Appendix A.1

List of Person for Interview

Appendix A.1 List of Person for Interviews		
I. Ministry of Trade (MOT)		
	Ardiansyah Parman	Director General of Domestic Trade (DGDT)
	Hatanto Reksodipoetro	Secretary General
	Suhartono	Head of Planning Bureau
	Erfandi Tabrani	Director of Goods and Service Inspection
	Prihata	Head of Trade Data Center
	K Pangestuti	Planning Bureau
	Rina Y	Planning Bureau
	Elgetrisna	Education and Training Center (Pusdiklat)
	Burhan Manurung	Directorate of Goods and Services Inspection
	Jhonni Martha	Directorate of Binus & PP
	Alexander MS	Inspectorate General
	Joni K Manik	Inspectorate General
	Lesman Sihombing	Finance Bureau
	Sunarto Kafli	Administration Section Pusdiklat
	Nur Hidayat	Directorate of Export Import Facility
	Anita Silalahi	Directorate of Consumer Protection
	Erwidodo	Directorate of BPPP
II. Directorate of Metrology (DOM)		
	Amir Syaharuddin Sjahrial	Director of Directorate of Metrology
	Bambang Setiadji	Head of Sub-directorate of Supervision and Information
	Edi Syarifudin	Head of Quality Guidance Section
	Djoni Nuzirwan	Head of UTTP Testing Section
	Sawab Saleh	Head of Measuring Unit National Standard Laboratory Office
	Hari Prawoko	Head of Mesuring Standard and Metrological Laboratory
	Wahyu Hidayat	Head of Measuring Instrument Testing Office
	Ngadi Hartono	Head of Metrological Functional Manpower and Facilities
	Oke Nurwan	Head of Sub-directorate Metrological Facility and Cooperation
	Hartobono G	Head of Sub-directorate Metrological Human Resources
	Rusmin Amin	Facility and Cooperation Section
	Novian	Facility and Cooperation Section
	M Hendro Purnomo	Facility and Cooperation Section
	Rifan Ardianto	SKK Section
	Rumaksono	Human Resources Section
	IGK Ketut Astawa	Human Resources Section
	Usman	SNSU Center
	Agus Permana	PPK Section
	Arifin	PPK Section
	Denny tresna	Metrological Technique Section
	Priyo Syamsu	Metrological Technique Section
	Ade Haryanto	SULK Section
III. Metrological Training Center (MTC)		
	Heru Busono	Director of MTC
	Ade Suherman	Section of Administration
	Permadi	Section of Planning and Program
	Deden	Section of Prpomotion and Cooperation
	Mudjijono	Section of Evaluation and Report
	Mohamad Prasetyo	Lecturer/Widyaiswara
	Deddy Kurniadi	Team Leader on Industrial Collaboration (ITB)
IV. Legal Metrology Standarization Center (LMS Center)		
Makassar LMS center		
	Soemardi	Head of Makassar LMS Center
Medan LMS Center		
	Chairil Burhan	Head of Medan LMS Center

Ahmad Misbah	Staff of Medan LMS Center
Haryono	Staff of Medan LMS Center
V. Regional Verification Office (RVO) and Industrial and Trade Bureau (Dinas)	
Denpasar RVO	
Dewa	Head of Denpasar RVO
Ismed	Staff of Denpasar RVO
Ni Wayan Kusumawathi	Sub-bureau of Foreign Trade, Dinas
Toni Worek	Sub-bureau of Law and PR, Dinas
Putu Bagiada	Sub-bureau of Industry PIKM, Dinas
Putu Hartini	Sub-bureau of Domestic Trade, Dinas
Manado RVO	
Alwy Pontoh	Head of Manado RVO
Abdullah	Section of Promotion, Manado RVO
Albert Paat	Section of Flow and Volume, Manado RVO
Petrus Agung	Section of Mass and Weighting, Manado RVO
Albert Pontoh	Director of Dinas
Rieke Tenda	Vice director of Dinas
Makassar RVO	
Bahrain Rahman	Head of Makassar RVO
Heri Kusmayadi	Section of Mass and Balance, Makassar RVO
Herry Saryanto	Section of Flow, Measurement and Volume, Makassar RVO
Ahmad Natsir	Director of Dinas
Darwin Tike	Vice Director of Dinas
Sahaluddin	Sub-bureau of Administration, Dinas
Ali Aman	Sub-bureau for Small Industry and Small Trade, Dinas
Hasan M	Sub-bureau for Foreign Trade, Dinas
Anton Mamonto	Sub-bureau for domestic trade, Dinas
Haerani Haeruddin	Sub-bureau of BPTTL, Dinas
Chairil Burhan	Center for Training and Promotion Regional, P3ED
Medan RVO	
Mahrudin Nainggolan	Head of Medan RVO
Fitra Kurnia	Staff of Medan RVO
Rustam Panjaitan	Staff of Medan RVO
TengkuAzwar Azis	Director of Dinas
Pekanbaru RVO	
Hasyim Abdullah	Head of Pekanbaru RVO
Syamsul Bahai	Staff of Pekanbaru RVO
Ahmad Basri	Staff of Pekanbaru RVO
Ruslaini Rahman	Director of Dinas
Fenty Yusida	Sub-bureau of Administration, Dinas
Arlis	Sub-bureau of Industry, Dinas
Padang RVO	
Buchori	Head of Padang RVO
Arkadius	Section of Length and Volume, Padang RVO
Syamsul	Section of Mass and Balance, Padang RVO
Yahya	Section of Administration, Padang RVO
Yenifra	Director of Dinas
Busharmaidi	Vice Director of Dinas
Banjarmasin RVO	
Kalbi Rubai	Head of Banjarmasin RVO
Husni	Staff of Banjarmasin RVO
Muladi	Sub-bureau of Administration, Dinas
Bogor RVO	
Bambang Suprihadi	Head of Bogor RVO
Agus	Staff of Bogor RVO

	Iwan Ridwan	Staff of Bogor RVO
Jakarta RVO		
	Tarigan	Head of Jakarta RVO
	Liliy	Staff of Jakarta RVO
	Dody	Staff of Jakarta RVO
Yogjakarta RVO		
	Agung Sudarmadi	Head of Yogjakarta RVO
	Suharno	Section of Mass and Balance, Yogyakarta RVO
	Imron	Section of Flow, Length and Volume, Yogyakarta RVO
	Bambang Supriyo	Sub-bureau of Administration, Dinas
	Sayidi Jauhar	Sub-bureau of Program and Planning, Dinas
	Riyadi Ida bagus	Sub-bureau of Trade, Dinas
	Suharto	Sub-bureau of Industry, Dinas
	Yanto	Sub-bureau of Logistic, Dinas
Surabaya RVO		
	Helmi	Head of East Java Metrological Bureau
	Tatang Kusnadi	Head of Surabaya RVO
	Muliyadi	Head of Madiun RVO
	Puryadi,	Head of Pamekasan RVO
	Sahid Mulahadi	Head of Bojonegoro RVO
	Tumiya	Head of Kediri RVO
	Baharudin	Head of Malang RVO
	Any Mulyandari	Metrological Instrument Section
	Arief Rachmansyah	Brawijaya University
VI. Laboratory for testing and Quality control (PPMB/BPSMB)		
PPMB		
	Bambang TS	Director of Goods Quality Monitoring
	Akhyar Rais	Director of Goods Quality Inspection
	Sofyan R	Director of Calibration
	Andreas Anugrah	Staff of PPMB
Denpasar BPSMB		
	Ketut darta	Section of Administration
	Indri	Section of Administration
	Tasguna	Section of Inspection
	Sudani	Section of Quality Control
Makassar BPSMB		
	Mohammad Nadjib	Head of BPSMB
	I Dewa Nyoman	Section of inspection
	Muda	Section of Calibration
	Akbar	Section of Quality Control
Medan BPSMB		
	Hasmirizal Lubis	Head of BPSMB
VII. PDAM/PLN/BKPM regional		
Manado BKPM and KR		
	Djo Tanduan	Director
Banjarmasin PDAM		
	Muslih	Technical Director
	Aji Sulaeman	Technical Staff
Banjarmasin PLN		
	Ridwan	Technical Divison Manager
	Gatot	Technical Staff
VIII. Other Institutions		
KIM-LIPI		
	Husein Avicenna Akil	Director of KIM-LIPI
	Dede Erawan	Director of PMU-MSTQ Project

	Suwono	Section of Metrology Accoustic
KAN/BSN		
	Iman Sudarwo	Director of BSN/KAN
	Sunarya	Deputy of Application Standard and Accreditation
	Sunyoto	First Secretary
	Kukuh	Director of Accreditation
Bandung Institute of Technology (ITB)		
	Deddy Kurniadi	Team Leader on Industrial Collaboration
	Hermawan K Diojono	Head of Departemen Engineering of Physics
	Nugraha	Electronics Materials, Departemen of Engineering Physics
	Bambang Sunendar	Fine Ceramics, Departemen of Engineering Physics
	Farida Muchtady	Measurement and Medical Instrumentation System
	Adiyanto	Materials Testing, Departemen of Mechanical Engineering
BAPPENAS		
	Tb. A. Choesni	Director for Trade, Investment and International Economic Cooperation
	Ratna Sri Marwati	Deputy Director for Investment
	Amalia Adiningar	Deputy Director for Trade
	Yunus	Directorate for Trade, Investment and Economic
Directorate General of Regional Autonomy, Ministry of Home Affair (MOHA)		
	Suwarni	Directorate of Regional Government
	Zainal Ahmad	Directorate of Regional Government
	Parda Simatupang	Directorate of Regional Government
Directorate General of Customs and Excise, Ministry of Finance (MOF)		
	Heru Pambudi	Head of Import Section
PLN / LMK		
	Ali	PLN Electricity R and D
	Thomas	PLN Electricity R and D
	Eddy	PLN Certification Service
MIDC		
	Muhammad Furqon	Head of Poundry Division
IX. Private Companies		
Pan Asia		
	Pudji Harsojo	Operation Manager
	Sri Aminah	Head of Laboratory
Metbelosa		
	Danny Wurdianto	QC Section Manager
	Takashi Aso	President Director
	Tsuneo Arai	Plant Manager
Barindo		
	Irwan	Director
Timbul		
	Dewi	Operation Manager
Metrocom		
	Suhari	Operation Manager
Musim Mas		
	Topan	Operation Manager
Indodacin		
	Halim	Owner

Appendix A.2

List of Reference

Appendix A-2 List of Referrence

No	Title	Japaneese
Directorate of Metrology (DOM)		
1	Undang-Undang Republik Indonesia No. 2 Tahun 1981 tentang Metrologi Legal	法定計量に関する1981年インドネシア共和国法律第２号
2	Penjelasan Atas Undang-Undang Republik Indonesia No. 2 Tahun 1981 tentang Metrologi Legal	法定計量に関する1981年インドネシア共和国法律第２号に関する解説
3	Organisasi dan Tatakerja Unit Pelaksana Teknis di Lingkungan Direktorat Metrologi	DOM内の技術実施部の組織と業務内容
4	Peraturan Menteri Perdagangan RI tentang Organisasi dan Tatakerja Unit Pelaksana Teknis di Lingkungan Direktorat Metrologi	インドネシア共和国商業大臣令によるDOM内の技術実施部門の組織と業務内容
5	Peraturan Pemerintah Republik Indonesia tentang Satuan Turunan, Satuan Tambahan, dan Satuan lain yang berlaku No.10 tahun 1987	インドネシア共和国政令による組合せ単位、追加単位、とその他の有効単位 (No.10/1987)
6	Keputusan Dirjen Perdagangan Dalam Negeri Deperindag No 29/DJPDN/Kp/XII/98 tentang Rincian dan Syarat-syarat Teknis Khusus Alat-alat UTTP Metrologi Legal	商工省国内貿易局局長令による法定計量の計測機器（UTTP）の技術的明細と条件（No. 29/DJPDN/Kp/X11/98）
7	Keputusan Dirjen Perdagangan Dalam Negeri Deperindag No 30/DJPDN/Kep/XI/99 tentang Pedoman Pengelolaan Standar danLaboratorium Metrologi Legal	商工省国内貿易局局長令による法定計量のラボと標準機材の運営ガイダンス(No 30/DJPDN/Kep/XI/99)
8	Keputusan Dirjen Perdagangan Dalam Negeri Deperindag No. 31/DJPDN/Kep/XI/99 tentang Pedoman Pengawasan Barang Dalam Keadaan Terbungkus (BDKT)	商工省国内貿易局局長令による包装商品（BDKT）監視のガイダンス (No. 31/DJPDN/Kep/XI/99)

No	Title	Japaneese
9	Keputusan Dirjen Perdagangan Dalam Negeri Deperindag No. 32/DJPDN/Kep/XI/99 tentang Pedoman Pembinaan Pos Ukur Ulang	商工省国内貿易局局長令による再検定所の向上のガイダンス（No. 32/DJPDN/Kep/XI/99）
10	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang Pedoman Penilaian Laboratorium Metrologi Legal	2004年、商工大臣令による法定計量ラボ評価のガイダンス
11	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang Tanda Tera	2004年、商工大臣令による検定の印
12	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang Ketentuan Izin Perbaikan UTTP	2004年、商工大臣令による計測機器修理許可の規定
13	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang Ketentuan UTTP asal Import	2004年、商工大臣令による輸入計測機器の規定
14	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang UTTP yang memerlukan penanganan Khusus	2004年、商工大臣令による特別処理が必要とする計測機器
15	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang KST Tangki Ukur Mobil	2004年、商工大臣令によるタンクローリーの規定
16	Keputusan Menteri Perindustrian dan Perdagangan tahun 2004 tentang Pegawai yang Berhak Menera dan Menera Ulang UTTP	2004年、商工大臣令による計測機器の検定／再検定資格持つ職員
17	Pedoman Mutu Laboratorium Kalibrasi Direktorat Metrologi	DOMでの校正ラボの品質ガイダンス
18	Peralatan Standar Minimum Pada Subdinas Metrologi dan Balai Pelayanan Kemetrologian	計量センターとRVOでの最低標準機材

No	Title	Japaneese
19	Laporan Tahunan 2004, Sub Direktorat Standar Ukuran dan Laboratorium Kemetrologian	計量標準と計量ラボ部門の2004年の年間報告
20	Bahan Presentasi PertemuanTeknis Kemetrologian tahun 2006	2006年の計量技術会議の材料
Metrology Training Center (MTC)		
21	Peraturan Menteri Perdagangan Republik Indonesia No. 34/ M-DAG/PER/12/2005 tentang Organisasi dan Tatakerja Balai Pendidikan dan Pelatihan Metrologi	インドネシア共和国商業大臣令による計量研修センターの組織と業務内容　(No.34/ M-DAG/PER/12/2005)
22	Pedoman Penyelenggaraan Pendidikan dan pelatihan fungsional Penera di Lingkungan Departemen Peridustrian dan Perdagangan	商工省内の検定官技能教育研修の実施に関するガイダンス
23	Rencana Kerja Anggaran – Kementrian Lembaga di Lingkungan Deperindag tahun 2005. Program pengelolaan sumberdaya manusia aparatur	2005年、商工省内の業務計画、公務員の人材教育プログラム
24	Pedoman Penyelenggaraan Pendidikan dan Pelatihan Fungsional Kemetrologian berbasis Kompetensi di Lingkungan Departemen Perdagangan	商業省での競合性に基づく計量機能の研修と育成の実施の方針
Ministry of Home Affair (MOHA)		
25	Undang-undang Republik Indonesia No.32 tahun 2004 tentang Pemerintahan Daerah	地方行政についての法律2004年32号
26	Hubungan Kewenangan antar Tingkatan Pemerintahan	各レベルの行政の関係と権利
27	Pembagian Urusan Pemerintahan Bidang Perdagangan	商業分野での行政の分け方

No	Title	Japaneese
Ministry of Trade (MOT)		
28	Organisasi dan Tatakerja Departemen Perdagangan	商業省の組織と業務内容
29	Rancangan Rencana Kerja (Renja) Departemen Perdagangan tahun 2007	2007年、産業省の業務計画案
30	Strategic Plan of MOT (2004-2009)	2004-2009年の商業省の戦略計画
KIM-LIPI		
31	Rencana Strategis PUSLIT KIM-LIPI, 2005 – 2009	2005 – 2009の戦略計画、PUSLIT KIM-LIPI
32	Survey of Industrial Calibration Needs in Indonesia	インドネシアでの産業校正の需要の調査結果
33	Pamflet Puslit KIM-LIPI	KIM-LIPIのパンフレット
BSN/KAN		
34	Tinjauan Sistim Pengelolaan Standar Nasional untuk Satuan Ukuran	計測単位用の国家標準管理システム評価
35	Ketelusuran Pengukuran Nasional	国家計測のトレーサビリティ
36	Kondisi saat ini tentang Standar Nasional untuk Satuan Ukuran	計測単位用の国家標準の現状
37	Kumpulan Perundang-undangan perihal Pengelolaan Standar Nasional untuk Satuan Ukuran	計測単位用の国家標準管理についての法律集
38	Pemetaan Laboratorium Penguji Mutu Produk Agro, Industri Agro, SNI Wajib dan Lembaga Sertifikasi, 2005	農産物、農産業の品質検査ラボ、SNI義務と認定機関のラボのマッピング、2005年

No	Title	Japaneese
BPS		
39	Statistical Yearbook of Indonesia 2004, 2005-2006	2004, 2005-2006 年インドネシア年間統計
40	Water Supply Statistic 1998 – 2002, BPS	1999-2003年水道供給統計
41	Transportation and Communication Statistics 2004	2004年の通信と交通統計
42	City Gas Statistics 1999-2003	1999-2003年の都市ガス統計
43	PLN Electricity Statistics 1999-2003	1999-2003年PLN電気統計
BAPPENAS		
44	Peraturan Presiden Republik Indonesia tentang Rencana Pembangunan Jangka Menengah Nasional tahun 2004 - 2009	インドネシア共和国大統領令による2004～2009年の国内中期開発計画
45	National Mid-term Development Planning 2004-2009	2004-2009国家中期開発計画
46	Draft of National Long-term Development Planning 2005-2025	2005年～2025年の国家長期開発計画のドラフト
LMS centers		
47	Organisasi dan Tata kerja SML Medan, Peraturan Mentri Perdagangan No.29/M-Dag/pewr/12/2005	メダンSMLの作業手順と組織、商業大臣令（No.29/M-Dag/pewr/12/2005）
48	Brochure of SML Makassar and Medan	メダンとマカッサルSMLのパンフレット
49	Laporan Interkomparasi Standar Volume seluruh Sumatra, SML Medan, 2006	全スマトラの体積標準内部比較調査の報告
BPMB/PPMB		
50	Brochure: BPMB, Balai Pengujian Mutu Barang	BPMB商品品質検査局のパンフレット

No	Title	Japaneese
51	Balai Kalibrasi PPMB	PPMBの校正部署
52	Kebijakan Teknis Direktorat Pengawasan dan Pengendalian Mutu Barang	品質管理と監視部署の技術政策
53	Profil Balai Pengujian Mutu Barang Ekspor dan Impor	輸出入の品質検査局のプロファイル
RVOs		
54	Bali in Figures 2004/2005	バリ州の概要、2004－2005年
55	Peraturan Daerah Propinsi Bali No.6 tahun 2004	バリ州の地方令　（No.6 /2004）
56	Kalimantan Selatan in Figures 2004	南カリマンタンの概要、2004年
57	Peraturan Daerah Propinsi Kalimantan Selatan No.13/2003	南カリマンタン州の地方令（No.13/2003）
58	Rekapitulasi Data Hasil kegiatan Kemetrologian Bogor RVO	ボゴルRVOの計量活動のデーター集
59	Profile of Jakarta RVO	ジャカルターRVOのプロファイル
60	East Java Industry & Trade Directory 2003 - 2004	2003 – 2004年、東ジャワ通商産業住所氏名録
61	Pamflet Pelayanan Kemetrologian di Propinsi Jawa Timur	東ジャワ州の計量サービスパンフレット
62	Rencana Detail Engineering of Design Laboratorium Kalibrasi Kemetrologian Surabaya	Surabaya計量校正ラボの建設計画
63	Peraturan Daerah Propinsi Jawa Timur No. 6/ 2002 tentang Retribusi Biaya Tera / Tera Ulang dan Kalibrasi Alat alat UTTP Serta Pengujian BDKT	東ジャワ州政令による検定／再検定料と計測機器（UTTP）校正料と包装品検定料について
64	Sulawesi Selatan in Figures 2004-2005	南スラウェシの概要、2004－2006年

No	Title	Japaneese
65	Peraturan Gubernur Sulawesi Selatan no.13/2006	南スラウェシ州の知事令
66	Peraturan Pemerintah Daerah Propinsi Sulawesi Utara No.10/2004	北スラウェシ州の地方令（No.10/2004）
67	Sumatra Utara dalam Angka 2004	北スマトラの概要、2004年
68	Hasil Survei Pendataan kWh meter Wilayah Kerja UPTD Balai Metrologi Medan, 2004	メダン計量局UPTD エリアーでのkWｈメーターの調査結果、2004年
69	Peraturan Daerah Propinsi Sumatra Utara No.3/2003	北スマトラの地方令（No.3/2003）
70	Sumatra Barat in Figures 2004/2005	西スマトラの概要、2004－2005年
71	Profile Balai Metrologi Propinsi Riau, 2006	リアウ州の計量局のプロファイル、2006年
72	Keputusan Gubernur Riau No.19/2003	リアウ知事令（No.19/2003）
73	Riau in Figures 2005	リアウ州の概要、2005年
74	Dinas Perindustrian Perdagangan dan Koperasi Propinsi Yogyakarta, tahun 2005	2005年、Yogyakarta特別州の通商産業協同組合局
75	Fasilitas Peralatan Pengukuran dan Standar Sekunder Balai Metrologi Yogyakarta tahun 2006	2006年、Yogyakarta特別州での計測機器と2次標準設備
76	Yogyakarta in Figures, 2004	ジョグジャカルタの概要、2004年
Private Companies		
77	Brosur Perusahaan PT Barindo	PT Barindo社の会社案内
78	Mengenai Revisi Metode Kerja Sheel di PLN (from Metbelosa)	PLNでのシール作業法の改定（メトベロサ）

Appendix 2.1.1

Detail of Repelita I to Repelita V

Appendix 2.1.1 Detail of Repelita (Five Year Development Plan) Ⅰ to Repelita Ⅴ

From the first year of Repelita I (1969) to the fifth year of Repelita V (1994), Indonesia's economy grew an average of 6.8% per year. The highest economic growth of 11.5% was recorded in 1973, and the lowest level of 2.2% occurred in 1982. The average rate of economic growth has tended to drop (i.e., from 8.0% per year in Repelita I to 5.2% per year in Repelita IV). However, a rise of 7.0% per year occurred in Repelita V. This drop in the growth rate was in line with efforts to encourage a more equitable distribution of development, assuming that a high rate of growth is characterized by increased investment in capital intensive economic activities in urban areas that do not support equitable distribution of the fruits of development as they do not involve a lot of people.

On the other hand, a low rate of growth is interpreted as a sign of investment in labor-intensive projects such as agribusiness, handicrafts and small industry which both involve many people in rural areas and contribute to more equitable distribution of development. The dilemma is that Indonesia lags behind many other countries. To realize a more advanced economy, Indonesia needs faster economic growth which can be achieved only through more intensive capital and high-tech investment projects.

In Repelita I (1969-1974) and Repelita II (1974-1979) the rate of economic growth was relatively high, averaging 8.5% per year and 7.2% per year, respectively. Indonesia once focused attention on industries which were manufacturing goods to substitute imports, as most community consumer requirements were being met by imports which consumed huge quantities of foreign exchange. The volume of Indonesian exports was very slow, and foreign exchange was in short supply. Over this period of Repelita I and II, the most important goal was to reduce foreign exchange expenditures by producing commodities to substitute imports. The Indonesian government offered special facilities and concessions aimed at supporting the achievement of this goal. Most of these commodities were products of downstream industries. Protection and subsidy were quite strong in these years, which were marked by import substitution industries. The manufacturing industry grew at a higher rate of more than 13% per year.

This decade that spanned Repelita I and II is remembered as Indonesia's reconstruction period after suffering from hyperinflation and extremely low economic growth in early 1960's, mainly

because the manufacturing sector did not develop during the period. The economic growth was based primarily on natural resources (i.e., oil, gas and fruit products).

During Repelita III (1979-1984) and Repelita IV (1984-1989), the rate of economic growth decreased (i.e., 6.1% and 5.2% respectively per annum). During that period, the government focused more attention on the agricultural sector, handicrafts, and both small and large labor-intensive industries such as textiles and footwear. All of these efforts were intended to decrease Indonesia's dependence on imports and to provide more employment for Indonesian citizens. The period peaked in 1984 when Indonesia became self-sufficient in rice production. Indonesia no longer imports rice.

In the 1980s, during Repelita III, Indonesia's government launched two important economic reform policies in banking/financial and foreign trade areas to facilitate further implementation of the reforms,. The banking reform policy reduced the power of monetary authority, allowing market forces to determine domestic interest rates. As some restrictions on commercial bank operation had been removed, many new national commercial banks emerged and many banks from abroad opened offices in Indonesia. The foreign trade reform policy consisted of two main elements which were implemented in a gradual way: the shift from import substitution towards export promotion, and the removal of certain import restrictions.

All these important steps conducted by the government generated a sustained rapid economic growth, especially in the 1980s and up to 1997, just before the crisis emerged. Accompanied by "pro-poor" policies in the areas of employment, education, health, cheap food, village development, and minimum wage, the rapid and sustained economic growth has caused the real income per capita to increase, the adult illiteracy to drop dramatically, and the poverty incidence (i.e., people living under current official poverty line as% of age of total population) to fall substantially. This experience implies that economic growth is not the only determinant factor of poverty reduction. But with supports from the "pro-poor" policies, the growth has greater impact than without such policies on poverty reduction.

The industrial sector did progress rapidly, particularly in Repelita IV. Indonesia has been able to meet its population's demands for many manufactured products. Further, the country has begun exporting many of the products. Products of small industry and handicrafts became important exports commodities. Textile products became an important source of foreign exchange and

finally began to complete with plywood exports as a major earner of foreign exchange. Shoe export has become another major foreign exchange earner. This period was unknown as the beginning of the deregulation period which started in the banking sector in 1983 when the interest rate ceiling was removed. More influential banking deregulation was introduced in 1988, resulting in the booming of the banking industry, facilitating the rapid increase in export and economic activities. These two Repelita were also made by the rise of non-oil export, after oil prices dropped from US$35 per barrel in 1982 to US$10 per barrel in 1986. Packages of deregulation policies were introduced to create a better climate for investment and export. This decade was marked by rapid development in wood-based industry, textiles, plus the start of several labor intensive industries such as footwear and processed-food.

In Repelita V (1989-1994) the rate of economic growth was higher (i.e., an average of 6.8% per year). This was a result of deregulation policies started by the end of Repelita IV. Activity in up-stream capital intensive industries began to increase rapidly, particularly in the petrochemical industry. One of the reasons is that Indonesian products still have high import content whereas basic materials and auxiliary materials still must be imported. These imports consume an increasing amount of foreign exchange. In order to reduce the high import content, the government has encouraged the development of mid-stream and upstream industries which can produce basic and auxiliary materials or components used in local industry. They were enhanced and supported by a more liberalized policy.

By the beginning of Repelita V, more businessmen seemed to possess plenty of capital, strong management skills, and advanced technology. Non-oil and gas exports, particularly manufactured products, continued to increase, and investment in manufacturing industry was encouraged resulting in industrial development and increased employment opportunities. The economic growth rate maintained annual high levels of 7.5% and 7.4% in 1989 and 1980, respectively. Purchasing power was also quite high. The increase in purchasing power was, not balanced immediately by the increase in the supply of goods and services. Thus, the inflation rate increased to almost 10% per year in 1990 and 1991. Credit interest also increased as demand for credit soared to more than 36% per year. The Indonesian economy became overheated. As such a situation was considered dangerous, the government took action to cool down the economy by stemming imports, halting overseas credit, and continuing its tight money policy. Eventually, the inflation rate and interest rates dropped to 5% in 1992 and imports did

not increase much, however the economic growth rate in 1991 and 1992 was lower than that of 1989 and 1990 (i.e., only 6.6% and 6.4%, respectively).

The rapid increase in industrial development in 1989 and 1990 had gained excessive growth of imports which were funded by offshore loans, therefore deteriorating the balance of payment experienced in the following years. As local sources of funds were difficult to find, the private sector expected resources from overseas and succeeded to get offshore loans, which were then reaching worrisome levels of more than US$4,000 a year. The government itself worried about this. So, in 1991, the government started limiting offshore loans made by state companies and later persuaded private companies to be more prudent in committing to make offshore loans.

Table 2.1.1-1 shows that Indonesia GDP grew at an average rate of 6.8% a year in the last 25 year period of 1969-1994, while the GNP was 6.5% a year and national income was 6.0% a year. The manufacturing sector grew at a rate of 11.9%, much faster than the agriculture sector at 3.7% a year.

In July 1997, following the decline of the Thai Bhat, the Indonesian rupiah depreciated dramatically against the US dollar. Since that initial decline of the rupiah, the Indonesian economy has undergone tremendous change, as shown by a fall of about 13% in real gross domestic product (GDP). Prices of certain goods, especially food, clothing, housing, and health, have since risen substantially, real wages have fallen, and percentage of population deemed as poor has increased by more than 100% for the period 1996-1998.

At the end of the national plan, Repelita VI (1994-1999), the preparation of Repelita VII was postponed with the economic crisis in 1997 and the nearly concurrent political transition. In 1999, the New Order Government moved to redraw its development strategy, articulated by the Guidelines of State Policy 1999-2004 (GBHN). These form the basis for the medium-term development strategy called Propenas (National Development Program), which was presented in 2000.

Propenas sets out five broad national objectives: (i) ensure national cohesion and social stability; (ii) achieve good governance and rule of law; (iii) accelerate economic recovery and strengthen the foundations for sustained growth; (iv)develop the social sectors and human

welfare; and (v) strengthen regional autonomy, rural and urban development, and structural poverty programs.

Table 2.1.1-1 Annual Economic Growth Rates in Repelita I to V (1969-1993)

Economic sector	Average annual growth rates in the last 25 years					Average
	Repelita I	Repelita II	Repelita III	Repelita IV	Repelita V	
1. Agriculture	4.6	3.0	4.2	3.6	3.0	3.7
2. Mining	16.7	5.0	-3.8	-0.1	4.3	4.4
-Oil	n.a.	(-1.0)	(-3.2)	(7.4)	(2.9)	(1.8)
-Gas	n.a.	(20.0)	(4.5)	(-7.4)	(23.5)	(13.6)
3. Manufacturing	13.0	13.7	(9.7)	13.0	9.9	11.9
-Non-oil & gas	n.a.	(14.3)	(12.0)	14.3	(11.3)	(13.0)
-Refinery	n.a.	(8.8)	(38.7)	33.7	(6.8)	(22.9)
-LNG	n.a.	(14.3)	(18.1)	14.2	(5.2)	(13.3)
4. Electricity, gas & water	11.7	13.5	15.2	11.9	13.3	13.1
5. Construction	23.2	15.2	11.6	2.8	11.3	12.8
6. Trade and Tourism	11.6	6.5	6.8	6.5	8.0	7.9
7. Transportation Communication	14.1	15.3	11.2	4.9	9.9	11.1
8. Banking and Finance	11.2	15.0	20.0	9.9	13.1	13.8
9. Housing	6.8	15.2	10.9	3.2	4.2	8.2
10. Government & defense	4.0	13.9	10.9	6.8	3.6	7.8
11. Other services	3.1	2.4	3.8	3.3	6.5	3.8
A. Gross Domestic Product (GDP)	8.5	7.2	6.1	5.2	6.9	6.8
1.Oil and Gas	n.a.	(6.6)	(-1.6)	(2.2)	(3.2)	(2.6)
2.Non-oil and gas	n.a.	(7.2)	(7.0)	(6.0)	(7.7)	(7.0)
B. Gross National Product (GNP)	8.2	6.6	(5.8)	5.4	6.7	6.5
C. National Income (GNY)	7.3	6.5	5.8	4.2	6.8	6.0

Sources: Data Consult, Indonesian Economic Trends 1968-2018

Good governance is thus a central theme of the government's medium-term reform program. The key components of the government's strategy include administrative and fiscal decentralization; an anti-corruption program; improved public financial management; civil service reforms; dismantling the state monopolies; and further deregulating trade, finance, industry, and investment. The government also attaches high priority to widening the scope of market-based economic decision-making.

