

Chapter 1: Tertiary Education and R&D Capacity

This chapter offers a thorough insight into Chile's tertiary education system and into the improvements underway to increase the country's research, development and innovation capacity. Based on rich data, it discusses important aspects of higher education policies like enrolment rates, career preferences, student financial support mechanisms and tertiary education reforms.

Tertiary education

Tertiary education institutions in Chile fall into three categories: Technical Training Centres (*Centros de Formación Técnica* or CFTs), Professional Institutes (*Institutos Profesionales* or IPs) and Universities. Course length depends on which of these is attended. CFT training typically lasts two years, (by law, technical degrees require 1 600 hours of training), IP professional degree courses last four years and university degree courses at least five years. Students who choose certain subjects or have to repeat years will take longer. Several universities also offer one-year post-graduate programmes and diplomas, two year Master's programmes and four-year PhD programmes.

The basic qualification for entry to tertiary education is the school-leaving certificate, given after successful completion of secondary education: the *Licencia de Educación Media* (Secondary Education Certificate) is for general education and the *Licencia de Técnico Medio* is for vocational education. While this is necessary for all types of institution, it is sufficient only for CFTs and sometimes IPs. All universities in membership of the *Consejo de Rectores de las Universidades Chilenas*, (CRUCH) require applicants to sit the *Prueba de Selección Universitaria* or PSU test, and are expected to confine recruitment to those school leavers

who have achieved a minimum score, currently 450. Private universities, some IPs and a few CFTs also take account of PSU scores in recruitment. Virtually all young people who have successfully graduated from school and are considering entering tertiary education sit the PSU. For entry in March 2008, nearly 217 000 did so (216 881 according to figures from University of Chile, which administers the PSU). This represented an increase of 3% on 2007 which in turn was a 20% increase on 2006. Students from higher income quintiles tend to score higher on the PSU than those from lower income quintiles.

Technician training

Tertiary-level technician training accounts for roughly 12% of tertiary enrolment and its increase is a policy priority for the National Innovation Council for Competitiveness of Chile (CNIC) and the Division of Higher Education of the Ministry of Education (DIVESUP). It is a commonly held view in Chile that universities have excessive enrolment compared with labour market needs, while CFTs are under-enrolling students. Current labour market data do not support this view, as employers still seem to prefer to hire university graduates, and salary differentials are significant. There are indications, however, that the gaps in demand and pay are narrowing and may close in the future as the supply of university graduates increases faster than the supply of technicians.

CFT-trained technicians typically work in automobile and appliance repair, construction, office and business administration, health-related professions, hospitality and hotel management, among others. It is increasingly common for holders of technician's degrees to continue on to receive four year professional degrees (from *institutos profesionales*). While most CFTs also offer IP degrees, almost all will give prior credit for coursework/degrees from their own institutions and, to a limited extent, from other institutions.

CFTs are privately owned and may be run for profit. CFT students until recently received no public support for their studies. They now have one scholarship programme available (the *Becas Nuevo Milenio* programme) and they are eligible to borrow from the state guaranteed loan programme provided their high school grades meet a minimum requirement, and they enrol in an accredited CFT or IP. Some institutions report financing occasional foreign training for academic staff as their particular needs and resources dictate.

Figure 1.1 Chile's educational system

Year/Grade					
21	Tertiary	Higher Education (ISCED 5)	Doctoral (ISCED 6)		Technician (ISCED 5B)
19			2nd diploma (ISCED 5A long)	2nd diploma (ISCED 5A short)	
17			Professional (ISCED 5A, 1st diploma)		
14 13			Upper Secondary	Upper Secondary Education (ISCED 3)	
9	Basic	Secondary Education – lower (ISCED 2)			Compulsory Education
7		Primary Education (ISCED 1)			
1					

Source: MINEDUC (2007), Country Background Report of Chile, prepared for the OECD/World Bank Report, *Reviews of National Policies for Education: Tertiary Education in Chile*.

