. As for France, after the May 1968 events Edgar Faure prepared the 'Guidelines for Higher Education Act' (dated 12 November 1968). Although setting out from the principle that the university exists only for the benefit of man and not for the benefit of the economy, to a great extent this Act incorporates the idea that the university and industry should come together. This idea was clearly expressed in Article 10 of the declaration 'Les Quinze Points de Caen' read at the Caen Colloquium which convened two years before the May events to reform higher education.

As we have shown above the concept of 'a pure science university' is now outdated having even been abandoned in its country of origin. The need to forge closer links between the university and industry and to develop these ties is felt not only in Turkey but also in industrialized countries undertaking new reforms. The enthusiasm of the Turkish industrialist for close ties with the university is an encouraging indication of the level of development of our industry. Because, such a need would not have arisen had there been no modern industry and had it not reached the stage of growth and expansion.

It can easily be seen to which of the above categories the Turkish university belongs. German influence played a dominant role in the foundation of the principal Turkish universities. They refused to take on the task of answering the demands and needs and of forging closer ties with industry. They were only able to establish local, partial and accidental links with industry. Although certain attempts were made in this direction by the universities, by industrial circles and even by the State, an institutional framework covering the whole of these relationships has not been created.

3/ When the Turkish Documentation Centre and the Management Centre were set up it was thought that small and medium-size industrial establishments would make wide use of their services. However, although they were encouraged and although these services were offered free of charge, they have not done so.

4/ It was not possible to institutionalize co-operation between the universities, research organizations and industries in Turkey. In order to overcome the problems arising out of this, in 1974 the Council of University-Industry Relations was set up. This council deals with the following matters:

- To make industry compatible with the developing modern technology, carry out studies on adequate academic formation of students.
- To ensure agreement and co-operation on defining staff requirements of the universities and industry and on the training of such personnel.
- To establish co-operation on research required by industry and universities.
- To act as a medium of information exchange between industry and the universities.
- To study the means of easy acceptance of new graduates by industry.
- To ensure the co-operation of industry with the universities in organizing industrial research.
- To get industry's economic and moral support for the universities and to take the initiative in the establishment of foundations, associations, etc. for that purpose.
- To organize conferences, seminars, courses, excursions, etc. on the related subject.
- Publish materials on important subjects and to support such publication activities.
- To undertake all activities which will serve the above purpose.

5/ Industry occupies a special place in research. Industrial establishments must carry out research themselves in order to develop or invent new technologies. Such research however is costly and requires teamwork and technical facilities.

Universities on the other hand possess laboratories as well as a staff of scientists and researchers for their work. Thus, the solution to the problem lies in the co-operation of the two sides. The number of industrial enterprises having their own industrial research units is limited. They are mostly firms listed among the 100 largest companies in Turkey. Their research units mostly work on quality improvement, product development and project development.

6/ A special programme was put into operation in 1965 in order to meet the industrial training and research requirements of small-size Turkish industry. Within the framework of this programme local technical schools were designated as project centres and the headmasters of these schools were appointed as project directors. Selected teachers attended special extension courses.

Common facilities and research equipment necessary for the needs of the local industry were supplied to the schools. In these schools special courses were organized for members of small-scale industry and teachers visited the plants outside school hours to help solve technical problems and to define research needs. A small number of industrial research cases which could not be handled locally were solved with the help of the facilities of the Ankara and Istanbul Universities.

7/ In recent years requests by industry to the universities have been limited to consultancy services and involved only such daily chores as analyses, material tests etc, which are far below the existing information and experience potential of the universities. The main reasons for this situation are the reservations of the industrialists about increasing their profits through research or their ignorance on this matter. In addition, many entrepreneurs make do with knowledge they have acquired from foreign sources and they prefer to turn to these same sources when their imported technical know-how becomes obsolete. Industry is thus made dependent on foreign countries. If an industry does not create and develop its own technology its chances of opening up to foreign markets will be limited and it will always be dependent on foreign countries for know-how and technology. We must therefore avoid extreme solutions and must make full use of the universities in industrial relations as they possess the widest knowledge and technology potential in Turkey. While continuing to use the consultancy services provided by the university staff, industry should also forge closer ties with the university when collective teamwork is required.

8/ Turkey has had some interesting experiences on this subject. When the economic research and engineering bureaus first appeared they declared that the projects for which they were commissioned to carry out feasibility studies were feasible and profitable. At the later stages of the projects when machines had been purchased and production had commenced they produced false results so as not to lose their customers. The unsuspecting and inexperienced entrepreneur was then forced to take on the ensuing risk.

