





JICA LIBRARY



1097048(1)

23637



**THE STUDY  
ON  
THE INDUSTRIAL STANDARDIZATION SYSTEM DEVELOPMENT  
IN  
THE REPUBLIC OF CHILE**

**<SUMMARY>**

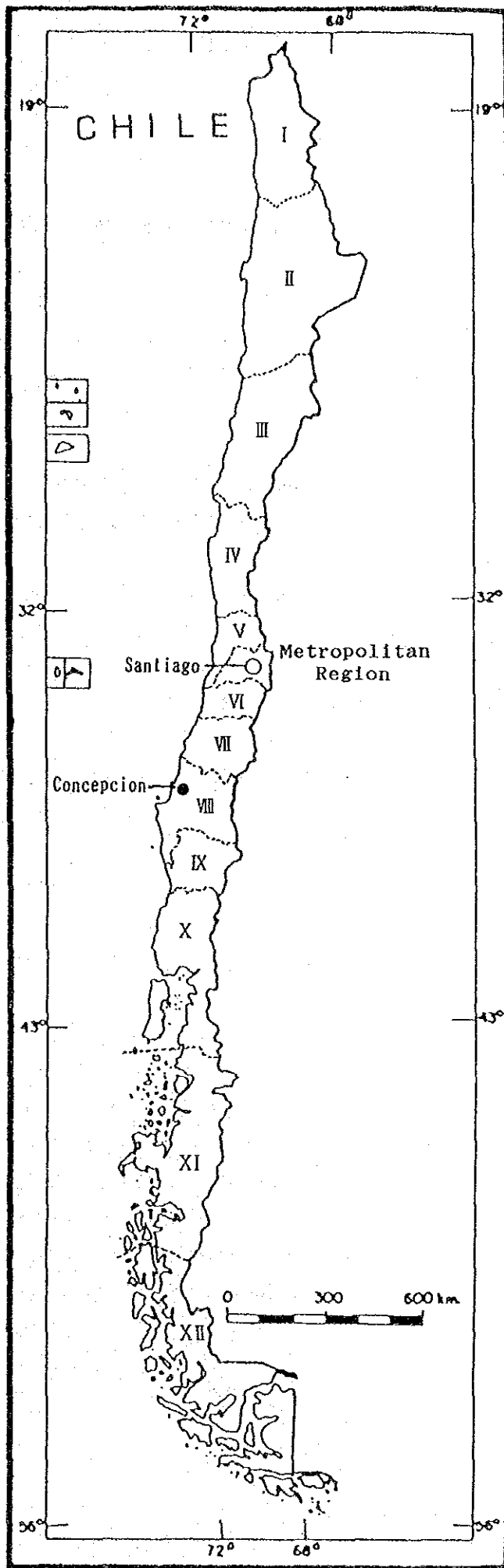
**DECEMBER 1991**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
TOKYO, JAPAN**

M P I
J R
91-176

国際協力事業団

23637







## CONTENTS

MAP

	Page
<b>CHAPTER 1 BACKGROUND OF STUDY AND PURPOSE</b>	
1.1 Background of Study .....	1-1
1.2 Objective of Study .....	1-3
1.3 Scope and Objective of Study .....	1-4
1.4 Regions Covered by the Study .....	1-4
<b>CHAPTER 2 SOCIO-ECONOMIC PROFILE OF THE REPUBLIC OF CHILE AND PROBLEMS CONCERNING THE NATION'S INDUSTRIAL DEVELOPMENT</b>	
2.1 Present Status of the Republic of Chile .....	2-1
2.2 Economic Situation .....	2-2
2.3 Current Situation of the Industrial Sector .....	2-8
2.4 Problems Concerning Industrial Development .....	2-11
<b>CHAPTER 3 CURRENT SITUATION OF AND PROBLEMS IN INDUSTRIAL STANDARDIZATION</b>	
3.1 Present Situation .....	3-1
3.1.1 Government Policy .....	3-1
3.1.2 Outline of INN .....	3-1
3.2 Establishment of National Standards .....	3-4
3.2.1 Executive Organization .....	3-4
3.2.2 Procedures for the Drafting of Standards and Results Achieved in the Establishment of Standards ..	3-4
3.2.3 General Penetration of Standards .....	3-9
3.2.4 Supervision of Standards .....	3-10
3.2.5 Preparation of Standards Other Than NCh .....	3-11
3.2.6 Problem Areas in the Establishment of Standards ....	3-11

3.3	Certification System .....	3-14
3.3.1	Outline of the Certification System as it Exists in the Republic of Chile .....	3-14
3.3.2	Problem Areas concerning the Certification System ..	3-36
3.4	Quality Control .....	3-40
3.4.1	System and Legislation .....	3-40
3.4.2	Diffusion Body .....	3-44
3.4.3	Current Status for Quality Control in Private-Sector Companies .....	3-51
3.5	Testing and Inspection System .....	3-57
3.5.1	Present Status and Current Problems of Testing and Inspection Organization .....	3-57
3.5.2	Equipment and Facilities for Testing and Inspection in Manufacturing Companies .....	3-66
3.6	Metrological System .....	3-72
3.6.1	Metrological System and the Present Legal System ..	3-72
3.6.2	Metrology Administration and Current Status of Policy-Making .....	3-73
3.6.3	The Traceability System (National Primary Standards - Secondary Standards, Working Standards and Calibration Apparatus) .....	3-74
3.6.4	Verification of Standards and Calibration Organizations .....	3-74
3.6.5	Organizations Responsible for Maintenance of Measurement Standards .....	3-85

#### CHAPTER 4    MAIN PROBLEMS AND OBJECTIVES TO BE ACHIEVED FOR IMPROVEMENTS OF INDUSTRIAL STANDARDIZATION

4.1	General .....	4-1
4.2	Main Problems and objectives to be Achieved for Establishment and Improvement of Industrial Standards .....	4-1

4.3	Main Objectives for Establishment of Unified Certification System and Objectives to be Achieved .....	4-2
4.3.1	Basic Concept for Unified Certification System .....	4-2
4.3.2	Improvement of Current Certification System .....	4-3
4.3.3	Objectives to be Achieved for Realization of Unified Certification System .....	4-5
4.4	Main Objectives for Diffusion of TQC and In-house Standards and Goals .....	4-10
4.4.1	Main Objectives .....	4-10
4.4.2	Main Goals in Achieving Main Objectives .....	4-10
4.5	Main Objectives for Consolidation of Framework for Measurement Standards and Calibration Systems and Goals to be Achieved .....	4-12
4.5.1	Main Objectives .....	4-12
4.5.2	Goal to be Achieved .....	4-13

## CHAPTER 5 PROGRAMS OF THE INDUSTRIAL STANDARDIZATION SYSTEM DEVELOPMENT

5.1	Plans for the Introduction and Diffusion of a Unified Certification System .....	5-1
5.1.1	Program for Establishing a Legal and Regulation Associated with the Unified Certification System ...	5-4
5.1.2	Program for Establishing Accreditation System for Certification Bodies .....	5-6
5.1.3	Program for Establishing Certification System .....	5-8
5.1.4	Program for Establishing a Registration System for Qualified Auditors Who Conduct Assessment of Quality System under the Unified Certification System .....	5-12
5.1.5	Program Establishing Training System for Qualified Auditors .....	5-14
5.1.6	Program for the Diffusion of the Unified Certification System .....	5-16

