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**Ministry of the Economy
Republic of Chile**

**CHILE IN THE TWENTY-FIRST CENTURY
A HISTORIC OPPORTUNITY**

**TECHNOLOGICAL INNOVATION
POLICY**

August, 1993

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CHILE IN THE TWENTY-FIRST CENTURY: A HISTORIC OPPORTUNITY

TECHNOLOGICAL INNOVATION POLICY

1. NOW: THE RIGHT MOMENT.

Chile is undergoing one of its best moments in history. Economic conditions make it possible to achieve sustained improvement in the living standards of its entire population and its definite inclusion in development.

In the last seven years, Chile has been showing remarkable social and economics results: it have managed to combine reconstruction of the democratics regime with an economic performance which, since middle of the 80's, has combined rapid growth and macro economic stability, in fact:

- * GDP has grown at an average rate over 6 % in the last seven years. Last year Chile's GDP grew 10.4 %.
- * Unemployment decreased below 5 % last year, and is around 4 % now, the lowest level in 20 years.

Small economies, such as Chile, can only hope to grow over the long term by integrating themselves into world trade. Exports have been leading growth factor since the mid 80's, representing now more than 30 % of Chile's Product (see appendix 1, Chile: macroeconomics, external sector and social figures).

The number of exporting firms, in turn, is expanding all the time. Also Chile have managed to diversify its exports both in terms of products and markets. Non traditional exports being, by far, the ones that grow faster, more than 20% last year.

At an economic level, Chile has accomplished remarkable achievements. It has consolidated its export activity rendering many examples of great entrepreneurial initiative; in the past 3 years (1990-1992) export companies grew by 33%, product supply was diversified by 49% and new markets were conquered, 155

new destinations were reached in 1992, which amounts to a 20% increase as compared to 1990.

Forestry, mining, agriculture and fishing are four keys areas. Included manufactures exports strongly based of these areas, they account for the 93 % of Chilean total exports.

Although advances are remarkable, challenges are even greater. No one holds secured or exclusive places in the world anymore. Industries flourish and fall if they do not become renewed, competition increases, the new competition factors are definitely productivity and quality. In this context, the preparation and training of human resources and technological innovation are of crucial importance in the achievement of long-lasting competitive advantages.

The capacity to innovate is at the core of the challenges that Chilean economy and society must face in the coming years. Flexibility and innovation understood as the capacity to adapt rapidly and smoothly to changes.

Persistence and innovation are two concepts that prevail in Chilean economy today. Our country is in the midst of an economic growth process that, under current levels, is increasingly demanding and incorporating more knowledge and creative spirit to increase productivity. In fact, average productivity increases - approximately 4% in recent years- reflects numerous innovations developed by domestic enterprises and institutions. But despite these major advances, the challenge of extending innovative activity and spreading it to enterprises and institutions throughout the country, especially small and medium sized enterprises, is still pending.

Vis-a-vis this challenge, the Government has worked intensely from its onset to promote productive modernization in Chilean enterprises, especially small and medium sized ones. This was done through instruments aimed to facilitate enterprises' access to technical assistance and financial markets, to promote technological development, innovation and training of individuals, and to facilitate integration to foreign markets. For this purpose, it has set forth a consistent development program in this matter, equipped with a full range of instruments and clearly oriented to the requirements of productive development.

This paper describes the scope of action of this program fostering productive modernization, technological innovation policy in Chile, from the perspective of production, which is the matter that concerns the Ministry of the Economy.

Far from concluding the task, the first steps have been taken by setting up the grounds for continuous improvement in which existing instruments must be corrected, and complementary activities must be developed.

Innovation is a permanent task, directly linked to the country's challenges, and in particular to Chile's capacity to generate a long-term development project, a country project.

2. RESEARCH AND DEVELOPMENT FIGURES IN CHILE

It is estimated that Chile's annual investment in research and development (R&D) amounts to nearly 0.71% of its Gross Domestic Product (GDP), which is equivalent to almost US\$ 270 million (see Table 1).

This investment is channelled primarily through the following sectors: universities and higher education institutions, research institutions and enterprises.

TABLE 1
CHILE
TOTAL EXPENDITURE ON R & D - 1992

SECTOR	US\$ Millions	Ratio over Total R&D Expenditure
UNIVERSITIES	93.7	34.9
RESEARCH CENTERS AND OTHERS INSTITUTIONS	85.1	31.7
CONTESTING FUNDS	55.5	20.6
BUSINESS EXPENDITURE	34.5	12.8
TOTAL R&D EXPENDITURE (US\$ millions)	268.8	100.0
TOTAL R&D EXPENDITURE (Porcentaje of GDP)	0.71	

