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# Science & Government Report International Almanac 1978-1979

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# Spain

PEDRO PUIGDOMENECH

*AREA: 195,988 square miles*  
*POPULATION: 35.5 million*  
*GNP: \$74.6 billion*  
*EXCHANGE RATE: 66 pesetas = \$1.00*

The condition of research and development in Spain must be viewed against the post-Franco uncertainties as to whether this country is an advanced Third World state or a retarded developed nation.

Spain's ambiguous status in regard to development is illustrated by its standing in two major economic indices: Spain claims to rank tenth among the world's industrial powers. Nevertheless, along with Greece and Portugal, she shares last place among the 24 nations of the Organization for Economic Cooperation and Development (OECD) in terms of proportion of Gross National Product (GNP) devoted to research and development. The amount is 0.3 per cent, a typical Third World figure.

Inadequate funding is only one of the problems facing R & D in Spain. After 40 years of authoritarian rule, it is generally agreed that reorganization of the research structure is essential, and that without such reorganization even increased funding will not bring about any significant improvements. Any such changes, however, would have to be implemented by the government. But it has been preoccupied with more pressing political problems over the past three years. Since science policy is not considered to be an urgent matter there have been

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no far-reaching government discussions on the subject. The diversion of funds earmarked for research and development to other purposes is further evidence of this neglect. The universities and research centers are all suffering from the current state of uncertainty.

It was hoped that science would benefit from the approval of a new constitution in December 1978, but it now seems likely that political concerns will continue to dominate the attention of policymakers. This may mean two or three more years of makeshift, provisional science policy.

At the moment, university institutes and departments, plus the High Council for Scientific Research (CSIC), are the main research centers. Other important research organizations are the Council for Nuclear Energy (JEN), which was founded in 1951 and employs 2000 people, and the National Institute for Agricultural Research, which was founded in 1971 and employs 732 people.

Most universities in Spain are public institutions (with the exception of a few religious foundations). The number of these public universities has doubled over the past seven years and there are now 24 of them providing higher education for about half a million students. Unfortunately, this boom in university and student growth was not accompanied by a corresponding increase in budget, and this has resulted in a confused and unsatisfactory state of affairs. Overcrowding is rife, students are sometimes directly promoted to professorial rank, and research standards are too low to ensure adequate training. Some universities have managed to keep their research at acceptable levels, but they have to struggle to obtain financing and are often obliged to waste a great deal of their energies in inter-departmental strife.

This last characteristic of Spanish research is exacerbated by the structure of the universities, which are divided into faculties, departments, and institutes of research. The functions of these various bodies are not well-defined and this often leads to division and dissension within the universities. Another source of discontent, manifested by waves of strikes, is the university tenure system and the selection of professors. In order to become a full professor a candidate must take a series of examinations called *oposiciones*, which are designed to demonstrate his teaching and research skills. Once a candidate has passed these examinations, he becomes a tenured civil servant for life. The advantages of this system are that it is an open selection process and that it guarantees job stability for the professor; however, it has also led to a number of problems and abuses.

First, the selection groups are rarely impartial since the

members are often interested professors thus chosen are more concerned with the acquisition of knowledge than in the creation of new positions available is far too small. This last factor, coupled with the fact that the number of teachers, has led to the creation of a large number of tenured positions (in some universities) and a large number of people doing the same job as those who are not. This is negotiated every year, thus creating a great uncertainty not at all conducive to research. It has resulted in some gains for research but in controlling the quality of research.

However, the most frequent problem in universities is lack of financing. The salaries of administrative and technical staff are only about half of those in industry. The struggle along on an annual basis to obtain a portion of its resources bears little fruit. There is a Fund for Research and Development, but its distribution of its resources bears little fruit. The granting of funds for practical research has been distributed for a long time according to the needs of the universities, but this is a problem.