The government aims to speed economic recovery in order to lay the groundwork for sustainable economic development. The key instruments of the government's growth strategy are macroeconomic stability, a strong banking sector, faster progress on corporate debt restructuring, and generating market confidence with the help of free-flowing information.

Propenas aims to achieve broad-based economic growth driven by market signals, based on Indonesia's comparative advantages.

For infrastructure, Propenas' priority is rehabilitation and betterment of existing infrastructure, prioritized on economic and urgent social considerations. Improving infrastructure services that support both production and export activities will be crucial, as will expanding employment and business opportunities. Greater competition, de-monopolization, and enhanced participation of the private sector in providing infrastructure are major goals. The private sector is expected to provide investment funds in certain sub-sectors such as toll roads in Jawa and electricity production in both Jawa and Bali.

In the social sectors, the overriding national objective is to ensure all citizens access to basic services. Consistent with its commitment to decentralization, the national government has outlined a development program giving major responsibility to local governments. They will determine specific development priorities based on regional needs and resources. Private sector involvement in social infrastructure is a major objective. It is expected that in the education and health sub-sectors, public investment will focus on primary and secondary education, basic health service delivery, and preventive health care.

The government views regional autonomy as central to improving governance. Greater local government autonomy through Law 32 is expected to make decision making more participatory and to create greater accountability. Decentralization of government functions will also enhance the quality and delivery of public services, strengthen implementation of programs, and enhance development impacts.

The Propenas has been articulated further with a 10-point program summarized below, to encourage recovery and sustainable development.

- Maintain economic stability with support of IMF/World Bank/ADB
- Reduce unemployment by creating jobs in all regions
- Improve agricultural productivity and farmer welfare
- Increase non-oil export revenues, particularly in manufacturing and agro-industry
- Promote domestic and foreign equity investment
- Expedite banking and corporate restructuring

- Ensure sustainable development of natural resources
- Implement economic decentralization through an orderly and phased transition
- Accelerate privatization of State-owned enterprises
- Initiate development programs for SMEs

Appendix 2.1.3

Details of Foreign Trade

Appendix 2.1.3 Details of Foreign Trade

In 1998, the value of non-oil and gas export recorded 83.9% of the total Indonesian export. In 1999, however, it dropped to 79.9%. The decrease was attributed by the economic slump due to the financial crisis which occurred in the middle of 1997. In 2000, the value of total export increased again by 27.7% (US$62.1 billion), and no- oil and gas export increased by 22.9% (US$47.8 billion). But in 2001, the export values dropped by 9.3% and non-oil and gas export also decreased by 8.5% (see Table 2.1.3-1).

In 2003, the total export value was US$61.0 billion by 6.8% increase over the value in 2002 and non-oil and gas was US$47.4 billion by 5.2% increase. In 2004, the total export value increased to US$72.0 billion (17.2% growth) and non-oil and gas increased to US$56 billion (18% growth).

For the last five years, the total import value has increased with the average growth rate of 16% annually. The import value achieved to US$33.5 billion in 2000 and down to US$31 billion in 2001. After that it continuously rose in 2002-2004, and it was US$46.5 billion in 2004. The import of oil and gas increased from US$7.6 billion to US$11.7 billion in 2003 and 2004, respectively. The import of non-oil and gas products also increased from US$24.9 billion in 2003 to US$34.8 billion in 2004.

Table 2.1.3-1 Trend of Value of Export and Import

Unit: US$ million

Year	Total		Non-oil and Gas	
	Exports	Imports	Exports	Imports
1994	40,053.4	31,983.5	30,359.8	29,616.1
1995	45,418.0	40,628.7	34,953.6	37,717.9
1996	49,814.8	42,928.5	38,093.0	39,333.0
1997	53,443.6	41,679.8	41,821.1	37,755.7
1998	48,847.6	27,336.9	40,975.5	24,683.2
1999	48,666.4	24,003.3	38,873.2	20,322.2
2000	62,124.0	33,514.8	47,757.4	27,495.3
2001	56,320.9	30,962.1	43,684.6	25,490.3
2002	57,158.8	31,288.9	45,046.1	24,763.1
2003	61,058.2	32,550.7	47,406.8	24,939.8
2004	71,584.6	46,524.5	55,939.3	34,792.5

Source: BPS Statistical Year Book 2004

According to the data of export volume by port up to 2004, the biggest export volume was from Kalimantan ports which accounts for around 136 million tons (58.6% of the total export volume), followed by Sumatra ports (59 million tons) and Java ports (30 million tons). When compared to the same period of 2003, the export volume through Sumatra port decreased by 2.6%. While the export volume through Kalimantan ports increased by 11.1% and the export volume through Java increase by 2.2%.

Table 2.1.3-2 shows the export volume by major ports. While the largest export volume came from Kalimantan ports, the largest export value came from Java ports which recorded at US$ 30.0 billion in 2003 (48.6% of total Indonesian export value). In 2004, export value through Java ports was US$34.7 billion; through Kalimantan ports increased from US$10.8 billion to US$13.1 billion. Export value from Sumatra ports increased by 15.7% to US$ 20 billion.

Table 2.1.3-2 Export Volume by Major Port

Unit: Net weight in thousand ton

Major ports	2000	2001	2002	2003	2004
Java and Madura	31,412.3	29,022.6	28,648.1	29,671.5	34,705.7
Sumatera	17,570.6	14,013.1	16,149.9	17,217.3	19,926.6
Kalimantan	9,972.4	10,404.1	9,249.5	10,786.0	13,148.6
Sulawesi	997,0	815.4	815.0	996.9	1.581.3
Bali and Nusa tenggara	716.6	659.6	706.8	699.7	1,083.2
Maluku, Papua	1,455.1	1,406.1	1,589.5	1,686.8	1,139.2
Total	62,124.0	56,320.9	57,158.8	61,058.2	71,584.6

Source: BPS Statistical Year Book 2004

Table 2.1.3-3 shows the export volume by major destination country. Since long ago, the main destination countries of export have been Japan, the USA and Singapore. In 2004, the export volume of these countries was 58 million tons to Japan, 7 million tons to the USA, and 18 million tons to Singapore.

Table 2.1.3-3 Export Volume by Major Destination Country

Unit: Net weight in 1000 ton

Country of destination	2000	2001	2002	2003	2004
Japan	52,078.3	53,200.1	53,317.3	57,674.5	57,646.3
Singapore	57,907.5	95,645.5	39,046.6	22,072.8	18,390.8
USA	6,606.3	6,523.1	6,542.8	6,832.8	7,371.0
Malaysia	4,592.5	5,559.9	7,049.5	8,360.2	10,509.7
Australia	4,099.1	6,697.9	6,365.4	4,993.9	4,724.4
Hong Kong	4,353.1	6,027.6	5,273.8	7,601.6	8,262.1

Source: BPS Statistical Year Book 2004

Table 2.1.3-4 shows the export value by major country of destination. In terms of export value, exports to main countries increased, exports to Japan in 2004 increased by 17.3%, and export to the USA and Singapore and increased by 18.9% and 11.1%, respectively.

Table 2.1.3-4 Export Value by Major Country of Destination

FOB: US$ million

Country of destination	2000	2001	2002	2003	2004
Japan	14,415.2	13,010.2	12,045.1	13,603.5	15,962.1
Singapore	6,562.4	5,363.9	5,349.1	5,399.7	6,001.2
USA	8,475.4	7,748.7	7,558.6	7,373.7	8,767.3
Malaysia	1,971.8	1,778.6	2,029.9	2,363.8	3016.0
Australia	1,519.4	1,844,9	1,924.4	1,791.6	1,887.4
Hong Kong	1,554.1	1,290.3	1,242.3	1,183.3	1,387.5

Source: BPS Statistical Year Book 2004

Table 2.1.3-5 shows the exports of crude oil. The export volume of crude oil in 2003 decreased to 26.5 million tons from 29.1 million tons in 2002. The crude oil export in 2004 was 23.5 million tons or decreased by 11.5% compared to 2003. In 2004, the total export value of crude oil was US$6.2 billion, which was 11.04% higher than that in 2003.

Table 2.1.3-5 Export of Crude Oil

Exports of crude petroleum	2000	2001	2002	2003	2004
In Net weight: 1000 m.ton	29,225.9	32,875.0	29,054.4	26,517.5	23,467.8
In FOB value: million US$	6,090,1	5,714.7	5,227.6	5,621.0	6,241.4

Source: BPS Statistical Year Book 2004

The trend of export of crude oil is presented in Table 2.1.3-6. Japan is the major destination country of exported crude oil . In 2004, the share of crude oil exported to Japan reached 31.8% (US$1,986 million); to South Korea, 18.9% (US$1,184 million); to China, 14.0% (US$874 million).

Table 2.1.3-6 Export Volume of Crude Oil by Major Country of Destination

Net weight in 1000 ton

Country of destination	2000	2001	2002	2003	2004
Japan	10,151.5	10,510.9	8,385.0	8,741.9	7,231.7
Singapore	2,090.4	2,845.5	1,934.2	1,583.2	1,197.3
China	4,483.1	2,617.8	2,909.9	3,499.1	3,352.3
Australia	2,691.3	4,950.8	4,865.5	3,150.3	2,540.5
USA	1,972.1	2,169.8	2,181.0	1,669.6	1,699.5
South Korea	5,065.0	6,922.4	5,912.1	5,355.4	4,690.6

Source: BPS Statistical Year Book 2004

Table 2.1.3-7 shows the export value of petroleum products by major country of destination in 2000-2004. Table 2.1.3-8 shows the export volume of petroleum products by major country of destination in 2000-2004.

In 2004, the value of export of oil products increased by 6.5% and reached to US$1,654 million. Most were exported to Japan, whose amount reached to US$693 million (41.9% of the total), that increased around 42.0% over 2003. The next main markets are Singapore and South Korea, reaching US$275 million and US$223 million, respectively.

Table 2.1.3-7 Export Value of Petroleum Products by Major Country of Destination

FOB value: US$ million

Country of destination	2000	2001	2002	2003	2004
Japan	419.1	284.9	290.1	487.8	692.7
Singapore	433.2	309.2	310.0	295.4	275.2
China	322.6	225.8	67.5	148.6	132.0
Australia	79.4	87.7	53.2	12.4	8.1
USA	35.4	28.5	15.3	76.4	64.6
South Korea	56.2	28.1	295.6	218.4	222.6
Others	305.8	225,2	274.9	314.7	259.2
Total	1,651.6	1,189.4	1,307.5	1,553.7	1,654.4

Source: BPS Statistical Year Book 2004

Table 2.1.3-8 Export Volume of Petroleum Products by Major Country of Destination

Net weight in 1000 tons

Country of destination	2000	2001	2002	2003	2004
Japan	2,162.6	1,622.5	1,662.8	2,339.0	2,803.9
Singapore	2,481.2	1,987.7	1,635.1	1,235.1	1,021.8
China	1,625.3	1,298.7	276.8	742,4	598.9
Australia	354.5	380.6	320.7	53,8	30.0
USA	200.0	189.9	110.1	422,6	307,2
South Korea	330.7	207.6	1,900.5	1,133.4	962,2
Others	1,632.3	1,320.8	1,668.0	1,480.7	1,076.4
Total	8,786.6	7,007.8	7,574.0	7,425.0	6,800.4

Source: BPS Statistical Year Book 2004

Table 2.1.3-9 shows the export value of natural gas by major country of destination. The export value of gas was US$7.8 billion in 2004, an increase of 19.6% over 2003. As was crude oil, natural gas was exported mainly to Japan. The export value of gas to Japan was US$4.9 billion or 63.2% of total gas exported in 2004. Compared to the previous year, the export value of gas to Japan increased by 11.2% in 2004.

Table 2.1.3-9 Export Value of Natural Gas by Major Country of Destination

FOB value: US$ million

Country of destination	2000	2001	2002	2003	2004
Japan	4,460.5	4,162.3	3,753.5	4,407.7	4,899.8
Singapore	0	5.8	0.7	0	15.6
China	663.4	711.9	669.5	727.6	1,020.2
Hong Kong	7.1	0.9	0	0	0
South Korea	1,350.5	752.5	1,010.8	1,207.5	1,577.8
Others	143.4	98.8	143.1	133.9	236.2
Total	6,624.9	5,732.2	5,577.6	6,476.7	7,749.6

Source: BPS Statistical Year Book 2004

Recently, non-oil and gas commodities become promising for export. They are classified into primary commodities and non-primary commodities. The primary commodities are products of the agricultural sector and the mining sector. The non-primary commodities consist of products from the manufacturing sector.

Table 2.1.3-10 shows export weight and value by selected items.

Table 2.1.3-10 Export Weight and Value by Selected Items

(Unit Net Weight in thousands ton, Value of Fob in US$ million)

Export Items	2000		2001		2002		2003		2004	
	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value
Rubber	1380	887	1453	786	1496	1038	1663	1496	1874	2180
Coffee	346	340	255	204	323	219	321	251	339	282
Tee	102	108	95	95	96	98	85	92	56	65
Tobacco	31	64	36	81	31	66	28	44	28	46
Shrimp	114	1003	127	940	122	840	134	853	128	824
White Pepper	34	118	30	60	41	59	25	55	14	30
Black Pepper	30	101	24	40	21	29	27	38	17	21
Swan Wood	451	331	527	301	747	371	519	303	432	311
Tin	46	233	45	193	57	224	67	296	91	618
Copper	2954	2007	2808	2104	3057	2208	2708	2485	2033	2557
Textile	1229	3505	1214	3202	1220	2896	1156	2923	1147	3152
Garment	405	4734	430	4530	376	3945	380	4105	376	4454
Plywood	3760	1989	3898	1838	3584	1748	3306	1663	2603	1577
Palm Oil	4110	1087	4903	1081	6334	2092	6386	2455	8662	3442
Fertilizers	1961	212	1192	130	1198	135	1315	188	478	88
Electronics	620	6466	602	5915	670	6062	644	6121	677	6573

Source: BPS Statistical Year Book

Rubber, tea, tobacco, shrimp, and coffee are the most important primary commodities in the agricultural sector. In 2004, the export value of most commodities increased, whereas shrimp, tea, and white pepper decreased by 3.4%, 29.4%, and 45.8%, respectively. The export value of rubber equaled US$2.2 billion in 2004, which is the largest amount among all other commodities.

In the mining sector, excluding oil and gas, the two main commodities are copper and tin. The export value of copper and tin in 2003 was US$2.5 billion and US$296 million, respectively. In 2004, the export value of copper was US$2.6 billion or increased by 2.9% over 2003. The export value of tin was US$618 million or increased by 109%.

With regard to the manufacturing sector, garments, textiles and plywood are important. In 2003, the export value of these three commodities in order of sequence above reached US$4.1 billion, US$2.9 billion and US$1.7 billion, respectively. Until December 2004, the export value of garment increased 8.5% to US$4.5 billion, and the export value of textiles increased 7.8% to US$3.2 billion. However, the export value of plywood decreased by 5.2% over 2003 to US$1.6 billion.

The export of electronic appliances in 2003 decreased slightly in volume (3.9%) but increased in value (1.0%). The export volume of electronic appliances increased from 644 thousand tons in 2003 to 677 thousand tons in 2004. The export value of electronic appliances increased from US$6.1 billion in 2003 to US$6.6 billion in 2004.

The import volume by major port is shown in Table 2.2.4-10. Imports entered Indonesia mostly through the ports of Java and Madura, which amounted to US$62 billion or contributed to 84.1% of total import in 2004. Compared with 2003, import commodities unloaded through the ports of Java and Madura increased by US$12.5 billion or 46.9% of the total import.

Table 2.1.3-10 Import Volume by Major port

Unit: Net weight in thousand ton

Major ports	2000	2001	2002	2003	2004
Java and Madura	51,373.8	48,961.5	53,705.9	52,413.9	61,893.0
Sumatera	11.022.5	9,706.4	11,605.4	9,510.4	10,145.7
Kalimantan	3,409.7	5,457.4	6,503.0	6,805.6	7,868.9
Sulawesi	986.4	860.9	342.7	548.5	1,054.2
Bali and Nusa tenggara	119.3	90.3	194.7	137.6	91.4
Maluku, Papua	477.2	490.3	389.5	289.1	267.4

Source: BPS Statistical Year Book 2004

Table 2.1.3-11 shows the import of some selected commodities. Crude oil was the top import product, just ahead of cement, rice and machinery.

Table 2.1.3-11 Import Value

CIF value: US$ million

Imports	2000	2001	2002	2003	2004
Rice	319,130	134,913	342,527	291,423	61,753
Fertilizers	180.6	195.0	241.1	226.3	377.3
Cement	2,626.4	2,508.0	5,524.2	4,360.8	6,239.0
Crude oil	6,019.5	5,471.9	6,525.7	7,610.9	11,732.0
Iron and steel tubes	371.0	305.0	331.0	257.7	332.6
Motor vehicles	366.1	422.9	334.9	562.7	985.8
Machinery	1,780.8	1,664.5	1,490.3	1,294.3	2,032.1

Source: BPS Statistical Year Book 2004

Appendix 2.2.1

Industry in Indonesia

Appendix 2.2.1 Industry in Indonesia

1) Agriculture

Indonesia is well-known as an agricultural country, as can be seen by the large area being used in agriculture. By 2003, the agricultural area in Indonesia (excluding Papua and Maluku) comprised around 54.4 million ha or around 74.5% of the total area. In 2004, the share of agricultural section in GDP was 14.6%.

Food crops sub-sectors consist of paddy (wet land paddy and dry lad paddy), maize, cassava, sweet potatoes, peanuts and soybeans. The harvested area of paddy in 2004 was 11.91 million ha. The harvested area increased by 0.42 million ha or increased around 3.7% over 2003. The harvested area of wet land paddy increased around 3.8%, meanwhile the dry land paddy increased around 2.2%. The production of paddy in 2004 was 52.06 million tons in dry paddy. The production of wet land paddy increased around 3.7% and the dry land paddy increased around 4.4%. This increase was due to increasing of the harvested area and productivity of paddy. The productivity of wet land paddy decreased 0.15%, meanwhile the dry land paddy increased around 2.1%.

Paddy production in Indonesia concentrated on particular areas. In 2004, the island of Java produced 29.6 millions tons of paddy or 54.8% of the total production in Indonesia. In 2004, the harvested area of paddy on Java reached 47.9% of the whole harvested area in Indonesia with the productivity of 51.87 quintal per hectare which is better than the averaged yield in the country. A similar pattern was also evident for food crops such as maize, cassava, peanuts and soybeans but not sweet potatoes, which produced less than 50% on Java. This means that farming conditions on Java are better than those of other islands. These conditions should be maintained in order to yield quality crops in larger quantities.

2) Manufacturing Industry

The manufacturing sector leads Indonesia's economy and has proven itself as the main contributor to GDP growth over the past ten years. In 2004, the share of manufacturing sector including oil and gas manufacturing sectors in GDP was 28.1%.

The manufacturing sector consists of two groups: first, oil and gas manufacturing and non-oil and gas sector. The industry with the largest share in GDP is the food and tobacco industry,

followed by transport equipment and machinery. Table 2.2.1-1 shows the GDP of manufacturing sub-sector at current market price.

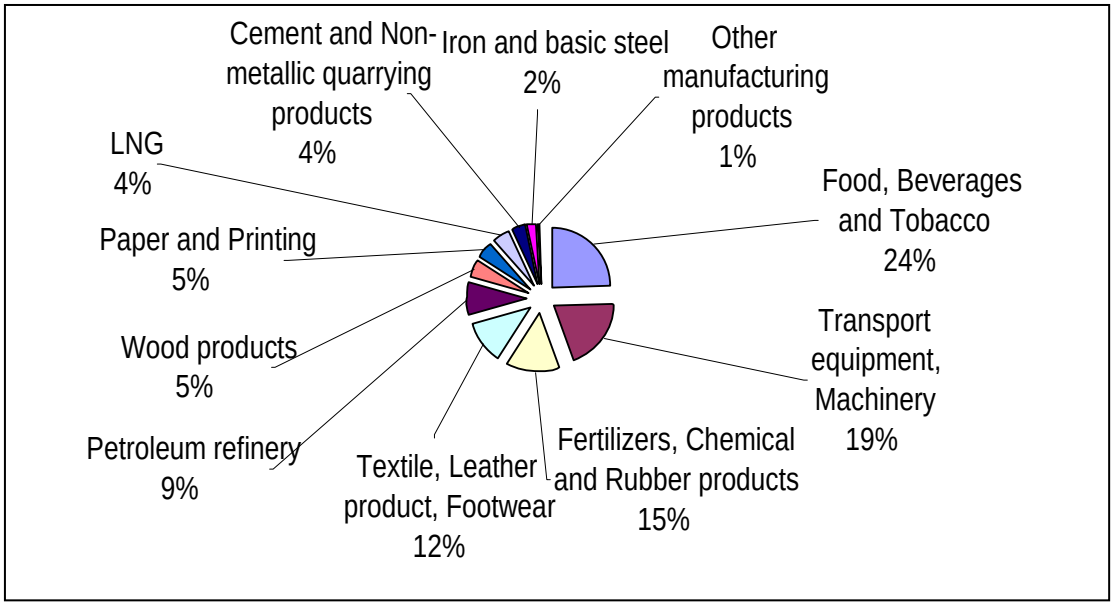
Table 2.2.1-1 GDP of Manufacturing Sub-Sector at Current Market Price

Unit: Rp Million

Manufacturing origin	2001	2002	2003	2004
(1) Petroleum refinery	34,959.3	43,448.5	50,989.5	57,819.0
(2) LNG	28,385.3	26,211.5	27,651.5	29,162.9
A. Oil and Gas manufacturing (1)+(2)	63,344.6	69,660.0	78,641.0	86,981.9
(3) Food, Beverages and Tobacco	129,036.1	145,809.2	153,304.4	158,998.4
(4)Textile, Leather product, Footwear	57,058.8	69,811.3	75,585.7	77,917.6
(5) Wood products	31,380.1	29,575.6	30,831.1	31,382,0
(6) Paper and Printing	19,420.0	23,685.8	26,584.2	29,890.7
(7) Fertilizers, Chemical and Rubber products	70,876.4	73,790.8	84,228.5	95,507.6
(8) Cement and Non-metallic quarrying products	16,780.5	19,010.9	21,565.1	24,049.4
(9) Iron and basic steel	12,159.2	14,046.0	13,265.8	16,266.5
(10) Transport equipment, Machinery	102,062.6	105,015.6	102,172.8	127,194.2
(11) Other manufacturing products	4,201.3	3,341.4	3,872.7	4,541.2
B. Non-oil and Gas manufacturing (3)~(11)	442,975	484,086.6	511,410.3	565,747.6
C. Total of Manufacturing industry	506,319.6	553,746.6	590,051.3	652,729.5

Source: BPS Statistical Year book of Indonesia 2004

Figure 2.2.1-1 shows the GDP distribution by industrial origin. The sub-sector of food products and beverages shows the highest share of GDP. Its GDP was Rp153 trillion (26%) and Rp159 trillion (24%) in 2003 and 2004, respectively.



Source: BPS Statistical Year book of Indonesia 2004

Figure 2.2.1-1 GDP Distribution of Manufacturing Industrial Sub-Sector in 2004.

The manufacturing sector can be divided into four categories: large, medium enterprises and small and cottage industry. In Indonesia this grouping is based on the number of personnel, and other factors such as annual turnovers are not considered.

Table 2.2.1-2 shows the index of large and medium manufacturers. In 2003, the number of large and medium manufacturers was 20,324 with reduction of 822 companies (3.9%) from 2002. However, the number slightly increased in 2004.

In 2003, the value of output by large/medium manufacturers decreased by more than 4.9% to Rp839 trillion. The decrease of production value was more than 4.0% from the value in 2002. The value was Rp775 trillion. The raw materials used by large/medium manufacturers decreased by about 9% in 2003 to Rp 421 trillion.

Table 2.2.1-2 Index of Large and Medium Manufacturers

Item	2001	2002	2003	2004
Number of establishments	21,396	21,146	20,324	20,370
Number of workers engaged	4,382,788	4,364,869	4,273,880	4,339,783
Value added of gross output (billion rupiah)	719,291	882,476	838,804	916,871
Production value of goods (billion rupiah)	665,733	810,895	775,096	845,343
Used energy (billion rupiah)	25,292	37,784	37,963	42,661
Used raw material (billion rupiah)	378,370	467,954	421,668	439,908

Source: BPS Statistical Year book of Indonesia 2004

Energy consumption of large/medium manufacturers in 2003 was Rp 37.9 trillion. It increased by about 0.5% compared to that in 2002. The highest energy consumption was textile sub-sector with more than Rp6.2 trillion.

3) Oil

(1) Development and Production

In 2004, Indonesia produced 1.9% of the total oil production in the world. Other than the biggest Minas oil field whose discovery was in 1944, Indonesia has many big oil fields in Arjuna, Handil, Duri, Ataka, etc. The quantity of oil deposit, which has been confirmed as of 2004, is about 4.7 billion barrel and can be explored for 11.5 years. The property of crude oil, in general, is low in sulfur with high pour point (high contents of wax). The crude oil production in Indonesia is decreasing every year and in 2004 was $1.08 million barrel/day. The trend of decrease of oil production also affects the oil export which is decreasing. The

main export destination countries are Japan, South Korea, China, Australia, Singapore, and the USA. In 2004, 5.2 million barrels of crude oil were exported to Japan, 29.1% of total of exported crude oil.

Table 2.2.1-3 shows the crude oil production in Indonesia. Table2.2.1-4 shows the supply & demand of oil in Indonesia.

Table 2.2.1-3 Crude Oil Production in Indonesia

Unit: thousand Barrel/day

Year	Crude oil	Condensate	Total
1998	1,401.3	155.3	1,556.6
1999	1,315.3	149.1	1,500.3
2000	1,271.7	142.4	1,414.1
2001	1,213.7	130.0	1,344.1
2002	977.8	135.7	1,113.5
2003	1,013.0	133.8	1,146.8
2004	951.1	128.9	1,080.0

Source: Directorate Oil and Gas

Table 2.2.1-4 Supply & Demand of Oil in Indonesia

Unit: thousand barrel

Items	2000	2001	2002	2003	2004
Exported crude oil	195,266	216,474	185,925	166,529	149,042
Exported condensate	28,234	25,138	31,349	31,831	30,324
Total of export	223,500	241,612	217,274	198,360	179,366
Imported crude oil	79,978	112,878	11,271	129,165	148,490
Exported products	67,085	55,118	55,490	63,712	64,501
Imported products	90,026	89,622	106,549	116,228	154,423

Source: Directorate of Oil and Gas

(2) Oil production and domestic consumption of oil products

The consumption of oil products in Indonesia is increasing year by year. Pertamina currently operates nine oil fields. Oil production is insufficient to cover domestic consumption, which demands that crude oil and oil products be imported. The government controlled the price of fuel oil by the system of permission, and the government kept the domestic price low by giving subsidy on fuel oil for a certain period of time. However, based on the agreement between government and IMF, it was necessary for the government to discontinue the subsidy on fuel oil by the year 2003. Therefore, the subsidy on the price of oil was cut incrementally. As a result, the price of fuel oil began to increase.

Table 2.2.1-5 shows the domestic consumption of oil in Indonesia. Table2.2.1-6 shows the capacity for processing crude oil at oil field and annual production

Table 2.2.1-5 Domestic Consumption of Oil in Indonesia

Unit: thousand barrels

Items	2000	2001	2002	2003	2004
Gasoline	12,421.8	13,067.2	13,732.4	14,681.9	14,006.3
Fuel of Jet	748.7	n.a.	552.9	1,932.9	1,433.9
Kerosene	12,455.2	12,280.3	11,678.4	11,753.1	9,894.5
Light oil (transportation)	21,734.7	23,357.0	12,756.7	12,194.8	11,267.4
Light oil (industry)	1,451.2	1,434.3	12,816.6	13,053.1	10,343.3
Heavy oil	6,013.1	6,159.4	6,260.3	6,215.6	3,190.8
Total	54,824.7	56,298.1	57,797.3	59,831.4	50,136.2

Source: Directorate of Oil and Gas

Table2.2.1-6 Capacity for Processing Crude Oil at Oil Field and Annual Production

Oil field	Process capacity (000 B/D)	Annual Production				
		2000 (000BBL)	2001 (000BBL)	2002 (000BBL)	2003 (000BBL)	2004 (000BBL)
P. Brandan	5.0	1,258.4	939.4	980.9	961.6	838.1
Dumai	120.0	45,107.4	47,634.9	43,698.0	47,038.1	46,584.1
S.Paking	50.0	16,850.7	17,580.5	17,935.5	17,140.1	17,730.1
Musi	135.2	44,610.2	42,416.7	44,233.3	41,353.3	39,482.1
Cilacap	348.0	118,233.2	123,575.9	116,085.6	128,286.7	124,155.6
Balikpapan	260.0	99,872.1	96,080.9	95,070.8	89,948.3	97,120.4
Balongan	125.0	43,774.2	43,831.5	44,732.5	41,891.3	45,665.9
Kasim	10.0	2,555.0	2,600.1	2,207.9	3,064.3	31,60.9
Cepu	3.8	905.5	1,008.3	916.0	822.1	822.6
Total	1,024.0	373,166.7	375,668.3	365,860.5	370,506.2	375,560.3

Source: Directorate of Oil and Gas

4) Natural Gas

(1) Quarrying, Development and Production

The quantity of deposit of Natural Gas in Indonesia is estimated to be 170 trillion SCF (equivalent to 291 billion barrel of oil). The confirmed quantity of deposit is around 90 trillion SCF (equivalent to 154 billion barrel of oil). If produced at current levels, production would continue for fifty years. Most gas fields are found in ocean areas: Natuna (33.3%), East Kalimantan (30.2%), South Sumatra (6.4%), Papua (15.1%) and Aceh (6.8%). Big gas/oil reserves are discovered at Papua's Belawan port, which leads to the expectation of the third LNG project in Indonesia (Tanguh LNG project: deposit quantity 18 trillion SCF). Table 2.2.1-7 shows the production of natural gas.