5.2	Quality Control/TQC Diffusion Program .....	5-17
5.2.1	Contents of Diffusion Program .....	5-17
5.2.2	Setting up Technical Committee for Innovation of Education and Diffusion Organizations for Quality Control and TQC .....	5-18
5.2.3	Decision of a Program for Consolidation of Education and Diffusion Organization by the Technical Committee .....	5-19
5.2.4	Program for Consolidation of Texts and Curriculum for Education and Training .....	5-21
5.2.5	Program for Acquisition of Competent Lecturers and Trainers .....	5-24
5.3	Program for Consolidation of and Diffusion of a Metrological System .....	5-25
5.3.1	Program for Enacting a Measurement Law .....	5-26
5.3.2	Program for Establishing the National Metrological Institute .....	5-28
5.3.3	Program for Consolidation of Specified Verification Organization .....	5-31
5.3.4	Program for Consolidation of Organizations for Measurement Calibration .....	5-34

## CHAPTER 6 IMPLEMENTATION PLAN AND IMPLEMENTATION ORGANIZATIONS

6.1	Implementation Plan .....	6-1
6.1.1	Basic Consideration in Executing the Implementation Plan .....	6-1
6.1.2	Execution Plan .....	6-4
6.2	Implementation Organizations .....	6-12
6.2.1	Progress Monitoring for the Plan as a Whole .....	6-12
6.2.2	Implementation Organization for Each Plan .....	6-13
6.3	Expected Role of the Government .....	6-16
6.3.1	Assistance in Strengthening INN .....	6-16
6.3.2	Assistance at the Initial Stage of Implementation of the Unified Certification System .....	6-17

6.3.3	Establishment of Industrial Standardization Law ....	6-18
6.3.4	Assistance for the Diffusion of the Unified Certification System .....	6-18
6.3.5	Aid for the Diffusion of TQC .....	6-18

## CHAPTER 7 EFFECTS LIKELY TO ARISE FROM THE IMPLEMENTATION OF THIS PLAN

7.1	Introduction .....	7-1
7.2	Effects That can be Expected at the Company Level .....	7-2
7.2.1	Effects of the Introduction of a Unified Certification System and the Diffusion of Quality Control .....	7-2
7.2.2	Benefits of Introducing a Metrology System .....	7-4
7.3	Benefits Expected at the National Level .....	7-6

## List of Abbreviations

AASHTO	The American Association of State Highway and Transportation Officials
AFNOR	Association Française de Normalisation
ANSI	American National Standards Institute
AOAC	Association of official Analytical Chemists
API	American Petroleum Institute
APSTC	Asociación de Productores de Salmon y Trucha de Chile
AQL	Acceptable Quality Level
ASCAL	Asociación Chilena de Control de Calidad
ASEXMA	Asociación de Exportadores de Manufacturas
ASIMET	Asociación de Industrias Metalúrgicas y Metalmecánicas
ASME	American Society for Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BIPM	International Bureau of Weights and Measures
BS	British Standards
B. V.	Bureau Veritas
CCV	Consumo y Calidad de Vida
C. Ch. C	Cámara Chilena de la Construcción
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical standardization
CESMEC	Centro de Estudios, Medición y Certificación de Calidad
CHILECTRA	Chilectra Metropolitana
CIE	Comite de Inversiones Extranjeras
CIMM	Centro de Investigación Minera y Metalúrgica de Chile
CIREN	Centro de Investigacion de Recursos Naturales
C. N. E.	Comision Nacional de Energia
CODEX	Codex-Alimentarius Commission
COPANT	Comisión Panamericana de Normas Técnicas
CORFO	Corporación de Fomento de la Producción
CORMA	Corporación Chilena de la Madera
C. P. C.	Confederación de la Producción y el Comercio

C. T. I.	Compañía Tecno Industrial S.A.
D. A. E.	Dirección de Aprovisionamiento del Estado
D I C T U C	Departamento de Investigaciones Científicas y Tecnológicas, Universidad Católica de Chile
D I N	Deutsches Institut für Normung
ENDESA	Empresa Nacional de Electricidad S.A.
EOQC	European Organization for Quality Control
FACH	Fuerza Aérea de Chile
FONDEF	Fondo de Fomento a la Investigación Científica y Tecnológica
FONDECYT	Fondo Nacional de Desarrollo Científico y Tecnológico
FONTEC	Fondo de Desarrollo Tecnológico y Productivo
GASCO	Compañía de Consumidores de Gas de Santiago
ICARE	Instituto Chileno de Capacitación Racional de Empresa
IDIC	Instituto de Investigaciones y Control del Ejército
IDIEM	Instituto de Investigación y Ensayes de Materiales, Universidad de Chile
IEC	International Electrotechnical Commission
IFAN	International Federation for Association of Standards Congress
IFOP	Instituto de Fomento Pesquero
ILAC	International Laboratory Accreditation Conference
INACAP	Instituto Nacional de Capacitación Profesional
INE	Instituto Nacional de Estadística
INFOR	Instituto Forestal
INN	Instituto Nacional de Normalización
INTEC	Instituto de Investigaciones Tecnológicas
IS	Indian Standards
ISO	International Organization for Standardization
ISP	Instituto de Salud Pública de Chile
ITINTEC	Instituto de Investigación Tecnológica
JIS	Japanese Industrial Standards
MBN	Ministerio de Bienes Nacionales
MDA	Ministerio de Agricultura
MDH	Ministerio de Hacienda
MDI	Ministerio del Interior
MDJ	Ministerio de Justicia
MDM	Ministerio de Minería
MDN	Ministerio de Defensa Nacional

MDS	Ministerio de Salud
MEP	Ministerio de Educación Pública
MIDEPLAN	Ministerio de Planificación y Cooperación
MIL	Military Specifications and Standards
MINECOM	Ministerio de Economía, Fomento y Reconstrucción
MINRE	Ministerio de Relaciones Exteriores
MINSEC	Ministerio Secretaría General de Gobierno
MINTRATEL	Ministerio de Transportes y Telecomunicaciones
MINVU	Ministerio de la Vivienda y Urbanismo
MOP	Ministerio de Obras Públicas
MRE	Ministerio de Relaciones Exteriores
MSGP	Ministerio Secretaría General de la Presidencia de la República
MTPS	Ministerio de Trabajo y Previsión Social
NACE	National Association of Corrosion Engineers
NAS	National Aerospace Standards Committee
NCh	Norma Chilena
NF	Normes Française
NIST	National Institute for Standards and Technology
OIML	International Organization of Legal Metrology
OLAC	Organization Latino-americana para la Calidad
PASC	Pacific Area Standards Congress
PDCA	Plan, Do, Check, Action
PROCHILE	Dirección General de Relaciones Económicas Internacionales
PNUD	Programa para el desarrollo de las Naciones Unidas
RPC	Refinería de Petróleo Concón S.A.
SABS	South African Bureau of Standards
SEC	Superintendencia de Electricidad y Combustibles
SENCE	Servicio Nacional de Capacitación y Empleo
SENDOS	Servicio Nacional de Obras Sanitarias
SERCOTEC	Servicio de Cooperación Técnica
SERNAC	Servicio Nacional del Consumidor
SERNAP	Servicio Nacional de Pesca
SGS	Sociedad General de Control SGS Chile Ltda.
SNA	Sociedad Nacional de Agricultura
SNCC	Sistema Nacional de Certificación de Conformidad
SOFOPA	Sociedad de Fomento Fabril
SONAMI	Sociedad Nacional de Minería