Student enrolments

In 1990 there were 250 000 students enrolled in Chilean tertiary education. By 2008, total enrolment had surpassed 800 000, as shown in Table 1.1. Ninety-five percent of students are enrolled in first degree (*pre-grado*) programmes (SIES, 2008). In this relatively short period Chilean tertiary education moved from an elite to a mass system. Currently enrolment represents 42% of the 18-24 year-old age cohort. A major policy goal of the government is for enrolment coverage to reach at least 50% of the age group. Achieving this goal would mean admitting an additional 200 000 students to tertiary education. Most of these students would be from the lower socio-economic quintiles and would represent the first generation of their families to attend tertiary education. Significant concern exists about

the ability of students with lower entry scores to succeed in academic university programmes without some remedial education. It is also expected that many new entrants will or should seek to enter technical tertiary education.

Table 1.1 Total student enrolments in higher education by type of institution, Chile, 1990-2008

Type of institution	1990	1995	2000	2005	2006	2007	2008
CFT	77 774	72 735	53 184	63 104	69 933	86 847	95 903
IP	40 006	40 980	79 904	114 546	113 134	156 126	162 870
Universities	131 702	231 227	319 089	468 497	478 075	519 557	546 208
<i>CRUCH</i>	112 193	161 850	215 284	252 936	262 151	285 984	295 158
<i>Non traditional</i>	19 509	69 377	103 805	215 561	215 924	233 573	251 050
Total	249 482	344 942	452 177	646 147	661 142	762 530	804 981

Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Students in Chile study at 192 tertiary institutions, of which 61 are universities, 44 IPs and 87 CFTs; 25 are members of the CRUCH and 36 are non-CRUCH members (CSE, 2008).

The distribution over areas of study gives a more detailed picture of the preferences of students. Table 1.2 provides that information.

Table 1.2 Tertiary education enrolment by area of study 2008

Area of study	Universities		IPs		CFTs		Total	
	Number	%	Number	%	Number	%	Number	%
Agriculture & fishing	22 017	4	3 311	2	2 557	3	27 885	3
Art & architecture	29 751	5	18 119	11	2 131	2	50 001	6
Sciences	13 354	2	24	0	0	0	13 378	2
Social sciences	92 173	17	17 680	11	1 323	1	111 176	14
Law	37 287	7	4 429	3	6 710	7	48 426	6
Humanities	11 258	2	1 879	1	441	0	13 578	2
Education	100 144	18	14 273	9	5 348	6	119 765	15
Technology	115 309	21	53 910	33	28 575	30	197 794	25
Health	85 032	16	16 319	10	19 456	20	120 807	15
Business & commerce	38 931	7	32 926	20	29 362	31	101 219	13
No area listed	952	0	0	0	0	0	952	0
Total	546 208	100	162 870	100	95 903	100	804 981	100

Source: *Consejo Superior de Educación, INDICES – 2008*.

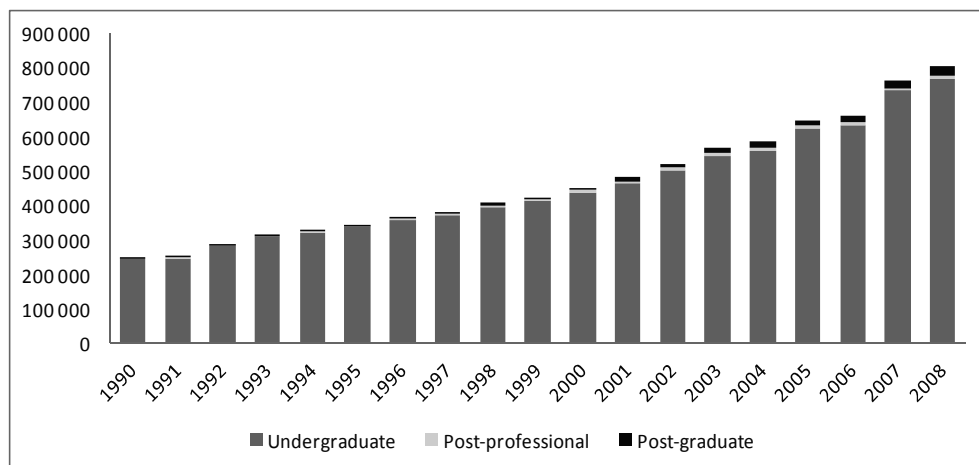
Students in the sciences (natural sciences, including life sciences) represent only a very small percentage (2%). Technology students, however, form a more significant share (23%), and universities, IPs and CFTs all contribute considerably. The bulk of enrolments are in public service areas (education, health and public administration), together accounting for 30% of total enrolments. As illustrated by Figure 1.2, enrolment expansion has been predominantly at the undergraduate level.