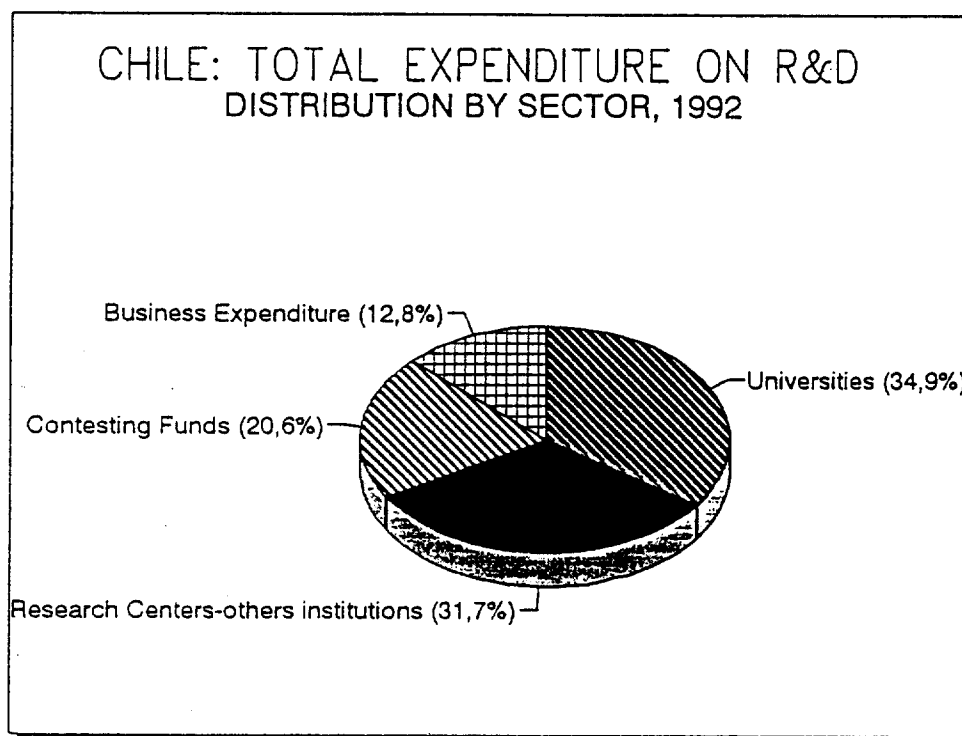
Source: - Comisión Nacional de Investigación Científica y Tecnológica, CONICYT
- Superintendencia de Valores y Seguros
- CODELCO
- Corporación de Fomento de la Producción
- Estudio "Cien Empresas innovadoras en Iberoamérica"

These activities are financed with institutions' own funds and State contributions. The latter, through direct contributions, in the case of universities and some research institutions, or by funds obtained from R&D contest projects and related activities.

R&D activities concentrate in universities and research institutions, representing approximately 67% of total investment in R&D in the country (see Figure 1).

It should be noted that in Chile around 22 universities and 2 higher education centers receive State support. They are the ones that basically carry out research and development activities.

FIGURE 1



In addition, the country invests US\$ 85 million a year in R&D through private and public research and technology transfer institutions.

There is also a number of Government funds allocated to contests that finance research and development projects in enterprises, universities and research centers in many activity areas in the country involving a yearly investment of around US\$ 56 million.

There is evidence that enterprises invest at least US\$ 35 million in R&D. At this point, it should be noted that Chile needs to improve the quality of its statistics on investment in research and development activities, especially in relation to enterprises. It should be mentioned that the stated figures underestimate efforts undertaken in R&D in enterprises as a whole in the country. They only corresponds to investment in leading Chilean enterprises and do not contemplate investment by small and medium size enterprises.

Along with financial resources allocated to R&D, human resources also constitute one of the determining factors in the national scientific and technological system.

In this sense, in Chile there are approximately 5.500 scientists and engineers dedicated to research and development activities (see Table 2).

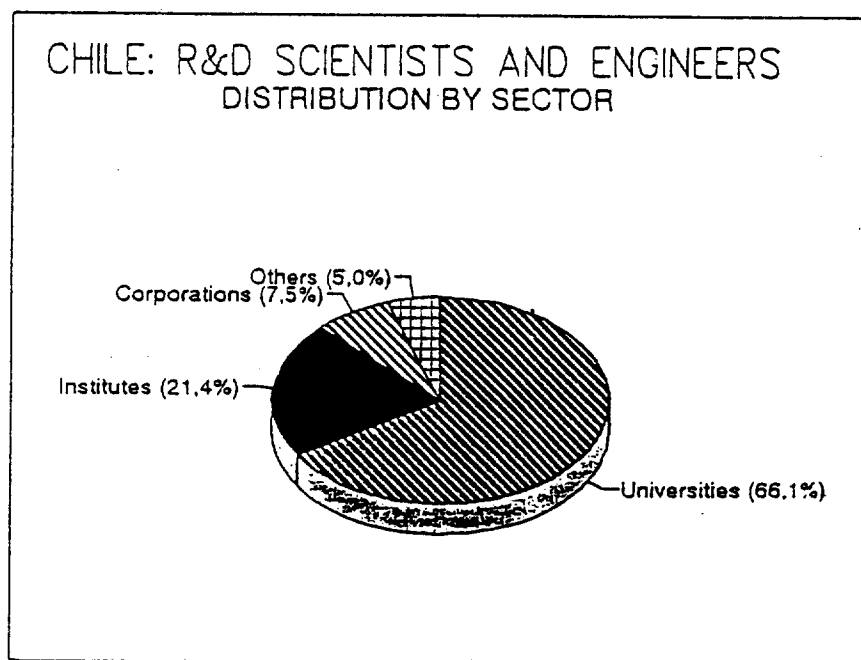
They concentrate mainly in universities (66% in total) and research institutions (21 %). Only around 7% of R&D researchers are employed in enterprises (see Figure 2).