9/ There are 195 men's trade schools and technicians schools in Turkey. Forty-three of the technicians schools are technical lycees, 7 are trade schools, 5 motor trade schools and 7 trade schools of other crafts. There are approximately 100,000 students attending these schools and approximately 20,000 students graduate every year. In Turkey there are 17 universities with various faculties spread over different areas of the country and 40 academies.

10/ According to Turkish Labour Law, all establishments employing more than 100 workers must provide training programmes. In addition the employer is obliged to grant leave at certain times to workers who wish to attend technical courses.

The Ministries concerned also organize special, temporary training programmes of short duration according to the requirements of local industry.

11/ Naturally companies with foreign capital can take most advantage of foreign industrial research. On the other hand Turkish firms generally use free of charge the industrial research facilities of foreign companies from whom they buy raw materials, intermediate products and machinery.

12/ Activities of The Turkish Universities on the co-operation with the industries

Name of the University Faculty or Institute	Industry-orientated studies within its capabilities			
	Project	Research	Test	Consultancy
	P	R	T	C
(a) Some examples of related Institutes (I), Laboratories (L) and Departments (D) of the Istanbul Technical University and its Faculties:				
<u>Faculty of Civil Engineering:</u>				
Hydraulics and Hydrokinetics (I), Building Materials (L) Building Elements and Machinery (L), Environmental Sciences and Technology (L), Hydraulic Structures (I).	P	R	T	C
<u>Faculty of Architecture:</u>				
Structural Research (D), Town Planning (I)	P	R	T	C
<u>Faculty of Mechanical Engineering:</u>				
Research on the Technology and Economy of Heat (D), Materials and Forms of Production (I), Motors, Motor-driven Vehicles and Traffic (I), Test and Research Centre for Agricultural Machinery (I), Machine Components (L), Metallography (L), Material Tests (L), Pressurized Gases (L), Motor (I), Hydro-mechanics (L), Machine Tools (L), Air Conditioning (L), Temperature Measurement (L), Aircraft, Air Tunnels (L), Textile Test (L), Agricultural Machinery (L), Heat Transmission (I), Automatic Control (I).	P	R	T	C
<u>Faculty of Electrical Engineering:</u>				
Applied Electrics in Industry (I), Electromechanics (L), Electrometry (L), Electrical Plants (I), Illuminations and Wiring (L), Energy Transmission (L), Electroacoustics (L), Telecommunication (L), High Frequency (L), High Tension (I).	P	R	T	C
<u>Faculty of Metallurgy:</u>				
Flotation (L), Metallography (L), Pyrometallurgy (L), Pit Props and Mining Machinery (I), Security and Ventilation in Mines (I), Spectral Analysis and Spectrophotometry (L), Drilling Geology (I), Casting (L), Electrometallurgy and Hydrometallurgy (L), Mechanical Tests (I), Ceramics (L), X-rays (I), Plating and Corrosion (L), Hydrogeology (I).	P	R	T	C

Faculty of Chemistry:

Organic Chemistry (I), Inorganic Chemistry (L), Analytical Chemistry (L), Physical Chemistry (L), Industrial Chemistry (I), Physics (L).

R T C

Faculty of Engineering and Architecture:

Electrometry (L), Illumination (L), High Frequency (L), Soil Mechanics (L), Materials (L), Inorganic and Analytical Chemistry (L), Physicochemistry (L), Unit Operation (L), Organic Chemistry (L), Mineralogy and Mine Deposits, Industrial Chemistry (L).

P R T C

Faculty of Shipbuilding:

Ship Design Model Tests (L): This laboratory contains two test tanks where all academic work can be carried out and the needs of industry met. Ships (I).

P R T C

Faculty of Fundamental Sciences:

Optical Physics (I), Mechanics and Heat (L), Electrics (L).

P R T C

The Turkish Technical Information Centre:

C

(b) Istanbul State Academy of Engineering and Architecture

Department of Mechanical Engineering:

Materials and Measurement (L), Production Techniques (I), Machine Tools (L), Motors and Motor-driven Vehicles (L), Ship and Ship Engines, Fluid Mechanics (L), Heat Process (L), Heating, Ventilation and Air Conditioning Plants (L), Energy and Machines, Industrial Engineering and Economics of Management, Mechanics Resistance, Machine Parts and Mechanisms; Automatic Command and Control

P R T C

Department of Electrical Engineering:

Applied Electrics in Industry (I), Electrical Machines (I), Electrometry (I), Electronic Equipment, Energy Transmission, Telecommunication, Use of Computers in Industry (L), High Frequency (L), High Tension (L), Electronics (L).