In 2007, there were 82 207 first-degrees granted, of which almost two-thirds were from universities. It is mostly university graduates who go on to Master's and PhD studies. Table 1.4 shows that enrolments in graduate education totalled 25 348 in 2008, representing just 3% of total tertiary education enrolments. Enrolments in doctoral programmes constituted 14% of all post-graduate enrolments.

Table 1.5 shows graduate student enrolments by field of study. Whereas the natural sciences dominate enrolments at PhD level, the study patterns of Master's degree students are more widely spread among the social sciences.

Table 1.6 shows the trend in graduate production by field of study over 1990-2006. The largest growth has been at the Master's degree level and mainly in social sciences and engineering and technology.

Figure 1.2 National undergraduate, post-professional and post-graduate enrolments, Chile, 1990-2008



Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Table 1.3 **First degrees granted by type of institution, 2007**

Type of institution	First degrees granted 2007	Percent (%)
CFTs	12 955	16
IP	17 430	21
Universities	51 822	63
Total	82 207	100

Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Table 1.4 **Enrolments in graduate education programmes**

Student enrolments by programme type, 2008			
Type of university	PhD	Master's	Total
Public universities	1 527	9 283	10 810
Private universities with public subsidies	1 536	5 647	7 183
Private universities (unsubsidised)	566	6 789	7 355
Total	3 629	21 719	25 348

Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Table 1.5 **Graduate student enrolments by field of study**

Field of study	PhD	Master's	Total
Business administration and commerce	6	5 709	5 715
Agriculture	252	483	735
Art and architecture	40	422	462
Natural sciences	1 189	832	2 021
Social sciences	225	3 922	4 147
Law	115	1 056	1 171
Education	476	4 232	4 708
Humanities	487	1 320	1 807
Health	302	1 363	1 665
Technology	537	2 376	2 913
Other	-	4	4
Total	3 629	21 719	25 348

Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Table 1.6 Graduates of graduate programmes in Chile

Master's graduates

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NES	64	88	90	69	91	99	108	95	126
ET	10	12	19	24	36	52	87	76	93
MS	97	60	39	43	42	46	67	43	66
AS	9	2	9	19	20	24	44	35	46
SS	29	33	26	45	57	85	141	197	385
H	35	34	28	42	72	52	47	59	76
Total	244	229	211	242	318	358	494	505	792

	1999	2000	2001	2002	2003	2004	2005	2006
NES	102	101	100	96	116	105	126	118
ET	90	105	196	123	165	267	256	307
MS	55	58	61	49	61	101	99	93
AS	34	35	46	61	57	84	58	88
SS	486	509	950	1 037	1 304	1 533	1 490	1 684
H	63	59	120	100	118	138	154	168
Total	830	867	1 473	1 466	1 821	2 228	2 183	2 458

Doctoral graduates

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NES	20	27	40	31	30	44	50	45	63
ET	7	9	6	8	11	17	-	8	5
MS	-	-	-	-	-	-	3	-	10
AS	-	-	-	-	-	-	-	-	-
SS	-	-	-	-	-	-	-	-	-
H	2	2	1	1	2	2	2	4	10
Total	29	38	47	40	43	63	55	57	88

	1999	2000	2001	2002	2003	2004	2005	2006
NES	61	63	63	95	94	159	134	140
ET	1	5	10	15	13	22	24	21
MS	4	7	3	13	10	14	25	20
AS	-	-	-	2		3	-	11
SS	-	-	8	4	10	22	21	34
H	9	8	8	18	17	24	18	23
Total	75	83	92	147	144	244	222	249

NES = Natural and exact sciences	MS = Medical sciences	SS = Social sciences
ET = Engineering and technology	AS = Agricultural sciences	H = Humanities

Note: Data provided based on most recent information provided at RICYT web site.