S S S A	Superintendencia de Servicios Sanitarios
T C	Technical Committee
T Q C	Total Quality Control
U L	Underwriters' Laboratories
U N E	Una Norma Española
U N I	Ente Nazionale Italiano di Unificazione
U S A C h	Universidad de Santiago de Chile
U T F S M	Universidad Técnica Federico Santa María
V A	Value Analysis
V D E	Verband Deutscher Elektrotechniker

## LIST OF FIGURES

	Page
Fig. 3.1-1 INN Organization .....	3-3
Fig. 3.2-1 NCh Standard Drafting Process Flowchart .....	3-5
Fig. 3.2-2 Number of Standards Authorized by Council of INN from 1973 until 1991 .....	3-8
Fig. 3.3-1 INN Accreditation Flow .....	3-17
Fig. 3.3-2 CONFORMITY Seal by APSTC .....	3-29
Fig. 3.3-3 CONFORMITY Mark by Voluntary Certification (Paints) .....	3-30
Fig. 3.4-1 TQC Activity System .....	3-42
Fig. 3.4-2 Stages in the Upgrading of Quality Control/TQC Activities .....	3-45
Fig. 3.4-3 Overview Chart of Quality Control Diffusion .....	3-47
Fig. 3.4-4 Courses and Seminars held by INN and Participants in the Years 1973-1989 .....	3-50
Fig. 3.6-1 Metrology/Calibration Equipment of CESMEC (Length) .....	3-79
Fig. 3.6-2 Metrology/Calibration Equipment of CESMEC (Mass) ..	3-80
Fig. 3.6-3 Metrology/Calibration Equipment of CESMEC (Volume) .....	3-81
Fig. 3.6-4 Metrology/Calibration Equipment of CESMEC (Force) .....	3-82
Fig. 3.6-5 Metrology/Calibration Equipment of CESMEC (Pressure) .....	3-83
Fig. 3.6-6 Metrology/Calibration Equipment of CESMEC (Temperature) .....	3-84
Fig. 5.1-1 Interrelation between Accreditation Body .....	5-2
Fig. 5.1-2 Composition of the Preparation Council for the Unified Certification System .....	5-4

Fig. 5.3-1	Position of INN .....	5-26
Fig. 5.3-2	The National Metrological Institute .....	5-29
Fig. 5.3-3	Committee for Verification Organizations .....	5-32
Fig. 6.1-1	Implementation Schedules for the Various Programs .	6-6
Fig. 6.2-1	Bodies Responsible for Implementation-Execution Organization and Related Bodies .....	6-14

## LIST OF TABLES

		Page
Table 3.2-1	Classification by Ministry in charge for Official Recognition of Standards .....	3-7
Table 3.2-2	Classification of NCh Standards by Area .....	3-9
Table 3.2-3	Classification of Standards kept at INN .....	3-10
Table 3.3-1	Certification Principles and Practice .....	3-15
Table 3.3-2	Overview of Scope of Certification of the Certification Bodies Visited by the Team .....	3-23
Table 3.3-3	Number of Engineers at the Certification Bodies Visited by the Team .....	3-25
Table 3.3-4	Overview of the Certification System .....	3-33

## CHAPTER 1 BACKGROUND OF STUDY AND PURPOSE



## 1.1 Background of Study

Chile, a country with rich natural reserves, has traditionally been a raw materials export nation. Its main exports items used to be minerals and agricultural, fishery and forestry products. In recent years, however, Chile has also developed an industry for processing the nation's natural resources, and industrialization efforts are being made with increased investments dedicated to non-traditional industries. An equally steady growth has been seen in the export of industrial products.

While Chile's industries cannot necessarily be considered as having a high standard of technology, and there is also much room for further improvement in the quality of Chile's non-traditional industrial export products. There is much left for Chile to do in order to raise the level of her industrial technology further as time proceeds so as to enhance the value-added content of her natural resources and thus to increase her exports. For the government and public authorities, in particular, it will be of paramount importance to provide the necessary industrial infrastructure as the basis for industrial development.

Industrial standardization (including quality improvement) is one of the vital aspects in the context of the furnishing of an industrial infrastructure.

The advancement of industrial standardization in Chile is primarily in the hands of Instituto Nacional de Normalización (INN), a body founded by Corporación de Fomento de la Producción (CORFO).

However, there are several problems in industrial standardization in Chile as follows.

- (1) National standards (NCh) are neither established nor maintained adequately.
- (2) Chile does not possess an adequately functioning certification system based on national standards.

- (3) Except for the export-oriented companies, there is generally a low level of interest in, and recognition of the need for, product quality.
- (4) Chile's testing and inspection capabilities are inadequate (especially in the electrical and electronic domains).
- (5) Chile has not created a national metrology system.

This demonstrates that Chile still faces a large number of problems in developing her own industrial standardization. It is also clear that the difficulties are of a serious nature.

While the Chilean government has at present no codified medium or long-term economic development programs, its policy approach does accord priorities to economic development in certain perceived key areas such as:

- (1) Expansion of export of value-added products
- (2) Upgrading and diversifying the nation's industrial structure
- (3) Technological development
- (4) Promotion of medium/small companies
- (5) Promotion of education

Against this background, the Chilean Government decided to formulate a program for industrial standardization system development and called upon the Japanese Government to extend technological cooperation.

Based on this request, the Japanese Government dispatched a preliminary Study Team in September 1990 and agreed on the Scope of Work (S/W) and signed the agreement for the implementation of a full-scale study.



## 1.2 Objective of Study

The purpose of the present Study is to achieve a more solid industrial base for and in the Republic of Chile and in so doing enhance the international credibility and reputation of Chile's industrial products and ensure greater competitiveness for the nation's industrial output on a worldwide basis, thereby activating the development of Chile's industry and achieving sustained economic growth for the nation as a whole.

Through these efforts, a master plan is to be drawn up for:

- (1) the promotion of industrial standardization and in particular for the creation and diffusion of unified national certification system
- (2) the propagation of total quality control, including thorough company standardization
- (3) the provision of a framework for a metrological system associated with the implementation of the certification system referred to in (1) above.

The primary objectives of this Study can thus be summed up as follows.

- (1) A clear appraisal shall be made of the necessary pre-conditions for the present and future development of Chile's economy and clear policy guidelines shall be established defining the short and medium/long-term measures for the promotion of industrial standardization and quality control, including the creation and propagation of a unified national certification system aligned with the nation's current position.
- (2) A clear assessment shall be made of the measures applied so far to industrial standardization and quality improvement through (1) appraisal of the current status of implementation by the government as well as industries and companies, and (2) a

critical evaluation based on an analysis of the needs of Chile's industry and companies and the potential for future development, and extracting the problem areas to be addressed in the future.

- (3) Based on the policy guidelines thus established and the problem areas thus extracted, concrete measures shall be defined for upgrading industrial standardization in general, and a unified certification system, in particular.
- (4) Concrete measures shall be established to ensure that both the government authorities and the industrial sector accept a greater and growing commitment toward quality control so that the recognition of the necessity and effectiveness of quality control will not only be shared by the big companies but also permeates to the medium and small companies and that appropriate methods of quality control will be propagated.
- (5) Plans shall be formulated to establish a metrological framework including systems and facilities, which is indispensable for creating and propagating a unified certification system and the diffusion of quality control, covering the government and private sectors.