Table 2.2.1-7 Production of Natural Gas

Unit: billion SCF

Year	1997	1998	1999	2000	2001	2002	2003	2004
Production	3,166	2,979	3,068	2,901	2,807	3,042	2,155	3,030

Source: Directorate Oil and Gas

(2) Condition of natural gas utilization

Table 2.2.1-8 shows the use of natural gas. Natural gas was used first in fertilizer production in Palembang in 1964. By the end of 1970, the LNG project started. In 2004, 46% of natural gas was supplied from Arun and Bontang gas fields. Natural gas is now used in power generation, fertilizer manufacturing, as fuel in factories and households, etc. The construction of a gas pipeline from South Sumatra to Central Sumatra was completed in 1999 and plans are in place to extend it from Batam Island to Singapore. In August 2002, the supply of gas from South Natuna to Malaysia started by pipeline. Plans are to construct pipeline from South Sumatra to West Java. The utilization of natural gas is a policy for countermeasures to reduce oil consumption in Indonesia, and promotion and acceleration for use of natural gas are under way.

Table 2.2.1-8 Use of Natural Gas

Unit: Billion SCF

Items	1999	2000	2001	2002	2003
LNG	1,790	1,584	1,490	1,657	1,714
LPG	0.014	0.032	0.013	0.027	0.024
Petrochemical	0.021	0.032	0.029	0.031	0.023
City Gas	0.047	0.069	0.077	0.087	0.096
Industry	0.610	0.627	0.645	0.629	0.594
Total	2,482	2,344	2,254	2,431	2,451

Source: Directorate of Oil and Gas

The LNG production was is 25.2 million tons in 2004. Indonesia is a big exporter of LNG in the world and has the share of 43% (other Asian countries: 43%). The 70% of export are for Japan, South Korea and Taiwan. Table 2.2.1-9 shows the export destination of LNG. Table 2.2.1-10 shows the production of LNG in Indonesia.

Table 2.2.1-9 Export Destination of LNG

Unit: thousand MMBTU

Destination	2000	2001	2002	2003	2004
Japan	933,660	870,978	714,426	923,711	841,969
South Korea	320,766	212,323	200,884	272,268	275,595
Taiwan	145,398	155,484	120,232	192,335	204,852
Total	1,400,024	1,238,785	1,035,543	1,388,314	1,32,415

Source: Directorate of Oil and Gas

Table 2.2.1-10 Production of LNG in Indonesia

Unit: thousand ton

Production area	2000	2001	2002	2003	2004
Arun	6,706.1	2,999.8	6,242.6	6,344.0	5,660.3
Bontang	20,614.9	21,343.9	19,942.2	19,733.3	19,577.5
Total	27,321.0	24,343.7	26,187.7	26,077.4	25,237.8

Source: Directorate of Oil and Gas

5) Iron and steel manufacturing Industry

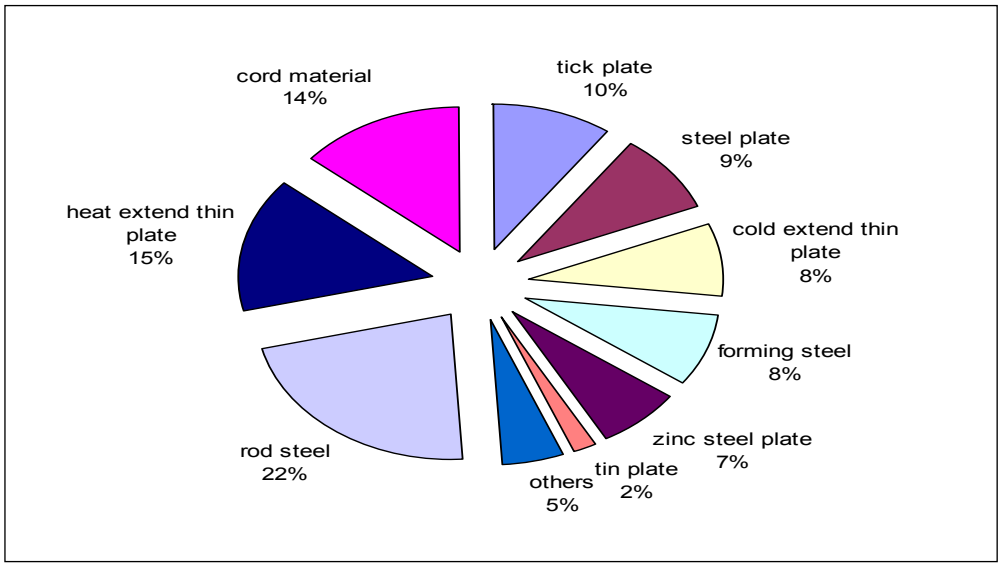
Table 2.2.1-11 shows the production and trade of iron and steel in Indonesia. Figure 2.2.1-3 shows the production of steel products by kind in 2004.

Table 2.2.1-11 Production and Trade of Iron and Steel in Indonesia

Unit: ton

Production	2001	2002	2003	2004
Raw steel material	2,780,607	2,461,856	2,042,233	2,411,658
Heat press steel material	4,075,979	3,798,514	3,718,674	4,237,906
Steel material	4,645,443	4,233,099	4,271,760	4,916,112
Imported steel material	1,752,383	2,005,497	1,917,865	2,648,656
Exported steel material	799,738	944,756	947,909	1,168,707
Consumption of steel material	5,028,624	4,859,255	4,688,255	5,717,855

Source: SEAISI statistics (Association of Steel Southeast Asia)



Source: SEAISI statistics (Association of Steel Southeast Asia)

Figure 2.2.1-2 Production of Steel Products by Kind in 2004

Table 2.2.1-12 shows the condition of process of iron and steel manufacturing in Indonesia.

Table 2.2.1-12 Condition of Operation of Iron & Steel Manufacturing in Indonesia

Kinds of iron and steel process	Production capacity (thousand ton)	Production volume (thousand ton)	Ratio operation (%)
Billet	4,755	1,199	25.0
Slab	2,000	1,213	60.0
Total	6,755	3,412	50.0

Source: SEAISI statistics (Association of Steel Southeast Asia), Gapbesi Capacity Production 2003 (Union of Steel Industry Indonesia)

Krakatau Steel, established in 1971, have capacity of slab: 2 million tons, billet: 600 thousand tons, hot coil: 2 million tons, clod coil: 850 thousand tons, and wire: 580 thousand tons.

There are 16 steel factories other than Krakatau Steel at Java, Sumatra and Sulawesi using electric furnace for steel making from scrap as raw material. Since they depend on imported scrap and high price of power, the operation rate is very low as shown in Table 2.2.1-13.

Table 2.2.1-13 Condition of Steel Making Process in Indonesia

Process extend press	Production capacity (thousand ton)	Production volume (thousand ton)	Ratio operation (%)
Rod steel	3,696	1,068	28.0
Cord material	1,777	680	38.0
Forming steel	1,255	356	28.0
Heat extend press steel plate	2,560	1,529	59.0

Source: SEAISI statistics (Association of Steel Southeast Asia), Gapbesi Capacity Production 2003 (Union of Steel Industry Indonesia)

6) Automotive Industry

The government plans to issue a new automotive regulation in the near future with an aim to cope with the development of automotive industry and trade in the AFTA era. The new regulation may include the changes of the government classification of motor vehicles and taxes on importation of motor vehicles.

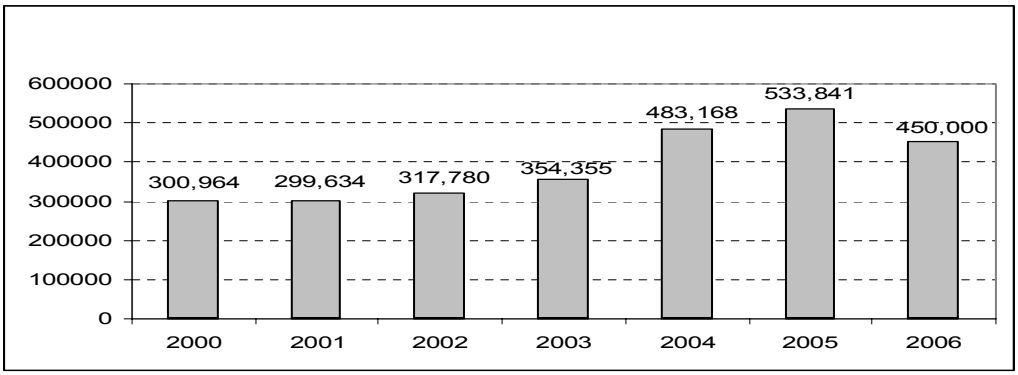
The Indonesian automotive market started to recover in 2000 after a huge setback during the monetary crisis. More than thirty motor vehicle makers, including both locally assembled and imported in Completely Built Up (CBU) units, compete in the automotive market. More than 200 component manufacturers support the industry as evidenced by the total annual capacity of 750,000 automobiles assembled. In 2003, the Indonesian automotive industry recorded total sales of 354,208 vehicles, of which 70% were 8-seater minibuses used as passenger cars.

In 2003, Indonesia's automobile imports stood at US$444 million, representing a 32.5% increase from US$335 million in 2002. In the same period, imports of automotive components also increased from US$830,000,000 to US$851,000,000.

The Indonesian automotive industry, which began to develop in the 1960s, has been mainly an automobile assembling industry. The industry has been dominated by Japanese suppliers and consists of numerous joint ventures and technology transfer arrangements. In addition to Japanese suppliers, General Motors of USA, South Korean Hyundai, French Peugeot, German BMW, and several other European companies also conduct their assembling activities in Indonesia.

After experiencing a significant downturn due to the prolonged monetary crisis, the Indonesian automotive market started to recover in 2000 when automobile sales reached 301,000 units, representing almost 80% of the pre-crisis sales level in 1997. Data from the Association of Indonesian Automotive Industries (GAIKINDO) shows that the automobile sales increased from 58,300 units in 1998 to 93,800 units in 1999 and to 301,000 units in 2000. After a slight decrease to 299,600 units in 2001, the sales increased to 317,800 units and 354,200 units in 2002 and 2003, respectively. Figure 2.2.1-3 shows the development of automobile sales in Indonesia, 2000-2006.

Industry sources predict that the Indonesian automotive market will reach 385,000 units. Two business groups, namely Astra and Indo-Mobil, dominate the Indonesian automotive market by controlling at least fifteen leading automobile makers in Indonesia. Astra represents and assembles six automobile brands, which include Toyota, Daihatsu, Isuzu, Nissan Diesel, BMW, and Peugeot. In 2003, Astra's total sales reached 147,200 vehicles, representing 41.5% of the total automobile market in Indonesia. Toyota has the largest market share by recording 100,900 units, followed by Daihatsu (21,700 units) and Isuzu (19,800 units).



Source: Gaikindo, 2006

Figure 2.2.1-3 Development of automobile sales in Indonesia, 2000-2006

Astra also has a strong component manufacturing division comprised of numerous companies that manufacture various components. These components, which include among others: clutches, brakes, radiators, ignition coils, spark plugs, batteries, cylinder blocks, transmissions, and gaskets, are supplied both to its assembly plants, as genuine parts, and to the replacement market.

Another big group of companies that dominates the Indonesian automotive market is Indo-Mobil. This group represents nine makers of cars, including Suzuki, Nissan, Volvo, Mazda, Sang-Yong, Volkswagen, Renault, Audi, and Hino. In 2003, Indo-Mobil sold 82,800 vehicles, representing 23.3% of the total Indonesian market. Suzuki recorded the highest sales of 70,200 vehicles, followed by Nissan (6,700 units) and Hino (4,400 units).

Like Astra, numerous component-manufacturing companies also support Indo-Mobil's assembling activities by supplying needed components and parts. These component-manufacturing companies are either independent suppliers or solely or jointly owned by Indo-Mobil. In addition, Indo-Mobil also has financing, insurance, and car-rental companies.

Japanese cars have been very popular in the Indonesian market, as they are perceived to be very reliable and worth for the price. Besides that, parts and accessories are easy and inexpensive to obtain, and the resale value of most Japanese cars is relatively high. Furthermore, after-sales services of Japanese cars are perceived to be reliable. Authorized garages are available in almost every corner of major cities in Indonesia.

In the small and medium-sized engine sedan and city-car market, Indonesian tend to purchase Japanese cars for the above-mentioned reasons. The leading brands are Toyota and Suzuki, floowed by Honda and Mitsubishi. In this market, Japanese suppliers compete mostly with Hyundai, KIA, Peugeot, and Chevrolet.

Appendix 2.3.2

MOT Strategic Plan 2004-2009

Appendix 2.3.2 MOT Strategic Plan 2004-2009

1. The Purpose of the Plan

The goal of the commercial development strategy is to improve on-going competitiveness in the global market. In order continuously to improve in this area, it is necessary to fully utilize all of the nation's latent resources, to maximize potential both domestically and overseas.

The essence of improving continuous competitiveness is to mobilize and organize all productive resources for satisfying the supply and demand of the market.

It is necessary to activate the efficient and effective domestic commercial system which enables expansion of the market via the market principle, by utilizing the chance at the same time and harmonizing the supply route of the goods and service.

Based on the above, the goal, which to be achieved, is decided as mentioned below:

1) Promoting abolition of government control, non-bureaucratic principle and transparency; improving the quality of public services, commercial facilities, and equipment to control high-cost economy
2) Expanding the export of non-oil and gas products
3) To guarantee the supply and the strategy to supply basic human needs by improving the efficiency and productivity of commercial fields
4) Realizing healthy business competition, consumer protection, business cooperation between small, medium-scale, and large-scale enterprises
5) Realizing management of price risk and transparent pricing, the choices of cost being offered for the business circles

2. Target Items

The target items in commercial development to be achieved during the period of 2004-2009 are as mentioned below:

(1) Improving the service quality for the business circles by promoting simplification of

procedure, transparency of policy, and upgrading information technology systems, by improving the role of commercial institution and its equipment

(2) Improving the competitiveness in global market continuously, by promoting strategic global cooperation with participation of domestic enterprises, the access to the global market, establishment of trade mark which can be acknowledged in the global market

(3) Improving quality and quantity of export traders, by promoting diversification of exporting non-oil and gas products and export country of destination, with the support of network in the global market, with the domestic industry participation

(4) Improving market intelligence and negotiation ability; improving the quality of service and the number of promotion offices in foreign countries

(5) Expanding the capability of an advance warning system, trade diplomacy and trade protection

(6) Improving the domestic physical distribution system efficiently and effectively, by improving commercial equipment and the construction of the facility

(7) Strengthening the consumer and the domestic products by improving public order and hygiene, safety and environment; with regard to the profit of domestic industry, safety of the domestic market.

(8) Supporting the business circles, by improving the price risk manager activity, diversifying the choices of pricing and cost in the maximum.

The quantitative part of commercial development target from 2005 to 2009 is shown in Table 3.2-1.

Table 3.2-1 Quantitative part of commercial development target from 2005 to 2009

No	Items	Target 2005－2009
1	Ratio of the commercial field in GDP	15%
2	Growth rate of commercial field	7.5-8.9%
3	Growth rate of export	5.7-10.1%
4	Growth rate of non-oil and gas export	5.5-8.7%
5	Growth rate of import	8.6-11.0%
6	Growth rate of non-oil and gas import	8.2-11.9%
7	Inflation rate	7-3%

3. Operational Strategy

3.1 Visions for Development

The visions for development to achieve the target are as follows:

1) Utilize the resources, which exist in the country to the maximum extent
2) Being fair in investment of business role, favorable treatment, business opportunity and in acquiring the business profit
3) Promoting environmental development and ecology movement
4) Being independent in terms of reducing the strategic dependence to external power
5) In order to support the actualization of the economic activity, which aims at the profit of many citizens, cooperation and the originality device from many citizens are preferred.
6) Recognition of the multiplier effect in the domestic latent characteristic aspect related Global competition.
7) The nation's profit and convenience precedes that of a circles or local area.
8) Global economic cooperation without sacrificing the nation's profit and dignity
9) In order to achieve the maximum effect from the development, get ideas of performance, productivity and saving natural resources.
10) The idea of professionalism and competition
11) The idea of norm of development, mental attitude, and renewal of management system

3.2 Policy for Development

The short-term strategy is listed below:

1) Controlling high-cost economy
   Simplification/reduction of the document procedure in commercial field and improvement of transparency makes simplifying business process. In order more easily and quickly, at the same time to be able to acquire at appropriate price, everything of permission of the commercial field, which includes local regulations shall be listed and evaluated all together.
2) Improving efficiency of logistic system
   The flow of goods and services shall be made smoothly by improving the efficiency of the logistics system.

3) Improving the competitiveness of the export commodity
4) Supporting the development of a preferential field
   The development of a preferential field of agriculture, forestry, mining and manufacturing industry, etc., shall be supported.

3.3 Policy in Operational Strategy

Policy in operational strategy is as follows:

1) The bureaucratic principle in business management and permission acquisition process shall be removed by enacting clear stipulation, idea of transparency, and maintenance of the service of good governance. This policy would be realized with the program of non-bureaucratic principle and control of abolition in the simplification of import and export procedures.
2) The clear stipulation shall be enacting to improve the efficiency of cost and time on office work procedures. The program of improvement for information network regarding import and export shall be executed by this policy.
3) Improving the abilities of government agencies and all other public agencies
   The programs to achieve the target are as follows:
   (a) Improvement of transparency and good governance in public service
   (b) Improvement of human resources development and reliability and supervision of government policy
   (c) Improvement of management ability in commercial research and study
4) Strengthening competitiveness in the global market
   The programs to achieve the target are as follows:
   (a) Development of Indonesian export products, which have competitiveness in the global market
   (b) Strengthening the function of exporting agency, equipment and audit
   (c) Development and introduction of import and export equipment
   (d) Enactment of the trade policy, which supports business in wholesome competition
   (e) Correspondence between foreign commercial policy with central and regional government
   (f) Development of commercial information system
   (g) Enlarging human resources, technology, and equipment and material capacity

(h) Improvement in quality of service for export traders via support at company level

5) Maintain and improve the access and permeation to the traditional market and the non-traditional market
   (a) Improving Indonesian roles in trade cooperation with WTO, ASEAN and APEC, FTA/EPA, and with other trade partners across economic boundaries
   (b) Promoting research and study regarding the trade business environment for development of exports
   (c) Promoting research and study regarding trade
   (d) Disseminating agreements based on international conferences, like WTO, ACEAN, APEC, ASEM, etc.
   (e) Promoting research and study regarding world trade cooperation
6) Improvement of ability of the trading company agency in foreign countries, quality of service, and establishment of agency in new trading partner's area
   (a) Improvement of access and permeation to thee market
   (b) strengthening of government staff in commercial affairs, including the supply of trainees
7) Improvement of the world trade diplomatic policy for advanced nations and developing countries

   This policy is executed, via the program for supervision and appraisal for making agreements between many countries, inside the limits, and between two countries.
8) Strengthening the world trade protection agency (Safeguard and antidumping) and the price adjustment system
   (a) Being assured of the convenience of the trade dispute solution, like dumping, subsidy, safeguard, including defense and technical support
   (b) Strengthening the effect of adjustment to various trade disputes between countries.
9) Developing the information network regarding products and the market in order to assure enlargement of the competitive market by both area and district, to support commerce in border areas and remote areas, to improve regional logistic systems, and to maintain equipment in districts.
10) Conforming central government policy with regional government, simplifying permission procedures, eliminating obstruction to the flow of logistics and services, and developing commercial service activities
11) Strengthening the consumer protective system, the legal metrology system, the wholesome competition system, and the other commercial systems

(a) Improving capability of consumer protective system

(b) Improving information service and the defense activity for consumer protective policy especially in the medical and food fields, in order to raise the consumer consciousness on the importance of standards in commodities and services

(c) Promoting the use of domestic products

(d) Enlarging the effects of the commercial information network in the center and district

(e) Promoting introduction of stipulations regarding business competitive policy

(f) Strengthening supervision in the commercial field for business, systems, and mergers

(g) Promoting the adjustment between supermarket and small-scale enterprises (Supplier) with the business cooperative method

(h) Strengthening the small and medium-sized business through staff development, market access, and business cooperation.

(i) Developing competitive business predominance: Promotion of research and study regarding the commercial business environment in consumer protection and commercial supervision

12) Strengthening the supervision system of goods and services by improving the effects of consumer protection and appraisal disciplined execution

(1) Strengthening execution of the monitoring system for goods in regard to circulation of safety and health, public order, environment (K31), and services, which tend toward swindling

(2) To maintain the national laws and stipulations of import and export, business discipline, supervision in the circulation of goods and services in the market, consumer protect condition

(3) Promoting the technical instruction and dissemination of metrological standard, management of verification office, supervision of length, weight, volume, pre-packaged goods, their measuring instilments

(4) Strengthening the system of legal metrology in Indonesia

(5) Enacting qualification standards of service professionalism in commercial field

(6) Improvement of audit policy execution regarding the quality of imports required when applying Indonesian domestic standards

13) Strengthening the agency in the forward operation market and developing the choices of money sources

Appendix 3.1.1

Detail of Industrial Analysis for Ten Provinces

Appendix 3.1.1 Detail of Industrial Analysis for Ten Provinces

1. North Sulawesi Province and Manado City

1) North Sulawesi Province

- North Sulawesi Province is called a "province of coconut leaves in trembling" and is famous worldwide for diving. North Sulawesi Province, which faces the Philippines and other pacific countries, serves as Indonesia's gate to the Pacific has potential to be a center for economic growth.
- North Sulawesi Province has potential in tourism (Bunaken Sea Park) as well as in agro industry/fishery. In order to support the development, North Sulawesi Province improves supporting infrastructures. Located 47 km from Manado City, Bitung Port is a natural base for fishery, export and import. Manado's Samratulangi Airport is an international entryway for tourists from northern countries.
- The population of North Sulawesi Province is 2.2 million people. The population density is 141 persons/km^2. There are nine districts/cities, including Minahasa, Bolaan Mongondow, Sangihe talaud, Bitung and Manado.
- Gross Regional Domestic Product (GRDP) in 2004 amounted to Rp12,169 billion (US$1,323 million) (2000 constant price) and Rp15,690 billion (US$1,705 million) (current price).
- Main industry in North Sulawesi is: (1) agriculture (coconut, cacao, clove, nutmeg, vanilla, coffee, corn, etc.), (2) tourism, (3) mining (gold), and (4) fishery.
- Enterprises in North Sulawesi Province are SMEs: 98% (48 thousand enterprises including retailer). Large businesses process coconuts (CCO, bio fuel, feed), process canned fish (tuna, mackerel, and sardine), and dock fishing boats.
- Agriculture and its processing products are mostly for export. The export value was as much as US$328,000,000 in 2000. The products exported included palm oil, palm fuel, palm feed which claim 65%, followed by marine products at 30%. Imported goods are mainly products to support industrial activity.
- The mining products found in this provinces are kaolin, as well as raw materials such as cement, iron sand, ochre, obsidian, and sulfur. All of these are presumed available in large deposits.
- The total road network in 2001 in North Sulawesi reached to 142 thousand km.
- North Sulawesi Province has an international airport and three domestic airports.
- North Sulawesi Province has three seaports. The Bitung Port is the largest with a 1,426

meter.

- The district-owned tap water supply companies have maximum capacity of 2,100 liter/second with production of 1,670 liter/second.
- The power generating capacity was 176 thousand kW in 2001 with a generation of 134.7 million kWh.

2) Manado City

- Manado City, with population of 417 thousand people, is the center of governmental services, industry and economy in North Sulawesi.
- The tourism industry is one of Manado City's top features. It's known for its many diving spots and an influx of nearly 4 million tourists each year. Hotels and shopping malls line the beaches, and further construction is in progress. Manado has four shopping malls, twelve supermarkets, and four traditional markets.
- With periodic air flights to destinations such as Taiwan, Singapore, and the Philippines, Manado's banner reads "To be a gate of tourism and trading in east Indonesia." Manado has been promoting the development of infrastructures as follows:

(1) Improvement of Manado airport

(2) Expansion of container berth of Bitung Port and improvement of access road to Manado.

(3) Electricity is insufficient. The expansion of geothermal power station is under investigation from 20 MW to 50 MW.

A. Outlook of North Sulawesi Province and Capital City of Manado

1) Land area and Population (Table 1-1)

Table 1-1 Land Area and Population

Item	**North Sulawesi**	**Manado**
Land area (km^2)	13,930	158
Population	2,154,254	416,771

2) Main industry in the Province (Table 1-2)

Table 1-2 Main Industry in North Sulawesi Province

Name of Industry	Items of product/ treatment
Processing industry	Oil, liquid natural gas
Agricultural industry	Food, farming, stockbreeding, foresting, fishery

3) Main manufacturers/enterprises in the City (Table 1-3)

Table 1-3 Main Manufacturers/Enterprises in Manado

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Trijujur bersama	Coconuts powder	Private
PT. PLN	Electric	State
PT. Multi food	Noodle, biscuit	Private

4) Export (Table 1-4)

Table 1-4 Export of North Sulawesi Province

Export product	Value (US$)-2004	Main country of destination
CPO, palm oil an its products, Fish (tuna, bonito, devil fish), coconuts and is products, seaweed, corn, vanilla, copra,	546,157,658 (kg)	USA, Singapore, Taiwan, etc.
Total value of export	346,970,841	

5) Import (Table 1-5)

Table 1-5 Import of North Sulawesi Province

Import product	Value(US$)-2004	Main country of origin
Supporting material, consumer goods, raw material, etc.	52,257,253	Uni-Europe, USA, China, Japan
Total value of import	52,257,253	

6) Gross Regional Domestic Product by Industrial Origin at Current Price (Table 1-6)

Table 1-6 GRDP of North Sulawesi by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture	2,794,251.84	2,744,233.95	3,018,915.69
2. Mining and Quarrying	1,310,816.56	1,393,623.36	1,617,767.66
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing	1,122,061.86	1,325,427.06	1,466,542.92
4-a Electricity supply	73,460.94	83,288.90	88,099.22
4-b City Gas			
4-c Water supply	23,144.11	27,627.94	27,188,18
5. Construction	1,828,599.41	2,211,189.45	2,370,900.41
6-a Wholesale and Retail Trade	1.462,835.43	1,640,483.58	1,932,895.50
6-b Hotel	124,896.89	152,050.76	171,965.09
6-c Restraints	164,759.13	193,397.25	227,228.58
7-a Transportation	1,278,770.34	1,350,690.33	1,462,898.00

7-b Communication	120,285.73	144,890.61	177,828.00
8. Financial, Ownership and Business Services	386,106.62	430,597.27	464,742
9. Services	2,118,371.80	2,286,854,27	2,663,217.00
GRDP at current price	12,808,360.65	13,984,354.73	15,690,191
GRDP Growth rate at constant 2000	7.17%	10.27%	15,18%

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 1-7)

Table 1-7 Number of Verification Office in the Province

Classification	Number of office	Main role
Province-owned	1	Management of laboratory and standards, monitoring to UTTP and packaged goods, re/verification of UTTP
KABUPATEN-owned	-	
Total	1	

2) Development plan of legal metrology.

(1) Current situation:

- Limited human resources as well as facility and infrastructure
- Insufficient budget for operation
- Less awareness of people about the importance of re/verification of UTTP

(2) Development/enforcement plan:

- Enhancing the capacity of existing staffs
- Procurement of building, facility and equipment, and necessity of utility facility
- Proposing sufficient budget to the government
- Increasing metrological guidance and socialization activity directly and indirectly through mass media and increasing the frequency of monitoring UTTP and pre-packaged goods

3) Needs of legal metrology.

- Kinds of users/manufacturers related to legal metrology which would increase are: stores, taxi companies, filling stations, transportation companies, and all users and manufacturers using measurement equipments.

4) Investment plan for legal metrology

- No reply.

5) Problems

(1) Lack budget for recruitment human resources, and for training at MTC

(2) Lack operational budget for metrological activities

(3) Laboratories are in poor condition.

(4) No equipment: water meter, moisture meter, mass comparator and TUM, electronic balance class II

(5) Room and building office are old and not in good condition (building constructed in 1944).

(6) Lacking support equipment, such as computers, fax machines, air conditioners and cars

(7) No renewal of mass and volume standards since decentralization. Only half of thermometers are in precise condition.

2. South Sulawesi Province and Makassar City

1) South Sulawesi Province

- South Sulawesi Province is known as a gate to eastern Indonesia and positioned in a cross section of western and eastern parts of Indonesia. In later 17 century, the VOC from Dutch placed home base at Makassar, and make it the center of trade and commerce. Since then it has been the center for development of agriculture, forestry, livestock, plantation, mining and fishery, especially in eastern part. .
- The population of South Sulawesi Province is 7.4 million people. The population density is 66 persons/km^2. There are 23 districts/cities, e.g. North luwu, Pare-pare, Makassar and others.
- Two years ago West Sulawesi Province is separated from South Sulawesi. But all budgets are still burdened by South Sulawesi Province until 2007.
- The economic growth rate of the province is 5.9 %, and the GRDP for current price amounts to Rp. 40,094 billion (US$4.36 billion) in 2003. The contribution sectors to GRDP are agriculture/forestry/fishery (49%), followed by manufacturing, trade and service.
- There are many food processing companies, but no metrology instrument manufacturer. For agriculture, the main product is rice, followed by cacao and coffee. The cacao is exported to US and European countries.
- Fishery Industry: The fish cultivation industry is in good development. Black tiger is cultivated for export and milkfish is cultivated for domestic consumption. The area of cultivation (around 450 thousand hectare) in South Sulawesi Province is widest in Indonesia. Since the marine products including fish and prawn/shrimp are one of the important export products for this province, they concentrate on the development in this

sector.

- For mining industry, the INCO Company from Canada has been excavating nickel mat since 1975 and mainly exported to Japan. Land utilization is: 900 thousand hectare for agriculture, 300 thousand hectare for cacao and 450 thousand hectare for shrimp cultivation. Other mine resources are clay and marble.
- The export value of South Sulawesi was US$801 million in 2000 and US$744 million in 2001, while import values in 2000 and 2001 were US$206 million and US$152 million, respectively.
- The South Sulawesi is the biggest food-crop producer (national rice producer) among east Indonesian regions, and other commodities are corn, sweet potato, cassava, and peanuts. In 2001, rice production was 3.6 million ton that was harvested from 814.6 thousand ha of rice field. The plantation products are sugarcane, palm oil, sago, nata de coco and hybrid coconut. The total area covers 307.4 thousand ha. The forestry products consist of timber and non-timber (such as rattan and resin). In 2001 the total forest production in term of timber was 72,100 cubic meter.
- The types of mining and digging materials are, among others, river sand with as much as 12.7 thousand tons and sandstone with as much as 4.3 million tons. Other mine resources are clay, nickel, and marble.
- The roads consist of 1,670 km state road, 1,885 km provincial road, 19,613 km municipal road and 1,765 km administrative road.
- The province has six airports, with the classification of one international airport and five pioneer airports. The International Hasanuddin Airport at Maros has 2,500 m long and 45 m wide landing area, accepting landing of wide-body airplanes. The incoming passengers during 2002 recorded 419 thousand people, while the outgoing was 489 thousand people.
- The South Sulawesi has 9 seaports. The largest port is Soekarno-Hatta seaport that is located in Makassar that can accept ships of 200,000 DWT.
- In 2002, the total power generation capacity was 588 thousand kW. Electricity is produced by the Hydro Power Generation (PLTA), Diesel Power Generation (PLTD), Gas Power Electric Generation (PLTG) and Steam Power Generation (PLTU). From the installed capacity, the connected power reached 1.1 million KVA.
- All the municipals and cities have their own tap water supply facility with 2,491 litter/s installed production capacity. The biggest capacity is in Makassar with 1,240 litter/second, while the smallest capacity is in Selayar regency with 10 litter/second.