Source: RICYT, www.ricyt.org.

In 2007, there were 307 doctoral degrees awarded by Chilean Universities. Historically, doctoral education has been the preserve of the largest and oldest of the CRUCH universities (Universidad de Chile, Pontificia Universidad Católica de Chile, Universidad Santiago de Chile and Universidad de Concepción). Recently, more universities – both CRUCH and non-CRUCH have significantly increased doctoral enrolments and the number of doctoral degrees granted. Achieving growth and diversification of graduate education, especially in doctoral programmes, has been a long-standing goal for tertiary education policy; the MECESUP programme has been a major vehicle for providing the resources and promoting the conditions to improve quality and efficiency of domestic doctoral education and stimulate the emergence of new PhD programmes.

Student financial support

This section reviews the support available for domestic and foreign graduate education prior to the BCP and for post-graduate studies in Chile. Annex C provides a summary of the support available for domestic first degrees.

Support for domestic and foreign graduate education prior to the BCP

Prior to the establishment of the BCP, public support for graduate education came from a diverse array of sources. Agencies and ministries such as the Ministry of Planning and the Ministry of Foreign Affairs, the National Arts Council and the International Co-operation Agency, CONICYT and the MECESUP programme financed foreign graduate education (and domestic graduate education, in the cases of CONICYT and MECESUP). CORFO, in co-operation with commercial banks, provided loans to graduate students for both foreign and domestic study.

Universities provide some support to students in the form of scholarships and loans from their own funds. CONICYT's support has traditionally been the largest and most comprehensive, and its main focus has been on provision of scholarship to students and research grants to researchers for the sake of promoting domestic graduate education and research. Infrastructure, some overhead expenses and other indirect costs of graduate education in CRUCH universities are also supported through the *Aporte Fiscal Directo*, or AFD.

This public provision of scholarships has been part of a systematic effort to increase the number of professionals with graduate qualifications. The modalities of support have included Master's, doctoral and post doctoral scholarships, plus specific support for thesis work, sandwich programmes and attendance in professional conferences, *inter alia*.

In 2008 CONICYT published a report, *Advanced Human Capital: Toward an Integrated Policy for Scholarships and Post-graduate Education*, produced by the Technical Commission for Post-graduate Scholarships. That report surveyed the national portfolio of support to graduate education, amassing an inventory of government scholarships and programmes:

- The Fellowship Programme for graduate study abroad and post-graduate scholarships in Chilean universities of the Ministry of Planning and Co-operation (MIDEPLAN). Provided scholarships to employees of the Chilean government, recent graduates and university professors for study abroad.
- Graduate Fellowships for Academic and Student Development (MECESUP).
- Domestic and Foreign Grants of CONICYT.
- Graduate Fellowships from the International Co-operation Agency (ACGI).
- Graduate Fellowships from the National Council for Culture and the Arts (CNCA).

Each of these programmes had different areas of emphasis, selection procedures, levels of support, and monitoring and follow-on activities.

Table 1.7 **Characteristics of Chilean scholarship types, 2000-2006**

	Period	Foreign scholarship for PhD study granted	Average grants per year	Period	Domestic scholarships for PhD study granted	Average grants per year
MIDEPLAN ¹	2000-2006	580 ²	82 ²	2000-2006	77 ²	11 ²
MECESUP ²	2000-2006	160	23	2000-2006	794	113
CONICYT	2001-2006	247	41	2001-2006	1 199	200
ACGI		0			0	0
CNCA	2003-2006	20	5		0	0
Total		-	151		-	324

Notes:

1. MIDEPLAN Scholarships were for Master's as well as PhD study.

2. Estimated using overall number of international and domestic scholarships for 2000-2006 times the respective 2006 proportion devoted to doctoral study. The report only disaggregates doctoral and other scholarships from MIDEPLAN for the year 2006.