### **1.3 Scope and Objective of Study**

The Scope of this Study has been explicitly stated in the Scope of Work (S/W) document concerning the full-scale study agreed between the Preliminary Study Team dispatched by JICA and the Government of Chile on October 2, 1990.

### **1.4 Regions Covered by the Study**

The site investigations carried out in the Metropolitan Region of Santiago and in Eighth Region representing the major industrial locations of the country.

In those areas in which it was not possible to carry out site investigations, surveys were made by questionnaire inquiry.



CHAPTER 2 SOCIO-ECONOMIC PROFILE OF THE REPUBLIC OF CHILE  
AND PROBLEMS CONCERNING THE NATION'S  
INDUSTRIAL DEVELOPMENT



## 2.1 Present Status of the Republic of Chile

### <Geography and climate>

With a land surface area of 760,000 square kilometers, due to the vast length of Chile's national territory, there are different climates. Chile's production activities concentrate on the central regions with a moderate continental climate.

### <The population>

Chile's population as of June 1990 is estimated as being 13,173,347. Santiago Metropolitan Region, accounts for almost 40% (5.20 million) of the nation's total population.

Average annual population growth for the period 1982-90 is given as 1.86%

The racial element of European extraction accounts for a 95% majority of the nation's population. Compared with other countries of Central and South America, this is a very high percentage.

### <Political situation>

Chile's political system is that of a constitutional republic.

The legislative power belongs to the parliament, which was restarted in March 1990, when the governing power was returned to the civil administration.

The administrative power belongs to the President, who is a head of the country, and the cabinet consists of 20 state ministers appointed by the President.

The current president of the country is Mr. Patricio Aylwin Azocal who took the presidency in March 1990.

The jurisdiction is independent from the legislative power and the administrative power, and the juridical system in the country is based on a three-examination system consisting of a supreme court, high courts and district courts.

Chile's national territory is administratively divided into 12 regions, with each province being sub-divided further into provinces of which there are 51 altogether.

The start of Aylwin's presidential term on March 1990 marked the return of democratic power in Chile after 17 years. While its policy orientation follows essentially in the footsteps of previous administration by upholding the principles of the free-market economy, in the policy domain concerned with the democratization of Chilean politics, the Aylwin administration has committed itself to the resolution and clarification of the problems of human rights intrusion by the state during the period of military power. Other areas on which the new administration concentrates are the improvement of the social welfare system and the labor problems.

## 2.2 Economic Situation

### <Recent economic trends>

While most Central and South American nations suffer from economic stagnation and are drawn into economic crises, the Chilean economy is an exception to this as it has maintained its favorable profile for the last few years. The essence of the economic policies that have helped Chile achieve this success may be attributed to the adoption of a private sector led, free-market style policy, in other words, an economic package giving freedom to trade and the inflow of foreign capital and favoring the privatization of state enterprises.

After Pinochet's military rule for 17 years, the economic policy of the new democratic administration under President Aylwin does practically follow in the footsteps of the free-market economy of the previous administration. The most important measures under this



economic policy are as follows.

- Promoting a free-market type liberal economy led by the private sector, with greater weight being given in the role of the state if and when required.
- While aiming for a redress of the income differentials and an expansion of the social welfare system, the financial resources needed to implement these policies will have to come from increased tax revenue achieved through a reform of the tax system.
- Another objective is to boost the status of workers through a reform of the Labor Laws.
- In connection with efforts to reduce Chile's foreign indebtedness, the government tries to lessen the burden for the nation by sharing the responsibility for the financial obligations with the holders of bonds. A review of the state enterprises is underway to privatize or nationalize only if approval of the organization concerned has been obtained.
- Measures are taken to promote the inflow of foreign capital which should contribute to the economic development of Chile.

After the Chilean economy had sustained growth for a some time, it began to show signs of overheating in the middle of 1989. This led to policy measures early in 1990 to throttle the economy. As a result, the rate of economic growth marked a substantial drop to only 1.6% in 1990. The rise in the consumer price index exceeded the initially set target of 25% and reached 27%. At the same time, the rate of unemployment was 0.6 points up on the previous year to reach 5.6%.

#### <Economic growth, inflation and employment>

In the period from 1978 through 1981, Chile's GDP attained solid growth at an average annual rate of 7.5%. In 1982, however, the economy swung into negative growth, with a significant minus rate of 14.1%. This was due to the dramatic increase in imports following the

liberalization of imports which opened the floodgates for foreign products entering Chile as well as the liberalization of capital. Another factor was the increased number of bankruptcy cases as a consequence of the nation's inflated indebtedness both domestically and toward the international community. From 1984, however, the economy was restored and by 1989 Chile's GDP was back to steady growth at an average annual rate of 6.2%. Yet, as mentioned earlier, with economic growth down to a small rate and high inflation combined with a high rate of unemployment, the economy suffered in 1990.

Chile's GDP per head of population is given, by the World Bank's statistics, as 1,510 US dollars (as of 1988) so that Chile ranks as one of the low-level medium-income nations. Taken over the period from 1965 through 1988, however, the average rate of the growth of GDP per head is a mere 0.1%.

Consumer price index rose at a rate of under 25% in any of the years from 1986 through 1989. Thus, consumer price increase in Chile has relatively been low as compared with other Central and South American countries. The rate of unemployment remained on a falling trend, reaching a level short of 10% from 1986.

#### <Structure of Chile's industry>

Analysis of the development of the composition of Chile's GDP by industrial sector shows that a share expansion in the nation's GDP has been recorded in recent years by the agriculture, fisheries, and forestry sector, the building and construction industry, transport and communication. Conversely, the mining sector showed a contraction in its contribution to the nation's GDP. This development is due to the measures taken in recent years to diversify export products, with a growth in Chile's non-traditional export products (that is, products other than mining output which has traditionally centered on copper), i.e. agricultural products, food processing, timber and allied products.

The manufacturing industry's share has remained stagnant for the last ten years.

The breakdown of the GDP achieved by each industrial sector in 1990 shows that agriculture and cattle-farming accounted for 8.3%, fishery for 0.8%, mining for 7.4%, manufacturing industry for 20.6%, electric power/gas/water (the utilities sector) for 2.5%, building and construction for 5.9%, commerce for 18.1%, transport and communication for 7.0%, and the service sector for 29.5%.

#### <Balance of payments and international trade>

Structurally, the Chilean balance of payments is characterized by a large amount of financial service payments such as interest payments, resulting in a chronic deficit in the nation's invisible trade balance. Though the balance of trade is constantly in credit, the invisible trade balance shows a larger margin of deficit than the trade balance's credit margin so that the current accounts are in deficit.

After the 18.1% drop in exports in 1981, the export accounts up until 1985 showed a repetition of minor increases and decreases. From 1986, however, they achieved a sound rate of growth associated with the recovery of the economy. In 1988, the copper price escalated and Chile's non-traditional product exports, including mainly products from the agricultural, forestry and fisheries sectors, rose favorably so that exports overall recorded a substantial growth rate of 35.0%. This growth was maintained also in 1989, when the export growth rate stood at 14.6%. Chile's main export products are mining output, with copper accounting for the overwhelmingly largest share. Due to the government's efforts to diversify the export product mix, Chile has seen an increase in the export of industrial products and agricultural products, including in particular fresh fruit. As a result, the share of copper in Chile's total exports dropped sharply from the 70% level it had in the 1960s to 41% in 1987. The escalation in copper prices, however, resulted in a share increase (in value terms) from 47.9% in 1988 to 49.6% in 1989.