2) Makassar City

- The population of Makassar city is 1.16 million people. Makassar has a role as the center of service, investment, exchange within South Sulawesi province. It is also the center of sea route, and flight route of cargo and passengers for coming and outgoing at east Indonesia area. Makassar city is maintained and supported by international port, ferry port and international airport, industrial park, hotels, shopping malls, etc. There are industrial park outskirt of the town, 15 traditional markets, three shopping malls (trade centers) and two supermarkets.
- Makassar Industrial Park (usually called KIMA, PT.Kawasan Industri Makassar), is located on the way to Hasanuddin port, 15 km from the harbor area and urban district. The area is 325 ha, where are around 150 factories and warehouses; however its occupancy rate is still low. The type of business of the companies are not only manufacturers for feed processing, coca processing, ice making, tank storage production (FRP), etc. but also many warehouses for stockyard of automotive spare parts (Honda), etc.
- Since the park is located near the sea and river, the groundwater level is high and the drainage is bad. In operation in the park, it is necessary to take some countermeasures (e.g., raise level of the site area, set-up gutter).
- The International Sukarno-Hatta port has two berth: Sukarno Cranes (length: 1,360 m, depth of water: 15 m) and Hatta Berth (length: 850 m, dept of water: 15 m); both could accept big ships of 100 thousand-ton classes. Sukarno Berth is mainly used for passenger ships, and Hatta berth, mainly for container ships. In port, there is a wide and big space for storage of containers and container trucks which run frequently in and out of the port.

A. Outlook of Sulawesi Selatan (South Sulawesi) Province and Capital city of Makassar

1) Land area and Population (Table 2-1)

Table 2-1 Land Area and Population of South Sulawesi Province and Makassar

Items	South Sulawesi Province	Makassar city
Land area (km^2)	46,116	(No reply)
Population	7,470,000	(No reply)

2) Main industry in the Province (Table 2-2)

Table 2-2 Main Industry in South Sulawesi Province

Name of Industry	Items of product/ treatment	Sales amount/year
Agro business industry	Rice, cacao, shrimps, seaweed, etc	(No reply)
Mining Industry (Inco)	Nickel	

3) Main manufacturers/enterprises in the city (Table 2-3)

Table 2-3 Main Manufacturers/Enterprises in Makassar

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Kimia	Rice, cacao, shrimp, seaweed etc	(No reply)

4) Export (Table 2.4)

Table 2-4 Export of South Sulawesi Province

Export items of product/ article	Value (US$)-2001	Main country of destination
Cacao, shrimps, seaweed, palm oil, nickel		USA, Europe, China, Japan, Korea, Malaysia etc
Total value of export	744.1 million	

5) Import: US$151.9 million in 2001.

6) GRDP at current price (Table 2-5)

Table 2-5 GRDP of South Sulawesi Province at Current Price

Unit: million Rupiah

Industrial origin	2000	2001	2003
GRDP at current price*	32,102,390	36,550,293	40,094,870
GRDP Growth rate at constant 2000*	3.74%	3.83%	4.85%

*Source: Statistik Indonesia 2004

7) Development plan of provincial economy and industry (Table 2-6)

Table 2-6 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan
2005	Makassar economic development movement (Gerbang emas) including Sulawesi island, Maluku and Papua

B. Government Policy for Legal Metrology

1) Number of verification office in the province (Table 2-7)

Table 2-7 Number of Verification Office in the Province

Classification	Number of office	Main role
Province-owned	1	Re/verification, monitoring, guidance
KABUPATEN-owned	-	
Total	1	

2) Development plan of legal metrology.
   - Current situation: Laboratory and standard equipment are not in competitive condition.
   - Development/enforcement plan: adding standard equipment, laboratory construction and HRD

3) Needs of legal metrology.
   - Kind of users/manufacturers related to legal metrology which would increase are: stores, taxi companies, filling stations, transportation companies, and manufacturers.
   - Reasons: It will become more important along with population growth and new district establishment (kabupaten and kota).

4) Investment plan for legal metrology (Table 2-8)

Table 2-8 Investment Plan for Legal Metrology

Name of project	Budget	Description
Legal metrology development	Aid from Foreign donor	Laboratory construction, standard equipment addition, and human resources capacity building

5) Problems
   - The operational budget is very little resulting in difficulty in keeping metrological service in suitable situation.

3. Bali Province and Denpasar City

1) Bali Province
   - Bali is a small island with limited natural resources but has various superior cultures. Bali province is the main tourism destination in Indonesia because it has unique culture, exotic natural view and lifestyle which are arranged by tradition, architecture, art and spirit. Tourists from overseas in 2000 reached to the largest number of 1.4 million people giving big income for the area. But, the number of tourists decreased drastically in 2002 and 2005 because of terrorist blasting incidences. It caused an increase of unemployment (layoff) in Bali Province, and the provincial government took countermeasures: (1)

reinforcement of security, (2) promoting activity (3) invitation to seminar/workshop, etc. with cooperation of central government.

- Bali Province has been developed by enhancement of competitiveness of priority sectors in global market. The export of various commodities from Bali in 2002 became US$460 million, showing increase of 20% compared with US$384 million in 2001.
- The land area is 5,633 km^2. The administratively the province is divided into nine districts/cities: Buleleng, Jembrana, Tabanan, Badung, Regency of Gianyar, Regency of Klungkung, Regency of Bangli, Regency of Karang Asem and City of Denpasar.
- In 2002, the total population reached 3.1 million people (90%: agriculture), consisting of 50 % male and 50% female. Population growth in 2002 was 1.38% yearly.
- GDRP (2004) in Province of Bali amount to Rp 28,986 billion (US$3.15 billion). The highest contribution is the sector of trade, hotel and restaurant (30.5%), followed by the agricultural sector (19.1%) and the service sector (14.9%). Income per capita in Province of Bali in 2002 amounted to Rp. 2.5 million (US$272).
- There is no big enterprise. SME companies are around 70 thousand, including handicraft factories. Some SMEs process fish cans and mineral water for drinking.
- The main export products are cocoa, coffee, vanilla, etc. to Asia Pacific areas, including Taiwan, Europe, Middle East, and the USA. Total export value in 2002 amounted to US$172.0 million. The highest are products of textile/garment and handicraft. Meanwhile the total import value amounted to US$24.7 million with commodities like raw material, consumption material and stock.
- The land area of food crops in 2002 amounted to 2404 thousand ha, consisting of 34 thousand ha for corn, 10.6 thousand ha for sweet potato, 13.6 thousand ha for nuts, 7.5 thousand ha for soybeans, and 148 thousand ha for paddy. Area for fruit cultivation is 245.6 thousand ha with main commodity productions in 2002, which were 36,000 tons of manggoes, 30.3 thousand tons of rambutan, 45.3 thousand tons of oranges, 124.2 thousand tons of bananas, and 32.6 thousand tons of Zalaccas.

  The area of food crop plantations reached 161.6 thousand ha with main production of coffee, clove, cacao, cashew nuts, and coconut. Sea fish production in 2002 amounted to 193.5 thousand tons, while freshwater fish equaled only 2.7 thousand tons. Livestock include cows, buffalo, horses, goats, deer and pigs.
- The total road length in Bali Province is 6.64 thousand km, consisting of 406 km of state road, 847 km of provincial road and 5.39 thousand km of regency road.
- There is one international airport at Ngurah Rai, Denpasar. The international cargo

terminal is 2,680 m^2 with a handling capacity of 116 thousand tons yearly, and the domestic one is 3,658 m^2 with the capacity of 32 thousand tons yearly. There are four main seaports, including Benoa seaport for export/import, tourism and fishery. Celukan Bawang Port is functioned as main port for raw material and wood.

- The power plant capacity is 964 thousand kVA, coming from PLTD (78.7 thousand kW) and PLTG (270.5 thousand kW). In 2002, the power sold amounted to 1.65 billion kWh. Potable water available in all regencies/cities is 4,771 litter/second.

2) Denpasar City

- Main industries in Denpasar are agriculture and handiwork industry of SMEs and tourism industry.
- The population of Denpasar is 446 thousand people with a population density of 3,449 people/km^2. Visitors to Bali in 2002 were 2,545 Indonesians per day on average and 3,945 foreigners. The number of Indonesians from Bali was 2,653 people per day on average and number of foreigners were 4,111 people per day.
- There are twelve trade centers, shopping malls, and 9 traditional markets in both Denpasar and surrounding districts/cities. .

A. Outlook of Bali Province and Capital City of Denpasar

1) Land area and population (Table 3-1)

Table 3-1 Land Area and Population of Bali and Denpasar

Items	Bali Province	Denpasar city
Land area (Km^2)	5632.86	129.98
Population	3,179,918	

2) Main industry in the Province (Table 3-2)

Table 3-2 Main Industry in Bali Province

Name of Industry	Items of product/ treatment	Sales amount/year US$
Small industry	Handworks	42,968,300 (March 2006)
Products of Industry	TPT	45,547,884.47 (March 2006)
Product of agriculture	tuna, shark fin, seaweed	

3) Main manufacturers/enterprises in the City: No reply.

4) Export (Table 3-3)

Table 3-3 Export of Bali Province

Export product	Value (US$)-2002	Main country of destination
Cocoa, coffee, vanilla	171.6 million	USA, Europe, Japan etc
Others	288.9 million	
Total value of export	460.5 million	

5) Import (Table 3-4)

Table 3-4 Import of Bali Province

Import product	Value(US$)-2004	Main country of origin
Consumer goods	51.4 million	Japan, China
Others	1.5 million	
Total value of import	52.9 million	

6) GRDP by industrial origin at current price (Table 3-5)

Table 3-5 GRDP of Bali Province by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture		5,666,835.82	6,011,426.77
2. Mining and Quarrying		176,904.87	196,471.79
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing		2,384,636.14	2,610,131.31
4-a Electricity supply		323,143.09	419,112.49
4-b City Gas			
4-c Water supply		87,870.35	103,440.98
5. Construction		1,051,150.30	1,132,719.56
6-a Wholesale and Retail Trade		2,824,587.03	3,227,655.60
6-b Hotel		2,536.820.11	2,833,374.38
6-c Restraints		2,077,938.29	2,391,914.77
7-a Transportation		2,444,006.16	2,732,565.26
7-b Communication		486,511.62	542,887.99
8. Financial, Ownership and Business Services		1,725,224.42	1,969,622.09
9. Services		4,382,313.94	4,815,272.68
GRDP at current price	22,062,905	26,167,941.94	28,986,207.99
GRDP Growth rate at constant 1993	3.15%	3.65%	

7) Development plan of provincial economy and industry (Table 3-6)

Table 3-6 Development Plan of Bali Provincial Economy and Industry

Starting Year	Outline of development plan
2003-2008	Realization Bali province in welfare based on “trihita karana”

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 3-7)

Table 3-7 Number of Verification Office in Bali Province

Classification	Number of office	Main role
Province-owned	1	Implementing Legal Metrology Law No.2/1981
KABUPATEN-owned	-	
Private firm	-	
Total	1	

2) Development plan of legal metrology.

- Current situation: Insufficient in equipment and facilities.
- Development/enforcement plan: Step by step completing equipments and facilities, completing laboratorial equipment and installation for inspection, and increasing quantity and quality of human resources.

3) Needs of legal metrology.

- Kinds of users/manufacturers related to the legal metrology which would increase are stores, taxi companies, filling stations, and transportation companies.
- Reasons: At Bali province there is no big industries.

4) Investment plan for legal metrology (Table 3-8)

Table 3-8 Investment Plan for Legal Metrology

Name of project	Budget	Description
Purchasing laboratorial equipment	Regional budget (APBD) 2006	Metrological development plan I
Renovation of testing equipment for tank truck, taxi, water installation	Regional budget (APBD) 2007	Metrological development plan II

5) Problems

PPNS (government employee investigation staff) as lead of metrology activity cannot do job optimally because dualism in authority: 1. as guard of law, 2. as guard of regional government regulation.

4. Riau Province and Pekanbaru City

1) Riau Province

- Riau province is advantageous in location because it is located along the busy international shipping line between the Indian and Pacific Oceans and is near Malaysia,

Thailand, and Singapore.

- Main industries are mining, agriculture, farm forestry, manufacturing and trading. Recently many incorporated estates have developed large scale plantations, like palm oil and rubber.
- Main big companies in Riau have business in palm oil, and pulp and paper. There are 180 factories for processing CPO and edible oil (1.5 million ha) and two factories for pula paper (indragiri, alpipi). SMEs are engaged in food processing (50%), metal processing (20%), hand work, etc. Main industrial products are: coconuts and its processing goods (673 thousand ha) at Indragiri, Bengkalis, Belalawan districts, woods (4.8 million ha), rubber and its processing goods (565 thousand ha) in 80 processing factories.
- A number of private companies utilize the extensive available land by developing forests of industrial planting. The government has encouraged the development of these forests as a source of raw materials for the wood industries. Riau with Sijori, Singapore, Johor, Malaysia as the triangle of cooperation in economic development will accelerate regional development.
- Population is 3.75 million people (2005) and most dense populated area is Pekanbaru with 628 thousand people
- The province is divided into 11 districts/cities, e.g. Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Pelalawan, Siak, Kampar, Rokan Hulu, Bengkalis, Rokan Hilir.
- GRDP of Riau Province is Rp. 114.2 trillion (US$12.4 billion) (2004) including oil, and Rp. 64.5 trillion (US$7.0 billion) excluding oil. The mining sector shares the largest (53.9%), followed by manufacturing sector (15.9%) and agriculture (9.8%).
- Export and import of oil/gas was US$5.4 million and US$245.5 million in 2004/2005, respectively.
- In 2005 crude oil was produced at 181 million barrels. Other potential minerals are bauxite and granite. Their production was 1.15 million tons and 434 thousand tons, respectively. The coal deposits in Kampar are 73 million tons and in Indragiri Hulu is 52.5 millions tons. Other minerals are limestone, quartz sand, kaolin and radioactive.
- Riau Province has two airports: one international/domestic airport and one commercial airport. Riau Province also has many sea ports. Sea transportation is important for access to Riau's many islands.
- In 2000, Riau Diesel Powered Electric Generation (PLTD) produced 1,017 million kWh with 402 generator units. Water capacity is 2,442 liters/second, and clean water production was 57.4 million m^3 as distributed to 93.8 thousand consumers.

- Riau province has some infrastructure development: toll road development connecting Pekanbaru and Dumai (155 km), railway development connecting Muaro-Lubukjambi-Pekanbaru-Rumbai-Dumai, Rumbai-Perawang (1,345 km), extension of Dumai and Kuala Enok Seaports, Tanjung Buton development, building of Ro-Ro facility of Dumai Seaport.
- Riau Province plans to construct some industrial parks: Pekanbaru Teyan under construction, Ruman beachside industrial for oil processing, etc. Kuala industrial park for coconuts processing, etc., and Buton industrial park for electronic goods Malaysia companies.

2) Pekanbaru City

- The population in Pekanbaru City is 585 thousand people (2000) with wide area of 63.2 thousand ha. Pekanbaru is the center of government and trading in Riau Province and with many facility of university and education institution.
- There is a center for job training (with object for high school and medium school graduates, new employment, for training of metal processing (welding, machinating, casting), woods products (chair, furniture, carving), food processing (fruits, biscuit), embroider products, repairing spare parts for motor, etc. with 150 person staff, annually 250 people trained, by free of tuition fee).
- There is one department store in Pekanbaru and many traditional markets in some districts.

A. Outlook of Riau Province and Capital City of Pekanbaru

1) Land area and population (Table 4-1)

Table 4-1 Land area and Population of Riau Province and Pekanbaru

Items	Riau Province	Pekanbaru city
Land area (km^2)	56,813	6.3226
Population	3,755,480	

2) Main industry in the Province

Table 4-2 Main Industry in Riau Province

Name of Industry	Items of product/ treatment
Oil	181,302.85 barrel
Pulp / paper industry	2940765 ton
Palm oil industry	3327419 ton

3) Main manufacturers/enterprises in the City (Table 4-3)

Table 4-3 shows Main Manufacturers/Enterprises in Pekanbaru

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Indah Kiat Pulp and Paper	Pulp	Private
PT. Chevron Pacific Indonesia	Oil	Private

4) Export (Table 4-4)

Table 4-4 Export of Riau Province

Export product	Value (US$)-2004	Main country of destination
Agriculture, mining etc	4,693 million	Various countries

5) Import (Table 4-5)

Table 4-5 Import of Riau Province

Import product	Value(US$)-2004	Main country of origin
various		Various countries
Total value of import	235.8 million	

6) GRDP by industrial origin at current price (Table 4-6)

Table 4-6 GRDP of Riau Province by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture		19,431,336	23,656,421
2. Mining and Quarrying		37,885,095	47,475,704
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing			
4-a Electricity supply			
4-b City Gas		235,834	264,683
4-c Water supply			
5. Construction		2,648,837	3,092,972
6-a Wholesale and Retail Trade			
6-b Hotel		5,782,993	7,403,066
6-c Restraints			
7-a Transportation			
7-b Communication		1,913,878	2,296,934
8. Financial, Ownership and Business Services		1,364,962	1,982,730
9. Services		3,518,367	4,223,020
GRDP at current price	67,664,109	91,452,618.84	114,188,642.76
GRDP Growth rate at constant 1993	4.40%	4.70%	

7) Development plan of provincial economy and industry: No reply

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 4-7)

Table 4-7 Number of Verification Office in Riau Province

Classification	Number of office	Main role
Province-owned	1	Metrological duty
KABUPATEN-owned	-	
Total	1	

2) Development plan of legal metrology.

- Current situation: metrological activity possible
- Development/enforcement plan: Management of legal metrology and calibration laboratory which accredited by KAN.

3) Needs of legal metrology.

- Kinds of users/manufacturers related to legal metrology which would increase are stores, taxi companies, filling stations, and transportation companies.
- Reasons: increasing/development of economy.

4) Investment plan for legal metrology (Table 4-8)

Table 4-8 Investment Plan for Legal Metrology

Name of project	Budget	Description
Mass laboratory	Rp. 1,850,000,000	The plan has been proposed to government many times but could not realize yet
Equipment and facilities of mass laboratory	Rp. 1,650,000,000	The plan has been proposed to government many times but could not realize yet

5) Problems

- Pending law process to illegal action in legal metrology because PPNS metrology at RVO is regional government staff that only has duty based on regional regulation.
- No legal metrology laboratory which meets to technical condition; lack of human resources who have authority to implementing legal metrology.

5. West Sumatra Province and Padang City

1) West Sumatra Province

- The West Sumatra Province is famous in agriculture and has many potential resources. It

has plenty of productive land, as many as 1.73 million hectare available for rice field, horticulture, and plantation which contribute significantly to the regional economy. The agriculture sector is placed to the highest priority for development. The other business sectors also focused include; forestry, mining, manufacturing and tourism.

- The West Sumatra Province is bordered by North Sumatra Province on the north, Riau Province on the east, Jambi and Bengkulu Provinces on the south, and Indian Ocean beach on the west. The total area is 42.2 thousand km^2. The government administration comprises of twelve district and seven cities. 98 % of companies are SMEs and the biggest company is PT. Semen Padang.
- The population of West Sumatra Province was 4.53 million people (2001). The population of Padang City is 785 thousand people with the population density of 108 people/$km^{2.}$
- In 2004, the GRDP of West Sumatra Province was Rp. 37.2 trillion (US$4.04 billion). The agriculture sector accounted for 22.8%, followed by trade, restaurant and hotel (18.1%), transportation and communication (13.5%), manufacturing (13.2%).
- In 2004, the export value was US$594 million. Export products include palm oil, palm products, cement, coal, cinnamon, woods, nutmeg oil, coconut oil and powder, coca, cash nut milk, cardamom (spice, plywood etc.) of 104 items with destination to 66 countries. The import value was US$37.7 billion.
- The area of food crops (non-fields) is 650 thousand ha, consisting of crops and horticulture whose products in 2003 were 182.8 thousand tons and 247.4 thousand tons respectively. The use of sea fishery resources was 92.8 thousand tons in 2003.
- Plantation products are rubber (74.2 thousand tons), coconut (66.7 thousand tons), cinnamon (25.1 thousand tons), and palm oil (324.4 thousand tons). The area of palm oil plantation is 189.6 thousand ha which produced the stem of fresh fruits (TBS) of 324.4 thousand tons.
- The area of cocoa plantation is 10.7 thousand ha which produces dried cocoa seed. The rubber plantation (93 thousand ha) can produce 59.3 thousand tons yearly. Seven palm oil (CPO) processing factories have an installed capacity of 280 tons TBS per hour with production capacity of palm oil (CPO) approximately around 354.8 thousand tons/year.
- West Sumatra's land is known for its coal mining resources which its deposits are located in Sawahlunto and other districts and granite in Pasaman with has deposit 2.04 million tons.
- It has 16.5 thousand km of roads, consisting of 872 km of state roads, 1.429 km of

provincial roads, and 14.2 thousand km of districts/city roads.

- There are two airports with domestic standard.
- It has ten seaports. The biggest one is at Teluk Bayur that can accept a ship with 35,000 DWT.
- The land area of Teluk Bayur Seaport is 546 ha. The water depth is 9-12 m².
- The power generating capacity is 634 MW, supplied by water power generator (PLTA): 367.5 MW, diesel power generator (PLTD): 23.4 MW, gas power generator (PLTG): 43.5 MW and steam power generator (PLTU): 200 MW.
- All regencies have water supply units with the installed capacity of 2,901 liter/second. The production is 2,088 liter/second.
- The Padang Industrial Estate has 500 ha, comprising the areas of Padang and Padang Pariaman. There is a shopping complex and and three supermarkets available in Padang.
- The development and improvement of West Sumatra province roads consists of 133 km road to access the border area of Riau province, 12 km road to Jambi province, 92.7 km road to North Sumatra province, 130.7 km road to Bengkulu province, and 500 m toll bridge of Kelok Sembilan.

2) Padang City

- Padang, capital of West Sumatra Province, is active as a trading city which handles mining products and agricultural products. The area is 70 thousand km^2 with 780 thousand people.
- There are many schools, churches and government buildings, and many restaurants and hotels. Industrial park does not make an impact. Padang is near from Minangkabau International Airport and Teluk Bayur Harbor.
- Teluk Bayur Harbor facing the Hindia Sea has an advantage in distance for export and import to Middle East Asia, Africa, and South Asia compared to other domestic harbors, but it has a disadvantage regarding export/import through the Malacca Channel on the opposite side.

A. Outlook of West Sumatra Province and Capital City Padang

1) Land area and Population (Table 5-1)

Table 5-1 Land Area and Population of West Sumatra Province and Padang

Items	West Sumatra Province	Padang Capital city
Land area (km^2)	42,200	694.96
Population	4,530,000	784,740

2) Main industry in the Province (Table 5-2)

Table 5-2 Main Industry in West Sumatra Province

Name of Industry	Items of product	Sales amount/year
Foods and drinks	49	Rp.1,474,012.25 million
Woods, goods made from woods	34	Rp.341,626.66 million
Textile	24	Rp.7,714.98 million
Rubber and goods made from rubber	10	Rp.1,207,977.51 million

3) Main manufacturers/enterprises in the City (Table 5-3)

Table 5-3 Main Manufacturers/Enterprises in Padang.

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Cement Padang	cement	Private
PT. Tropical andalas	cassia	Private

4) Export (Table 5-4)

Table 5-4 Export of West Sumatra Province

Export items of product/ article	Value (US$)-2003	Main country of destination
Agriculture products	16,137,951	US, Canada, Singapore, Japan Nigeria, Ceylon, India Germany,
Industrial products	439,683,247	
Mining products	19,006,220	

5) Import (Table 5-5)

Table 5-5 Import of West Sumatra Province

Import items of product/ article	Value(US$)-2004	Main country of origin
Rice, wheat flour, Sugar, Salt	1,262,310,000	China, Thailand, Singapore, Malaysia, South Korea
Fertilizer	30,583,499	
Machine, spare parts	11,746,338	

6) GRDP by industrial origin at current price (Table 5-6)

Table 5-6 GRDP of West Sumatra Province by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture		8,012,509	9,066,534
2. Mining and Quarrying		1,188,626	1,315,145
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing		229,033	205,078
4-a Electricity supply		446,003	503,712
4-b City Gas			
4-c Water supply		41,214	45,608
5. Construction		1,636,974	2,006,972
6-a Wholesale and Retail Trade		6,011,689	6,711,612
6-b Hotel		54,149	60,445
6-c Restraints		160,245	179,147
7-a Transportation		3,522,733	3,799,584
7-b Communication		649,703	819,809
8. Financial, Ownership and Business Services		1,745,187	2,062,908
9. Services		5,849,284	6,060,769
GRDP at current price	29,106,780	33,139,682	37,161,017
GRDP Growth rate at constant 1993	4.31%	4.48%	

7) Development plan of provincial economy and industry (Table 5-7)

Table 5-7 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan
2000	development and improvement of province roads

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 5-8)

Table 5-8 Number of Verification Office in West Sumatra Province

Classification	Number of office	Main role
Province-owned	1	Verification of standards and measuring instruments.
KABUPATEN-owned	-	
Total	1	

2) Development plan of legal metrology.

- Current situation: no reply.
- Development/ enforcement plan: made proposal (2004) and send to MOT through governor.

3) Needs of legal metrology.

- Kinds of users/manufacturers related to legal metrology which would increase are stores,

taxi companies, filling stations, transportation companies and manufacturers.

- Reasons: no reply.

4) Investment plan for legal metrology (Table 5-9)

Table 5-9 Investment Plan for Legal Metrology

Name of project	Budget	Description
Improvement of RVO		Made proposal (2004) and send to MOT through governor, but have no follow-up yet.

5) Problems

The regional government decreases the budget of RVO, if the revenue from re/verification is decreasing.

6. North Sumatra Province and Medan City

1) North Sumatra Province

- North Sumatra Province has been the center of plantations in Indonesia since the Dutch occupation. The area of plantation is 1.7 million ha. Primary plantation commodities are crude palm oil, rubber, coffee, tea, coconuts, cocoa and cigar which export to Singapore, Malaysia, The total area of North Sumatra is 71,680 km^2. It has 18 districts and 7 cities
- In 2005, the total population was 12,123,000 people and the highest density was Kota Sibolga (7,429 people/km^2).
- In 2004, the GRDP as much as Rp. 117,744 billion (US$12.8 billion) (including oil and gas). The biggest share was agricultural sector (31.06%) followed by manufacturing (26.65%), and trade/restaurant and hotel sectors (19.51%). The GRDP/Capita was Rp. 9.7 million (US$1,054).
- In 2004, the export value recorded as much as US$ 4.24 billion. Main destination countries were Japan (14%), India (11%), New Zealand (9%) and USA (9%). Main exported products were palm oil, rubber, coffee, tea, cocoa ad coconuts,
- In 2004, the total import value amounted to US$ 953 million. The main import commodities were raw materials, semi-finished goods, consumer goods as well as capital goods. The rubber industry mainly manufactures rubber gloves.
- Food crop land area is 1.38 million ha excluding paddy. Cultivated crops are peanut, soybean, green bean, cassavas, and corn. The cultivating area has been increasing year by year. The horticulture products are the major export commodities.
- The main plantation commodities are rubber, palm oil, CPO, cocoa, coconut, cigar and coffee. The total people's plantation area was 802 thousand ha with its various production

of 2.29 million ton and the total crops plantation was 725 thousand ha.

- The province has a lot of marine/fishery resources as many as 338 thousand ton/year. The primary commodities from forest area are log, pine log, sawn timber, multiplex and pulp.
- The deposits of mineral are quite a lot, including carbon materials, mineral materials, and crude oil & gas. Except crude oil, these deposits have not been optimally explored. The mining products are gold, lead, zinc, braze, etc.
- The total road length is 28.1 thousand km, consisting of 1,887 km state road, 2,920 km provincial road and 23.2 thousand km districts/city road.
- There are seven airports: one international airport, five domestic airports, and one commercial airport. The biggest airport is Polonia in Medan.
- It has 21 seaports. The biggest one is at Belawan. In 2000, the unloading capacity registered was 9.8 million tons while the loading capacity was 7.2 million tons at six seaports.
- Electrical power capacity is 1,247 MW. The current consumption is 883 MW.
- The water supply capacity is 144 million m^3/year of which the largest is in Medan with its capacity of 25 million m^3/ year.
- There are three industrial estates: Medan Industrial Estate (504 ha), Lamhotma Pulahan Seruai Industrial Estate (650 ha) and Medan Star Industrial Estate (77 ha).
- There are two hypermarkets, one shopping center in Medan, 24 supermarket spread over the large cities and 21 traditional market places.
- The infrastructure development plan is: PLTA power generation 82 MW at Lau Reneun Sipansipahoras, Sibolga; Toll roads construction from Medan-Binjai-Namo-Tanjung Morawa-Tebing Tinggi; Kuala Namo Airport to replace Polonia Airport at Kuala Namo (Deli Serdang).

2) Medan City

- Medan city has an area of 265 km^2 with population of two million people. There is Polonia international airport. Near Belawan International Seaport is the biggest harbor in North Sumatra.

A. Outlook of North Sumatra Province and Capital City of Medan

1) Land area and population (Table 6-1)

Table 6-1 Land Area and Population of North Sumatra Province and Medan

Items	North Sumatra Province	Medan city
Land area (Km^2)	71,680	265.10
Population	12,326,678	2,036,185

2) Main industry in the Province (Table 6-2)

Table 6-2 Main industry in North Sumatra Province

Name of Industry	Items of product/ treatment	Sales amount/year
Chemical, rubber industry	Petroleum, coal, plastic, rubber	
Manufacturing industry	Food, beverages, textile, wood, etc.	

3) Main manufacturers/enterprises in the City (Table 6-3)

Table 6-3 Main Manufacturers/Enterprises in Medan

Name of manufacturers/enterprise	Items of product/value	State-owned or Private
Palm oil and Fast co.	12 / US$1,636,709	private
Natural rubber co.	6 / US$ 875,225	private
Aluminum co.	4 / US $ 298,526	private

4) Export (Table 6-4)

Table 6-4 Export of North Sumatra Province

Export product	Value (US$)-2004	Main country of destination
Agricultural products	1,029,559,000	Japan, USA, China, Netherlands
Industrial products	3,165,893,000	
Total value of export	4,239,410,000	

5) Import (Table 6-5)

Table 6-5 Import of North Sumatra Province

Import product	Value(US$)-2004	Main country of origin
Agricultural	62,026,000	China, Australia, Malaysia, USA, Germany
Industry	854,770,000	
Total value of import	953,360,000	

6) GRDP by industrial origin at current price (Table 6-6)

Table 6-6 GRDP of North Sumatra Province by Industrial Origin at Current Price

Unit: billion Rupiah

Industrial origin	2002	2003	2004
1. Agriculture	26,638	28,634	31,763
2. Mining and Quarrying	1,452	1,571	1,711
3-a Oil and Gas Manufacturing	23,201	27,868	31,526
3-b Non-Oil and Gas Manufacturing			
4-a Electricity supply	1,071	1,398	1,628
4-b City Gas			
4-c Water supply			
5. Construction	3,693	4,329	5,283
6-a Wholesale and Retail Trade	16,750	19,316	21,680
6-b Hotel			
6-c Restraints			
7-a Transportation	4,941	5,895	6,882
7-b Communication			
8. Financial, Ownership and Business Services	3,781	4,342	5,196
9. Services	6,586	7,966	9,033
GRDP at current price	88,117	101,323	114,647
GRDP Growth rate at constant 1993	4.07%	4.42%	

7) Development plan of provincial economy and industry (Table 6-7)

Table 6-7 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan
2005	in application to be assignment as “exclusive economic area”

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 6-8)

Table 6-8 Number of Verification Offices in North Sumatra Province

Classification	Number of office	Main role
Province-owned	4	Verification of standards and measuring instruments Control measuring instruments and packaging
KABUPATEN-owned	-	
Total	4	

2) Development plan of legal metrology.