Source: CONICYT (2008), *Advanced Human Capital: Toward an Integrated Policy for Post-graduate Scholarships*.

Support for post-graduate study in Chile

Scholarship support for domestic graduate education is provided principally by CONICYT and MECESUP. Support for PhD students has doubled since 2005. Support for Master's students has increased by a factor of five from its low 2005 base. Grants by gender are reasonably equal for Master's degrees but consistently about 20% higher for men at the PhD level. On average, some 100 Master's scholarships and 500 PhD scholarships have been awarded annually in recent years.

The analysis in the CONICYT 2008 report found different programmes with different targets, and no overall strategy for human capital development, no definition of priority areas, and weak co-ordination among programmes. The programmes for foreign graduate study mostly took the form of bi-lateral agreements aimed at facilitating access of Chileans to foreign universities. Little was done to guarantee the quality of these programmes. No assistance was provided for second-language skills for student studying in foreign languages. The MIDEPLAN programme catered to the needs of government employees who sought to upgrade their professional qualifications, both in Chile and abroad.

No consolidated programme of publicity or information for potential students existed. Nor was any unified system of record keeping or statistics maintained. Some programmes awarded scholarships based on the academic record of the student without regard to the area of study, while others identified the area of study first and then selected the applicants with the best academic records. No consolidated system of monitoring/evaluation or follow up with students and graduates was in place. Although each system did some degree of monitoring, this mostly tabulated input data (number of students supported, amounts of resources provided, etc.). Almost no impact evaluation of these programmes has been undertaken.

Policies for improvement

The government has numerous agencies and mechanisms designed to improve or ensure the quality of the tertiary education system. The Ministry of Education is responsible for regulating university and non-university education, and oversees the CFTs and IPs. The Higher Council for Education (CSE, *Consejo Superior de Educación*), increasingly with the National Accreditation Commission (CNA, *Comisión Nacional de Acreditación*), also contributes to Chile's tertiary education regulatory framework.

The CSE oversees and regulates the licensing of new private tertiary education institutions. It does this through an extended probationary period through which new institutions demonstrate required levels of educational

quality plus financial and administrative soundness. At the end of this period, successful institutions are granted licenses to operate with autonomy. The private universities that the CSE regulates have generally offered few graduate programmes, but this is changing. More are offering Master's degrees, especially professional Master's in areas like business administration. A few are offering doctoral degree programmes. However, private universities normally expand into graduate education only after they are licensed and autonomous and therefore no longer regulated by the CSE. The CSE does have a growing role in regulating CFTs and IP. In fact, in the past few years the majority of new private tertiary institutions seeking licenses are CFTs and IPs.

The CNA was formed in 2006 to conduct accreditation processes and co-ordinate the new national system of quality assurance for higher education. The CNA's principal tasks are to design and develop institutional and programme accreditation, and to help tertiary institutions build up their own capacity for quality assurance and the provision of full and accurate public information.

In addition to the CSE and the CNA, the MECESUP, created by the Chilean government in 1997, has made an important contribution to improving the quality of Chilean tertiary education. The MECESUP programme supported the government's policies for higher education reform initiated in the 1990s. In its first phase the programme supported reforms to the budget allocation process, through a competitive fund to promote quality and relevance; the development of the system for programme and institutional accreditation discussed above; the revitalisation of graduate education; investment in learning infrastructure; and reform of curricula and teaching and learning practices. Supported in part by a World Bank loan, the programme invested over USD 200 million in Chile's tertiary education system from 1997-2005 (World Bank, Disbursement Information System).