After the sharp increase in imports from 1975 through 1981, the recession in 1982 and 1983 brought a dramatic drop in imports (57% down on a cumulative basis). With the recovery of the economy in 1984,

however, imports rose again at a rate of 18%. The substantial devaluation of the Chilean currency in 1985 was one of the major factors for the 12% drop in imports of that year. After 1985, imports were on a rising trend, with growth rates in imports recorded at 28.9% in 1987 and 21.0% in 1988. At the end of 1989, Chile had a presidential and a general parliamentary election. In the economic program announced by the presidential candidate Aylwin, the expansion of the social welfare system was given as a priority area in the election campaign. As a source for the revenue need to finance this welfare package, Aylwin had indicated a variety of fiscal measures including an increase in taxation on luxury goods. The result was a rapid increase in the importation of consumer durables, including in particular automobiles and electric household appliances. Imports in 1989 thus rose by 34.5% as compared with the previous year.

Chile's main export and import trading partners are the United States of America, Japan, Germany, and Brazil.

#### <Foreign debts>

Based on the economic policies agreed with the IMF, Chile is one of the few countries reducing their external debts. In 1989, Chile's external debts amounted to a total of around 17.7 billion dollars (including IMF loans). This is clearly down on the 1988 peak when external debts reached 20.8 billion dollars. The fact does remain, however, that the nation's total indebtedness stands at a enormous level. In 1988, debts were equivalent to 96.8% of Chile's GNP and to 232.5% of the value of goods and service exports. Measures are considered to enhance the nation's foreign currency earning capacity by diversifying the export mix and/or adjusting the demand for foreign currency for import purposes and the repayment of external debts.

#### <Use of foreign capital>

The Chilean government adopts foreign capital in a positive manner and makes no difference between domestic and foreign capital and even allows direct foreign investments to a level of 100%. This shows that Chile has an extremely liberal policy toward foreign capital.

The areas in which direct foreign investments are made include primarily the mining industry as the biggest sector, followed by the service sector. By country, investment from the United States of America is the biggest in scale by far. In 1990, the investment total rose by 26% over that of the previous year and reached a peak level of 1,132 million US dollars.

#### <Financial policy>

Chile's financial situation substantially deteriorated during the Allende administration, with the fiscal deficit/GDP ratio reaching 24.3% in 1973. In the subsequent period under President Pinochet, efforts were made to raise the tax revenue as a source of state income other than from copper while expenditures were curtailed mainly in the public investment sector. As a result, the scale of fiscal expenditures was reduced and progress was made to achieve a balance. These efforts produced an improvement in the fiscal balance which recorded a credit position in the period from 1979 through 1981. From 1982, however, Chile struggled with the increased burden of debt repayments and the lack of growth in revenue so that the fiscal account returned to a deficit position. In 1985, the fiscal deficit/GDP ratio worsened to 6.3%. After 1985, however, this ratio was practically stabilized at a reduced level of 0.1% in 1987, 0.3% in 1988, and 0.5% in 1989.

#### <Economic development plan>

At present there are no formally stated long-term economic development programs in Chile. MINECOM does give priority to the expansion of industrial product exports so that emphasis is placed in policy making on areas such as the introduction of foreign capital, technological development, promotion of medium and small companies, diffusion of educations/training, and development of human resources.

#### <Acceptance of economic cooperation>

In recent years, the amount of official development aid received

by Chile on a bilateral basis from member nations of the OECD Development Aid Committee (on a net value basis) has tended to increase significantly. Thus in 1984, ODA amounted to 9.7 million US dollars and rose to 45.80 million US dollars in 1985. Though 1986 marked a swing to a 4.0 million US dollar excess of debt repayments over ODA receipts, the following year (1987) recorded ODA receipts of 23.40 million US dollars and 1988 receipts of 46.30 million US dollars.

Multilateral ODA aid from international organizations showed that Chile's repayment exceeded ODA receipts each year from 1985 through 1988.

The total inflow of capital into Chile (that is, the total of ODA plus non-ODA funds) shows that the capital influx on multilateral basis exceeds that made on a bilateral basis. The organization primarily responsible for the supply of capital to Chile are the World Bank and the Inter-American Development Bank (IDB).

In 1988, the inflow of funds based on multilateral arrangements totaled 409.20 million US dollars, including 211.00 million US dollars from the World Bank and 188.70 million US dollars from IDB.

## **2.3 Current Situation of the Industrial Sector**

### **<Changes in economic and industrial policies>**

Of all the Central and South American nations, Chile took a lead in taking policies to foster industries by the first-phase import substitution (import substitution of consumer goods). Under President Frei, the Chilean government increased its capital share in the production of copper in 1964 and proceeded with the policies of the second-phase import substitution, concentrating on the chemical and heavy industries. CORFO founded in 1939 had been aimed in particular to carry out effective funding operations for the industrial sector concentrating on the basic industries such as iron/steel, automobiles, and petroleum. Through these activities, a number of national enterprises were founded.

The Allende administration coming into power later in 1970, proceeded with the nationalization of companies and introduced a variety of economic control measures. For Chile with its small market size, however, these economic measures were counter-productive. Instead of raising management efficiency, they led to a drop in efficiency standards, with production output falling at the same time. The economy went into a recession and Chilean society was thrown into confusion, thus creating the conditions that were conducive to the coup d'etat which occurred in 1973.

The military regime under Pinochet pushed ahead with major liberalization programs. While economic controls on the domestic market were removed and efforts made to privatize state enterprises, the administration was committed to improving the nation's industrial structure by exposing Chilean companies to direct international competition through a reduction in duty tariffs for foreign goods and the removal of non-tariff barriers. As a result, ineffective domestic enterprises were unable to survive in this process of "natural selection". The administration's export promoting policies included a number of preferential measures, with determined attempts made to attract foreign capital through an amendment of the laws on foreign investment and foreign exchange.

The Chilean government tried to push through economic measures to liberalize the market and put it under the lead of the private sector. Thus it aimed at a "small government" and did not specifically lay down any positive industrialization measures or programs for the promotion of industry under state guidance. The result was the development of a light industry processing primary products for export, including mainly agricultural, forestry, and fishery products as those have comparative advantages, with abundance and low-price. This light industry made a contribution to the earning of foreign currency. This policy is responsible for the success Chile is showing at present, though partly this success was also due to the favorable climate of the world economy since the latter part of the 1980s.

Thus, the economic policies of the Pinochet administration do not include any development plans or industrialization programs in which the state plays a leading role. Nor did the Pinochet administration pass any substantial industrial promotion policies or lay down preferential measures to create strategic industries, with the exception of only some such measures as export promotion measures to be described later. There is the criticism, however, that letting the market find its short-term equilibrium may not have consequences on the long-term economic development and the manufacturing sector, which, as a leading sector, has drastic spin-off effects on the economy, should be fostered with a priority.

Yet, the present administration under President Aylwin does follow in the footsteps of the economic policies of the previous administration and does not envisage any changes from the liberal and private sector-led, open-market policy, judging from the generally stable economic situation at present. This view was fully confirmed in the hearings the Survey team conducted with the government officials in the ministries concerned.

#### <Structure of the manufacturing sector>

Under the economic liberalization policies enacted since 1973, the structure of Chilean industry has been a good reflection of these areas of relative superiority. Thus, the mining industry and the agricultural, forestry and fisheries sector account for a predominant share in Chile's economy, while the manufacturing sector stands at a relatively low level of 20.6%. The industries classed under the manufacturing sector include a high proportion of areas related to the agricultural, forestry and fisheries sector.