- Current situation: Metrology is known but not popular. Number of inspectors is decreasing. Many instruments are not verified in North Sumatra RVO such as K-H meters and water meters.

3) Needs of legal metrology.

- Kinds of users/manufacturers related to legal metrology would increase are stores, taxi companies, filling stations, transportation companies, and manufacturers.
- Reasons: Economy will grow, international airport at Kuala Namu is under preparation, filling stations and manufactures will increase.

4) Investment plans for legal metrology (Table 6-9)

Table 6-9 Investment Plans for Legal Metrology in North Sumatra Province

Name of project	Budget	Description
Thermo tester Pressure tester	Rp.150,000,000 Rp.250,000,000	to test thermo gauge : -10 up to 500 degree C to test pressure gauge : -50 up to 200 Bar
Water meter installation Flow meter installation Re/verification to district	Rp.100,0000,000 Rp.1,000,000,000 ---	To test water meter over 2 To test flow meter To re-verify measurement instruments to all districts in province

5) Problem

- Fund for metrology budget is limited
- Some metrology programs/plans are always delayed
- Some standards are out of date and damage
- No tester and installation for testing pressure gauges, thermo gauges, bulk water meters, 3 phase kWh meters, etc.

7. South Kalimantan Province and Banjarmasin City

1) South Kalimantan Province

- South Kalimantan Province has good territorial water of both river and sea with great fishery potency. Income for South Kalimantan Province came from various processing products of wood material, especially, plywood, instead of traditional diamond mining. Agricultural product, plantation rubber and rattan that are exported to Asian countries. The province is very rich in natural resources (e.g., oil, coal, stone ash, gold, manganese, iron, nickel, etc.). Oil from South Kalimantan is processed and exported to overseas or it is used for domestic consumption.
- Forest product industry has developed various products and processed material. Industrial plantation forests are especially in Banjar, Kotabaru and Tanah Laut. Meanwhile, mining sector and plantation are also important because the province has a great potency in mining development, plantation, and horticulture.
- Infrastructure gets great attention to rebuilt and be developed. South Kalimantan has

become the most developed province in economy and trade in all Kalimantan. It comes to “one-step ahead" phases in manufacturing sector and service sector. It is also planning for development of KAPET Batulicin (Integrated Economy Development Area) for agricultural commodity and natural resources which are produced in the province.

- Eleven regencies and two cities: Tanah Laut, Kotabaru, Banjar, Tapin, Hulu Sungai Selatan, Hulu Sungai Tengah, Hulu Sungai Utara, Tabalong, Tanah Bumbu, Balangan, Banjarmasin and Banjarbaru.
- The total population of South Kalimantan in 2004 was 3.2 million people; The biggest city is Banjarmasin City (573 thousand people).
- In 2004, GRDP of South Kalimantan was Rp. 24.5 trillion (US$2,663 million) (without oil and gas) and Rp. 25.1 trillion (US$2,725 million) (with oil and gas). Agriculture sector contributed 22%, followed by mining sector (18%) and manufacturing (17%). GRDP/Capita was Rp. 7.77 billion (US$844). The export value in 2002 was US$ 1.1 billion, while the import value was US$. 73.6 million.
- The area of food crop plantation (non-paddy) is 6,865 ha consisting of oranges, rambutans, bananas and durians. Plantation production reached 366,665 tons.
- The potential sectors for industrial growth are plantation, animal husbandry, forestry and mining as well as tourism. Other industry sectors that have developed are plastics, rubber gloves and CPO from plantations, cold storage and fish canning from fishery products, cement and marble from mining, plywood, block board and venal from forest and service from tourism.
- There are three industry areas, namely Alalak industrial region/River Barito, LiangAgang industrial area, and Industrial Estate of Batulicin.
- The total length of road is 19.0 thousand km, consisting of state road: 864 km, provincial road 954 km, districts/city road 16.4 thousand km.
- South Kalimantan Province has one airport, Syamsudin Noor in Banjarmasin. Some small airports at Warukin in Tanjung, Stagen in Kotabaru, Batulicin and Mekarputih in Kotabaru can accept small planes such as Cassa.
- There are five seaports including Trisakti, Martapura, Kotabaru and Batulicin seaports.
- Capacity of power generation is 264 MW in total.
- All regencies/cities have the facility of potable water supply through PDAM. From 116 Regencies, 60% has been served by PDAM with installed capacity of 2,901 litter/second. The biggest one is in Banjarmasin with the capacity of 1,000 litter/second. Used production is 2,088 litter/second.

2) Banjarmasin City

- Banjarmasin harbor: from Barito river, operated by barge from container ship.
- Banjarmasin itself has fifteen malls and twenty-five supermarkets. Other districts and cities have 2,207 traditional markets.

A. Outlook of South Kalimantan Province and Capital City Banjarmasin

1) Land area and Population (Table 7-1)

Table 7-1 Land Area and Population of South Kalimantan Province and Banjarmasin City

Items	South Kalimantan Province	Banjarmasin city
Land area (km^2)	37,530.52	72.67
Population	3,219,398	572,942

2) Main industry in the Province (Table 7-2)

Table 7-2 Main Industries of South Kalimantan Province

Name of Industry	Items of product	Sales amount/year
Metal, machinery, electronics		
Chemicals, agro, and forest products		

3) Main manufacturers/enterprises in the City (Table 7-3)

Table 7-3 Main Manufacturers/Enterprises in Banjarmasin

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Perkebunan nusantara	SIR, RSS	State owned
PT. Barito Pacific timber	Plywood, particle board	Private
PT. Adaro Indonesia	Coal	Private

4) Export (Table 7-4)

Table 7-4 Export of South Kalimantan Province

Export product	Value (US$)-2004	Main country of destination
Coal	1,175,537	US, Arab Saudi, China, Hong Kong, Japan, South Korea, Taiwan, Malaysia
Wood products	371,876	
Rattan products	13,309	

5) Import (Table 7-5)

Table 7-5 Import of South Kalimantan Province

Import product	Value(US$)-2002	Main country of origin
Industrial raw material		US, Malaysia, Singapore etc
Total value of import	73,636,183	

6) GRDP by Industrial Origin at Current Price (Table 7-6)

Table 7-6 GRDP of South Kalimantan Province by Industrial Origin at Current Price

(1) Without Oil and Gas, (2) Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture		5,342,532.91	5,809,360.07
2. Mining and Quarrying		3,909,708	4,271,460.50
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing		36,233,411	3,904,644.16
4-a Electricity supply		196,738.41	198,446.68
4-b City Gas			
4-c Water supply		25,633	29,197.67
5. Construction		1,061,331	1,135,874.24
6-a Wholesale and Retail Trade		2,965,178	3,214,184.06
6-b Hotel		24,262	25.899.16
6-c Restraints		384,569	431,605.89
7-a Transportation		1,882,329	2,218,438.10
7-b Communication		168,860	190,136.91
8. Financial, Ownership and Business Services		703,842	1,012,799.83
9. Services		2,002,886	2,251,903.73
GRDP at current price	20,635,418	22,259,313	24,503,864
GRDP Growth rate at constant 1993	3.83%	4.85%	

7) Development plan of provincial economy and industry (Table 7-7)

Table 7-7 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan
2005	KAPET Batulicin infrastructure

B. Government Policy for Legal Metrology

1) Number of verification office in the Province (Table 7-8)

Table 7-8 Number of Verification Office in South Kalimantan Province

Classification	Number of office	Main role
Province-owned	1	Re/verification UTTP
KABUPATEN-owned		
Total	1	

2) Development plan of legal metrology: no reply

3) Needs of legal metrology

- Kinds of users/manufacturers related to legal metrology which would increase are stores, taxi companies, filling stations, transportation companies and manufacturers.
- Reasons: Demand will increase in future because population is increasing.

4) Investment in legal metrology: not available.

5) Problem

- Banjarmasin RVO does not have own building, still rent to seaport companies. Thus, difficult to expand laboratory.
- The equipment for re/verification is insufficient.

8. East Java Province and Surabaya City

1) East Java Province

- The economy of East Java province is supported by three main business sectors: agricultural, manufacturing and trade, and hotel and restaurant sectors.
- Currently, manufacturing sector plays more important role in economic development. Important industries are shipping industry, cement, metal, petrochemical, electronic, food processing, pharmaceutical, machine tools and agriculture industry. In last five years, the manufacturing sector shows the average growth rate of 6 %.
- In 2004, total population was 34.5 million people.
- There are 29 districts and nine cities in the province.
- GRDP (2004) totaled Rp. 292 trillion (US$31.7 billion) with the largest contribution coming from manufacturing sector (34.5%), 5.7 billion.
- The total export value was US$5.7 billion, while import value was US$3.8 billions. Import commodities were capital goods such as machineries and spare-parts, textile raw material, mineral, transportation machinery. Export commodities were coffee, chocolate, tobacco, wood, plywood, textile, etc.
- Many sugar processing factories is managed by state-owned companies which share around 60% of national sugar production. As a whole, 122 plantation areas are managed by government and 226 managed by private, producing important commodities like coffee, clove, chocolate, rubber, kapok and tea. Fishery products were 312.2 thousand tons.
- The forest area is estimated 1.36 million ha, consisting of production forest (52%),

conservation forest (32%), natural forest (11%) and national park forest. This province is a major producer of the highest quality teakwood (298,473 m³/year). In addition to producing wood, it also produces cajuput oil, turpentine, silk and some other commodities.

- In the northern part of the province (including Madura island), there are big oil and gas deposits. Recently, several foreign oil companies and domestic companies have operated in these sites. It is also known as a rich area of mining materials like phosphate, kaolin, marble and limestone.
- The network transportation is integrated with Surabaya as the centre, with total road length of about 27.2 thousand km, consisting of 1.9 thousand km state road, 1.4 thousand km provincial road, and 63 km toll road.
- There are four international and domestic airports, of which the largest is Juanda Airport which functions as an international gateway in Eastern Indonesia.
- It has seven large seaports, of which the largest is Tanjung Perak Seaport in Surabaya.
- Electrical capacity is 6,803 MVA, consisting of 6,003 MVA from PLTA and 800 MVA from PLTU.
- This province has a water supply facility done by concerned region water companies. Installed capacity is 16,027 liters/second and the use of clean water production is 10,338 liters/second. Clean water supply capacity by private companies was 4,210 liter/second (outside of PAM capacity).
- There are several Industrial parks as follows: SIER and Berbek Industrial park (332 ha) at Surabaya and Sidoarjo ; Gresik Industrial park (135 ha) in Gresik; Maspion Industrial park (450 ha) in Gresik; PIER Industrial park (500 ha) in Pasuruan; Dharmala RSEA Industrial park (200 ha) in Mojokerto

2) Surabaya City

- Target infrastructure development in Surabaya: construction/road rehabilitation of 203 km of Juanda airport; Suramadu bridge construction which is connecting Surabaya and Madura Island.

A. Outlook of the East Java Province and Capital City of Surabaya

1) Land area and Population (Table 8-1)

Table 8.1 Land Area and Population of East Java Province and Surabaya City

Items	East Java Province	Surabaya city
Land area (km^2)	46,689	
Population	34,525,588	3,500,000

2) Main industry in the Province (Table 8-2)

Table 8-2 Main industry in East Java Province

Name of Industry	Items of product/ treatment	Sales amount/year
Small scale industry and home industry		1,791 billion rupiah
Big and mid scale industry		9,315 billion rupiah

3) Main manufacturers/enterprises in the City (Table 8-3)

Table 8-3 Main Manufacturers/Enterprises in Surabaya City

Name of manufacturers/enterprise	Items of product	State-owned or Private
PT. Semen gresikk	cement	Private
PT. Petrokimia gresik	Fertilizers, chemical	State owned

4) Export (Table 8-4)

Table 8-4 Export of East Java Province

Export product	Value (US$)-2002	Main country of destination
Non-oil and natural gas (shrimp, pawn frozen, wooden furniture etc)	5.7 billion	Japan, US, China , Malaysia, etc

5) Import (Table 8-5)

Table 8-5 Import of East Java Province

Import product	Value(US$)-2004	Main country of origin
Non-oil and natural gas	3.8 billion	Asian countries, US, China
Total value of import	3.8 billion	

6) GRDP by industrial origin at current price (Table 8-6)

Table 8-6 GRDP of East Java Province by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2003	2004	2005
1. Agriculture		59,946,000	68,632,756
2. Mining and Quarrying		6,599,000	8,103,672

3-a Oil and Gas Manufacturing		100,995,000	
3-b Non-Oil and Gas Manufacturing			
4-a Electricity supply		7,564,000	6,823,398
4-b City Gas			1,114,853
4-c Water supply			354,240
5. Construction		12,549,000	14,540,117
6-a Wholesale and Retail Trade		91,106,000	109,587,965
6-b Hotel			
6-c Restaurant			
7-a Transportation		18,817,000	15,898,574
7-b Communication			6,381,388
8. Financial, Ownership and Business Services		15,117,000	17,544,115
9. Services			32,437,419
GRDP at current price	254,380,758	292,322,590	281,418,497
GRDP Growth rate at constant 1993	4.11%		

*excluding manufacturing

7) Development plan of provincial economy and industry (Table 8-7)

Table 8-7 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan	Target
2001-2005	Economic recovery and productivity acceleration through strengthening unit business and economic institution.	

B. Government policy for Legal Metrology

1) Number of verification office in the Province (Table 8-8)

Table 8-8 Number of Verification Offices in East Java Province

Classification	Number of office	Main role
Province-owned	1	Administration and Re/verification UTTP, calibration, BDKT measurement etc
KABUPATEN-owned	6	(Kediri, Bojonegoro, Jember, Malang Pamekasan, Madiun)
Total	7	

2) Development plan of legal metrology.

- Current situation: Insufficient of area for laboratory
- Development/ enforcement plan: in construction of new building for new laboratory

3) Needs of legal metrology.

- Kinds of users/manufacturers related to legal metrology which would increase are stores, taxi companies, filling stations, transportation companies and manufacturers.
- Reasons: demand will increase

4) Investment plan for legal metrology (Table 8-9)

Table 8-9 Investment Plan for Legal Metrology in East Java Province

Name of project	Budget	Description
Construction of calibration laboratory	Rp. 6,000,000,000	
Facilities for calibration laboratory	Rp. 1,000,000,000	

5) Problems

- Insufficient in facilities and operational budget
- Operational truck mainly is old and necessary to replace by new truck for visiting verification

9. DI Yogyakarta Province and Yogyakarta City

1) DI Yogyakarta Province

- Yogyakarta Province is known as a centre of Javanese culture and as an education centre supported by several institutes of higher education, trading and regional transportation services. Yogyakarta intends to become a major tourist area supported by its strong agriculture development as well as the development of export-oriented manufacturing sectors. To reach this target, in addition to its potential natural resources, various infrastructure and important facilities are available in the province.
- Some types of B and C excavated mining objects like kaolin; iron sand and limestone are ready to be exploited.
- Yogyakarta has a very large population (3.12 million people) with the area spreads on 3.19 thousand km². Government administration is divided into five regencies/cities consisting of one city and four regencies: Yogyakarta (32.5 km²), Sleman (575 km²), Bantul (507 km²), Kulonprogo (586 km²), and Gunung Kidul (1,485 km²).
- In year 2005, the amount of GRDP is Rp21.9 trillion (US$2.38 billion) and GDRP/capita is Rp. 6.6 million (US$717).
- In year 2004, export value was US$122 million, while import value was only US$18 million. The export commodities are leather tanning, batik and textile, lamps and gloves. Import commodities among others are cotton, leather skin potion, milk, and plastics raw materials.
- The main agricultural commodities excluding rice are: corn, sweet potatoes, peanuts, and soybeans. Production of corn was 170.3 thousand tons, soybean production was 68.1 thousand tons, and cassava/sweet potato production was 673.5 thousand tons.

- The province has also potential product of horticulture: banana production (4.6 thousand tons), salak (4.6 thousand tons), mangoes (1.4 thousand tons), rambutan (1.5 thousand tons) and nangka (1.4 thousand tons).
- The main commodities of plantations are coconut (46.1 thousand tons), cashew nut (149 tons) production, cloves (358 tons), cocoa (147 tons), and tobacco (1.17 thousand tons).
- There are 17,034 ha of forest. This sector contributed Rp91.65 billion (US$9.96 million) to the GRDP. Wood production is mainly used in construction as building wood (80%), or as raw material for plywood and household tools and furniture (20%).
- Mining sector gave a contribution at 2% from GDRP, mining materials available are clay and colin are being used for producing ceramics, arts, ceramic floors as well as bricks.
- Length of road is 4.93 thousand km consisting of state road (158 km), provincial (690 km).
- Air transportation in this province is served by international airport Adisucipto with runway of 2,250m in length and 45m in width.
- Yogyakarta uses an ocean seaport in Cilacap and Tanjung Emas Seaport in Semarang as an international seaport gate.
- Electricity capacity is 9.45 million kWh, which is supplied by water electricity generator (PLTA) serving 575.4 thousand consumers. Each district has its own facility for water supply. The biggest capacity is built in Yogyakarta at 600 liters/second.

2) Yogyakarta City

- Yogyakarta is often called as “Education City (Kota Pendidikan)” because the education facilities are quite complete including one job training centre, 2,231 elementary schools, 439 junior high schools, 191 senior high schools, 146 vocational schools, 49 universities, and 57 academies.
- The population is 397 thousand people.
- Yogyakarta city has five shopping centers, ten supermarkets, and 200 traditional markets.

A. Outlook of the DI Yogyjakarta Province and Capital City of Yogyakarta

1) Land area and population (Table 9-1)

Table 9-1 Land Area and Population of DI Yogyakarta Province and Yogyakarta City

Items	DI Yogyakarta Province	Yogyakarta city
Land area (Km^2)	3,186	32,5
Population	3,121,701	397,398

2) Main industry in the Province (Table 9-2)

Table 9-2 Main Industries of DI Yogyakarta Province

Name of Industry	Items of product/ treatment	Sales amount/year
Plastics, Wood, Bamboo,Rattan		
Metal, Stone, Silver		
Brass, Copper, ceramics		

3) Main manufacturers/enterprises in the City

- No reply.

4) Export (Table 9-3)

Table 9-3 Export of DI Yogyakarta Province

Export product	Value (US$)-2004	Main country of destination
Wood industry	4,059,957	Italy, US, Japan, France etc.
Clay industry	1,521,388	
Stone industry	1,380,921	

5) Import (Table 9-4)

Table 9-4 Import of DI Yogyakarta Province

Import product	Value(US$)-2004	Main country of origin
Raw material for milk	10,915,644	US, UEA, New Zealand, Australia
Cotton	3,813,857	
Total value of import	18,372,740	

6) GRDP by industrial origin at current price (Table 9-5)

Table 9-5 GRDP of DI Yogyakarta Province by Industrial Origin at Current Price

Unit: million Rupiah

Industrial origin	2002	2003	2004
1. Agriculture		3,337,881	3,636,705
2. Mining and Quarrying		170,096	182,522
3-a Oil and Gas Manufacturing			
3-b Non-Oil and Gas Manufacturing		3,086,623	3,219,137
4-a Electricity supply		215,746	250,279
4-b City Gas			

4-c Water supply		15,945	17,816
5. Construction		1,451,872	1,743,786
6-a Wholesale and Retail Trade		1,615,579	1,775,643
6-b Hotel		438,138	497,959
6-c Restraints		1,717,094	1,897,767
7-a Transportation		1,323,886	1,465,321
7-b Communication		575,612	671,915
8. Financial, Ownership and Business Services		1,940	2,199,372
9. Services		3,738,594	4,290,460
GRDP at current price	16,712,889	19,690,911	21,848,682
GRDP Growth rate at constant 1993	4.02%	4.09%	

7) Development plan of provincial economy and industry (Table 9-6)

Table 9-6 Development Plan of Provincial Economy and Industry

Starting Year	Outline of development plan
2006	Development of Bantul district and South Yogyakarta area for recovery after earthquake

B. Government policy for Legal Metrology

1) Number of verification office in the Province (Table 9-7)

Table 9-7 Number of Verification Office in DI Yogyakarta Province

Classification	Number of office	Main role
Province-owned	1	Calibration standard and re/verification for measuring equipments for trading
KABUPATEN-owned		
Total	1	

2) Development plan of legal metrology

- Current situation: Insufficient in budgeting for expanding in re/verification equipments and calibration standard.
- Development/ enforcement plan: no reply.

3) Needs of legal metrology

- Kinds of users/manufacturers related to legal metrology which would increase are stores, taxi companies, filling stations, transportation companies, and manufacturers.
- Reasons: Users/manufactures will increase in all sectors.

4) Investment plan for legal metrology

- Purchasing weighting instrument and balance (2003)

5) Problems

- Insufficient in budget for renovation building and facilities and also insufficient in budget for operation of re/verification and standard calibration.

10. DKI Jakarta Province

- DKI Jakarta Province has five governmental administration regions: North Jakarta, Central Jakarta, East Jakarta, West Jakarta, South Jakarta and one administrative city: Thousand Island. The total area of the province is 673 km^2.
- The population is 8.6 million people. The biggest population resides is in East Jakarta (28.6%), while the highest density region is Central Jakarta (17,732 people/ km^2).
- In 2004, GRDP of DKI Jakarta based on current price reached Rp.321.82 trillion (US$35.0 billion) (including oil and gas). The contributing sectors are transportation & communication (24.7%), services (17.1%), trade, restaurant and hotel (16.9%). GRDP per capita based on current price is Rp36.8 million (US$4,000).
- The export value is recorded at US$18.6 billion. The import value is US$ 14.6 billion.
- The paddy rice was produced at 25.4 thousand ton, while horticulture sector produced 1.6 thousand ton of cassava. The export of cut flowers (orchids) is very active. The production value of fresh fish is US$86.5 million including US$69.3 million of frozen fish, US$3.8 million of dried fish. Of this commodity, tuna fish is the highest with 14,200 tons (52.5%), followed by 2,700 tons of frozen shrimp/lobster.
- This province has two airports: International airport (Soekarno Hatta International Airport) and domestic airport (Halim Perdana Kusuma Airport).
- This province has one seaport at Tanjung Priok. The offloading capacity is 33 million tons and uploading capacity is 9 million tons. The length of quay is 1,838 km and container yard is 100 ha.
- The demand of electricity is strong. Most electricity is supplied by PLN. Electricity sold within Jakarta and Tangerang is 19.85 billion kWh. The total consumers are 2.73 million. The demand of gas for manufacturing is 1.27 billion m^3.
- There are 300 malls/shopping centers, 120 supermarkets or hypermarkets, and 150 traditional markets.
- There are nine industrial estates: Jakarta Industrial Estate (JIEP) Pulogadung (950 ha), The Nusantara Bonded Area (KBN) in Tanjung Priok (10 ha) and Cakung (173 ha), Marunda Estate (410 ha), Cilandak Industrial Estate (113 ha), BP Sunda-Kelapa (91 ha), PD Wisata Niaga Jaya (4.3 ha), Badan Pengelola Lingkungan Industri dan Pemukiman

Pulogadung (BPLIP) (15 ha), Sentra Primer Baru Barat (125 ha) and BP Sentra Primer Baru Timur (96 ha).

Appendix 4.1.1

Focus Group Discussion Survey Result

Appendix 4.1.1 Focus Group Discussion (FGD) Survey Result

The objectives of this FGD survey is to grasp the degree of awareness of the public about the existence of metrology especially for legal metrology and to grasp the opinion from their about accuracy and usefulness of legal metrology.

All input from the public will be used for improvement of legal metrology. The information and the question offered should not influence participants' opinions. They may give their opinions freely.

A. Place

This FGD survey was conducted from May to June 2006 for 10 cities in Indonesia.

- Banjarmasin
- Medan
- Padang
- Pekanbaru
- Singkawang
- Makassar
- Bandung
- Batam
- Denpasar
- Manado

Note: Interview survey was conducted in five cities, and the questionnaire result was conducted in seven cities. FGD at Denpasar and Manado used the socialization method.

B. Method

The survey was conducted in two steps.

a. Step One: By direct interview (9 questions) and hearing the opinion to participants. The objective was to grasp the usefulness of the existence and claims/problems of legal metrology.

b. Step Two: The attendants had to complete a "right or wrong" questionnaire (50 questions). The objective was to know their request for legal metrology activity.

C. Participants

A total of 181 participants (20 -30 persons/city) of various backgrounds were interviewed. They included housewives, students, businessmen, traders, government officers, etc.

D. Result

a. Interview result

Interviews revealed that 80% of participants know the functions and duties of legal

metrology in their area. Table 1 shows the result of interviews in five cities.

Table 1 Result of Interview in Each City

No.	Interview	Banjarmasin		Medan		Padang		Pekanbaru		Makassar		Average	
		Know	not Know	Know	not Know	Know	not Know	Know	not Know	Know	not Know	Know	not Know
1	Knowledge about legal metrology	70	30	68	32	60	40	67	33	68	32	67	33
2	Existence of UUML	85	15	50	50	65	35	40	60	68	32	62	38
3	UTTP should be re-verify periodically	90	10	86	14	95	5	67	33	86	14	85	15
4	Place to do re-verification	95	5	86	14	95	5	87	13	93	7	91	9
5	Metrology staff conduct monitoring in regionl	65	35	68	32	90	10	87	13	68	32	76	24
6	Importance of RVOs	100	0	86	14	95	5	100	0	100	0	96	4
7	Necessity to increase re-verification of UTTP	100	0	86	14	95	5	100	0	93	7	95	5
8	Necesity to increase monitoring to UTTP and BDKT	95	5	86	14	90	10	93	7	26	74	78	22
9	Necessity to increase guidance in metrology	85	15	86	14	85	15	93	7	26	74	75	25
	Average	87	13	78	22	86	14	82	18	70	30	80	20

The detail of answers from participants follow:

1. Knowing about legal metrology

67% of participants answered “know” and 33% answered “do not know”.

☞ Some participants do not know the difference of terms between metrology and meteorology

2. Knowing the existing of legal metrology law (UUML).

62% of participants answered “know” and 38% answered “do not know”

☞ Some participants do not understand that legal metrology in Indonesia is regulated by the Law since 1981

3. Knowing that the UTTP should be re-verified periodically

85% of participants answered “know” and 15% answered “do not know”.

☞ Most participants known that the UTTP should be re-verified to protect consumers from unfair measurement

4. Knowing the place for doing re-verification

91% of participants answered “know” and 9% answered “do not know”

☞ Most participants know the place from public announcement by RVO

5. Knowing the existing of metrological staffs which conduct monitoring in region

76% of participants answered “know” and 24% answered “do not know”

☞ It is necessary to increase the public announcement of metrology

6. Importance of RVO

96% of participants answered “know” and 4% answered “do not know”

☞ The importance of metrology is to avoid the problem between traders and buyers

7. Necessity to increasing re-verification of UTTP

95% of participants answered “know” and 5% answered “do not know”

☞ The reason is to protect measurement from unfair measurement

8. Necessity to increasing the monitoring of UTTP and BDKT

78% of participants answered “know” and 22% answered “do not know”

☞ To protect consumer

9. Necessity to increase guidance in metrology

75% of participants answered “know” and 25% answered “do not know”

☞ To disseminate the function and duty of RVO

b. Questionnaire results

According to questionnaire survey results 94% of participants know and have knowledge about legal metrology. Only 2% do not know and understand the existence of legal metrology. The result in seven cities and total average are summarized in Table 2.

Table 2 Number of Wrong Answer from 50 Questions of Questionnaire

No.	Number of wrong answer	Banjarmasin		Medan		Padang		Pekanbaru		Makassar		Bandung		Batam		Total	
		person	%	person	%	person	%	person	%	person	%	person	%	person	%	person	%
1	0 to 10 (very know)	1	5	1	5	2	10	2	7	4	14	1	3	24	77	35	19
2	11 to 20 (know)	11	55	10	45	13	65	24	80	13	46	24	80	4	13	99	55
3	21 to 30 (just know)	8	40	9	41	5	25	4	13	3	11	5	17	3	10	37	20
4	31 to 40 (less know)	0	0	2	9	0	0	0	0	5	18	0	0	0	0	7	4
5	41 to 50 (do not know)	0	0	0	0	0	0	0	0	3	11	0	0	0	0	3	2
	Total	20	100	22	100	20	100	30	100	28	100	30	100	31	100	181	100

Detailed results of 50 questions are summarized in Table 3.