The great increase in the number of graduates has resulted in the influx of a huge number of graduates into the labor market at a time when the unemployment rate is 15 percent. It was estimated that 374,000 graduates with degrees in the social sciences and humanities are looking for jobs related to R & D is 2 percent of the total in OECD countries. There are no jobs available, but more than 90 percent of graduates from the University of Madrid find employment in their first year after leaving university. The unemployment among graduates has led to a great deal of dissatisfaction among university applicants, but it has not resulted in any action within the universities; the government does not care little about these problems.

In November 1977, a new law was passed to meet the needs of a changing society.

members are often interested in a particular candidate. Second, the professors thus chosen are often more interested in the broad application of knowledge than in specialized research. Third, the number of positions available is far too small for the number of students aspiring to them. This last factor, combined with the need for more university teachers, has led to the creation of two classes of teaching staff, a limited number of tenured professors (less than 20 per cent of the staff in some universities) and a large number of professors under contract doing the same job as those with tenure. These contracts have to be renegotiated every year, thus creating a climate of instability and uncertainty not at all conducive to research. Though the strikes have resulted in some gains for those under contract, the problem of controlling the quality of research has not been solved.

However, the most formidable problem facing Spanish universities is lack of financing. University budgets just about cover the salaries of administrative and teaching staff (even though salaries are only about half of those in industry) and basic services. Some faculties struggle along on an annual research budget of as little as \$10,000. There is a Fund for Research in Universities (FIU), but the distribution of its resources bears little relation to the research work being done, and normally the best that can be hoped for from the FIU is the granting of funds for practical courses for students. Once the money has been distributed for a designated purpose, it cannot be reapportioned according to the needs of the university, which adds to the problem.

The great increase in the number of university students has resulted in the influx of a huge number of graduates into the labor market at a time when the unemployment figure is approaching 10 per cent. It was estimated that 374,000 students graduated in 1976, half of them with degrees in the social sciences and literature. The proportion of jobs related to R & D is 22 per 100,000, the lowest ratio in the OECD countries. There are no official statistics on graduate unemployment, but more than 90 per cent of the chemistry students graduating from the University of Barcelona fail to find employment in their first year after leaving university. This widespread unemployment among graduates has led to a small reduction in the numbers of university applicants, but it has also produced an atmosphere of frustration within the universities; all this in a society which appears to care little about these problems.

In November 1977, a new law designed to adapt the universities to the needs of a changing society was presented to the Spanish Par-

liament. This new law is a long one, filling ten pages of general considerations and 52 pages of articles. It introduces a certain autonomy in the distribution of credits and the establishment of curricula within the universities, and also proposes a new career structure for the teaching staff. This last provision, however, retains the distinction between civil service professors and those under contract, and while it simplifies the election process, it also retains the essential features of the *oposiciones*. Many universities, backed by some of the political parties, will therefore seek to introduce amendments to the law. Thus, some changes may occur in the university structure. However, all this will be useless without a dramatic increase in funding.

The main public entity devoted to research in Spain is the High Council for Scientific Research (CSIC), which employs about 5000 people, including 1177 researchers. The CSIC was created in 1939, the end of the Spanish Civil War, from the remains of a previous institution founded by the Rockefeller Foundation. It is based on the model of France's National Center for Scientific Research (CNRS), and its symbol is the "tree of knowledge" representing the unity of all sciences, from theology to the natural sciences. Initially, much of the research carried out at the CSIC was largely determined by the ideological biases of those in charge. Thus, eight of the most important institutes were at one time devoted to edaphology (soil science) because of the interests of the Secretary General, J.M. Albareda, who was a prominent member of a powerful religious order, the Opus Dei. Nevertheless, the number of research staff increased, as did the quality of research, and the CSIC gradually became Spain's most important research center.

Until recently, the CSIC consisted of 96 of its own research centers plus 62 other centers, mainly university departments. These various centers were grouped in *patronatos*, depending on their subject. This system created a huge bureaucracy, which was abolished, together with the entire internal structure of the CSIC, in January 1977. For a year the CSIC existed in a vacuum until a new Statute was issued in January 1978. This established economic and scientific councils, which include members elected from the staff, to oversee the reorganization of the CSIC. However, the reorganization process as carried out by these councils has suffered from two major drawbacks. One is the budget, which has not been increased, and which may even be reduced in the near future, and the other is the cloud of uncertainty surrounding the future of the CSIC.