The predominant position of food products also comes to the fore in the export field as food products account for a major share in Chile's export mix. The government is therefore inclined to promote the export of products with a high or higher value-added content and of a more advanced degree of finishing, rather than the export of primary products. Efforts are also made to shift from the exporting of products derived from the processing of natural resources to the



exporting of machinery, parts, chemical products, in an attempt to achieve a higher level of technical advancement. At present, however, Chile's products have a poor competitiveness against foreign products in terms of their prices and quality.

#### <Promotion of export of industrial products>

To diversify Chilean exports, a variety of export promotion systems have been established. One of these systems has been very successful and brought positive results. This is the refund system for non-traditional export items. This system envisages the refunding of 5 - 10% of the FOB costs for all product exports other than those categories stated in the annual announcements of MINECOM (being primarily traditional export products). This refund system is applied on a broad scale, irrespective of whether the exports is a foreign or domestic capital operation. In addition, there is an assurance fund system for non-traditional industrial products available for medium and small companies.

Chile has the following export promotion organizations and groups.

- PROCHILE
- ASEXMA
- FONTEC
- SERCOTEC

## 2.4 Problems Concerning Industrial Development

#### <Targets for the Industrial Sector in the Economic Development Plans>

At present, Chile has no national development plan so that there are no specific targets for the industrial sector clearly defined in specific documents. The policy of the present administration carried on with the policies of its predecessor by trying to stimulate

experts of non-traditional products.

<Problems Concerning the Industrial Sector and Types of Industry for Which the Propagation of TQC Offers Favorable Prospects>

The particular feature of Chile's industrial policy is that it has no active policy emphasizing the development of any specific industries in particular.

The prospective types of industry in this context are, therefore, those that have a comparative advantage, such as the mining industry and the agricultural, fishery and forestry sector. In these segments of industry, Chile has the natural advantage of abundant and relatively low-price resources and raw materials. It can also resort to a high-level labor force. The introduction of TQC in the types of industry and sectors to upgrade quality would result in the achievement of international competitiveness for Chile's products and would create industries capable of earning the nation strong foreign currency reserves. With the gradual upgrading of the level of processing, industry would then be in a position to produce and export products with a high value-added worth. This, in turn, would stimulate employment on the domestic market, increase the national income, reduce Chile's foreign indebtedness and thus contribute to the nation's economic growth.

If the level of processing were to be raised even further to achieve an even higher value-added content, it would be essential to upgrade and introduce technology. This might create the need for some preferential or incentive measures for the various types of industry.

CHAPTER 3 CURRENT SITUATION OF AND PROBLEMS  
IN INDUSTRIAL STANDARDIZATION



### 3.1 Present Situation

#### 3.1.1 Government Policy

The government's industrial standardization policies and programs are within the jurisdiction of the MINECOM, while CORFO assumes responsibility as an executive organ, handling the implementation of government policies in domains such as the provision of finance, the development of technology and manpower.

CORFO has under its umbrella six technical organization, including INTEC, IFOP, CIREN, and INFOR. One of the organizations is INN.

INN plays an important role as Chile's core organization for industrial standardization. Placed under the jurisdiction of the MINECOM and CORFO in all matters concerning economic planning, plant and equipment investment, technical development and the training of manpower resources so that its position allows it to promote industrial standardization in accordance with national policies directives.

The ministerial offices related to the government or CORFO have strong views about the need for industrial standardization and quality control and the necessity of ensuring the further development of these activities in the future.

#### 3.1.2 Outline of INN

INN was created by CORFO and received corporate status pursuant to the 1973 Decree of MDJ No. 678.

In Chile, it is the only body entitled to establish national standards.

The purpose of INN is defined in its statutes as follows:

- (1) Establishment of national technical standards (NCh)

- (2) Development of, and control over, the Chilean Certification System
- (3) Participation in the planning for the development of a national weights and measures system
- (4) Participation in the planning for the international standardization activities as Chile's representative organization

In Chile, standardization activities were started in 1944, following the establishment of INDITECNOR, the forerunner of INN. Since the establishment of INN in 1973, a total of 839 standards have already been established. At present, there are 1,763 standards drawn up as NCh standards.

The INN Council consists of seven members, appointed by the Vice-President of CORFO.

There are 24 ordinary (regular) INN staff members. Fig. 3.1-1 shows the organization of INN.

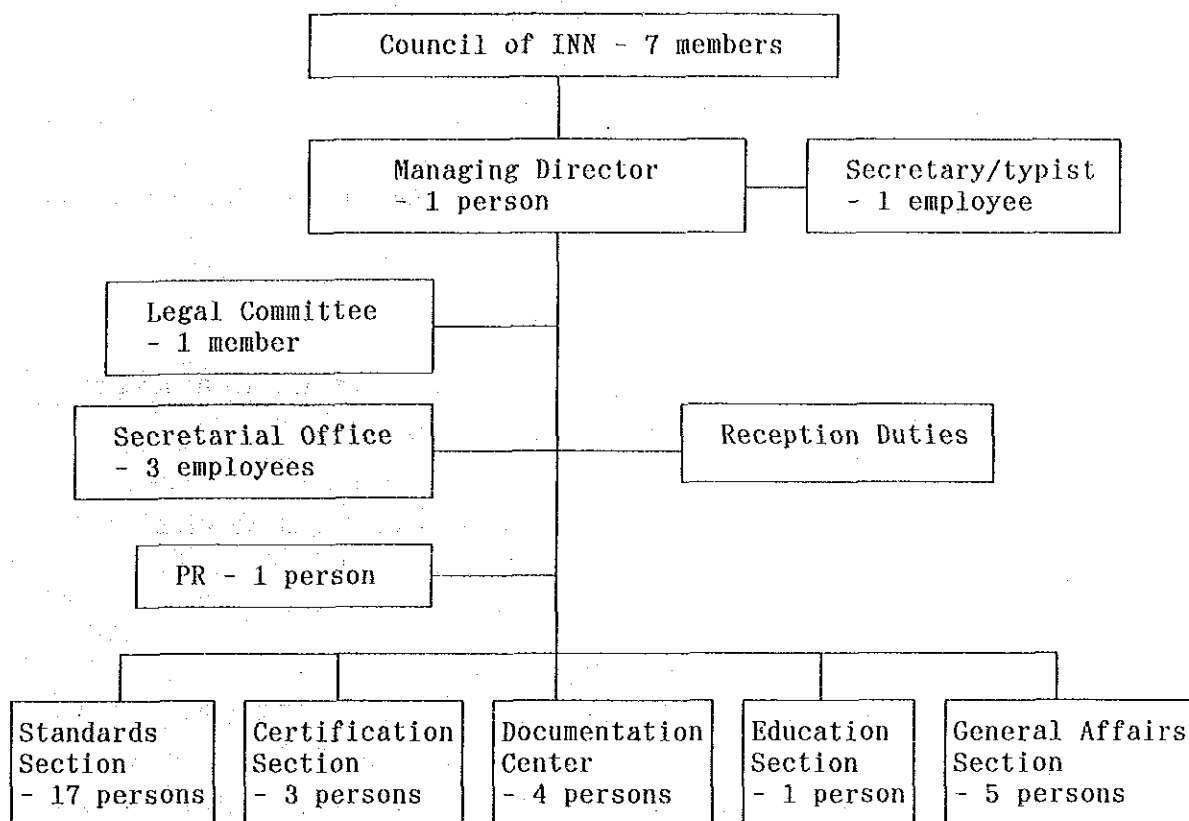


Fig. 3.1-1 INN Organization

The Education Section is responsible for training activities on quality control.