Table 3 Result of questionnaire

Unit:%, N.A: no available

No.	Questions	Banjarmasin			Medan			Padang			Pekanbaru			Singkawang			Batam			Bandung			Average		
		Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A	Right	Wrong	N.A
1	Metrology is a measurement science	84	11	5	95	5	0	100	0	0	90	7	3	93	3	3	90	3	6	100	0	0	93	4	3
2	Verification is a testing to a measuring equipment to be appraisal or non appraisal by an authorized institution	95	0	5	90	0	10	90	0	10	100	0	0	86	7	3	94	6	0	97	3	0	93	2	4
3	Utilization of measuring instrument in trade transaction is monitoring by government	89	11	0	95	5	0	100	0	0	86	14	0	97	3	0	100	0	0	80	20	0	92	8	0
4	RVO is the only one institution which have authority to do re-verification of measuring instrument use in trade transaction	89	11	0	95	5	0	85	5	10	100	0	0	93	7	0	94	6	0	67	33	0	89	10	1
5	Any owner of measuring instruments which use in trade transaction is obligated to do re-verification of his instruments	95	5	0	95	5	0	85	15	0	97	0	3	93	3	3	97	3	0	67	33	0	90	9	1
6	Any measuring instrument which legally verified is guaranted in accuracy and has basic legal	84	5	11	90	10	0	100	0	0	97	3	0	86	14	0	97	3	0	97	3	0	93	6	2
7	Calibration is a testing of measuring instruments by calibration laboratory	84	16	0	81	10	9	85	5	10	90	10	0	90	7	3	94	6	0	97	3	0	89	8	3
8	Calibration laboratory which is accredited by an accreditation body can do calibration of any measuring instruments	74	26	0	81	5	14	85	5	10	66	31	3	66	34	0	94	6	0	70	30	0	76	20	4
9	Calibration laboratory which is accredited by accreditation body can not do verification of measuring instrument use for trade transaction	42	53	5	38	52	10	35	0	65	21	72	7	34	59	7	87	13	0	70	30	0	47	40	13
10	Balance and measuring instruments which is calibrated by calibration body which is already accredited can use in trade transaction	79	21	0	81	5	14	80	10	10	83	10	7	90	10	0	19	81	0	20	80	0	65	31	4
11	Balance and measuring instruments which is legally verified if has a damage and reparated by its expert is can directly use in trade transaction	32	63	5	52	33	15	25	75	0	45	52	3	76	24	0	84	16	0	13	87	0	47	50	3
12	Balance for measuring gold is also can use for measuring drugs	74	26	0	29	57	14	15	80	5	34	59	7	10	86	3	90	10	0	40	60	0	42	54	4
13	Balance which use in trade transaction has obligation to re-verified every year	89	5	6	76	19	5	100	0	0	90	10	0	100	0	0	94	6	0	97	3	0	92	6	2
14	Water meter which belongs to PDAM which is installed at customers house is a measuring instrument which not necessary to verify	16	84	0	48	43	9	20	80	0	34	59	7	31	69	0	16	84	0	47	53	0	30	67	2
15	Taxi meter which showing the cost of taxi is a measuring instrument which should be verify	89	11	0	100	0	0	95	5	0	79	17	3	100	0	0	97	3	0	100	0	0	94	5	0
16	"Bancana Patakaran Pralaya Kapradan" means utilization of measurement to get profit	42	42	16	29	43	28	35	55	10	38	55	7	52	48	0	94	6	0	40	60	0	47	44	9
17	Law No.2 1981 is regulating measuring instrument and trading	53	37	10	52	5	43	70	25	5	72	7	21	76	10	14	90	10	0	23	77	0	62	24	13
18	In transaction of seling and buying goods which on weight is obligated to use balance which have legal mark of verification	95	0	5	90	10	0	100	0	0	97	3	0	100	0	0	97	3	0	100	0	0	97	2	1
19	To import measuring instrument into Indonesia is need permision from Ministry office.	63	21	16	57	19	24	85	10	5	90	7	3	76	17	7	100	0	0	97	3	0	81	11	8
20	To repairing measuring intruments is need permission from Ministry office	84	11	5	52	48	0	20	80	0	14	79	7	24	69	7	97	3	0	70	30	0	52	46	3
21	It is prohited to placing balance and measuring instrument which not passing verification in place of company	84	11	5	62	19	19	95	5	0	83	10	7	72	28	0	90	10	0	83	17	0	81	14	4
22	Using balance and measuring instrument which have broken verification sheel in transaction of good is not prohibited if do not decreasing the	21	74	5	24	71	5	20	80	0	48	48	3	31	62	7	84	16	0	23	77	0	36	61	3
23	To import measuring instrument into Indonesia is need permision from ministry.	63	21	16	57	19	24	85	10	5	90	7	3	76	17	7	100	0	0	7	93	0	68	24	8
24	International Units (SI) is measurement unit which have a system base on a measurement which obtain from basic unit approval	79	0	21	81	0	19	85	5	10	90	3	7	90	7	3	100	0	0	100	0	0	89	2	9
25	In International Unit System, there are 7 basic units: three of it are length unit: length, mass and volume	68	11	21	67	0	33	75	5	20	83	10	7	97	3	0	3	97	0	27	73	0	60	29	12
26	The symbol unit is a legend which showing a measurement unit	89	5	6	81	0	19	80	0	20	93	3	3	93	3	3	100	0	0	100	0	0	91	2	7
27	To writing of symbol of unit is not determined, but the importance is the unit measurement abbreviation should be easy to understand	21	68	11	33	48	19	25	65	10	10	90	0	31	66	3	87	13	0	87	13	0	42	52	6
28	Writing unit or symbol of measurement at an advertisement products in newspaper or magazines if not correct is not a diobedience to law of legal metrology	37	47	16	29	38	33	25	65	10	21	66	14	28	66	7	84	16	0	17	83	0	34	54	11
29	Basic unit of length is meter	74	16	10	81	0	19	100	0	0	93	7	0	90	7	3	100	0	0	100	0	0	91	4	5
30	Basic unit of mass is gram	74	11	15	71	10	19	70	20	10	76	17	7	93	7	0	10	90	0	3	97	0	57	36	7
31	Basic unit of time is second	89	5	6	67	14	19	100	0	0	90	10	0	93	3	3	3	97	0	0	100	0	63	33	4
32	1000 gram is equal to 1 kilo gram	84	11	5	85	5	10	90	0	10	100	0	0	97	3	0	100	0	0	100	0	0	94	3	4
33	Symbol of length unit of meter is m	95	5	0	95	0	5	90	10	0	100	0	0	93	3	3	100	0	0	100	0	0	96	3	1
34	Ons is include in derivative of mass unit in International System Unit	79	16	5	38	14	48	65	30	5	34	59	7	41	55	3	90	10	0	20	80	0	53	38	10
35	Symbol of mass unit of kilogram is Kg	74	21	5	71	24	5	65	35	0	31	66	3	66	24	10	81	19	0	10	90	0	57	40	3
36	Thermometer is equipment for measurement of temperature	89	0	11	90	0	10	100	0	0	100	0	0	90	3	7	100	0	0	97	3	0	95	1	4
37	In neighbour shops, mother bought 3 ons of red onion, 2 kg of sugar, 500 gr of egg and 4 litter of kerosene	68	16	16	52	29	19	60	35	5	52	45	3	31	62	7	87	13	0	43	57	0	56	37	7
38	Those land and building will be sell, the wide of land is 400 m2	89	0	11	81	5	14	85	15	0	79	17	3	83	7	10	100	0	0	100	0	0	88	6	5
39	The direction arrow at intersection show direction to Palopo is 435 km	68	26	6	48	19	33	65	35	0	45	48	7	52	41	7	84	16	0	20	80	0	54	38	8
40	The capasity of this truck tank is 800 litter	74	16	10	67	19	14	75	25	0	41	55	3	62	31	7	84	16	0	7	93	0	59	37	5
41	The bottle is containing 230 cc of drugs liquid	84	5	11	57	29	14	85	10	5	86	14	0	52	34	14	77	23	0	23	77	0	66	27	6
42	This machine is using electricity 10 A, 220 V and 60 Hz.	68	21	11	62	10	28	75	10	15	86	10	3	86	3	10	100	0	0	97	3	0	82	8	10
43	The weight of Palm oil in net is 5 kg	68	21	11	67	5	28	80	20	0	66	34	0	62	31	7	81	19	0	83	17	0	72	21	7
44	Product in packing (BDKT) are the products which the contens and volume is under monitoring of metrology	79	11	10	57	19	24	45	50	5	66	21	14	62	31	7	100	0	0	47	53	0	65	26	9
45	Product in packing (BDKT) which the object of metrology is only the product which display net contents and net weights at the packing or labels.	79	11	10	48	24	28	85	10	5	66	21	14	79	14	7	100	0	0	73	27	0	76	15	9
46	White sugar which sell and packing in vinnyl bag is not the product which the object of metrology	32	63	5	33	43	24	55	40	5	59	34	7	34	59	7	45	55	0	93	7	0	50	43	7
47	Baking peanuts netto 250 gr is produced by PT.Laris Manis-Makassar.	79	11	10	67	10	23	70	20	10	79	21	0	69	24	7	90	10	0	100	0	0	79	14	7
48	Tabacco with contents of 16 pieces is produced by PT.Menara Tinggi-Kudus	74	5	21	67	10	23	80	5	15	79	17	3	76	21	3	97	3	0	93	7	0	81	10	9
49	The palm oil in net contents 2 litter is packing by CV.Pasar Hiper-Bandung.	58	26	16	52	24	24	75	20	5	72	28	0	59	34	7	100	0	0	83	17	0	71	21	7
50	Distributing, packing and stocking of BDKT which size, volume and contenst in packing are less than legend in packing is not criminal	5	89	6	24	48	28	5	95	0	97	0	3	17	76	7	6	94	0	73	27	0	33	61	6
Average		**70**	**22**	**8**	**65**	**19**	**17**	**70**	**23**	**6**	**71**	**25**	**4**	**70**	**26**	**4**	**82**	**18**	**0**	**64**	**36**	**0**	**70**	**24**	**6**

A4.1.1 - 4

E. Summary

a) The reason for public opinion about the importance of existence of RVOs are:

1. Service which related to public needs in trading transaction
2. Can guarantee and ensuring the measurement
3. Can guarantee the difference in measurement within specified range
4. For protection when a problem rises between traders and buyers

b) The reasons of society opinion in importance to increasing re-verification are:

1. To protect producers and consumers from mistake in determining of quality and quantity of goods
2. To monitor the utilization of measuring instruments in public
3. To protect society in utilization of UTTP
4. To guarantee the correctness of measurement
5. Utilization of UTTP is closely related to living of consumers

c) The reasons of necessity to do monitoring of UTTP and BDKT are:

1. To guarantee products that consumers buy
2. To reduce the problem between traders and buyers
3. To protect consumers by law
4. To reduce the claim/request from public
5. To give protection to public needs

d) The reasons of importance of increasing guidance in metrology are:

1. To make public understand measurement units and its utilization (e.g., mass units etc.)
2. Many people still do not understand metrology and UUML
3. To make society know the correct method in measurements

e) Claim form society:

1. Many measurement instruments which are used in the market are not re-verification yet
2. Many traders/sellers are selling gasoline without use of any measurement instruments but using bottle whose the volume is not accurate
3. The service from metrology does not reach to remote area
4. This monitoring is not implemented periodically and does not cover all regions
5. The weighing instruments between stores and consumers show different weights

f) Request from the public:

1. RVOs should conduct monitoring to UTTP more actively
2. RVOs should do make dissemination/guidance activity to public in periodically and widely

3. Metrology activity should be disseminated to public so that the public can understand how to measure correctly
4. Metrological service should reach to remote area
5. Government should protect consumers and producers by minimizing losses in both sides.
6. RVOs should increase monitoring activities and guidance to entrepreneurs which use UTTP
7. RVOs should increase quality of service to society.

F. Conclusion

1. Most participants already know the Law of Legal Metrology
2. Most participants know and understand the existence of RVO
3. Most participants suggest that the existence of RVO is important
4. Most participants suggest that the service for re-verification should be wider and higher level
5. Most participants already know that the UTTP used for determining the quantity of goods should be re-verified
6. Most participants suggest that the monitoring of UTTP and BDKT is necessary to increase and should reach to remote area
7. Most participants hope all illegal activities in legal metrology to be punished
8. Most participants suggest that the guidance of metrology have important role, so it is necessary to enhance it in all level of society

Appendix 4.1.2

Detail of Questionnaire Survey for

Regional Verification Offices

Appendix 4.1.2 Detail of Questionnaire Survey for Regional Verification Offices

1. Outline of RVO

Q1. *Year of establishment* (Table 1.1)

- Number of responses: 33

Table 1.1 Year of Establishment

Before 1981	1981 - 2000	After 2000	Total
16 (48%)	13 (40%)	4 (12%)	33 (100%)

Q2. *Functions and responsibilities* (Table 1.2)

a) Do the functions and responsibilities change after the de-centralization?

- Number of responses: 33

Table 1.2 Change of Functions and Responsibilities after the De-centralization

Yes	No	Total
18 (55%)	15 (45%)	33 (100%)

b) If you answered "Yes", please describe below what has changed (Table 1.3).

- Number of responses: 15, multiple answers acceptable.

Table 1.3 Changed Functions and Responsibilities

Subject	Description	Number of response
1) Functions, additional	1) Administration	2
	2) Finance	2
	3) Retribution of UTTP service	2
	4) Range of area service	2
2) Functions, deleted	1) Nothing	1
	2) Authority to monitoring	9
	3) Closing equipment and building section	1
3) Responsibilities, additional	1) Administration	3
	2) Finance/ regional income	2
	3) Have to achieve income target	1
	4) Closing RVO building section	1
	5) Retribution re/verification	3
	6) System of recruitment	1
	7) Range of area service	1
	8) Packing goods	1
4) Responsibilities, deleted	1) Nothing	1
	2) Closing of monitoring and guidance sections	7

Q3. *Service Area*

a) Total service area (Table 1.4)

- Number of responses: 27
- Average service area is 50,921 Km^2.

Table 1.4 Service Area Distribution

Less than 10,000Km^2	10,000-30,000 Km^2	More than 30,000 Km^2	No response	Total
9 (27%)	11 (33%)	7 (21%)	6 (19%)	33 (100%)

b) Population (Table 1.5)

- Number of responses: 24
- Average population is 5.113 million persons.

Table 1.5 Population in Service Area

Less than 5 million person	5-10 million	More than 10 million	No response	Total
15 (45%)	6 (18%)	3 (9%)	9 (28%)	33 (100%)

Q4. *Major activities of RVOs* (Table 1.6)

- Number of responses: 33, multiple answers acceptable

Table 1.6 Major Activities of RVO

Description	Number of responses	Major activities of RVO
1) Verification/re-verification	33	◎
2) Periodical inspection	24	◎
3) On-the-spot inspection	28	◎
4) PR of legal metrology	21	◎
5) Others	12	
* Calibration	(2)	
* Re-measurement quantity of goods	(4)	
* Inventory of UTTP	(2)	
* Monitoring and inspection	(3)	
* Coordination	(1)	

Q5. *Number of staffs*

- Number of responses: 30
- Average number of staffs is 32.2 persons.
- Table 1.7 shows total number of staffs of RVO.

Table 1.7 Total Number of Staffs of RVO

Less than 20 person	20-30 persons	More than 30 persons	No response	Total
7 (21%)	13 (39%)	10 (30%)	3 (10%)	33 (100%)

- Table 1.8 shows number of staffs by type of job.
- Number of responses: 27

Table 1.8 Number of Staffs by Type of Job

Description	Total Number of responses	Number of staffs/ Office
1) Metrological Engineer	172	6.3
2) Technical Assistant	50	1.9
3) Inspector	214	7.9
4) Assistant to Inspector	81	3.0
5) Administration staff	248	9.1
6) Others	116	4.3

2. Verification/Re-verification including on-the-spot inspection of pre-packaged goods

Q6. *Users and manufacturers of legally controlled measuring instruments* (Table 2.1)

- Number of responses: 33, multiple answers acceptable.

Table 2.1 Users and Manufacturers

Users and manufacturers	Number of responses	Main users
1) Stores	33	◎
2) Taxi companies	18	◎
3) Filling stations	33	◎
4) Electric power companies	17	◎
5) Town gas (LPG) suppliers	21	◎
6) City water suppliers	18	◎
7) Transportation companies,	14	◎
8) Manufacturers	20	◎
(a) Building material (cement etc)	(4)	
(b) Packaged good	(4)	
(c) Tank truck	(1)	
(d) UTTP maker	(5)	
(e) Food and drinks	(3)	
(f) Textile and chemical	(1)	
(g) Fertilizer	(1)	
(h) DLLAJR	(1)	
9) Others	7	
(a) Soybean	(2)	
(b) Rice	(1)	
(c) Supplier of fuel	(3)	
(d) Sugar, palm oil factory	(2)	

Q7. *Kinds of legally controlled measuring instruments for verification/re-verification* (Table 2.2)

- Number of responses: 32, multiple answers acceptable.

Table 2.2 Kinds of Legally Controlled Measuring Instruments

Measuring instruments	Number of responses	Main instruments
1) Weighing instruments	32	◎
2) Weights	31	◎
3) Taxi meters	18	◎
4) Fuel dispensers	31	◎
5) Watt-hour meter	24	◎
6) Gas meters	5	
7) Water meters	17	◎
8) Pressure gauges	5	
9) Others	11	
(a) Tusid, TUM, Tustsida, tongkang	(7)	
(b) Weight	(1)	
(c) Moisture	(2)	
(d) Fuel flow meter	(1)	

Q8. *Do you report the data and information to DOM including verification/re-verification records every year?* (Table 2.3)

- Number of responses:33

Table 2.3 Reporting to DOM

Yes	No	Total
24 (72%)	9 (28%)	33 (100%)

Reason of 'No'

- Send to provincial government.
- No official form.

Q9. *Did you complete the verification/re-verification of all the measuring instruments subject to the verification/re-verification last year?* (Table 2.4)

- Number of responses: 31

Table 2.4 Implementation of the Verification/Re-verification

Yes	No	No response	Total
22 (67%)	9 (27%)	2 (6%)	33 (100%)

Q10. *If you answered "No", what percentage do you cover?* (Table 2.5)

- Number of response: 9

Table 2.5 Implementation Ratio

More than 80%	50-80%	Less than 50%	No response	Total
2 (22%)	5 (56%)	2 (22%)	0	9 (100%)

Q11. *Number of measuring instruments for verification/re-verification by kind of instrument for the past 3 years with fees for verification*: (Table 2.6)

- Number of responses: 24, multiple answers acceptable.

Table 2.6 Number of Measuring Instruments for Verification/Re-verification (Total of 24RVOs)

Measuring Instrument	Number of measuring instruments			Fee (Rp/unit)	
	2003	2004	2005	Verification	Re-verification
1) Weighing instruments	618,310	328,637	443,321	10,000	5,000
2) Weights	998,281	874,906	1,159,912	300-1000	200-500
3) Taxi meters	37,031	38,071	47,375	10,000	5,000
4) Fuel dispensers	18,190	22,412	25,517	50,000	40,000
5) Watt-hour meters	831,910	491,402	890,894		
6) Gas meters	0	37	170		
7) Water meters	178,468	141,290	144,493	4,000	2,000
8) Pressure gauges	3	0	8		
9)Tank Truck	12,294	16,650	9,747	30,000	20,000
10) Tank fix	216	185	182		
11) Volume	4,633	7,680	34,876	400-2,000	200-2,000
12) Flow meter	426	325	792	30,000	30,000
13) Length	140	138	100		
14) Wet measure	1,264	1,098	964		

Q12. *Percentage of measuring instruments that did not pass the verification/re-verification by kind for the past 3 years.*(Table 2.7)

- Number of responses: 14

Table 2.7 Defective Rate of Verification/Re-verification (Average of 14 RVOs)

Measuring Instruments	2003	2004	2005
1) Weight instruments	12.7%	11.1%	9.9%
2) Weight	6.0	5.0	4.5
3) Taxi meters	3.8	4.8	6.0
4) Fuel dispensers	11.7	10.2	10.7
5) Watt-hour meters	6.8	6.3	14.3
6) Gas meters			
7) Water meters	7.4	7.0	6.6
8) Pressure gauges	10.7	20.5	35.0

9)Tank truck	2.0	3.0	15.3
10) Volume	10.0	5.0	6.0
11) Flow meter	5.0	6.0	17.5
12) Tank fix	5.0	3.5	8.0

Q13. *Actual number of pre-packaged goods inspected on-the-spot by kind for the past 3 years* (Table 2.8)

- Number of responses: 11

Table 2.8 Number of Pre-packaged Goods Inspected On-the-spot (Total of 11 RVOs)

Name of goods	2003	2004	2005
1) Rice	1,248	1,102	574
2) LPG	2,576	2,142	532
3) Sugar	28	14	780
4) Flour	9	12	234
5) Drinks	101	1,200,151	1,200,151
6) Coffee	225	276	480
7) Sirop	0	0	135
8) Peanuts	0	0	300
9) Green peanuts/soybean	0	0	241
10) Ketchup	50	95	135
11) Tomato sauce	50	90	130
12) Garlicky fries	100	225	315
13) Cement	2	3	3
14) Foods	101	151	151
15) Cosmetics	20	20	30
16) Fertilizer	1	1	1
17) Canned fish	4	7	18
18) calk	2	1	3
19) BBI balance		10	10

Q14. *Percentage of pre-packaged goods that did not pass the inspection by kind for the last 3 years:*

- No valid answers are available.

Q15. *Methods to inform users about verification/re-verification*:

- Number of responses: 29, multiple answers acceptable.
- Table 2.9 shows methods to inform users about verification/re-verification.

Table 2.9 Methods to Inform Users about Verification/Re-verification

1) Notification by RVO	2) Newspaper	3) Radio	4) Others:
19	10	19	14

Q16. *Estimation of increase/decrease rates of number of measuring instruments subject to verification/re-verification in 2010.* (Table 2.10)

- Number of responses: 22

Table 2.10 Estimation of Increase/Decrease Rates of Number of Measuring Instruments

Measuring Instrument	Increase/decrease rate		Number of responses	Remarks
	2005	2010		
1) Weight instruments	100	148	22	
2) Weight	100	135	22	
3) Taxi meters	100	138	16	
4) Fuel dispensers	100	131	21	
5) Walt-hour meters	100	164	22	
6) Gas meters	100	143	7	
7) Water meters	100	253	12	
8)Pressure	100	150	1	
9)Others				

3. Technology and manual

Q17. a) *Do you think that your staffs' technology and/or technical skills are sufficient for the operation?* (Table 3.1)

- Number of responses: 33

Table 3.1 Satisfaction of Staffs' Technology and/or Technical Skills

Yes	Partly yes	No	No response	Total
3 (9%)	21 (64%)	9 (27%)	0	33 (100%)

b) *If you answered "No", what kinds of technology and/or skills are required for improvement?* (Table 3.2)

- Number of responses: 26, multiple answers acceptable.

Table 3.2 Requirement of Technology and/or Skills to be Up Grade

Description	Number of response	Major requirement
1) Basic knowledge of legal metrology	12	○
2) Basic skills for machinery/Measuring instruments	12	○
3) Basic skills for electricity/electronics	17	○
4) Up-dated technology,	26	◎
5) Maintenance skills	17	○
6) Others	7	
* Computer	(3)	
* Repairing equipment	(2)	
* Telephone	(1)	
* Lab standards management	(1)	

Q18. *Do you have manuals for verification/re-verification?*(Table 3.3)

- Number of responses: 33

Table 3.3 Provision of the Manuals

Yes	No	Partly	No response	Total
27 (82%)	4 (12%)	2 (6%)	0	33 (100%)

4. Human Resources Development (HRD)

Q19. *What measures do you take for HRD?* (Table 4.1)

- Number of responses: 33, multiple answers acceptable.

Table 4.1 Measures for HRD

Description	Number of responses	Major action
1) Periodical internal training	12	○
2) Internal training as required	9	○
3) Dispatch of staff to outside training organizations	28	◎
4) Almost no training	0	
5) Others:	7	
* DINAS staff * Motivation to learn	(1) (1)	
* Workshop training	(3)	
* Training to oversea	(1)	
*Internal competition	(1)	

Q20. *Do you get assistance from DOM for HRD?* (Table 4.2)

- Number of responses: 33

Table 4.2 Acquisitions of Assistance from DOM for HRD

Yes	No	Total
25 (76%)	8 (24%)	33 (100%)

a) *If you answered "Yes", what does DOM assist you in HRD?* (Table 4.3)

- Number of responses: 22, multiple answers acceptable.

Table 4.3 Received Assistance from DOM in HRD

Description	Number of response	Major action
1) Training of skill up, technical guidance	19	◎
2) Instructor, consultation, advice	4	
3) Watt-hour meter and telephone training	2	

4) New technology information	2	
5) Metrological regulation	1	

b) *Is DOM's assistance sufficient for the operation?* (Table 4.4)

- Number of responses: 30

Table 4.4 Satisfaction of DOM's Assistance

Yes	No	No response	Total
7 (22%)	23 (70%)	3 (8%)	33 (100%)

Q21. *What do you expect for future HRD?* (Table 4.5)

- Number of responses: 33, multiple answers acceptable.

Table 4.5 Expectation for Future HRD

Items	Number of response	Major expectation
1) Basic knowledge	12	○
2) Up-dated technology	30	◎
3) Measuring instruments/Machine	22	◎
4) Electricity/Electronics	29	◎
5) Maintenance technology	25	◎
6) Others	12	
* Computer related, communication tech	(4)	○
* Post graduate programs	(2)	
* Repairing digital equipment	(2)	
* Metrological book/ reference law	(2)	
* Management	(1)	
* Related to re/verification UTTP	(1)	

Q22. *How many trainees did you send in 2005?* (Table 4.6)

- Number of responses: 31

Table 4.6 Number of Trainees Sent in 2005 (Total of 31 RVOs)

Classification	Number of responses	Distribution
1) 0 persons	0	0
2) 1-3 persons	16	52
3) 4-6 persons	13	42
4) 7-9 persons	1	3
5) Over 10 persons	1	3

Q23. *How many trainees will you send annually?*

a) *Long-term training course to MTC* (Table 4.7)

- Number of responses: 31

Table 4.7 Number of Expected Trainees for Long-term Training Course to MTC (Total of 31 RVOs)

Classification	Number of responses	Distribution
1) 0 persons	1	3
2) 1-3 persons	13	46
3) 4-6 persons	9	27
4) 7-9 persons	3	9
5) Over 10 persons	5	15

b) *Short-term training course* (Table 4.8)

- Number of responses: 30

Table 4.8 Number of Expected Trainees for Short-term Training Course (Total of 30 RVOs)

Classification	Number of responses	Distribution
1) 0 persons	1	3
2) 1-3 persons	12	41
3) 4-6 persons	11	37
4) 7-9 persons	1	3
5) Over 10 persons	5	16

5. Budget

Q24. *Please let us know the sources of budget for the operation of RVO, such as from provincial government, DOM etc.* (Table 5.1)

- Number of responses: 33

Table 5.1 Sources of Budget

Source	Number of responses	Major source
1) From the provincial government	32	◎
2) From DOM	7	
3) Verification/re-verification fees	2	
4) Others	6	
* P3DN	(1)	
* APBN(DAU) national budget	(5)	

Q25. *Is the budget you obtained sufficient for keeping the operation?* (Table 5.2)

- Number of responses: 32

Table 5.2 Sufficiency of Obtained Budget for Keeping the Operation

Yes	No	No response	Total
8 (24%)	24 (73%)	1 (3%)	33 (100%)

Q26. *Please provide us with the detailed budget, and actual income and cost for the*

operation

1) Year: 2005

2): Income: 198,451,576 Rp (US$2,157)/year (Source; 28RVO average)

3) Cost: 648,303,148 Rp (US$7,047) /year (Source; 27RVO average)

6. Relationship with DOM

Q27. *Do you receive guidance and/or technical assistance from DOM for implementation of legal metrology?*(Table 6.1)

- Number of responses: 33

Table 6.1 Receiving Guidance and/or Technical Assistance from DOM

Yes	No	Total
30 (91%)	3 (9%)	33 (100%)

Q28. *What role do you expect for DOM?* (Table 6.2)

- Number of responses: 33

Table 6.2 Expectation for DOM

Description	Number of responses	Major expectation
1) Traveling instruction	26	◎
2) Provision of manuals	24	◎
3) Calibration of secondary standards	22	◎
4) Assistance in verification/re-verification	9	
5) Dispatch of information and frequent communication,	27	◎
6) Others	12	
* Aid in facilities	(4)	
* Cooperation in special UTTP	(1)	
* Metrological book/reference	(2)	
* Building	(1)	
* Providing human resources	(1)	
* Consultation	(1)	
* Technical training	(2)	

7. Dissemination and PR

Q29. *How do you make PR for dissemination of the legal metrology?*(Table 7.1)

- Number of responses: 33

Table 7.1 Dissemination and PR

Items	Number of responses	Major dissemination
1) Pamphlets	19	◎
2) Seminar	6	◎
3) Exhibition/Demonstration,	12	◎
4) Consumer's participation in monitoring	22	◎
5) Radio discussion, TV, news paper	7	◎
6) Others	1	
*Cooperation with kabupaten/city	(1)	

8. Legal Metrology Standardization Center (LMS Center)

Q30. *Do you think you need such LMS Centers for the improvement of your operation?*(Table 8.1)

- Number of responses: 33

Table 8.1 Needs of LMS Centers

Yes	No	Total
20 (60%)	13 (40%)	33 (100%)

1) *Yes, Reason* (Table 8.2)

- Number of responses: 20, multiple answers acceptable.

Table 8.2 Reason of Need of LMS Center

Description	Number of responses	Major reason
1) Calibration of standards	4	◎
2) HRD	1	
3) Effective coordination and control	8	◎
4) Support RVO which insufficient in facilities	6	◎
5) Lampung to Bandung not to Medan	1	
6) To cover regional service	3	◎
7) Easier traceability	1	

2) *No, Reason* (Table 8.3)

- Number of responses: 13, multiple answers acceptable

Table 8.3 Reason of Unnecessary LMS Center

Reason	Number of responses	Major reason
1) Re-verification is authority of RVO.	4	◎
2) Increasing capability existing RVO	4	◎
3) Should do at DOM/MTC.	4	◎
4) Promotion and socialization in metrology is priority.	1	
5) Our RVO is near to DOM.	3	◎

6) Rising dualism in metrology	1	◎

9. Expansion of RVOs

Q31. *According to the new Autonomy Law, the administration of RVOs shall be shifted to the governments of prefectures and cities. In your region, is such a plan under way?* (Table 9.1)

- Number of responses: 31

Table 9.1 Expansion Plan

Yes	Not clear	No	No response	Total
12 (36%)	17 (52%)	2 (6%)	2 (6%)	33 (100%)

1) In case yes, how soon will it be realized? (Table 9.2)

- Number of responses: 9

Table 9.2 Timing of Realization

Within 1 year	2-3 years	4-5 years	No response	Total
5 (42%)	1 (8%)	3 (25%)	3(25%)	12 (100%)

10. Areas of RVO and buildings

Q32. *Area*

a) Total area of RVO (Land area) (Table 10.1)

- Number of responses: 28

Table 10.1 Total Land Area

Less than 2,000 m^2	2,000-5,000 m^2	Over than 5,000 m^2	No response	Total
8 (24%)	16 (48%)	4 (12%)	3(25%)	12 (100%)

b) *Total floor area* (Table 10.2)

- Number of responses: 24

Table 10.2 Total Floor Area

Less than 500 m^2	500-1,000 m^2	Over than 1,000 m^2	No response	Total
9 (27%)	7 (22%)	8 (24%)	9 (27%)	12 (100%)

c) *Number of stories/floors of building* (Table 10.3)

- Number of responses: 27

Table 10.3 Number of Stories

One story	Two-stories	Three-stories	No response	Total
20 (60%)	5 (15%)	2 (6%)	6 (19%)	33 (100%)

c-1) *Underground floor* (Table 10.4)

- Number of responses: 25

Table 10.4 With/Without Underground Floor

With underground floor	Without underground floor	No response	Total
0	25 (75%)	8 (25%)	33 (100%)

d) *Do you have a plan for renovation, rebuilding, etc?* (Table 10.5)

- Number of responses: 27

Table 10.5 Renovation, Rebuilding Planning

Yes	No	Do not know	No response	Total
16 (48%)	9 (27%)	2 (6%)	6 (19%)	33 (100%)

11. Equipment, measuring instruments and secondary standards

Q33. *Existing equipment and measuring equipment* (Table 11.1)

Do you think that the existing equipment and measuring equipment is sufficient for conducting legal metrology service?

- Number of responses: 28

Table 11.1 Satisfaction of Existing Equipment and Measuring Equipment

Yes	No	No response	Total
3 (9%)	25 (76%)	5 (15%)	33 (100%)

Q34. *Necessary equipment*

If you answer "No" on above, what kind of equipment and/or measuring instruments do you want to purchase? (Table 11.2)

- Number of responses: 27, multiple answers acceptable.