If the government proposal is passed by Parliament, the CSIC

budget for 1979 may be 85 per cent of the CSIC portion has probably of the universities, is *oposicion* and the system on highly spec again the number of grown with the expansion of the research institute which does not encourage renewed or cancelled i being done. A reduction of research workers in public between.

Another facet of the proposal to split the CSIC other to applied research the universities, applied to the INI. INI is one of the produces 10 per cent of a thorough re-evaluation will have to take place in practice, or it could mean

The number of the CSIC and the universities be far too small to be a research staff of three or researchers. The creation on considerations of priorities. This situation has impeded the formation of groups.

In Spain, there are social problems. This is partly because most research where 70 per cent of the industrial areas, Catalonia the CSIC's staff works in an institute in the Basque Country even a university in this

budget for 1979 may be reduced by as much as 30 per cent. In 1975, 85 per cent of the CSIC budget was spent on salaries, and this proportion has probably increased since then. The CSIC staff, like that of the universities, is divided between people who have passed a public *oposicion* and those under contract. The focus of the selection system on highly specialized subjects makes it more objective, but again the number of tenured positions is very small and has not grown with the expanding needs of the laboratories. Indeed, in some of the research institutes all of the staff are under contract, a fact which does not encourage research, especially when contracts are renewed or cancelled in an arbitrary fashion regardless of the work being done. A reduction in the budget would mean staff redundancies, though employment opportunities for highly qualified research workers in public research and industry are few and far between.

Another facet of the reorganization scheme is a government proposal to split the CSIC in two, one half being devoted to basic the other to applied research. Basic research would then be taken over by the universities, applied research by the National Institute for Industry (INI). INI is one of the largest industrial holdings in Europe, and produces 10 per cent of Spain's GNP. According to some observers, a thorough re-evaluation of the place of research in the universities will have to take place before this project can be successfully put into practice, or it could mean the end of research in many institutes.

The number of staff in the individual research groups within the CSIC and the universities has been considered by many people to be far too small to be viable. More than 50 CSIC institutes have a research staff of three or less, the average group consisting of seven researchers. The creation of a new department or institute is often based on considerations of personal power and prestige rather than scientific priorities. This situation has led to an increase in the bureaucracy and has impeded the formation of larger and more effective research groups.

In Spain, there is little or no application of scientific research to social problems. This is partly because of the quality of research and partly because most research institutes are concentrated in Madrid, where 70 per cent of the CSIC's staff is located. Spain has two main industrial areas, Catalonia and the Basque country. Only 5 per cent of the CSIC's staff works in Catalonia, and there is not a single research institute in the Basque country. Indeed, until recently, there was not even a university in this area. The problem of uneven distribution of

research centers and funds has been compounded by political problems, particularly the battle for political autonomy being waged in different regions of Spain.

One of the original functions of the CSIC was the coordination of Spanish science policy. The increasing number of centers dependent on the CSIC and the consequent administrative burden made general coordination more difficult. In 1958, an Advisory Commission for Scientific and Technological Research was created under the auspices of the Prime Minister to coordinate the public research effort. The Commission included representatives from the research-related ministries, the official trade unions, and the army.

In 1963, jurisdiction over this Commission was transferred to a restricted Council of Ministers within the Cabinet. However, this Council of Ministers has not met for years, and the Minister for Education and Science established a General Directorate for Science Policy to fill the gap. But the function of this body is far from clear, and its funds are still controlled by entities such as the Advisory Commission.