The Certification Section assesses and accredits the certification bodies for agricultural and pasture farming and fisheries. So far, 46 certification bodies have been accredited as of March 1991.

The Standards Section is handling the establishment of NCh.

The Documentation Center has 180,000 documents under its care. It also controls technical documentation relating to exports and the Codex Alimentarius.

Although the system of Weights and Measures are essential elements in the certification and standards system, INN has no specialist for Weights and Measures.

### 3.2 Establishment of National Standards

#### 3.2.1 Executive Organization

INN is authorized under Chilean law to establish national Chilean standards (NCh).

#### 3.2.2 Procedures for the Drafting of Standards and Results Achieved in the Establishment of Standards

Fig. 3.2-1 shows the flowchart for the procedures leading to the establishment of NCh standards.

When a proposal for the establishment of standard has been prepared, the original draft drawn up by INN's Secretariat and the relevant information are submitted to the Standards Technical Committee which will assume the main responsibility for deliberating on this standard. The Committee's proposal will be made public and disclosed to the general public to invite comments and opinions. When a consensus has been reached, the draft will be forwarded to the relevant ministerial offices for official recognition after the INN Council has given its approval. The standard emerging from this process will then be promulgated by affixing the Of mark (meaning "OFFICIAL") to the Number of the Standard.



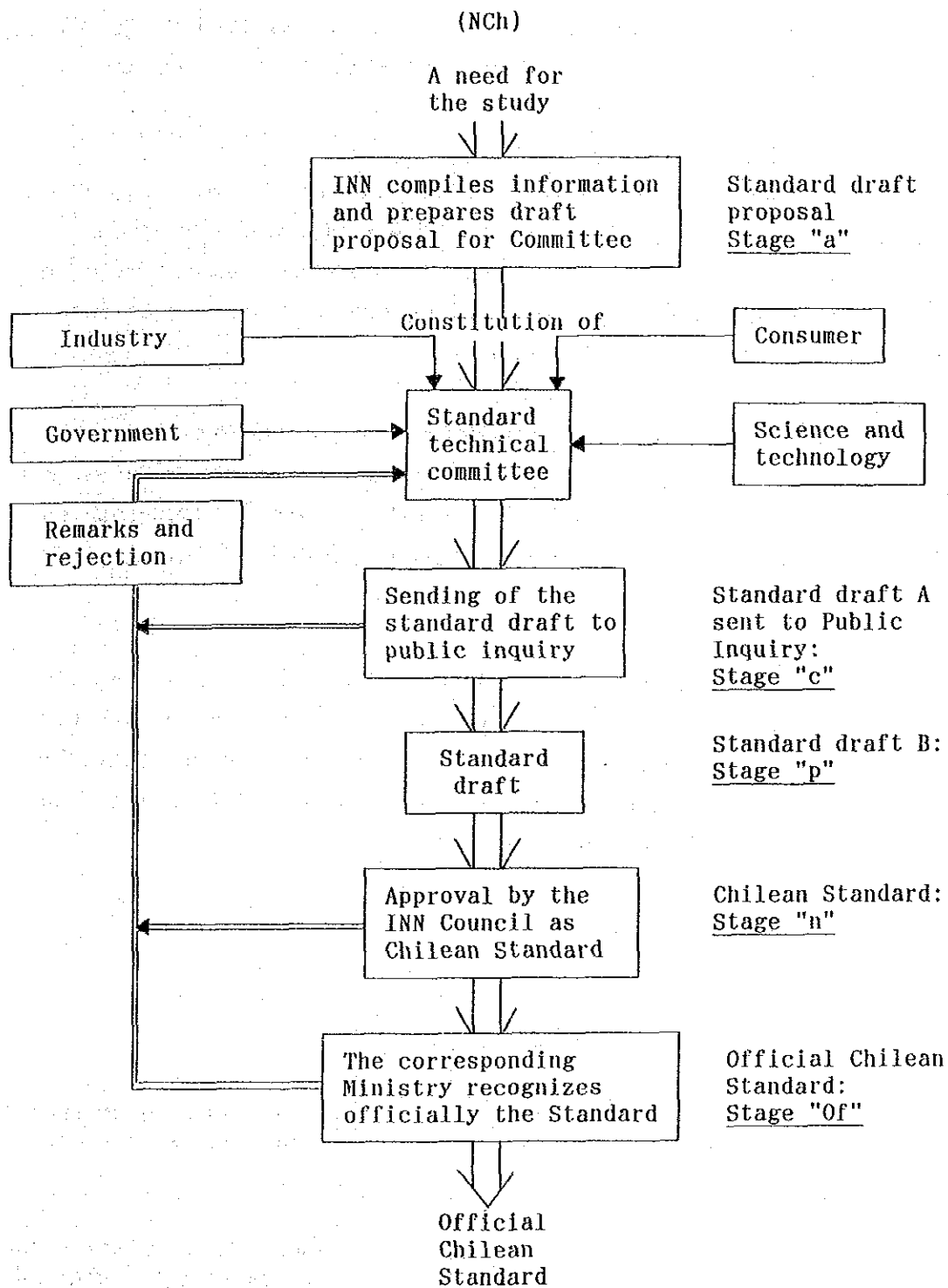


Fig. 3.2-1 NCh Standard Drafting Process Flowchart

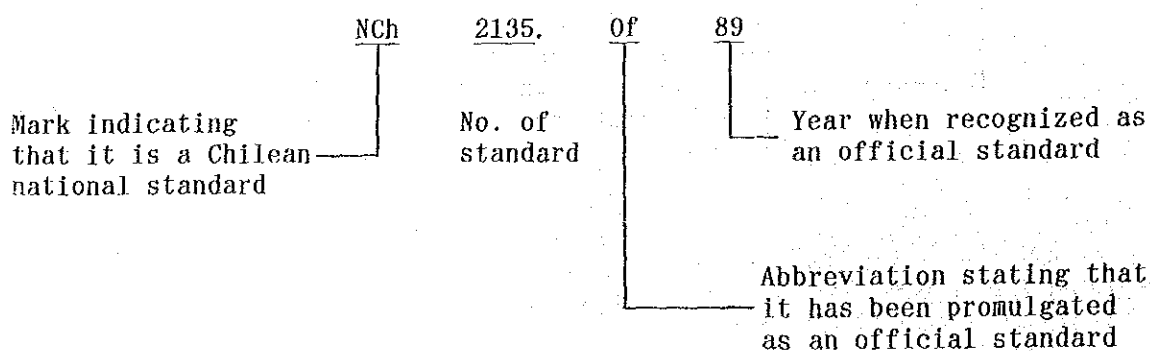
In the preparation process for the original standard draft, the specialists concerned at the INN Standards Section will examine the need for the standard.

INN has established Standards Technical Committees for deliberating on standards. At present, INN has standing committees of 22. The normal practice is to elect 50 - 100 persons from the relevant ministerial offices, industry, private-sector organizations as users of standards, and neutral academic entities.