Table 11.2 Necessary Equipment

Necessary equipment	Number of responses	Major
1) All standard and optional	7	◎
2) Mass and volume	3	◎
3) Partly	3	◎
4) Taxi meter	2	
5) Temperature and pressure	6	◎
6) Volume measurement moisture	4	◎
7) Water meter and fuel	5	◎
8) Laboratory level B	2	
9) Parking, telephone, gas	2	
10) Watt-hour meter	3	◎
11) Moisture	3	◎
12) Health measurement	1	
13) Mass comparator	1	

Q35. *Maintenance*

Who conduct the maintenance of facility, equipment and measuring instruments?(Table 11.3)

- Number of responses: 30

Table 11.3 Way of the Maintenance

By employee of RVO	Sub-contract	Others	No response	Total
30 (91%)	0	0	3 (9%)	33 (100%)

12. Ambient conditions and utilities

Q36. *Problems*

a) *Do you have sufficient air conditioning units in your laboratory?* (Table 12.1)

- Number of responses: 33

Table 12.1 Existence of Air Conditioning Problem

Yes	No	Total
17 (52%)	15 (48%)	33 (100%)

b) *Does the electricity have problems?* (Table 12.2)

- Number of responses: 32, multiple answers acceptable

Table 12.2 Existence of Electricity Problem

Description	Number of responses	Distribution
No problem	14	40
Problems		60
1) Power failure	4	(11)
2) Fluctuation of power supply	17	(49)

c) *Problems on water supply* (Table 12.3)

- Number of responses: 32, multiple answers acceptable

Table 12.3 Existence of Water Supply Problem

Description	Number of responses	Distribution
No problem	18	56
Problems		44
1) Supply volume	3	(9)
2) Seasonal fluctuation	7	(23)
3) Not clear water	4	(12)

Appendix 5.2.3

Overview of Measurement Law

Appendix 5.2.3

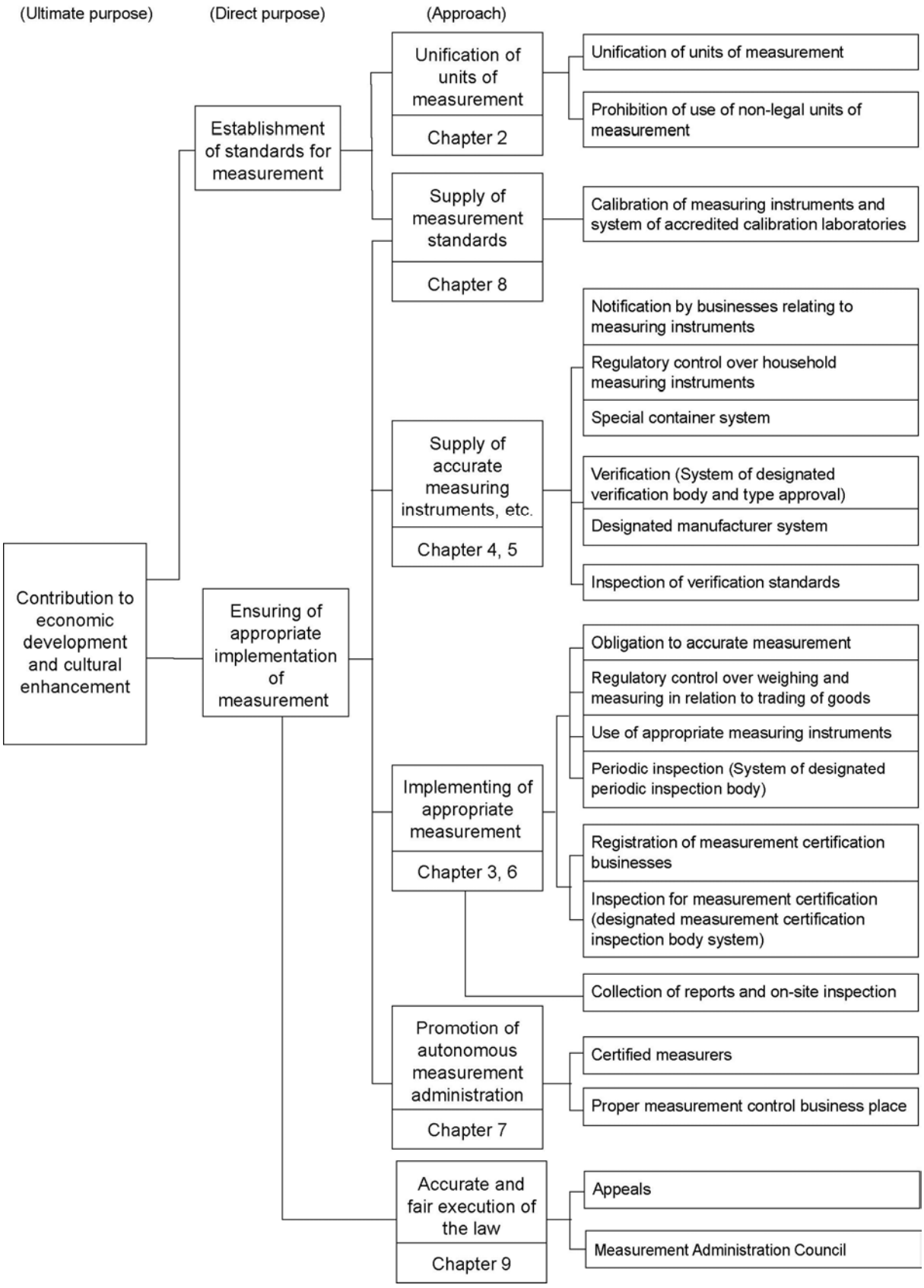
Overview of Measurement Law

June 2005

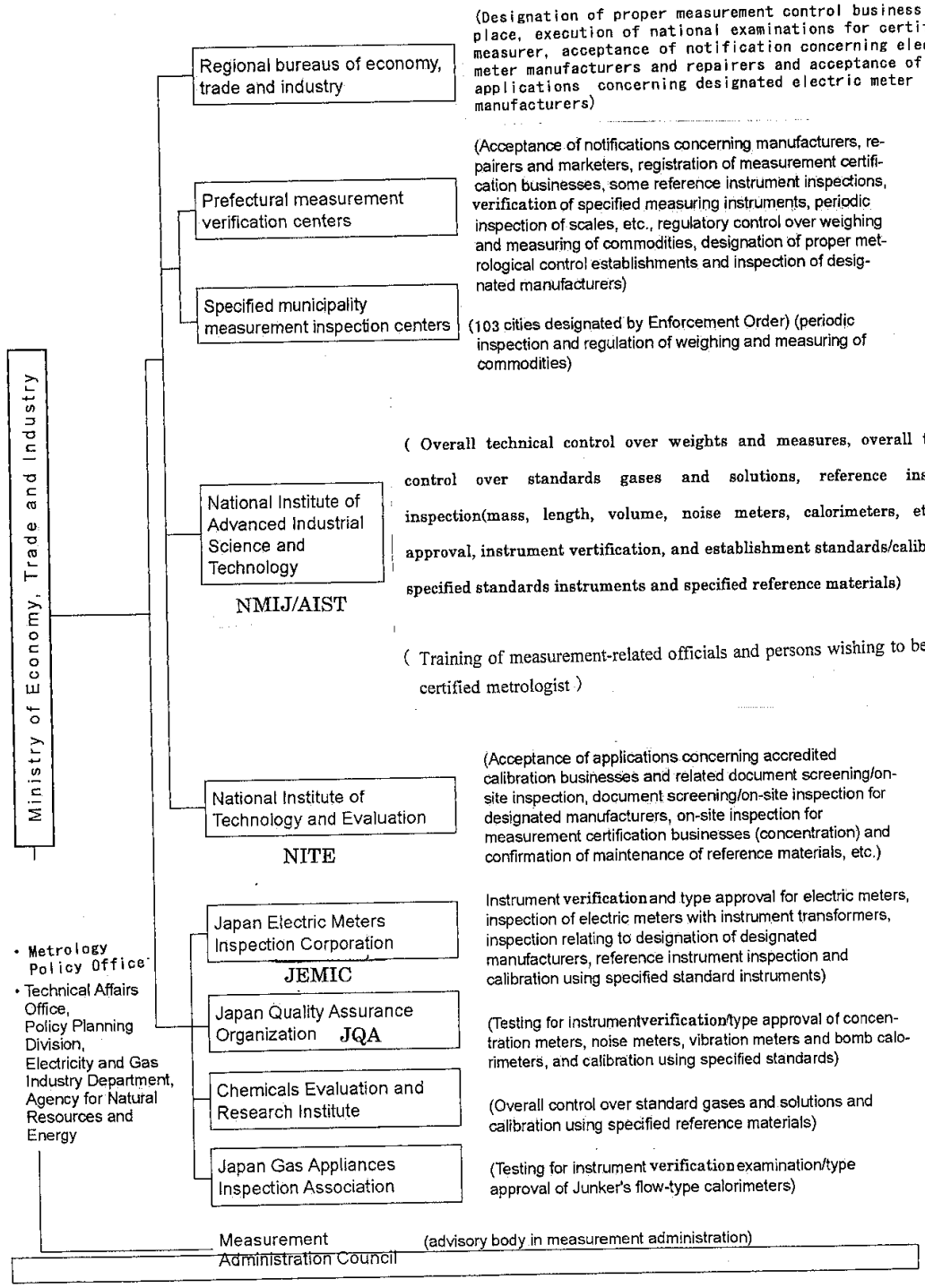
Metrology Policy Office, METI

CONTENTS

1. Structure of the Measurement Law



2. Institutions Related to the Measurement Law



3. Unification of Units of Measurement

Traditionally, all countries had their own units of measurement, resulting in the coexistence of diverse systems of units of measurement. To rectify this situation, the Convention of the Metre was signed in 1875, and worldwide efforts to unify units of measurement under the metric system followed.

As part of this process, Japan converted its traditional "shakkan" system of units of measurement to the metric system.

- 1921 Stipulation of unification of units of measurement under the metric system by the Weights and Measures Law
- 1959 Adoption of metric system in general commercial transactions
- 1966 Adoption of metric system in real estate transactions (conversion to the metric system completed)

However, since the metric system contained several variant systems of units of measurement, the International System of Units (SI) was adopted at the 1960 General Conference on Weights and Measures to ensure a strict one-to-one correspondence between quantities and units of measurement worldwide.

Coinciding with an amendment of its Measurement Law, Japan moved to totally embrace the SI units in 1992 by imposing an in-principle ban on the use of non-SI units in transaction and certification activities so as to fulfill its responsibility as a major economic power amid accelerating globalization.

> Example: Outlawing the use of measuring instruments calibrated to "yards", "pounds", "shaku" or "kan" for transaction and certification purposes

In this regard, it was decided to phase-in the conversion by granting three grace periods according to individual units in view of the fact that there were areas where non-SI units were widely used. Except for certain medical applications, these grace periods expired in September 30, 1999.

< Main examples of change >:

- Sound pressure level .....phon → decibel
- Force .....kilogram-force (kgf) → newton
- Heat.....calorie → joule
- Magnetic flux density .....gauss → tesla

< Non-SI units still permitted as exceptions >

- Carat (limited to the measurement of the mass of gem stones)
- Are, hectare (limited to the measurement of the area of land)
- Calorie (limited mainly to the measurement of heat energy intake of people and animals)
- Knot (limited to the measurement of velocities in marine or aeronautical navigation)

Related laws and ordinances: Measurement Law, Articles 3-9,
Enforcement Order on the Mesurement Units

Main Statutory Units of Measurement

Table 1: SI Units of Measurement

Quantity		Unit of measurement (symbol)
Basic	1. Length	1. Meter (m)
	2. Mass	2. Kilogram (kg), gram (g) and tonne (t)
	3. Time	3. Second (s), minute (min) and hour (h)
	4. Electric current	4. Ampere (A)
	5. Temperature	5. Kelvin (K) and degrees Celsius or degrees centigrade (°C)
	6. Amount of substance	6. Mole (mol)
	7. Luminous intensity	7. Candela (cd)
Space and time	8. Angle	8. Radian (rad), degree (°), minute (') and second (")
	9. Solid angle	9. Steradian (sr)
	10. Area	10. Square meter (m^2)
	11. Volume	11. Cubic meter (m^3) and liter (l or L)
	12. Angular velocity	12. Radians per second (rad/s)
	13. Angular acceleration	13. Radians per second per second (rad/s^2)
	14. Velocity	14. Meters per second (m/s) and meters per hour (m/h)
	15. Acceleration	15. Meters per second per second (m/s^2)
	16. Frequency	16. Hertz (Hz)
	17. Rotational speed	17. Per second (s^{-1}), per minute (min^{-1}) or per hour (h^{-1})
	18. Wave number	18. Per meter (m^{-1})
Dynamics	19. Density	19. Kilograms per cubic meter (kg/m^3), grams per cubic meter (g/m^3) and grams per liter (g/l or g/L)
	20. Force	20. Newton (N)
	21. Moment of force	21. Newton meter (N·m)
	22. Pressure	22. Pascal (Pa), newtons per square meter (N/m^2) and bar (bar)
Quantity		Unit of measurement (symbol)
Dynamics	23. Stress	23. Pascal (Pa) and newtons per square meter (N/m^2)

	24. Viscosity	24. Pascal second (Pa·s) and newtons second per square meter ($N·s/m^2$)
	25. Dynamic viscosity	25. Square meters per second (m^2/s)
	26. Work	26. Joule (J), watt second (W·s) and watt hour (W·h)
	27. Power	27. Watt (W)
	28. Mass flow rate	28. Kilograms per second (kg/s), kilograms per minute (kg/min), kilograms per hour (kg/h), grams per second (g/s), grams per minute (g/min), grams per hour (g/h), tonnes per second (t/s), tonnes per minute (t/min) and tonnes per hour (t/h)
	29. Flow rate	29. Cubic meters per second (m^3/s), cubic meters per minute (m^3/min), cubic meters per hour (m^3/h), liters per second (l/s or L/s), liters per minute (l/min or L/min) and liters per hour (l/h or L/h)
	61. Oscillating acceleration level	61. —
Heat	30. Heat	30. Joule (J), watt second (W·s) and watt hour (W·h)
	31. Thermal conductivity	31. Watts per meter per kelvin (W/(m·K)) and watts per meter per degree (W/(m·°C))
	32. Specific heat capacity	32. Joules per kilogram per kelvin (J/(kg·K)) and joules per kilogram per degree (J/(kg·°C))
	33. Entropy	33. Joules per kelvin (J/K)
Electricity and magnet-ism	34. Quantity of electricity	34. Coulomb (C)
	35. Electric field strength	35. Volts per meter (V/m)
	36. Voltage	36. Volt (V)
	37. Electromotive force	37. Volt (V)
	38. Capacitance	38. Farad (F)
	39. Magnetic field strength	39. Amperes per meter (A/m)
	40. Magnetomotive force	40. Ampere (A)
	41. Magnetic flux density	41. Tesla (T)
	42. Magnetic flux	42. Weber (Wb) and webers per square meter (Wb/m^2)
	43. Inductance	43. Henry (H)
Electricity and magnet-ism	44. Electrical resistance	44. Ohm (Ω)
	45. Electrical conductance	45. Siemens (S)
	46. Impedance	46. Ohm (Ω)
	47. Electric power (real power)	47. Watt (W)
	48. Reactive power	48. —
	49. Apparent power	49. —
	50. Electric energy (real energy)	50. Joule (J), watt second (W·s) and watt hour (W·h)
	51. Reactive energy	51. —
Quantity		Unit of measurement (symbol)
Electricity and magnet-ism	52. Apparent energy	52. —
	53. Attenuation of electromagnetic wave	53. —
	54. Power density of electromagnetic wave	54. Watts per square meter (W/m^2)

Light and radiation	55. Radiant intensity	55. Watts per steradian (W/sr)
	56. Luminous flux	56. Lumen (lm)
	57. Luminance	57. Candelas per square meter (cd/m^2)
	58. Illuminance	58. Lux (lx)
	63. Neutron emission rate	63. Per second (s^{-1}) and per minute (min^{-1})
	64. Radioactivity	64. Becquerel (Bq) and curie (Ci)
	65. Absorbed dose	65. Gray (Gy) and rad (rd)
	66. Absorbed dose rate	66. Grays per second (Gy/s), grays per minute (Gy/min), grays per hour (Gy/h), rads per second (rd/s), rads per minute (rd/min) and rads per hour (rd/h)
	67. Kerma	67. Gray (Gy)
	68. Kerma rate	68. Grays per second (Gy/s), grays per minute (Gy/min) and grays per hour (Gy/h)
	69. Exposure	69. Coulombs per kilogram (C/kg) and roentgen (R)
	70. Exposure rate	70. Coulombs per kilogram per second (C/(kg·s)), coulombs per kilogram per minute (C/(kg·min)), coulombs per kilogram per hour (C/(kg·h)), roentgens per second (R/s), roentgens per minute (R/min) and roentgens per hour (R/h)
	71. Dose equivalent	71. Sievert (Sv) and rem (rem)
	72. Dose equivalent rate	72. Sieverts per second (Sv/s), sieverts per minute (Sv/min), sieverts per hour (Sv/h), rems per second (rem/s), rems per minute (rem/min) and rems per hour (rem/h)
Miscella-neous	59. Sound power	59. Watt (W)
	60. Sound pressure level	60. —
	62. Concentration	62. Moles per cubic meter (mol/m^3), moles per liter (mol/l or mol/L), kilograms per cubic meter (kg/m^3), grams per cubic meter (g/m^3) and grams per liter (g/l or g/L)

Table 2: Non-SI Units with Restricted Application

Quantity	Unit of measurement (symbol)
1. Length	1. Nautical mile (M or nm) {applicable to distances measured at sea or in the air} Angstrom (Å) {e.g. applicable to electromagnetic waves, film thickness, surface roughness and crystal lattices}
2. Mass	2. Carat (ct) {mass of gem stones} Monme (mon) {mass of pearls} Troy ounce (oz) {mass of gold coin}
8. Angle	8. Point (pt) {marine or aeronautical navigation}
10. Area	10. Are (a) and hectare (ha) {area of land}
11. Volume	11. Ton (T) {displacement of marine vessels}
14. Velocity	14. Knot (kt) {marine or aeronautical navigation}
15. Acceleration	15. Gal (Gal) and milligal (mGal) {gravitational acceleration and earth tremor}
22. Pressure	22. Torr (Torr), millitorr (mTorr) and microtorr (μTorr) {pressure within organisms} Millimeter of mercury column (mmHg) {blood pressure}
30. Heat	30. Calorie (cal), kilocalorie (kcal), megacalorie (Mcal) and gigacalorie (Gcal) {nutrition and metabolism}

Remark: { } shows permitted areas of use.

4. Specified Commodity Quantities System

While the Measurement Law requires measurement in general "to be made as accurately as possible," it provides for a specific obligation for the measurement of certain commodities as specified in the Enforcement Order (specified commodities), encompassing meat, vegetables, seafoods and other similar consumer goods so that they be weighed and measured within the specified margin of error (quantity tolerance) from the viewpoint of fair trade and consumer protection.

Given the fact that some commodities are not amenable to precise measurement which would invariably produce the "true value," the intention of this provision is to specify a "quantity tolerance", an allowable range of error which is unavoidable due to their characteristics as commodities.

< Quantity tolerances of major commodities >

-Confections	5g ~ 50g	→ Up to 4%
-Meat(exclude whale meat),	50g ~ 100g	→ Up to 2g
chilled meat and processed	100g ~ 500g	→ Up to 2%
meat	500g ~ 1 kg	→ Up to 10 g
	1 kg ~ 25 kg	→ Up to 1%
- Noodles, pasta , etc.	5g ~ 50g	→ Up to 6%
	50g ~ 100g	→ Up to 3g
	100g ~ 500g	→ Up to 3%
	500g~ 1.5 kg	→ Up to 15 g
	1.5 kg ~ 10 kg	→ Up to 1%

Some specified commodities are subject to compulsory net quantity indication when sold in sealed packaging. Here, sealed packaging refers to nonreversible packaging, such as sealed up bottles and cans, and reversible packaging, such as cling wrapping is not applicable.

Examples of sealed up specified commodities: soybean paste, soy sauce, milk and cheese

Although kerosene is not a sealed commodity, it is also subject to compulsory net quantity indication when sold in a container. This gives consumers peace of mind when purchasing measured commodities.

Related laws and ordinances: Measurement Law, Article 11 to 15, and Cabinet Order for Measurement concerning Sale of Specified Commodities, etc.

5. Regulation of Measuring Instruments

The Measurement Law calls for the use of appropriate measuring instruments in measurement undertaken as part of economic or other activities so as to ensure accuracy.

Measuring instruments needed fit for official guarantee of accuracy because of their use for transaction/certification purposes or official regulatory control because of their close relation to people's daily lives (specified measuring instruments) are required to meet set accuracy standards through verification, etc.

< Scope of Measuring Instruments >

- Items not classified as measuring instruments —— buckets, rulers and syringes
- Measuring instruments
  - Measuring instruments not used for transaction/certification purposes
    - Ex. lactometers, tanks with scale and measuring cylinders
  - Measuring instruments with acceptable accuracy
    - Ex. clocks/watches, length gauges (rulers/tape measures), sake/rice measures and dosimeters
  - Specified measuring instruments
    - Ordinary specified measuring instruments
      - Ex. taxi meters, LPG meters, densimeters and illuminometers
    - Specified measuring instruments required to be used under set conditions in terms of the method of use, measurement range, etc.
      - Ex. water meters, fuel oil meters, gas meters and watt-hour meters
    - Specified measuring instruments subject to compulsory periodic inspection
      - • Nonautomatic scales, balance weights, counterweights and leather area measuring machines
    - Specified measuring instruments subject to transfer restrictions, etc. as well as certification
      - • Glass thermometers, aneroid sphygmomanometers and resistance thermometers
    - Household measuring instruments (not subject to certification but required to comply with Measurement Law Enforcement Regulations)
      - • Health meters, baby scales and kitchen scales
    - Specified measuring instruments not subject to certification
      - Ex. On-board truck scales and small-footprint mat scales
  - Measuring instruments used by experts with adjustments
    - Ex. Some concentration meters (e.g. gas chromatographs)
  - High precision measuring instruments requiring user accuracy check
    - Ex. Length meters (block gauges and vernier calipers), electrical measuring instruments and radioactivity-related measuring instruments
- Special containers —— Any shape of containers used to sell set amounts of liquid product through filling up to a set level, it may be compared to "similar measuring instruments"
  - Ex. Approved beer bottles, soy sauce bottles, milk bottles and liquid pesticide

Related laws and ordinances: Measurement Law, Articles 16-18 and 53-69,
Enforcement Order for the Measurement Law

Verification and Inspection for Specified Measuring Instruments

Under the Measurement Law, specified measuring instruments are subject to instrument verification and/or inspection to ensure their accuracy.

• Verification

In principle, all specified measuring instruments are subject to a verification conducted by the National Institute of Advanced Industrial Science and Technology (AIST), a prefectural government, the Japan Electric Meters Inspection Corporation or a designated verification body to check conformity to set technical standards in terms of structure and instrumental error.

In this regard, measuring instruments used in combination with other devices or systems, such as a taxi meter , which is equipment-mounted on a vehicle, and an electric meter, which is connected to transformer, are subject to compulsory inspection conducted in installed state (equipment-mounted inspection, electric meter with transformer fitting inspection) to ensure accuracy in their actual state of use, in addition to a verification examination.

Some specified measuring instruments have a specific validity period of verification, while others do not. measuring instruments in the latter case, are subject to periodic inspections or equipment-mounted inspections as necessary to ensure accuracy if they are susceptible to fluctuations in performance or instrumental error due to the nature of their use.

- Specified measuring instruments with fixed validity period of verification: Water meters, fuel oil meters, gas meters, watt-hour meters, noise meters, etc.
- Specified measuring instruments without fixed validity period of verification but subject to periodic inspections: Nonautomatic scales, balance weights, counterweights (with some exceptions) and leather area measuring machines
- Specified measuring instruments without fixed validity period of verification but subject to fitting inspections (annual): Taxi meters

– Specified measuring instruments without fixed validity period of verification: Thermometers, exhaust gas/effluent current (velocity) meters, exhaust gas/effluent flowmeters, density measurement buoys, etc.

• Periodic inspections

Prefectural governments, specified municipal governments, and designated periodic inspection bodies conduct periodic inspections for non-automatic scales, balance weights and counterweights as often as every other year. Inspections for leather area measuring machines are conducted once a year.

Example: Area to area rotation - e.g., in town A in the first week of month X, in town B in the second week of the same month and so on

A periodic inspection may be replaced by a commissioned inspection conducted by a certified metrologist or a self-inspection in the case of a proper measurement control business place/measurement certification business.

◎ Inspection of verification standards (reference instrument inspection)

Under the Measurement Law, measuring instruments used for verification, periodic inspection and other instrument inspection purposes are subject to an inspection of verification standards, with those passing the inspection named verification standards.

In the past, a traceability system did not exist, and the inspection of a verification standards system was used in the private sector as an alternative system. Coinciding with the overhaul of the Measurement Law in 1993, a traceability system was introduced, and the application of inspections of verification standards has been limited mainly to measuring instruments owned by public organizations.

Related laws and ordinances: Measurement Law, Articles 19-25 and 70-75 and 102-105, Enforcement Order for the Measurement Law

Repair and Other Measuring Instrument-related Regulations

◎ Repair

Any verification mark, type approval label, etc. placed on a specified measuring instrument must be removed after modification or repair (subject to re-verification).

• Minor repairs

Minor repairs fall outside the scope of "repair" under the laws and therefore are not subject to the submission of a business notification, thus allowing any person to engage in such work.

> Example: Repair of a power supply unit involving batteries, fuses, power cords, etc., repair/replacement of screws, rubber base pads, cover and other parts accessible without opening the cover, repair/replacement of the level adjustment bolt of a non-automatic scale, replacement/cleaning of the packing of a water meter, replacement/replenishment of the lubricant for a gas meter, and repair/replacement of the piping for a concentration meter.

• Simple repairs

Simple repairs do not require the removal of the verification mark, etc. if performed by notified manufacturers, notified repairers, or by a proper measurement control business place with its own specified measuring instrument.

> Example: repair/replacement of the connector of a taxi meter, repair/replacement of the dish of a dish scale, repair/replacement of the platform plate of a platform scale, repair/ replacement of the power supply unit of the printing mechanism of an electric scale, overhaul cleaning of a water meter or fuel oil meter, repair/replacement of the valve, nozzle or hose of a fuel oil meter, replacement of the vehicle of a vehicle-mounted measuring tank with a scale, and replacement of a power switch or any other switch on an illuminometer, noise meter or vibration level meter.

• Repair obligation concerning specified measuring instrument with fixed validity period

A type-approved specified measuring instrument with a fixed validity period is only required to pass an instrumental error check at a verification performed upon the expiry of validity if found in proper working order. As parts degrade over time, however, the measuring instrument is subject to mandatory repairs to ensure continued compliance with technical standards set by the Enforcement Regulations and the maintenance of accuracy until the next verification.

• Household measuring instruments

Although no verification obligation has been specified for household measuring instruments such as health meters, manufactured/imported products must comply with technical standards set by the Enforcement Regulations. Household measuring instruments must not be sold or displayed for sale unless they carry a compliance mark, verification mark, etc.

• Glass thermometers, aneroid sphygmomanometers and resistance thermometers

As these measuring instruments have serious implications for human life or health, the transfer or lending by manufacturers, repairers, importers or transfer, lending or possession for the purpose of transfer or lending by sellers of those without a verification mark, etc. is prohibited.

Related laws and ordinances: Measurement Law, Articles 46-50, 53-57, 71 and 84,
Enforcement Order for the Measurement Law

6. Measuring Instrument Manufacturing Business

• Measuring instrument manufacturing business

To ensure the supply of accurate measuring instruments, the Measurement Law requires the manufacturers of specified measuring instruments to file a notification (notified manufacturers) before starting the business.

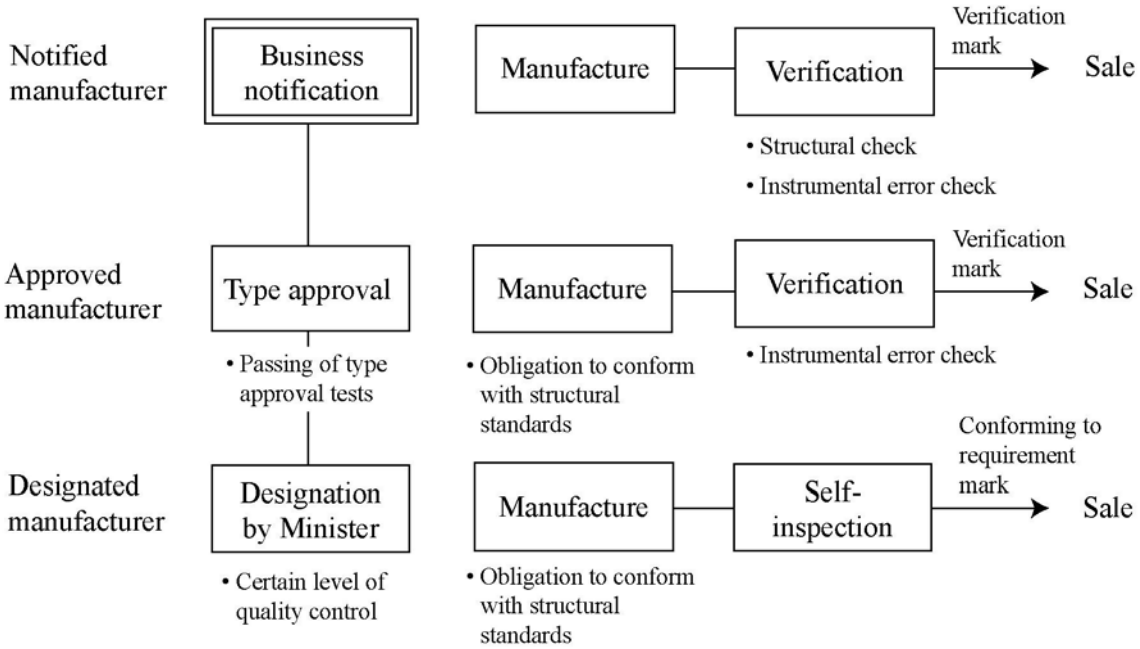
– Notification to be filed with the Minister of Economy, Trade and Industry via the prefectural government (directly with the minister in the case of electric meters)

A notified manufacturer may apply for approval of a "type" with regard to measuring instruments manufactured by him, and in the event of obtaining "type approval", will be exempted from "structure" inspection (structural check) from verification (approved manufacturer).

A notified manufacturer with outstanding quality control capability may obtain designation as a "designated manufacturer" for each factory or other business site on application, provided he passes a screening examination of his quality control practices.

A designated manufacturer is exempted from initial verification for his "type-approved specified measuring instruments" as long as he conducts self-inspections.

< Overall procedure of verification/inspection> Initial Verification



• Special container manufacturing business

In cases where a special container approved under the Measurement Law Enforcement Regulations in terms of shape, etc. is used as a container for a mass-produced commodity such as milk, the commodity can be sold without conducting volume measurement, provided the content is filled to a predetermined level and provided special container and volume indications are provided.

A manufacturer of special containers must obtain designation from the Minister of Economy, Trade and Industry for each factory or business site, with the application directed to the competent prefectural government, except for an overseas manufacturer who files his application directly with the minister.