TABLE 2
CHILE
R&D SCIENTISTS AND ENGINEERS – 1992

UNIVERSITIES	3,643
INSTITUTES	1,180
CORPORATIONS	412
OTHERS	274
TOTAL	<u>5,509</u>
Total R&D Scientist and Engineers per 1,000 of the Labor Force	
	1,14 %

Source: Comisión Nacional de Investigación Científica y Tecnológica, CONICYT

FIGURE 2



3. TECHNOLOGICAL INNOVATION POLICY: OBJECTIVES PURSUED

Within the above framework, this policy intends to strengthen the technological innovation capacity of the country's productive sectors, with the purpose of increasing its international competitiveness.

The specific objectives pursued are:

- Increasing technology transfer and research and development activities in domestic enterprises, whether carried out in the company itself or in organizations engaged for this purpose.
- Updating and strengthening research and development capacity and quality in institutions devoted to this purpose -universities, research centers, etc.- and in the entities that provide technological services to support innovation in enterprises.
- Increasing links between research entities and other technological support service providers, and enterprises.
- Promoting research and development in areas of strategic interest and of great potential for the country.
- Establishing a legal frame to encourage innovation in enterprises and to allow them to benefit from its results.
- Increasing the rate of creation of innovatory enterprises.
- Encouraging an attitude favoring innovation in young people, opinion leaders, entrepreneurs and the general public.
- Strengthening international bilateral and multilateral technological cooperation.

4. INNOVATION INSTRUMENTS.

Among the policy initiatives implemented by the Government, the most meaningful is the Science and Technology Program, followed by all of the other policies aimed to create in the country an institutional framework to encourage innovation.

4.1 SCIENCE AND TECHNOLOGY PROGRAM

Created in March 1992, the fundamental objective of this program is to encourage technological innovation in Chilean enterprises and to strengthen research and development (R&D) capacity and quality in universities, technological institutes and research centers, in close connection with the country's production requirements.

The program coordinates three financial instruments, which are complementary, each with its own users and aims: FONTEC, FONDEF AND FONDECYT. They embrace the different fields of innovatory activity in an integral manner, from basic scientific research to applied research, including technological development, and up to productive innovation in enterprises (see Appendix 2: Summary of the Science and Technology Program Funds)

In the technological context, the program operates through FONTEC and FONDEF. They are both oriented to applied research, technological development and productive innovation in enterprises. These instruments are complemented by Fondo Nacional de Desarrollo Científico y Tecnológico (National Fund for Scientific and Technological Development), FONDECYT, aimed at fostering scientific and technological research of excellence.

This Program represents the most significant initiative in the field of innovation promotion undertaken in the country in the past decades. Funds amounting to US\$ 155 million shall be channelled between 1992 and 1995. Of these, US\$ 94 million correspond to an IDB loan and the rest to Government contributions. This effort shall enable a domestic investment increase in technological innovation of approximately 25% in coming years.

The Ministry of the Economy, as the entity coordinating this initiative, channels the funds through CORFO (in charge of the execution of FONTEC) and CONICYT (in charge of the execution of FONDEF and FONDECYT). The Science and Technology Program has a Board of Directors composed of representatives from the Ministries of the Economy, Education, Finance, Planning and Cooperation and Mining, as well as CORFO and CONICYT, which reflects an integral vision of the innovation policy, which was uncommon until now in Chile.

This program is significantly triggering innovative activity in the country. Indeed, up to August 1993, 230 innovative projects have been financed through FONTEC and FONDEF, covering an extensive range of activities in the country with the participation of 440 enterprises and different research teams from 28 universities and R&D centers (see Table 3).

Substantial investment has been made in these innovative projects. Chile is investing US\$ 152 million -approximately 56,450 million pesos- of which roughly US\$ 70 million have been contributed by FONTEC and FONDEF; US\$ 60 million by universities and research and development centers and US\$ \$ 25 million have been funded by currently participating enterprises.

TABLE 3

SCIENCE AND TECHNOLOGY PROGRAM ADVANCES. 1992-1993

(FONTEC Y FONDEF)

TOTAL PROJECTS FINANCED		230
<u>ENTERPRISES AND INSTITUTIONS PARTICIPANTS</u>		
ENTERPRISES		440
* Direct participation (FONTEC)		130
* Indirect participation (FONDEF)		310
INSTITUTIONS		28
* Universities		17
* Technological Institutes and R&D Centers		11
<u>FINANCES</u>		
	<u>Millions of CH\$</u>	<u>Millions of US\$</u>
* Enterprises contribution	9,502.3	25.3
* Institutions contribution	20,906.0	56.6
* Funds contribution (FONTEC +FONDEF)	26,042.1	69.6
TOTAL INVERSION	56,450.4	151.5

* Including information until august, 1993.