Prior to deliberation, draft standards (proposals) are classed as "stage a", and those under deliberation as "class c" to make a distinction. The number of members on committee work in 1990 totaled 500, and the "hearings" conducted to invite opinions involved 2,000 persons.

The final stages of a draft standard is denoted as "stage p". In this stage, examination is conducted by the INN Council which examines the deliberation procedures up to the "p" stage and verifies that the committee members have been appropriate. After ministerial recognition, it is promulgated in the Official Gazette.

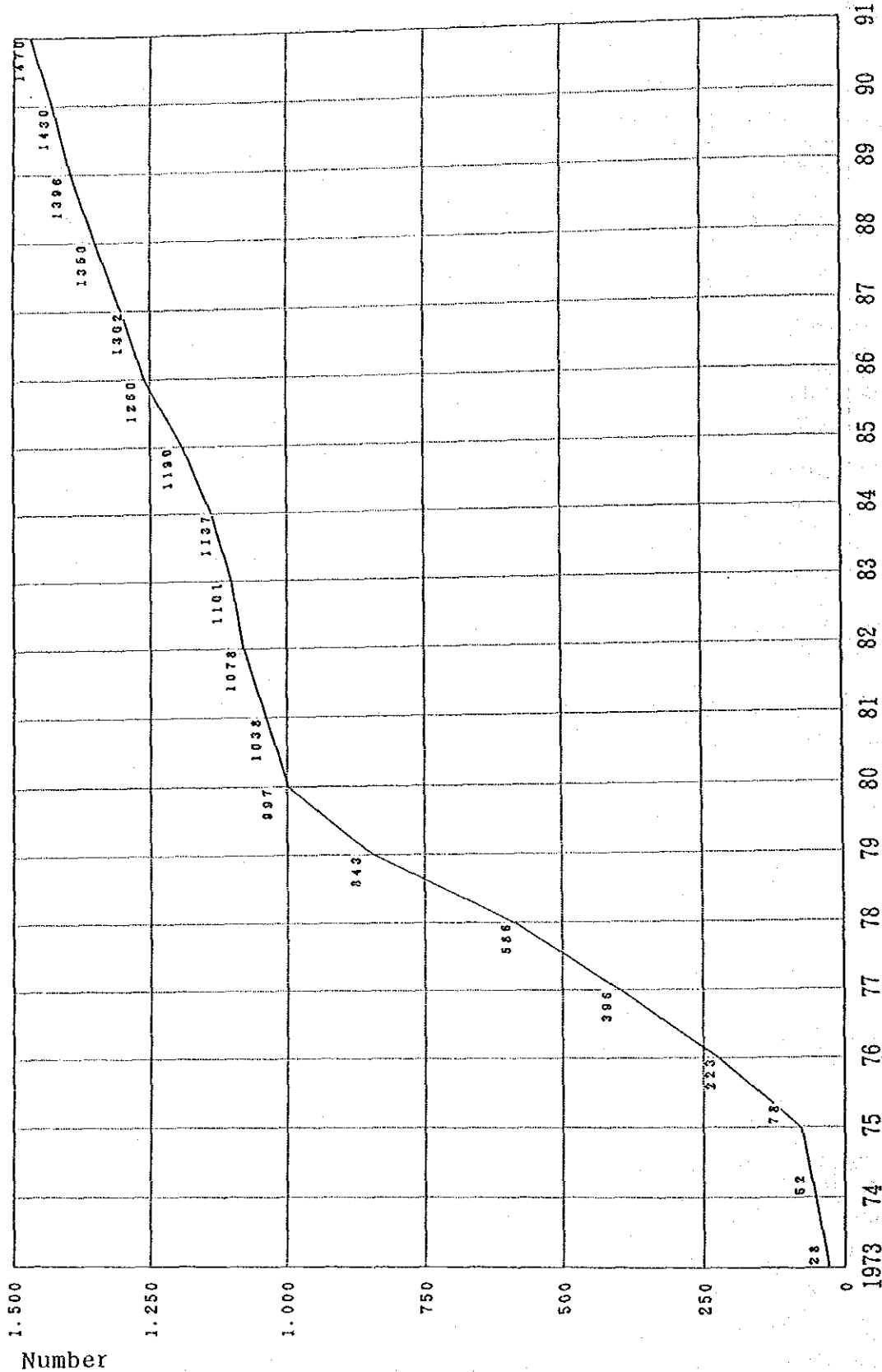
NCh/Of standards are identified as follows.



Until the end of 1991, a total of 1,763 NCh - Of standards had been established, and roughly 15% of these are compulsory standards. Fig. 3.2-2 shows the number of standards having reached the "n" stage since the establishment of INN in 1973.

Table 3.2-1 Classification by Ministry in Charge for Official Recognition of Standards (Source: INN)

Ministry Concerned	Number of Standards Passed
MDA	207
MINECOM	920
MEP	19
MDI	2
MOP	342
MDS	72
MINTRATEL	60
MDM	1
MINVU	140
Total	1,763



(Source: INN)

Fig. 3.2-2 Number of Standards Authorized by the Council of INN from 1973 until 1991

Table 3.2-2 gives the number of standards by area.

Table 3.2-2 Classification of NCh Standards by Area

Letter	Area	No. of Standards
A	Basic standards	70
B	Document - Information	23
C	Life - Safety - Health	148
D	Packaging - Handling - Transport	110
E	Energy	112
F	Building/Construction	229
G	Food - Agricultural/Pasture Farming	296
H	Chemicals	146
J	Metals and Ores	281
K	Machinery	67
L	Electricity	106
M	Fabric and Leather	99
N	Wood/timber and wood products	75
O	Miscellaneous	1
	Total	1,763

(Source: INN)

### 3.2.3 General Penetration of Standards

INN, has its own publication. This is the INN-Informativo which went into print in July 1986. Unfortunately, however, the bulletin has been discontinued after April 1988 and only seven numbers have appeared. "Of" standards are made public in the Official Gazette. When important standards or standards difficult to understand are issued, explanatory meetings are held at and by INN. Standards are sold from the INN offices.

### 3.2.4 Supervision of Standards

#### (1) Standards kept by INN

At present, INN keeps 180,000 standards. These can broadly be divided into standards, regulations, and certification system. Table 3.2-3 gives the details of the standards kept by INN.

Table 3.2-3 Classification of Standards kept at INN

1. Standards	<ul style="list-style-type: none"><li>1.1 NCh</li><li>1.2 Catalogo de NCh</li><li>1.3 Normas Internacional: ISO, IEC, CODEX</li><li>1.4 Catalogo de Normas Internacionales</li><li>1.5 Normas Regionales: CEN/CENELEC, COPANT</li><li>1.6 Normas Extranjeros: ANSI, NF, DIN, UNE, JIS, UNI, etc.</li><li>1.7 Normas de Asociacion: ASTM, API NFPA, AWWA, etc.</li></ul>
2. Regulations	<ul style="list-style-type: none"><li>2.1 Reglamentos Nacionales: Por Ministerio, Por Area Tecnologia</li><li>2.2 Reglamentos Extranjeros</li></ul>
3. Certification System	<ul style="list-style-type: none"><li>3.1 Sistemas Nacionales: Obligatorio, Voluntario</li><li>3.2 Certificacion de Producto</li><li>3.3 Directorio de los Organismos de Certificacion</li></ul>

(Source: INN)

#### (2) INN database

##### 1) NORDAT (NCh)

Number of standard, title, relevant ministry, data of regulations, data of establishment, industrial sector, history