P R T C



Department of Cartography and  
Cadastration:

Cadastral Law and Technology,  
Planimetry, Physical and Mathematical  
Geodesy, Photogrammetry (L).

P R T C

Department of Civil Engineering:

Building Materials (L), Geology (L),  
Soil Mechanics and Foundation  
Construction (L), Steel and Wood  
Construction, Hydraulics and Hydraulic  
Structures (L), Solid Structures,  
Highway Construction, Ecology (Land  
and Sea).

Department of Architecture:

Construction and Building Technique,  
Interior Decoration, Town Planning,  
Architectural Development, Industrial  
Architecture, Acoustics and  
Illumination (L)

P R T C

Fundamental Sciences:

Industrial Mathematics and Applied  
Mathematics in Industry, Chemical  
Analysis and Physical Measurements.

R T C

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(c) Middle East Technical University,  
Departments of Civil Engineering,  
Metallurgy, Industrial Engineering,  
Applied Mathematics, Environmental  
Engineering and the Institute of  
Business Administration and  
Management Systems.

P R T C

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(d) Boğaziçi University, Departments of  
Physics, Chemistry, Applied Mathematics,  
Data Analysis.

R T C

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(e) Hacettepe University, Faculty of  
Engineering, Institute of Technology

P R T C

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(f) Ankara University, Science Faculty,  
Organic Chemistry Research Institute  
Faculty of Law

R T  
R C

(g) The Aegean University Science Faculty, Departments of General Physics, Experimental Physics, General and Analytical Chemistry, Organic Chemistry, Astronomy, and Institutes of General and Systematic Botany. Faculty of Agriculture, Departments of Textile and Leather, Vegetable Foods, Agricultural Machinery and Equipment, Food and Fermentation Technology.	P	R	T	C
(h) Istanbul University, Faculty of Business Administration	P	R		C
Faculty of Law		R		C

13/ Non-Profit Institutions, who has activities on the co-operation among  
universities, industrial research organizations and industries in TURKEY

- I. Turkish Technical Information Centre (1952)
- II. Business Administration Faculty, Extension Services (1963)
  - Business Administration Institute
  - Management and Organization Institute
  - Marketing Institute
  - Financial Auditing Institute
- III. Public Institutions
  - Turkish Scientific and Technical Research Institute (1963)
  - Marmara Scientific and Industrial Research Institute
  - Priministry State Planning Organization (1960)
  - Turkish Standardization Institute (1960)
  - State Statistical Institute (1962)
  - National Productivity Center (1965)
- IV. Professional Institutions
  - Union of Chambers of Commerce, Industry and Commodity Exchange
  - Istanbul Chamber of Industry
  - Chambers of Engineers and Architects
  - Trade Unions
- V. Associations and Foundations
  - Turkish Industrialists and Businessmen's Association
  - Economic and Social Studies Conference Board
  - Economic Development Foundation
  - Turkish Management Association
  - Turkish Management Foundation
- VI. Others
  - Turkish Automotive Manufactureres Association
  - Turkish Economic Researches Foundation
  - Hacettepe University Research Center Foundation
  - Turkish Development Foundation for EEC Studies

14/ In 1975 the Middle East Technical University received around \$17,000 in fees for applied research projects.

The Boğaziçi University charges an approximate fee of 30 per man/hour for research projects.

In addition to these facilities, Istanbul Technical University has large research laboratories operating under its various departments.

Until a few years ago relations between the Technical University and industry were mostly confined to small-scale work such as quality control experiments, checks etc. In recent years there has been a large increase in the scientific and technological research carried out in connexion with large public projects. These include hydraulics research and studies on various dams, breakwater studies and model tests for various harbour projects in Turkey and Libya, operational research for large industrial undertakings, transportation studies on Turkey's railways, waterways and lakes, pipeline studies and studies for the Turkish shipbuilding industry on naval and merchant ships. It is quite clear that the economy will gain significantly from a well built breakwater which functions properly. A special ship design developed through research will reduce energy consumption by 10 per cent, saving 3.5 - 5 million TL a year. Yet the cost of this research would not exceed TL. 50,000. Studies on the pollution of five major harbours and their environments are at present in progress at the Istanbul Technical University.

Members of staff at the Ankara Middle East Technical University may accept projects from public or private organizations on the basis of a protocol drawn up by the university. A proportion of the earnings received for the project may be paid to the members of staff, their assistants and technical personnel working on it. The share received by the university is calculated according to the use made of its buildings, laboratories and equipment.