Source: Science and Technology Program- Ministry of the Economy

A. FINANCING INNOVATION.

* FONTEC: Innovating in Enterprises.

Created to encourage technological innovation in enterprises, the Fondo Nacional de Desarrollo Tecnológico y Productivo (National Fund for Technological and Productive Development) provides direct financing of innovatory projects through loans and grants.

For this purpose, it co-finances projects presented by private enterprises in three areas: Technological innovation, Techno-logical infrastructure; and Research and Development and technological scientific services.

It operates through the "open window" system, i.e., enterprises having an innovation project can present it without entering a contest. In addition, it encourages their association for the presentation of joint projects.

FONTEC funds for the 1992-1995 period amount to US\$ 30 million. It is estimated that participating enterprises shall contribute an equivalent sum. Up to June of this year, FONTEC financed 131 projects with contributions amounting to approximately US\$ 6.7 million. Enterprises, in turn, contributed an additional sum of approximately US\$ 5.4 million (see Table 4 and Figure 3).

FONTEC, which is under the administration of a CORFO Committee, is considered a pioneer initiative in its field, since in its investment decisions besides public personnel, also participates representatives of the productive sector and of the scientific community.

Even FONTEC is not explicitly limited to smalls and mediums enterprises, the results until now shows that these firms, among all firms, are the preferent user of this instruments, representing around 70 % of the financed projects. This shows the great innovative potencial this group has.

Another relevant aspect is the participation of universities and research centers in the projects, as technical support for the firms. Even firms are the direct users of FONTEC, nearly in 40 % of the cases universities are involved, indicating that FONTEC is also contributing to the linkage between the R&D system and the industry, in an institutional or individual base.

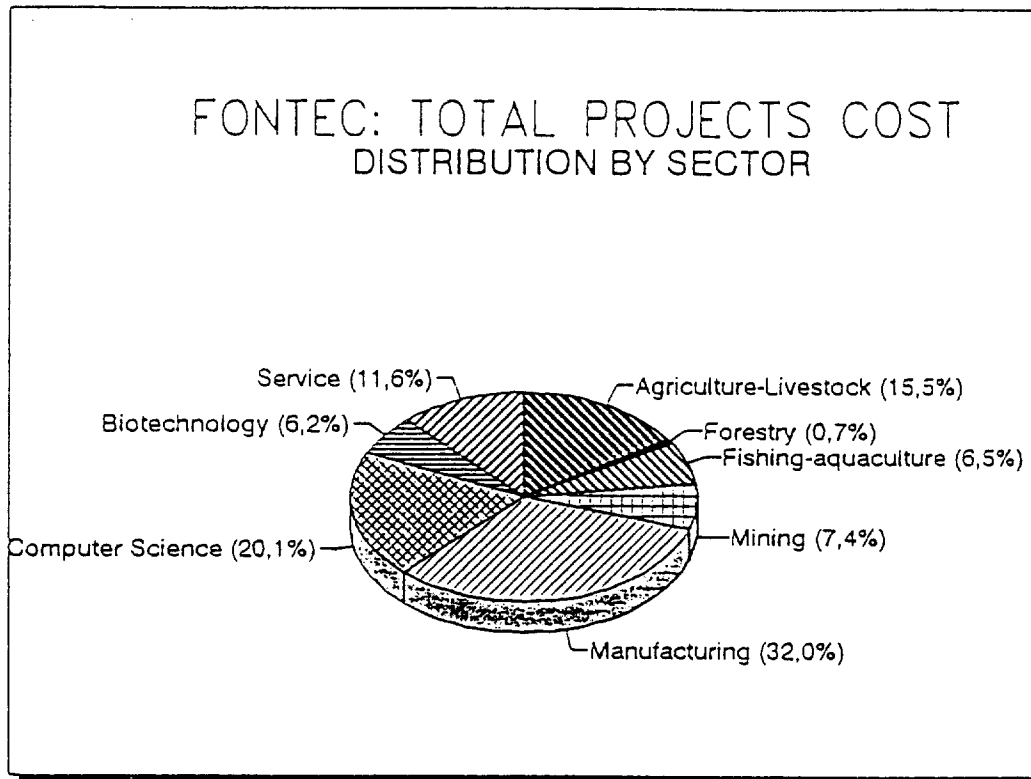
TABLE 4
FONTEC
PROJECTS APPROVED BY SECTOR

SECTOR	Number of Projects	INVESTMENT (thousands of US\$)		
		FONTEC	Enterprises	TOTAL
Agriculture – Livestock	22	1,090.2	778.9	1,869.1
Forestry	1	54.1	36.4	90.5
Fishing – Aquaculture	9	427.4	358.4	785.8
Mining	10	527.8	360.4	888.2
Manufacturing	46	2,155.9	1,699.5	3,855.4
Computer Science	27	1,177.7	1,241.9	2,419.6
Biotechnology	8	413.1	339.6	752.7
Services	8	862.2	543.3	1405.5
TOTAL	131	6,708.4	5,358.4	12,066.8

* Including information until august, 1993.