A second phase of the programme, known as "MECESUP 2", has continued and expanded on the results of phase one. MECESUP 2 made investments of over USD 90 million from 2006-2009 in an improved regulatory framework for tertiary education (including the creation of a Higher Education Information System), the continued competitive allocation of funding for academic innovation, and the piloting of performance-based budgeting for tertiary institutions. The improvement of domestic graduate education remains a significant priority for the MECESUP programme. Under MECESUP 2 more limited support was provided for foreign graduate training and to activities such as short visits abroad and other types of international networking to strengthen graduate education.

The MECESUP programme is credited by various observers with having catalysed significant experimentation and change in Chilean tertiary education. New curricula, improved teaching and learning practices, budget and management innovations, enhanced faculty qualifications and institutional improvement plans, are among innovations promoted and funded by MECESUP. The challenge for MECESUP now is to ensure the insertion and institutionalisation of its mechanisms that prove to be successful into the Ministry of Education's comprehensive approach to the governance and management of tertiary education. Co-ordinating the support for domestic graduate education through MECESUP with that provided by the BCP for foreign graduate education is a significant part of this challenge. The inclusion of sandwich programmes and development of performance contracts with individual graduate programmes are seen as very welcome additions to the portfolio of Becas Chile instruments. Critics of the MECESUP programme have raised questions about the diffuse focus of investments and the lack of systematic evaluative data.

Improvements in research, development and innovation capacity

Three entities play a large role in the improvement of Chile's research, development and innovation capacity: CNIC, CONICYT and CORFO, the Ministry of Economy's Private Sector Development Agency. Funding for research and development in the higher education sector in Chile comes largely through the latter two.

CONICYT's total 2007 budget amounted to CLP 90 billion, up from CLP 48 billion in 2004. CONICYT has developed a large number of funding instruments. Currently there are eleven, most of them with a number of sub-programmes. The two major research and development competitive funds are the Science and Technology Development Fund (*Fondo Nacional de Desarrollo Científico y Tecnológico*, FONDECYT), for basic research, and the Fund for the Promotion of Scientific and Technological Development (*Fondo de Fomento al Desarrollo Científico y Tecnológico*, FONDEF), for technological research and development. The budget for FONDECYT was stable in real terms between 1999 and 2005 (fluctuating around CLP 19 and 21 billion *per annum*) but has since risen to CLP 33 billion (running currency) for 2008. The recent budget increase for research is partially due to the availability of resources from the Innovation Fund for Competitiveness, a levy on copper exports.

Table 1.8 provides an overview of all eleven CONICYT programmes with their 2007 and 2008 budgets. Together with CONICYT's own operational costs of some CLP 5 billion these add up to an overall budget of around CLP 91 billion in 2007.

Table 1.8 CONICYT programmes

		Budget 2007 (CLP billion)	Budget 2008 (CLP billion)
FONDECYT	Core programme funding individual research projects.	26.0	33.1
FONDEF	Applied research, pre-competitive development, technology transfer; university-industry co-operation.	12.2	12.4
FONDAP	Centres of Excellence in priority areas, including units for valorisation.	4.9	4.5
EXPLORA	Presenting science to society at large throughout the country.	3.3	1.9
<i>Financiamiento Basal</i>	Basic infrastructure funding for Centres of Excellence.	9.1	6.4
<i>Programa Bicentenario</i>	Improving the Science, Technology and Innovation system; strengthening science base; industry-university linkages.	18.8	9.3
<i>Programa Astronomía</i>	Research in astronomy.	0.6	0.6
<i>Programa Regional</i>	Regional research centres jointly with regional governments.	2.4	2.6
Scholarships for post graduates ¹	Grants to follow PhD and Master's education in Chile and abroad or mixed; as well as complementary funding for e.g. printing thesis, conference visits.	8.4	13.6
<i>Relaciones Internacionales</i>	International co-operation.	0.3	0.6
<i>Información CyT</i>	Access to scientific information.	0.1	0.2

Note (1): There are many other scholarship schemes.

Source: CONICYT.