The importance of the Advisory Commission lies in its administration of the National Fund for the Development of Technical and Scientific Research. This Fund is the main source of financing for both public and private research and its assets are distributed in the form of grants for various research programs that may run from one to four years. Some laboratories use these grants to pay for salaries, equipment, and running expenses. However, there are no Advisory Commission guidelines on these expenditures, and since the composition of the Commission is political rather than scientific, grants from the Fund tend to bear little relation to research needs. The latest published figures show that in 1975, 60 per cent of the grants distributed by the Fund went to about 400 research projects which received less than \$60,000 each to be spread over four years. In 1976, the Fund had \$20 million at its disposal, but detailed expenditure figures are not yet available.

The same Advisory Commission also administers the funds for the programs arising from the Treaty of Friendship and Cooperation between Spain and the United States. Over the past few years, these grants have taken three forms: Institutional grants, used to buy research equipment for institutions such as the universities and the CSIC; grants for Spanish research projects; and grants for joint research in American and Spanish laboratories. In fact, this fund is not large; in 1978 it contained \$2.4 million. This was apparently used for

non-scientific projects, since the program still did not lead to their applications.

Situations such as these can cause a great deal of frustration and relief that funds are allocated to the proposed project. Friends and sharing out of funds that any objective system would give to scientists. Grant distributed to reviewers that it has taken some part in the process.

Another influential factor is the Formation of Research signed to promote further help for laboratories. This highly trained personnel, employment many of them are a number of these fellowships is confined to the universities, teaching staff. In general source of research funds, they have been hurt by irregularly organized.

The establishment of research has been made more difficult public and industrial research poor relations in this area. The public research center also prohibits cooperation is beset with problems. At or are controlled by foreign competitive research prefer to carry out their research Spanish industry should market in Spain is dominated are interested only in short finance the import of foreign indigenous research. Spain nology (0.4 per cent of GNP per cent of GNP). The current



non-scientific projects, since the laboratories requesting grants from the program still did not know at the end of 1978 what had happened to their applications.

Situations such as the one described in the preceding paragraph cause a great deal of frustration among researchers and add to the belief that funds are allocated to research without regard for the quality of the proposed project. In Spain, there is such a tradition of helping friends and sharing out funds in equal (and very small) proportions that any objective system of grant distribution would be welcomed by scientists. Grant distribution is so hampered by the scarcity of qualified reviewers that it has been proposed that foreign reviewers should take some part in the process.

Another influential Spanish research fund is the Program for the Formation of Research Workers, which grants fellowships designed to promote further training and also includes some financial help for laboratories. This program has produced a large number of highly trained personnel, but since there is no provision for their employment many of them are obliged to emigrate. In addition, the number of these fellowships is decreasing and they are now generally confined to the universities, where they are used as another source of teaching staff. In general, private foundations are not an important source of research funds. They do not have a coherent grant policy, they have been hurt by inflation, and many of them are being reorganized.

The establishment of a coordinated research policy in Spain has been made more difficult by the lack of cooperation between the public and industrial research sectors. There are several reasons for poor relations in this area. Industrial researchers tend to look down on the public research centers, and the structure of industrial research also prohibits cooperation. Like public research, industrial research is beset with problems. At present, most industries are either too small or are controlled by foreign firms; the small industries cannot afford competitive research programs, and the foreign-controlled firms prefer to carry out their research elsewhere. The financial structure of Spanish industry should also be taken into account. The financial market in Spain is dominated by a number of commercial banks which are interested only in short-term benefits, and therefore prefer to finance the import of foreign technology, rather than investing in indigenous research. Spain is now spending more on foreign technology (0.4 per cent of GNP) than on the promotion of research (0.3 per cent of GNP). The current economic problems mean that Spain

lacks the capital to develop and adapt foreign technology in order to produce products for export.

This dependence on foreign technology was one of the arguments advanced by the opponents of nuclear power. In general, Spain has bought nuclear power plants on a turn-key basis; thus, Spanish research has not benefitted from their installation. The question of nuclear power is the only technological issue that has sparked public debate in the past year or so. In October 1978, the problems of nuclear power were addressed to some extent in an Energy Plan passed by Parliament after a somewhat limited debate. The Plan included vague proposals for a reduction in the number of nuclear power plants and increased research into alternative energy sources, but it did not specify any financing for these projects.