Source: Science and Technology Program – Ministry of the Economy.

FIGURE 3



* **FONDEF: Linking Research with the Productive Sector.**

The purpose of Fondo de Fomento al Desarrollo Científico y Tecnológico, FONDEF, is to strengthen the country's capacity to carry out medium and long term research and development, placing special emphasis on the projects implemented in and causing an impact on productive activity and economic and social development.

FONDEF finances major projects - of an average total cost of nearly US\$ 2 millions- presented by Universities and Research Institutes, and its funds amount to US\$ 65 million to cover its 4 years of duration. It is estimated that an additional sum of approximately US\$ 92 million shall be contributed by research institution and participating enterprises.

FONDEF has defined in a first step five broad priority areas, related to dynamic sectors with clear advantages: mining, fishery, forestry, agriculture and manufacturing and information technologies.

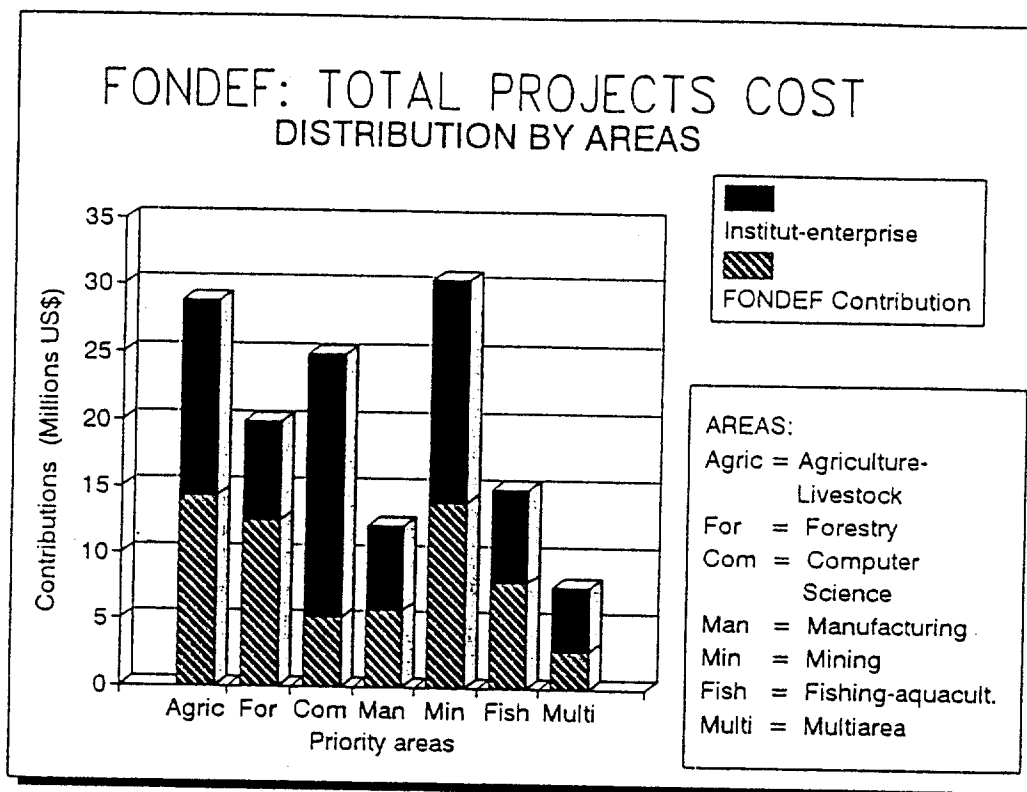
TABLE 5
FONDEF
PROJECTS APPROVED BY PRIORITY AREAS
(First and Second Contest)

PRIORITY AREA	NUMBER OF PROJECTS	INVESTMENT (Millions of US\$)			
		FONDEF	Institutions	Enterprises	TOTAL
Agriculture - Livestock	23	14.4	10.4	4.1	28.9
Forestry	17	12.6	5.1	2.2	19.9
Computer Science	7	5.2	18.9	0.8	24.8
Manufacturing	13	5.8	3.9	2.6	12.4
Mining	24	14.0	8.4	8.1	30.5
Fishing - aquaculture	12	8.0	4.9	2.2	15.1
Multiarea	3	2.8	4.9	0.0	7.7
TOTAL	99	62.8	56.6	20.0	139.4

* Including information until august, 1993.

Source: Science and Technology Program - Ministry of the Economy.