Universities – and especially graduate programmes within universities – are virtually the sole beneficiaries of FONDECYT and FONDEF. Universities received 100% and 99.6% of the awards from these two funds during 2000-2004. Most awards go to CRUCH universities, although awards to non-CRUCH institutions are growing. Some non-CRUCH institutions win more grants than some CRUCH institutions and this trend is likely to continue. Table 1.9 provides details by institution for 2007.

A much smaller source of funding for advanced human capital development is from the Ministry of Economy through CORFO, the Private Sector Development Agency. CORFO's mandate is to promote innovation, technology transfer and entrepreneurship. CORFO has combined all its instruments to promote innovation in the INNOVACHile programme (CORFO, 2008). Most of INNOVACHile's programmes are targeted at companies. However one programme, Innovation Projects of Public Interest, targets universities and government institutes and agencies; and another one, Pre-competitive Innovation Projects, is focused exclusively on universities.

This last programme spends some CLP 13 billion *per annum* for pre-competitive research in universities. For 2008, CLP 13.6 billion was allocated to 38 university projects.

Table 1.9 FONDECYT and FONDEF awards, 2007 (CLP billion)

Institution	FONDECYT	FONDEF	Total
CRUCH universities (first twelve)			
University of Chile	7.2	1.9	9.1
Pontifical Catholic University of Chile	4.8	1.4	6.2
University of Concepción	2.5	1.8	4.3
Southern University of Chile (<i>Universidad Austral de Chile</i>)	1.5	0.7	2.2
University of Santiago	1.6	0.4	2.0
Pontifical Catholic University of Valparaíso	0.9	0.3	1.2
Catholic University of the North	0.6	0.5	1.1
Federico Santa Maria Technical University	0.6	0.4	1.0
University of Los Lagos	0.1	0.8	1.0
Arturo Prat University	0.1	0.9	1.0
University of La Frontera	0.4	0.3	0.7
University of Antofagasta	0.3	0.4	0.7
Non-CRUCH universities (first two)			
Andrés Bello University	0.4	0.1	0.5
University for Development (UDD, <i>Universidad del Desarrollo</i>)	0.1	0.0	0.2
Not-for-profit or government institutes (first two)			
Agricultural and Livestock Research Institute (INIA, <i>Instituto de Investigaciones Agropecuarias</i>)	0.1	0.3	0.4
Centre for Scientific Studies (<i>Centro de Estudios Científicos</i>)	0.3	-	0.3

Source: CONICYT.

As mentioned above, the establishment of the Innovation Fund in 2006 prompted a major change in resource availability. Allocation of funds is specified by the Committee of Ministers for Innovation, who define key programmes on which the budget should be spent.

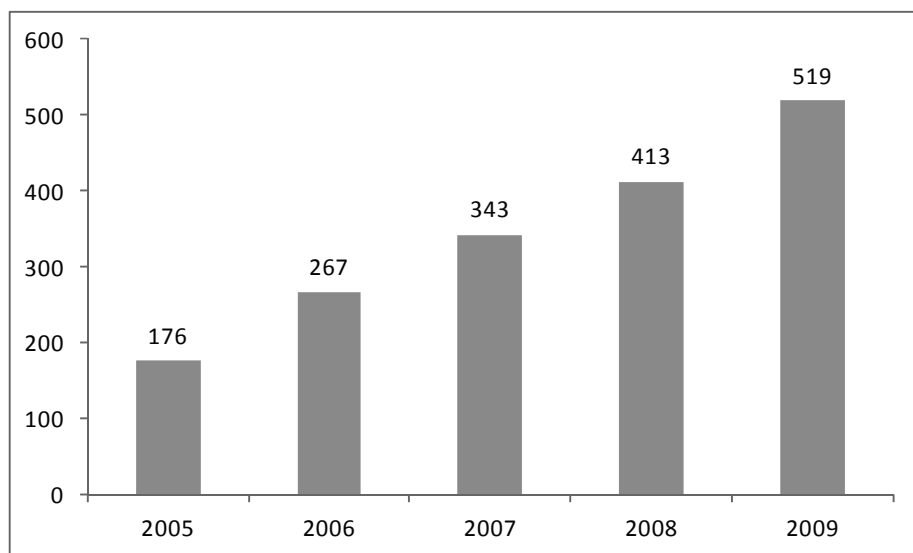
With regards to the CNIC, the latter has made several policy proposals for human capital development since its creation in 2006. The CNIC has sought to maximise the long-term competitiveness of Chile by optimising investment in technology development, research and human capital formation. The CNIC makes recommendations to an inter-ministerial Council for Innovation, whose members include the ministers of Education,