The establishment of a new political order in Spain was accompanied by some personnel changes in the higher echelons of science. However, some posts are still held by incumbents from the old regime, which has led to some doubts about the prospects for reform. Other posts have changed hands several times in the past three years. This situation has created a dual perception; nothing has changed, but the future is most uncertain.

There were a few changes in key research positions. The Director General of Science Policy, Eugenio Sanchez del Rio, was appointed President of the CSIC, leaving his former position still vacant at this writing. The President of the Advisory Commission, Frederico Mayor Zaragoza, was appointed Associate Director of UNESCO, leaving his post vacant also. Professor Mayor Zaragoza will be difficult to replace. One of the few scientists in the government, he managed to keep in touch with scientists and was very influential.

The situation may become clearer with the approval of the new Spanish Constitution, following the referendum held in December 1978. The Spanish Constitution is one of the few where research is mentioned, in this case in the section outlining the Articles for the Organization of the State.

One of the main constitutional problems facing the new government has been the organization of autonomous governments in various parts of Spain. The Constitution attempts to put an end to cultural inequities and the unequal distribution of activities such as research by granting more power to the communities. Therefore, Article 148, which lists the areas that may be controlled by these communities, includes "the promotion of culture and research."

However, "the promotion of scientific research" can be done by the central government. In Catalonia, for example, the government of Spain, Catalonia, has established "autonomous research institutions" as a prerogative. All this may increase uncertainty in the next few months, but at least action will be taken in the future of research in vanguard areas. This will become apparent.

The other important factor is that the Advisory Commission on Research. Release of the Commission was in the summer of 1978, but by the end of the year. Planning is vital for a smooth transition. The Plan must take into account the current situation. At the moment there are no state-financed high-quality research. It is necessary to make some provisions for funding research.

Though international cooperation is important for a country like Spain, there has been a withdrawal from Spain's participation in Research (CERN), and from European joint programs. Spain has decided that no effort was made to continue the construction of observatories.

In the last years of Franco's rule, to improve Spain's scientific situation, even after his death, political and scientific planning. At the moment, what would happen to research in a general state of uncertainty will have to be taken soon. The government will have to mobilize its research effort mobilized if it is to improve her position relative to the

However, "the promotion and general coordination of technical and scientific research" can be found in the list of matters reserved for the central government. The first Statute of Autonomy for one part of Spain, Catalonia, has been drafted. It includes "research and its institutions" as a prerogative of the proposed Catalan government. All this may increase uncertainty in the laboratories in the next few months, but at least action will have to be taken quite soon, and the future of research in various parts of the country will gradually become apparent.

The other important news for research was the announcement that the Advisory Commission was preparing a three-year Plan for Research. Release of the Plan was supposed to be imminent in the summer of 1978, but by the end of the year there was still no sign of it. Planning is vital for a small country with limited resources, but such a Plan must take into account the state of the laboratories; at the moment there are no statistics on the numbers of scientists involved in high-quality research. It seems that the proposed Plan will also include some provisions for funding.

Though international cooperation is very important for a country like Spain, there have been few advances in this direction. Spain has withdrawn from the European Organization for Nuclear Research (CERN), and has failed to participate in some of the European joint programs. Spanish astronomers, for example, complain that no effort was made to take advantage of the joint European construction of observatories in the Canary Islands and Southern Spain.

In the last years of the Franco regime, no effort was made to improve Spain's scientific standing among the OECD countries, and even after his death, political problems have taken precedence over scientific planning. At the end of 1978, it was difficult to predict what would happen to research and development in Spain, given the general state of uncertainty and fragmentation. However, decisions will have to be taken soon and a genuine and fundamental reorganization effort mobilized if Spain is to resolve the uncertainties about her position relative to the industrialized and the developing nations.