FIGURE 4



FONDEF operates by means of project contesting. The main criteria used to assign funds are the economic-social potential impact of the projects and institutional capacity and feasibility. Ninety-nine projects were selected in the two contests held. Its contribution amounted to approximately US\$ 63 million, from a total of approximately US\$ 139 million, contributed both by research institutions (45% of total) and by enterprises sponsoring the projects (13%). (see Table 5 and Figure 4)

It should be noted that the enterprise-research institution linking process is a new experience in the country, and even more so if we consider that it involves projects that shall be implemented in many years to come. The impact caused by FONDEF is reflected in the participation of enterprises - nearly 310 - in its very first contest. Approved projects cover all high-priority areas and involve 17 Universities, 11 Technological Institutes and other research institutions.

Besides this, FONDEF is also contributing to develop in universities and R&D centers new capacities in formulating, evaluating and managing technological projects, with a high concern on the applications of the results, a rather uncommon practice in chilean R&D system. Maybe this will be, by far, the main effect of FONDEF.

*** FONDECYT: Promoting scientific research.**

Complementing this two new funds -FONTEC and FONDEF- the third fund which integrates the Science and Tecnology Program is FONDECYT.

FONDECYT is dedicated to promote scientific research, mainly basic research, with a criteria of excellence. This fund non discriminates by disciplines or by sectors, and finances rather little projects presents by individual researchers.

FONDECYT assigns approximately 16-18 millions dollars per year by contest.

B. THE INNOVATION OF PEOPLE.

* Chile, Good Idea Innovation Culture Program.

Encouraging technological innovation in the productive sector implies developing a means to favor innovation that will spread throughout Chilean society.

Besides the financial instruments just mentioned, Chile is starting a diffusion campaign, The Innovation Culture Program.

The objective of the Innovation Culture Program is to situate this issue in current Chilean society, as an attitude and a value in today's and in the future society.

The Program is a medium and long term effort destined to create a favorable atmosphere for innovation in public opinion, leaders, entrepreneurs, workers, mass media and authorities, and, especially, in young Chileans.

This idea was promoted by the Science and Technology Program (coordinated by the Ministry of the Economy) and FONDEF. They invited the participation of the country's eight major universities and leading enterprises.

The communication campaign combines various techniques -journalism, TV spots, advertising, educational communications, cultural extension, public relations- showing a broad variety of innovative experience in many fields, productive, educational, cultural, etc.

The object of this is to create an open and participatory social conversation network to facilitate the acceptance and use of innovation as an essential resource for the country.

4.2 AN INSTITUTIONALITY FOR INNOVATION

In addition to the creation of instruments such as the ones described, a setting allowing and fostering innovation in the country requires an institutional framework conforming to these objectives. Actions have been undertaken in this direction in the field of industrial property, technological cooperation and quality improvement.

A. THE LAW PROTECTS OUR INNOVATIONS.

New Law of Industrial Property and Technological Information Service for Patents.

The country's technological development requires mechanisms to encourage domestic investment in local innovation, granting it adequate protection, in addition to facilitating the acquisition of knowledge from abroad. In this aspect, the Industrial Property System plays a prominent role since it provides legal instruments for the protection, dissemination and commercial-ization of this knowledge.

In an open economy such as the Chilean one, an adequate legal framework and an agile institutionality addressing the needs of entrepreneurs is essential, albeit not enough. It must also integrate international spheres through basic agreements on the matter as a way to assure the country's integration to other markets.

In the field of intellectual property Chile has taken important steps in these past few years focusing on three areas:

- Modernization of the legal framework concerning Intellectual Property.
- Improving its insertion in the international context.
- Modernization of institutions managing Industrial Property and new customer services.

Thus, during 1991, the Government put into effect the new Law of Industrial Property (No. 19,039) which improves regulations relating to the protection of industrial property. Which was updated in accordance with international trends, hence facilitating Chile's international acknowledgement and insertion in this field.

The new Chilean law is the first important initiative in this area in Latin America and has been taken as an example in other countries in the region.

As for international integration, in 1991 Chile adhered to the Paris Agreement on Industrial Property, which is a cornerstone for doctrine on the matter. Entering into this important treaty links the country with 102 other nations committed to follow similar regulations.

In addition to this, and to contribute to link Chilean scientific community and firms with new global technological advances it has been implement a new Technological Information Service for Patents, based on a system connected to foreign patent documentary funds. For this purpose, it uses advanced optic disk reading equipment. This provides constant state of the art information on the most diverse areas, low-cost technological solutions and simplifying the search and negotiation with technology suppliers.

It should be noted that a year and a half ago the country only registered about 40,000 patent documents for the period 1941 - 1992. Today, with the new system, scientists and entrepreneurs have access to the European and United States documentary funds which contain over 6 million patents with technological data.

B. COOPERATION, THE BASIC SUPPORT OF INNOVATION.

For the country, international cooperation in the sphere of science, applied research and technological development is one of the pillars to enhance the capacity of its private and public institutions in this field.