The table below gives the number of applied research projects contracted in each year and the total cost of the projects thereby giving an indication of development since the regulation was put into operation.

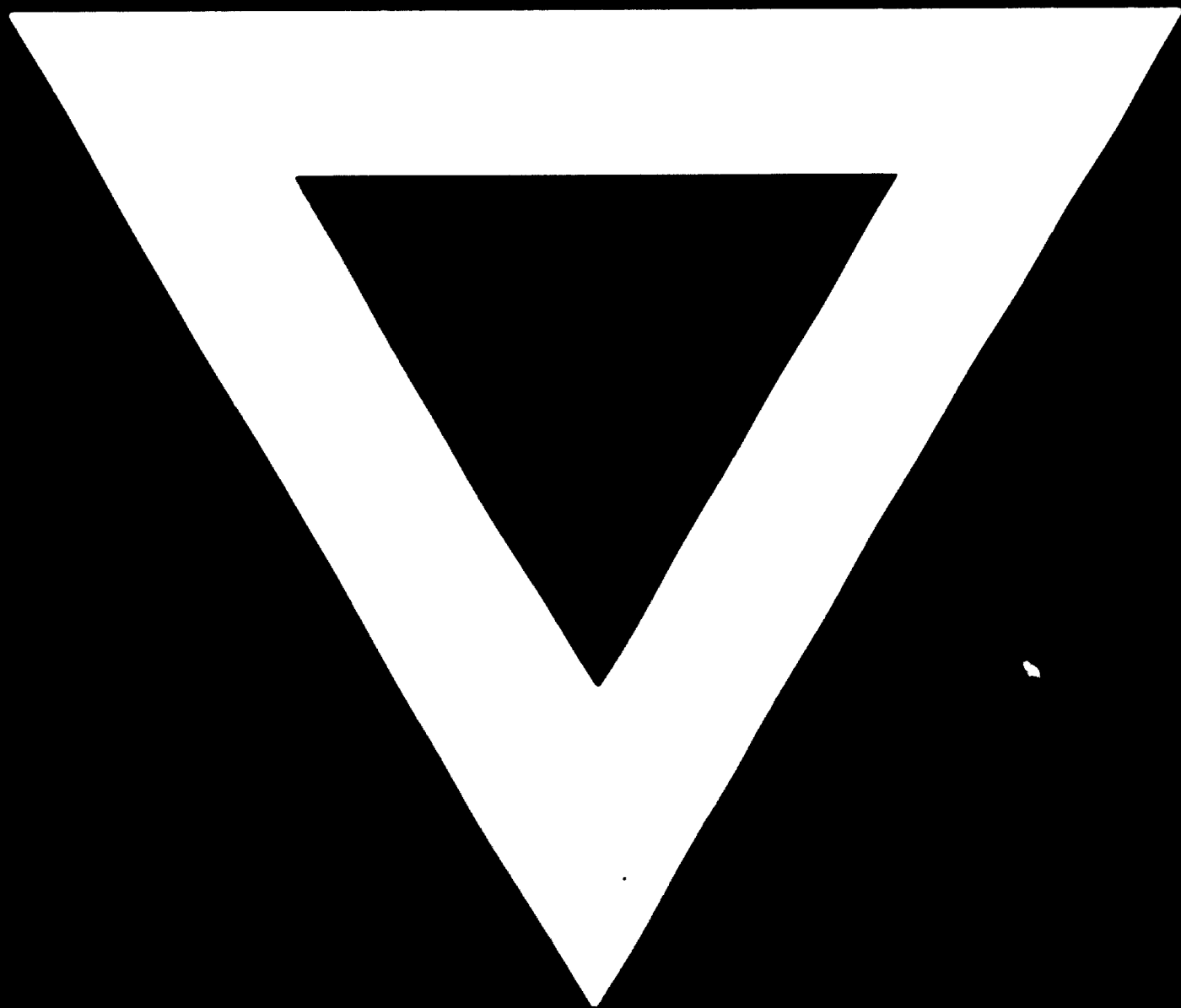
<u>Year</u>	<u>No. of Projects</u>
1973	20
1974	25
1975	42

Short-term laboratory tests, patent tests, computer programmes and short-term consultants' services have not been included in the table. Hundreds of post-graduate and Ph.D theses on industrial topics are also excluded.

The Applied Research Regulations of the Middle East Technical University provides that the applied research activities should be carried out through research units to be set up in certain fields of study. According to requirements research units are intra or inter faculty or intra or inter departments. The Institute of Systems Sciences and the Institute of Business Management and Administration Systems are the first examples of such research units.



**B-321**



**77.09.16**