Economy and Finance, *inter alia*. The CNIC has been influential in proposing priorities for innovation and human capital development. They have proposed a comprehensive longer-term strategy for innovation in Chile which proposes the development of industrial clusters in five thematic areas. In addition to its role in strategy formulation, the CNIC has directly influenced the criteria for allocating resources from the Innovation Fund for Competitiveness (as described above) and indirectly influenced funding priorities for CONICYT. Under the CNIC influence the role of CORFO as a financier of innovation has increased, with more funds allocated to university-industry co-operation. CONICYT has also increase emphasis on university-industry co-operation in its funding priorities.

R&D in numbers

Latest figures (2004) indicate R&D investment as a percent of GDP stands at 0.68%. The growth in resources invested in the National Innovation System between 2005 and 2009 has been strong, reaching a peak of USD 519 million in 2009. Most of these resources have been directed towards high potential clusters and cross-cutting development platforms. Significant efforts have been made on three broad fronts: private sector innovation, basic and applied research and advanced human capital.

Figure 1.3 National system of innovation, budget in USD million



Source: Budget Office, Ministry of Finance, Chile.

Box 1.1 Chilean programmes for attracting foreign scholars, professional and technicians to Chile

Attraction of the advanced human capital programme

I. Objective

Run by CONICYT, this programme was created to finance the recruitment of scientists, researchers and experts living abroad for short or long stays in Chile. This programme seeks to strengthen undergraduate and graduate programmes of regional state universities in Chile, develop research on the country's priority areas, promote collaborative projects with research and teaching institutions in Chile, and develop networks of scientific knowledge.

II. Arrangements

1 - National and Regional Short Stays

Short-term stays to develop research and teach in disciplines related to a national and regional priority areas, respectively. The stays may have a minimum duration of two months and a maximum of ten months. Each project may attract one scientist/expert from abroad.

2 - Long Stays Mode

Long-term to develop research and teach in disciplines related to a national priority area. The stays may have a minimum duration of one year and a maximum of four years. Each project may be made up of one to three experts from abroad.

III. Beneficiaries

Potential beneficiaries of the programme are public universities, whose headquarters are located outside the Metropolitan region and who have a proven track record of scientific and technological research. Applications may include partnerships with a group of as universities and/or research institutes from any region of the country.

Insertion of professionals and technicians in enterprises programme

I. Objective

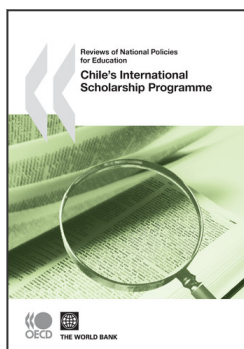
Run by CORFO, this programme supports the implementation and development of R&D projects and processes in enterprises by recruiting qualified professional and technical personnel to develop research and innovation.

II. Beneficiaries

Profitable or unprofitable domestic firms in the first income tax bracket that have been operating for at least a year. Companies must certify they have adequate technical, administrative and financial capacity to develop the project, as well as the management skills to implement its production phase.

III. Benefits

Covers up to 70% for the first year and up to 50% for the second year of the total monthly gross payroll of the professional(s) and/or technician(s) hired for the implementation of the project. The maximum monthly salary covered by the subsidy will be: CLP 1 000 000 for professionals and CLP 500 000 for technicians. INNOVACHile will co-finance up to CLP 20 000 000 (with an annual cap of CLP 60 000 000) per company.



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