There is awareness of the need to foster relations with the international community, by furthering what has been done to now in the area of scientific cooperation. Also by strengthening technological cooperation in those areas in which Chile may improve its economic might and which may help to complement efforts in the second exporting stage, in which technology stands out as a decisive element to be successful in foreign markets.

* An opportunity for Chile

In this sense, the first steps have been taken in technological cooperation with the European Community, EC.

The EC is currently discussing the Fourth Framework Program. This program shall determine the research and development (R&D) activities to be carried out in the community during the 1994-1998 period. They shall be undertaken as projects in specific research and development areas with the participation of enterprises, universities and research centers of community member countries. The IV Program has been allocated a budget of 13.1 billion Ecus (approximately US\$ 15.4 billion).

Chile has proposed EC the possibility of participating, in an equitable way, in the R&D community programs, specifically in the IV Framework Program, and also in the bilateral initiatives that may be used. For this purpose, Chile is willing to make the appropriate scientific, technological and economic contributions.

In this context, Chile has already taken up actions in the II meeting of the Chile-EC mixed Commission, held in Brussels in May 1993. On that occasion, EC agreed to form a working group to propose Chile's form of access to the IV Framework Program. This is an important opportunity for the technological

community - enterprises, universities and R&D centers - and the scientific community in Chile to become closely linked to European centers of excellence in areas of mutual interest.

Strengthening and taking full advantage of all available opportunities in the area of technological cooperation is a task that, albeit the first steps have been taken, there is still much to be done.

*** Fundación Empresarial Comunidad Europea-Chile.**

Another action undertaken has been the creation of the Fundación Empresarial Comunidad Europea-Chile. Its objectives are to promote, manage, and channel economic, industrial and technological cooperation between the European Community and the State of Chile, and to promote modernization in domestic enterprises, primarily small and medium sized ones.

Its creation constitutes a pioneer initiative in Latin America. Fundación Empresarial Comunidad Europea-Chile has financing for 12 million ECU (14 million dollars). This amount was contributed in equal parts by the European Community and the Government of Chile.

Its Board of Directors is composed of representatives of the European Community, the Government of Chile and the productive sector.

Its main activity areas are:

- Promotion of technical, economic and financial exchange of information by creating channels to draw Chilean enterprises closer to world economic and technological centers. The information service shall be connected to major international data bases.
- Preparation of technical instructors and development of entrepreneurial abilities in youth, which contemplates training activities for instructors in technological areas, sojourns at Chilean, European and Latin American

enterprises and the organization of entrepreneurial training meetings addressed to young people.

- Modernization of small and medium sized Chilean enterprises (PYME). Fundación Empresarial Comunidad Europea-Chile shall demonstrate new technologies aimed to increase and improve supply in these enterprises through Demonstration Centers. At the same time, it shall promote supply of technical assistance and training services addressed to satisfy PYME needs.
- Promotion of entrepreneurial cooperation between European, Chilean and Latin American firms, with a view to reinforce the transfer of technologies and the exchange of experiences. Likewise, the creation of new enterprises shall be promoted by means of joint-ventures and the participation in activities dealing with technological and economic cooperation with the European Community.

C. INNOVATION AND QUALITY. National Quality Program

A third area of action in the institutional field is focused on the improvement of quality, one of the main motivations for technological innovation.

Continuous quality improvement, as an essential requirement to compete in international markets, lead the Government of Chile and the entrepreneurial private sector to create the National Quality Program. It aims to increase and coordinate the efforts of both sectors in this field.

This will facilitate Chilean firms to develop sound competitive advantages which will lead to increase and diversify exports, penetrate more demanding, but also more attractive markets, capitalizing the "country trademark".

The National Quality Program includes various activities tending to adapt the institutionality and infrastructure supporting quality improvement to international standards and practices on the matter.

These activities cover the following areas: dissemination and awareness-raising, technical standards and regulations; certification and accreditation of laboratories and certifying entities; and metrology. Included is the bill for the creation of a National System of Quality Certification for Exports, which is currently being examined by Congress. This bill has been fostered by the Government and the private sector in order to promote quality in export products and to reward those with "better quality".

This last initiative, which will improve domestic supply reliability in international markets, shall establish a voluntary accreditation scheme for certification bodies and laboratories, to evaluate and supervise the technical capacity of these entities, i.e., "to certify certifiers", in conformity with international criteria and procedures.

By permitting users and buyers to distinguish and recognize the quality of various products, and thus increase the transparency of markets, this system will allow enterprises that strive to improve their products and services to obtain - via the market - a retribution for their efforts, providing an incentive to improve quality.

Another action linked to the Program is the project to establish a National Award for Quality in the country (as the Baldrige Award in the USA or the Deming Award in Japan), aimed to encourage enterprises to adopt modern forms of quality achievement.

This initiative is being prepared jointly by the Government and the Confederación de Producción y Comercio, with the support of various specialized bodies, and its implementation is expected in the course of the present year.

5. CONCLUSIONS.

The country's auspicious conditions and the mentioned policy initiatives constitute a suitable atmosphere to promote a major innovation in Chile. This contributes to reinforce the competitiveness of our production and, thus, to the sustained growth of the domestic economy with greater levels of equity.

The initiatives presented constitute a broad set of instruments to encourage and support innovation in the country and they establish sound bases to advance in a process of continuous, accumulative and long-term improvement.

However, together with improving them, these mechanisms should be complemented in the future with actions inscribed in the framework of a task that is yet pending: the development of a greater culture of collaboration at different levels. That is to say, cooperation among enterprises; among universities or research entities, and in particular, among the latter and the productive sector. International experience indicates that this is a demand posed by modern times and a condition for the policy's success.

The most recent experience shows that the first steps are being taken in this direction, but there is still a long way to go.

APPENDIX

* APPENDIX 1:

CHILE: MACROECONOMICS, EXTERNAL SECTOR AND
SOCIAL FIGURES

* APPENDIX 2:

SUMMARY OF THE SCIENCE AND TECHNOLOGY
PROGRAM FUNDS

APPENDIX 1

CHILE

MACROECONOMICS FIGURES

	1988	1989	1990	1991	1992
GDP GROWTH (% rate)	7.4	10.0	2.1	6.0	10.4
INVESTMENT (ratio over GDP)	17.0	20.3	20.2	18.8	21.3
NATIONAL SAVING (ratio over GDP)	16.3	17.2	17.5	19.0	19.6
FISCAL SURPLUS (ratio over GDP)	(0.7)	1.8	0.5	1.5	2.5
INFLATION (% rate)	12.7	21.4	27.3	18.7	12.7
MONEY (% rate of change)	40.0	24.3	14.3	41.1	36.9
REAL INTEREST RATE (rate)	4.6	6.8	9.4	5.4	5.3

Source: Ministry of the Economy.

CHILE

EXTERNAL SECTOR FIGURES

	1988	1989	1990	1991	1992
TOTAL EXPORTS (US\$ billions)	7.0	8.2	8.6	9.0	10.0
NON COPPER EXPORTS (US\$ billions)	3.6	4.2	4.8	5.4	6.1
TRADE BALANCE (US\$ billions)	2.2	1.6	1.3	1.6	0.7
TOTAL FOREIGN DEBT (US\$ billions)	17.6	16.3	17.4	16.4	18.2
NET FOREIGN DEBT (US\$ billions)	15.1	13.3	12.1	9.8	9.2
FOREIGN INVESTMENT (US\$ billions)	0.8	0.9	1.1	1.2	1.3
REAL EXDCHANGE RATE (index 1988=100)	100	98	101	96	88

Source: Ministry of the Economy.

CHILE

SOCIAL FIGURES

	1988	1989	1990	1991	1992
EMPLOYMENT (% rate of change)	4.9	5.2	2.0	0.7	4.1
UNEMPLOYMENT (rate)	8.3	6.3	6.0	6.5	4.9
REAL WAGES (% rate of change)	6.5	1.9	1.8	4.9	4.5
PRODUCTIVITY (% rate of change)	2.4	4.6	0.3	5.3	6.1
SOCIAL EXPENDITURE (index 1988= 100)	100	86	92	101	108
INCOME DISTRIBUTION (% share of lower 40%)	--	12.6	13.3	14.7	--

Source: Ministry of the Economy.

APPENDIX 2: SUMMARY OF THE SCIENCE AND TECHNOLOGY PROGRAM FUNDS

Financial Mechanism	Objetives	Users	Finance Sources	Modality	Executing Institution	Available Resources 1992 – 1995 (Th M US\$)
FONTEC PERMANENT OPEN WINDOW	– Encouraging technological innovation in enterprises	PRIVATE ENTERPRISES	– Technological Innovation Projects, up to US\$ 100.000	– Subsidy and risk loan	CORFO	30
			– Technological Innovation Projects, total cost over US\$ 100.000	– Subsidy and risk loan and shared benefit		
			– Technological infrastructure projects submitted by an enterprise	– Technological development loan		
			– Technological infrastructure projects submitted by three or more enterprises	– Technological development loan and partial subsidy		
			– R & D and scientific and technological service projects	– Technological development loan		
FONDEF CONTEST ALLOCATION	– Strengthening R & D capacity and supply of scientific and technological services in productive areas – Increasing links between universities and research institutions and enterprises	UNIVERSITIES TECHNOLOGICAL INSTITUTES RESEARCH AND DEVELOPMENT CENTERS	– R & D projects with immediate transfer of results to productive sector (less than 4 years)	– Transfer	CONICYT	65
			– R & D projects with non-immediate transfer of results to productive sector	– Transfer		
			– Scientific and technological infrastructure projects	– Transfer		
			– Scientific and technological service projects	– Transfer		
FONDECYT CONTEST ALLOCATION	– Encouraging scientific and technological research of excellence	RESEARCHERS AND RESEARCH INSTITUTES	– Scientific research projects – Technological research projects	– Transfer – Transfer	CONICYT	60