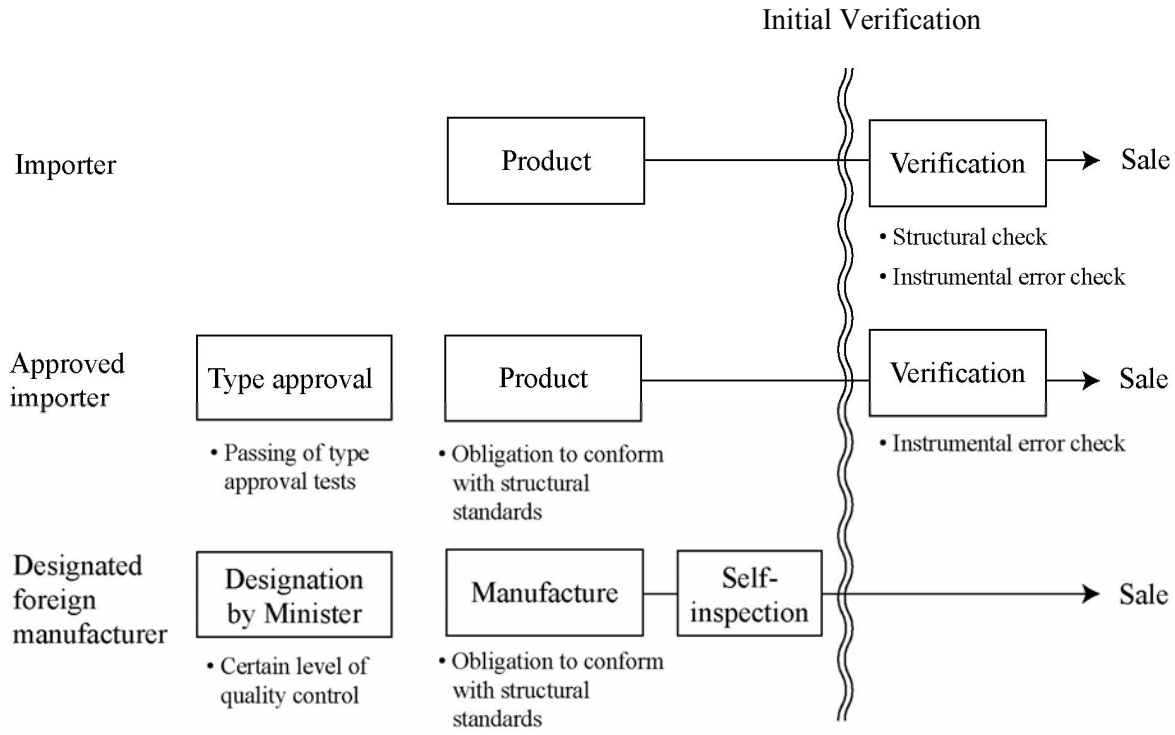
Related laws and ordinances: Measurement Law, Articles 40-45, 58-69, 76-80, 83-88 and 90-100, Enforcement Order for the Measurement Law

Foreign Manufacturers, etc.

• Regulation of Foreign-made Specified Measuring Instruments

Any person wishing to import a specified measuring instrument from a foreign country must pass a complete domestic verification before marketing it. However, a specified measuring instrument granted type approval by the Minister of Economy, Trade and Industry (Japan Electric Meters Inspection Corporation in the case of electric meters) may be marketed after passing an instrumental error check only.

A measuring instrument manufacturer based in a foreign country may become a designated foreign manufacturer who is exempted from domestic verification in the same manner as a domestic designated measuring instrument manufacturer.



• Specified measuring instrument repair business

Under the Measurement Law, specified measuring instrument repair businesses are also subject to notification before starting the business. Notification is not required in the case of a notified manufacturer engaging in repair activities.

– Notification to be filed with the Minister of Economy, Trade and Industry in the case of electric meters and the prefectural government otherwise

• Sellers of nonautomatic weighing instruments (excluding household measuring equipment), balance weights and counterweights

These specified measuring instruments are widely used in measurement conducted for transaction/certification purposes and require special care in their handling. In view of this, they are subject to notification so as to facilitate the seller to pass instructions, etc. to purchasers.

– Notification to be filed with the prefectural government (notification not required in the case of a notified manufacturer/repairer engaging in marketing activities)

Related laws and ordinances: Measurement Law, Articles 46-48, 51-52, 81-82, 89 and 101, Enforcement Order for the Measurement Law

7. Measurement Certification Business System

"Measurement certification" is a "certification" service provided by an independent party at the request of a person who needs such a service for his measurement. The person who provides this service as the main line of business, called a measurement certification business, is required to be registered with the competent prefectural government for each of his business sites.

• Measurement certification business
  – A business that provides a certification service for the measurement of length, mass, area, volume or heat (general measurement certification business)
    — Measurement certification carried out upon unloading of cargo or moving them in/out of a warehouse for the purpose of transportation, consignment or sale (excluding loading and unloading of cargo on to or off a marine vessel)
  – A business that provides a certification service for the measurement of concentration, sound pressure level or oscillating acceleration level (environmental measurement certification business)
    — Measurement certification relating to the concentration of a substance in air, water or soil, frequency-weighted sound pressure level or frequency-weighted vibration acceleration level

• Certification not considered as measurement certification
  – General — certification relating to loading and unloading of cargo onto or off a marine vessel
  – Concentration — indoor air, drinking water, fertilizer, minerals, crude oil, wind velocity, temperature, transparency, electrical conductivity, chromaticity, offensive odor, asbestos concentration or coliform group bacteria count

• Parties which do not require registration as a measurement certification business
  – National Government and local governments
  – Some independent administrative institutions
    — National Institute of Advanced Industrial Science and Technology, National Institute of Technology and Evaluation, National Institute of Industrial Health and National Institute for Environmental Studies
  – Measurement certification as specified under this law provided by organization registered under another law
• Measurement certification inspection

Of the specified measuring instruments used by measurement certifier for measurement certification business, the following must undergo measurement certification inspections conducted by a prefectural government or designated measurement certification inspection body at specified intervals.

— Non-automatic weighing instruments, balance weights, counterweights, Beckmann thermometers, leather area measuring machines, bomb calorimeters, noise meters, vibration level meters and concentration meters (excluding glass-electrode hydrogen ion concentration meters and sake purity measurement buoys)

A measurement certification inspection can be substituted for with a commissioned inspection conducted by a certified metrologist or a self-inspection in the case of a proper measurement control business place which is a proper metrological control establishment.

- Accredited specified measurement certification business
  (law being amended, scheduled to take effect in FY 2002)

A person wishing to provide a measurement certification service relating to extremely particle substances must be accredited by the Minister of Economy, Trade and Industry(NITE) or specified measurement certification accreditation body(JCLA,JAB) prior to registration as a measurement certification business. An accredited specified measurement certification business is required to have an advanced quality control capability, etc. in light of the difficulty associated with the measurement of such quantities.

Related laws and ordinances: Measurement Law, Articles 107-121-10,
Enforcement Order for the Measurement Law

8. Promotion of Autonomous Measurement Administration

◎ Certified metrologists

To ensure accurate measurement, proper metrological control is essential in the private sector, as well as verification, inspection, etc. by public organizations.

For this reason, the voluntary management of measuring instruments is being promoted by granting the qualification of a "certified metrologist" to persons who have the knowledge and experience sufficient to properly undertake measurement administration, including the inspection of measuring instruments.

• Classification of certified metrologists

– General certified metrologists

– Environmental certified metrologists (concentration)

– Environmental certified metrologists (noise and vibration)

• Main duties of certified metrologists

– Commissioned inspection as substitute for periodic inspection (→ exemption from periodic inspection)

– Commissioned inspection as substitute for measurement certification inspection (→ exemption from measurement certification inspection)

– Measurement administration at measurement certification business (→ measurement certification business required to employ certified metrologists)

– Measurement administration at proper measurement control business place

• Procedure to obtain qualification

– Certified Metrologist National Examination + Practical experience, etc. → Registration

– Training given by National Institute of Advanced Industrial Science and Technology + Practical experience + Certification by Measurement Administration Council (June and December) → Registration

• Certified Metrologist National Examination implementation schedule

The beginning of September: Announcement of examination date via official gazette →

October: Distribution of application forms (by end of month)/ acceptance of applications (from 15th to 31th of October/mail only) → First Sunday of March of following year: Examination → End of May: Announcement of examination results

◎ Proper measurement control business place

An business place which uses specified measuring instruments under proper measurement control may be designated as a proper measurement control business place on application.

The proper metrological control establishment system helps advance voluntary metrological control spearheaded by certified metrologists.

– National government-related business place to file the applications to the Ministry of Economy, Trade and Industry, and others place to file the application to respective prefectural governments.

Designated establishments have the following three advantages:

1) Exempted from periodic inspections for specified measuring instruments having undergone self-inspections
2) Exempted from re-verification after simple repairs on condition of compliance with technical standards
3) Entitled to display a sign declaring a "proper measurement control business place"

• Main designation conditions

– Inspections are undertaken periodically by a certified metrologist.

– The staff are given measurement management guidance by a certified metrologist.

– Measurement management rules have been established.

Related laws and ordinances: Measurement Law, Articles 122-133,
Enforcement Order for the Measurement Law

9. Designated Body System

In relation to instrument verification, etc. under the Measurement Law, a designated body system has been set up to facilitate the outsourcing of measurement tasks by public-interest corporations and private companies, as well as public organizations, according to the geographical area or type of measurement.

In view of administrative reform, deregulation and other circumstances, the system is designed to enable the private sector to enter the market wherever possible.

• Designated periodic inspection body

Designated periodic inspection bodies are organizations that conduct periodic inspections in place of prefectural governments and the governments of specified municipalities. In a geographical area where periodic inspections have been outsourced to a designated periodic inspection body, the prefectural government or the government of a specified municipality does not conducts these inspections.

• Designated verification body

A designated verification body is an organization that carries out verification in the same manner as the National Institute of Advanced Industrial Science and Technology, a prefectural government, etc.

Designated verification bodies are designated according to the type of measuring instrument, with their verification services provided alongside those of public organizations, unlike periodic inspection services for which designation is made on an area-by-area basis for the purpose of delegating services to the private sector for the given area.

• Designated measurement certification inspection body

A designated measurement certification inspection body is an organization that conducts measurement certification inspections in place of the prefectural government with which it is registered. In an area where measurement certification inspections have been outsourced to a designated periodic inspection body, the prefectural government does not conduct these inspections, as in the case of a designated periodic inspection body.

• Designated calibration body

A designated calibration body is an organization that retains specified standards, etc. and calibrates measuring instruments and reference materials in place of the National Institute of Advanced Industrial Science and Technology and others.

As such, a designated calibration bodies form an integral link of the nation's traceability system, and for this reason, are required to have considerable technical expertise in addition to being in possession of official measurement standards.

Related laws and ordinances: Measurement Law, Articles 26-39, 106, 121 and 138-142,
Enforcement Order for the Measurement Law

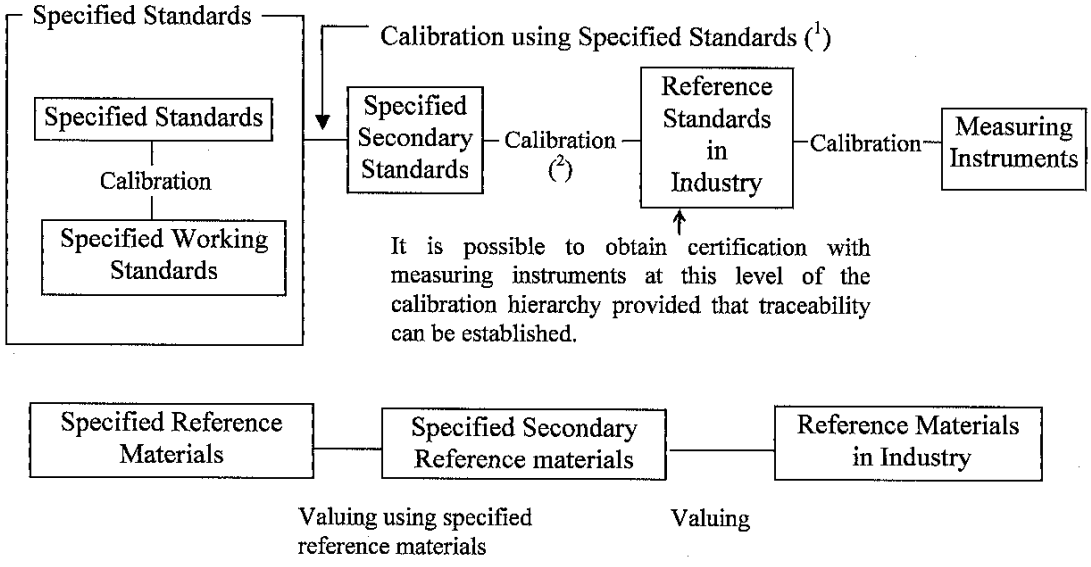
10. Japan Calibration Service System (JCSS)

The globalization of economic activities, rapid advancement of technology and other ongoing trends have given rise to an urgent need for proper support for high precision measurement which is conducive to more streamlined business transactions and greater product quality and reliability in terms of enhancing measurement reliability in the area of conformity assessment, effective production management in the area of cutting-edge technology, and so on.

Through a major amendment of the Measurement Law in 1993, Japan has introduced a "traceability" system as a means of officially verifying the accuracy of measuring instruments in use by designating measuring instruments and reference materials that act as standards (national measurement standards) and establish an "unbroken chain of comparisons to stated references" through calibrations based on them.

The importance of the traceability of measuring instruments owned by Japanese companies has increased steadily, particularly in business transactions with overseas companies or in the acquisition of ISO 9000 certification. Therefore, the National Government should urgently acquire and maintain standard instruments and reference materials.

Schematic Drawing of Traceability System:
National measurement standards

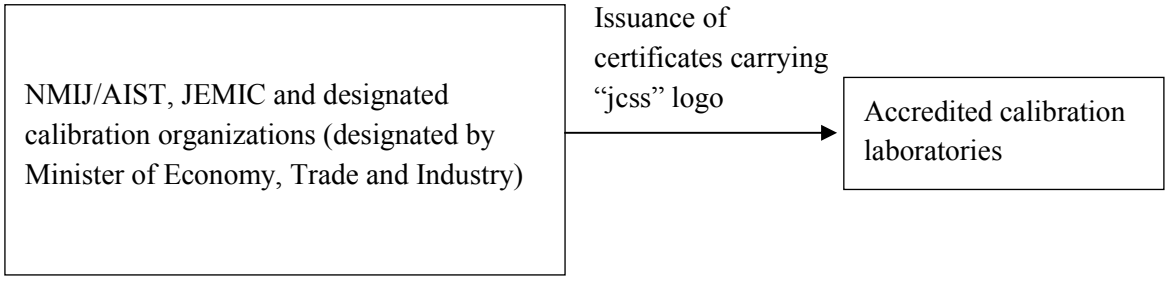


Calibration: Process of measuring the deviation of the values of a quantity indicated by an instrument from those values indicated by a relevant standard, where a quantity is defined as an "attribute of a phenomenon, body or substance." This process also applies to reference material (valuing).

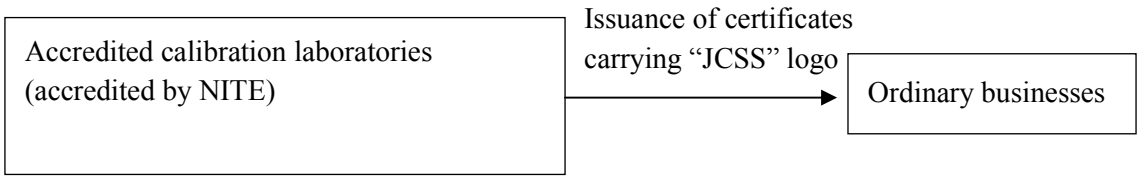
• Implementation of calibration

Under the traceability system, it is important to delegate calibration work to capable, accredited private-sector businesses as much as possible to ensure wide accessibility to measurement standards in light of the fact that it is impossible to carry out all calibration work in the public sector with limited staff.

–(1) Calibration using specified standard instrument (direct calibration through national measurement standards)



–(2) Calibration using specified secondary standard instrument (indirect calibration)



Related laws and ordinances: Measurement Law, Articles 134-146

11. Other Matters

• On-site inspections

The Measurement Law empowers administrative authorities, such as the Minister of Economy, Trade and Industry, prefectural governors, and mayors of specified municipalities to collect activity reports from measurement-related businesses and others and whose staffs conduct on-site inspections. These powers, though limited to " the extent necessary for the enforcement of this Law," include the removal of the verification mark from measuring instruments that do not comply with standards.

• Measurement Administration Council

The Measurement Law has established the Measurement Administration Council to have experts deliberate matters such as, an amendment or the abolition of cabinet orders, the certification of certified metrologists and designation of designated calibration organizations, standard instruments and reference materials.

This is important because the enforcement of the metrological control system has a major impact on people's lives and because listening to expert opinions on the issue is vital.

• Fees

Most fees payable under the Measurement Law have been set by the Cabinet Order on Fees related to the Measurement Law. However, not all fees have been set by laws and ordinances. For example, fees related to services of prefectural governments and the governments of specified municipalities are subject to approval, while there are no provisions for fees of certified calibration businesses.

• Training

The Measurement Law stipulates the provision of training aimed at persons wishing to obtain the qualification of a certified metrologist and those engaged in measurement-related work. Training courses are held at the National Institute of Advanced Industrial Science and Technology Training Center.

• Outsourcing of administrative processing to independent administrative institutions

Of the services specified by the Measurement Law, those of a highly technical nature have been delegated to independent administrative institutions with specialized knowledge and expertise as part of the ongoing administrative reform process.

The overall functional division is the Minister of Economy, Trade and Industry, who exercises authority, vs. independent administrative institutions, which carry out actual administrative processing tasks.

- National Institute of Advanced Industrial Science and Technology: verification, type approval and other services
- National Institute of Technology and Evaluation: accreditation of accredited calibration laboratories and other services

• Penalties

The Measurement Law incorporates various consumer protection provisions, including penal provisions which are laid out over 10 articles.

In particular, persons violating the prohibition of the transfer/lending of a thermometer, unregistered measurement certification businesses and measurement certification businesses violating a revocation or suspension order are punishable by either imprisonment of up to one year or a fine of not more than 1 million yen, or both.

Related laws and ordinances: Measurement Law, Articles 147-180,
Enforcement Order for the Measurement Law

Appendix 5.6.4

Summary of

“Implementation Policy for Training of Inspectors”

Appendix 5.6.4: Summary of "Implementation Policy for Training of Inspectors"
Ministry Decree No.482/November 2000

1. Objectives of Training

1) Acquisition of skills for verification/re-verification of measuring instruments (UTTP)
2) Acquisition of technology to properly treat high precision standards
3) Acquisition of management skills of calibration laboratories
4) Acquisition of inspection technology of pre-packaged goods (BDKT)

2. Classification of Inspectors

Two types of inspectors can be classified: an inspector who is in charge of implementation of whole measurement work and an assistant inspector who is in charge of limited work. The latter is in charge of supervision and instruction of measuring instruments and pre-packaged goods.

3. Type of Training, Term of Training and Qualification of Trainees (Only for Civil Servants: 35 trainees/class)

1) Assistant Inspector (Penera Berjenjang)
   a) Basic (Dasar): 1,820 hours for those who are graduated from high school at 35 years old or below
   b) Advanced, Continuation (Lanjutan): 1,540 hours for those who (i) completed course a) above (STTPP) at 40 years old or below, or (ii) are equivalent to Assistant Inspector (Penara Berjenjang) at 42 years old or below
2) Inspector (Penera): 1,260 hours for those who are graduated from faculty of science or engineering in universities at 35 years old or below
3) Equivalent level to Inspector (Penera Kasetaraan)
   a) Supervisor of Measurement (Pengamat): 1,200 hours for those who completed STTPP at 40 years or below
   b) Re-verification Inspector (Pengulang): 1,200 hours for those who completed STTPP at 40 years old or below-

4. Trainers, Supervising Organization, Method of Training and Training Facilities

1) Trainers
   a) The qualification to become a trainer is to be Widyaiswara and/or actual civil servant being engaged in the legal metrology system.
   b) Those who are appointed by the Director of MTC among persons who can give lessons systematically, efficiently and effectively by understanding the objective of the training as a whole and by properly utilizing textbooks and lectures according to the objective of the corresponding lessons
2) Supervising organization

   The government should provide a suitable laboratory for practice with sufficient training facility and equipment in order to train inspectors efficiently and effectively.
   a) DOM is an organization for administration of the training.

      Roles of DOM: (i) Decision of standard capabilities by type of training, (ii) Supervision and (iii) Management of application of acquired skills to the practice at RVOs
   b) MTC is an organization to carry out training.

      Roles of MTC: (i) Design of training courses, (ii) Implementation of training (including support, evaluation), (iii) Standardization of training and certification
   c) Responsible organization is MTC or certified organizations.

      Roles: (1) Design and implementation of training plan, (ii) Evaluation and reporting of training results, (iii) Structuring collaboration with other science institutes and organizations
3) Method of training
   a) Combination of lectures and Q&A and exercises to solve questions at class room
   b) Training at machine room, inspection room with equipment, calibration laboratory and practice training, repetition of actual practice, evaluation of results by Widyaiswara and lecturers, acquisition of practical skills, etc.
   c) Group discussion to deeply understand contents of subjects based on the appropriate issues given by Widyaiswara
4) Training facilities (omission)

5. Evaluation of Trainees and Widyaswara/Trainers

<To trainees>

1) The evaluation of trainees comprises intellectual capability (60%) and practical skills (40%).

Widyaiswara, trainers and instructors evaluate them by performance of test scores of each subject and attitude during the training (100 points in full).

2) Passing conditions
   a) More than 60 points on average for technical lessons (scores of 50 or below not acceptable)
   b) More than 65 points on average for basic lessons (scores of 50 or below not acceptable)
   c) Good attending rate to each lessons (absence rate of 10% or over not acceptable)

<To Widyaiswara and trainers>

1) The trainees and responsible organization will evaluate them.
2) There are 12 evaluation items: Understanding of contents of training, systematic training, ability for training, punctuality/low absence rate of lectures/suitable lessons, suitable use of equipment, attitude, suitable response in Q&A, way of speaking, way of enhancing motivation, achievement of training target, suitable clothing, collaboration between Widyaiswara and trainers

<To responsible organization>

1) The Widyaiswara, trainers and trainees will evaluate it.
2) Five points to be evaluated: Effectiveness of training by the organization, preparation of training equipment, conformity between plan and achievement, sanitation of facilities (classrooms, dormitory, dining room, shower rooms, toilets), availability of facilities for leisure, relaxation, sports and preservation of health

6. Evaluation of Training Results

1) MTC and DOM conduct the follow-up evaluation to trainees who completed the training.
2) Two points to be evaluated: application of skills to actual measurement work and demonstration of ability as a measurement civil servant
3) The results of training are reported to directors of HRD Division, Ministry of Civil Servant Management, Education and Training Center, MOT and DGDT, MOT.

Appendix 6.10.4

List of Planned Equipment for Calibration

Appendix 6.10.4 List of Planned Equipment for Calibration

No.	Name	Specification	Q'ty
Mass			
	Standard Weights		
1	Standard weights	1 g ~ 10 kg Class E1 (Sert. Vol.)	1
2	Standard weights	1 mg ~ 50 kg Class E1	1
3	Standard weights	1 mg ~ 50 kg Class E2	1
4	Standard weights	1 mg ~ 50 kg Class F1	1
5	Standard weights	1 mg ~ 50 kg Class F2	1
6	Standard weights	1 mg ~ 50 kg Class M1	1
7	Weights	10 t (@ 20 kg)	500
	Mass Comparator		
8	Mass comparator	Capacity 1 kg / 0.01 mg	1
9	Mass comparator	10 kg / 1 mg	1
10	Mass comparator	30 kg / 5 mg	1
11	Mass comparator	60 kg / 10 mg	1
12	Vacuum Mass comparator	1 kg / 0.001 mg	1
	Testing Equipment		
13	Roughness Tester		1
14	Hardness Tester		1
	Other Equipment		
15	Laptop		3
16	Weights manupulator (crane)	min.: 50 kg	1
17	Weights washer		1
18	Pinset		1
19	Stop Watch		5
20	handheld drill		1
21	Laser printer		5
22	Balance Table	540x600x750	10
23	Balance Table	1200x600x750	10
Pressure			
24	Calibration Apparatus for Vacuum Meter		1
25	Standard Barometer		1
26	Liquid Column Pressure Gauge	0-1500 mmHg, Accuracy: 2 mmHg	1
27	Liquid Column Pressure Gauge	0-2000 mmH2O, Accuracy: 2 mmH2O	1
28	Dead Weight Piston Gauge	Max. Pressure: 1000 kg/cm2, Accuracy: 0.2%	1
29	Dead Weight Piston Gauge	Max. Pressure: 500 kg/cm2, Accuracy: 0.2%	1
30	Dead Weight Piston Gauge	Max. Pressure: 100 kg/cm2, Accuracy: 0.2%	1
31	Dead Weight Piston Gauge	Max. Pressure: 20 kg/cm2, Accuracy: 0.2%	1
32	Dead Weight Piston Gauge(w/Control Pack)	Max. Pressure: 5 kg/cm2, Accuracy: 0.2%	1
33	Pressure Transducer	Capacity: 0-10 kg/cm2	1
34	Pressure Transducer	Capacity: 0-100 kg/cm2	1
35	Differential Pressure Transducer	Capacity: 0.1 kgf/cm2	1
36	Differential Pressure Transducer	Capacity: 1 kgf/cm2	1
37	Strain Meter	Range: -30000 to +30000x10-8, Resolution: 1x10-6	1
38	Digital Pressure Calibrator		1

No.	Name	Specification	Q'ty
Force			
39	Force Standard Machine	Type: Lever Type, Capacity: 10 tonf	1
40	Force Standard Machine	Type: Lever Type, Capacity: 1 tonf	1
41	Standard Proving Ring	Capacity: 100 kgf (1 KN), Readability: >0.2%	1
42	Standard Proving Ring	Capacity: 500 kgf (5 KN), Readability: >0.2%	1
43	Standard Proving Ring	Capacity: 2 tonf (20 KN), Readability: >0.2%	1
44	Standard Proving Ring	Capacity: 5 tonf (50 KN), Readability: >0.2%	1
45	Standard Proving Ring	Capacity: 10 tonf (100 KN), Readability: >0.2%	1
46	Standard Proving Ring	Capacity: 50 tonf (500 KN), Readability: >0.2%	1
47	Standardizing Box	Type: Box Type Dynamometer, Capacity: 300 tonf (3 MN)	1
48	Load Cell	Type: For Compression, Capacity: 100 kgf (1 KN)	1
49	Load Cell	Type: For Compression, Capacity: 1000 kgf (10 KN)	1
50	Load Cell	Type: For Compression, Capacity: 10 tonf (100 KN)	1
51	Load Cell	Type: For Compression, Capacity: 100 tonf (1 MN)	1
52	Load Cell Indicator	Sensitivity: 10V at 0.5mV/V IN with Amplifier	1
53	Wire Strain Gauge, Strain Meter	Range: +-60000x10-8	1
54	Torque Transducer	Capacity: 100 kgf/m, output: 1.5mV/V +-10%	1
55	Torque Transducer	Capacity: 1000 kgf/m, output: 1.5mV/V +-10%	1
56	Temperature/Humidity Recorder	Temperature Range: -15-50 Deg. C, Humidity: 0-100%RH	1
Volume			
	Standard Equipment		
57	Weighing Machine (balance)	Capacity: 300 kg, Readability: 1 g	1
58	Specific Gravity Meter		1
59	Thermometer	100/ 0.1 °C	1
60	Water Distillation Apparatus	Method: Ion Exchange and Distillation Methd, Capacity: 0.4-0.7 liter/min.	1
61	Standard Tank	Capacity: 5 liter, Accuracy: 0.1%	1
62	Standard Tank	Capacity: 10 liter, Accuracy: 0.1%	1
63	Standard Tank	Capacity: 20 liter, Accuracy: 0.1%	1
64	Standard Tank	Capacity: 50 liter, Accuracy: 0.1%	
65	Standard Tank	Capacity: 200 liter, Accuracy: 0.1%	1
66	Standard Tank	Capacity: 500 liter, Accuracy: 0.1%	1
67	Standard Tank	Capacity: 1000 liter, Accuracy: 0.1%	1
68	Standard Tank	Capacity: 2000 liter, Accuracy: 0.1%	1
69	Standard Tank	Capacity: 5000 liter, Accuracy: 0.1%	1
70	Pycnometer	Capacity: 10, 20, 50, 100, 150, 250 (ml)	1
71	Standard Flask	Capacity: 1 liter	1
72	Standard Flask	Capacity: 2 liter	1
73	Standard Flask	Capacity: 5 liter	1
74	Standard Flask	Capacity: 10 liter	1
75	Standard Burette	Capacity: 25 ml	1
76	Standard Burette	Capacity: 50 ml	1
77	Standard Burette	Capacity: 100 ml	1
78	Small Volume Prover	Capacity: 110 liter, Flow Range: 0.1-3 m3/h, Accuracy: 0.005%	1

No.	Name	Specification	Q'ty
Length			
	Comparator		
79	Line gauge comparator	with Zeeman stabilized laser interferometer	1
80	Gauge block comparator	with Zeeman stabilized laser interferometer	1
81	Comparator 50 m		1
82	Comparator Van Becker (line gauge)		10
	Standard Equipment		
83	Iodine stabilised He-Ne Laser		1
84	Gauge Block Class AA	0.5mm - 1m	1
85	Gauge Block Class A	0.5mm - 1m	1
86	Gauge Block Class A	0.5mm - 1m	1
Temperature			
87	Thermocouple	Resistance Thermometer Fixed Point Calibration Equipment	1
88	Standard Resistance Thermometer	Range: 13.81 K-231.91 Deg. C	1
89	Standard Resistance Thermometer	Range: 90.188 K-630.74 Deg. C	1
90	Standard Resistance Thermometer	Range: 90.188K-961.93 Deg. C	1
91	Saltpeter Bath		1
92	Oil Bath		1
93	Water Bath		1
94	Sand bath		1
95	Standard Thermocouple	Max. Temperature: 1064.43 Deg. C	1
96	Potentiometer		1
97	Ice Maker		1
98	Ice Crasher		1
99	Glass thermometer	Glass 0 ~ 250 oC	1
100	Thermocouple calibrator		1
Time			
101	Rubidium Frequency Standard	+-5 x 10**-11	1
102	Frequency Comparator		1
103	Standard Frequency Counter	+-5 x 10**-9	1
Specific Standard Gas Measurement Devices			
104	Gas Chromatograph	for measuring impurities	1
Specific Standard Liquid Measurement Devices			
105	Viscometer		1
Electrical			
106	Power Source	Output (V): 0.01mV-1200V, Output (A): 6mA-0.5A	1
107	Digital Power Meter Single Phase	Range (V): 3-600V, Range (A): 100mA-30 A	1
108	Digital Power Meter Three Phase	Range (V): 3-600V, Range (A): 100mA-30 A	1
109	Digital Multimeter	Range: +-100mV-+-1000V (DC), Range: 1V-500V (AC)	1
110	Digital LCR Meter	Range (L): 100nH-1000H, Range (C): 1pF-1F	1
111	Standard Capacitance	Capacitance: 1, 10, 100, 1000pF	1
112	Standard Capacitance	Capacitance: 0.01, 0.1, 1Micro F	1
113	Standard Cell	Electromotive Force: 1.0193V at 20 Deg. C, Accuracy: +-50ppm	1
114	Channel Switch for Standard Cell	Max. Generation of Thermal EMFs: >=0.01Micro V	1
115	Voltage Standard		1

No.	Name	Specification	Q'ty
116	Multi Meter	DC V: +-100mV-+-1000V, Accuracy: 0.01%	1
117	Stabilized Source	Output: 0-35VDC, 0-500ADC, Stability (A): 0.05%	1
118	Standard Shunt	Current Rating: 300A (0.333m-Ohm), 0.01mA (10k-Ohm)	1
119	Differential Voltmeter	Range: 1V-1000VDC, Accuracy: +-25ppm	1
120	High Voltage Source	Output: 0-60kV, 0-50mADC, Stability (A): +-0.01%	1
121	High Voltage Voltmeter	Input Resistance: 2000 M-Ohm, Readability: 10,000-1	1
122	Differential Voltmeter	Range: 1-1000VDC, Accuracy: +-25ppm	1
123	AC/DC Voltage and Current Supply	Output (V): 0-1100V (AC, DC), Output (A): 0-2A (DC), 0-2A (AC 10-50Hz)	1
124	Power Amplifier	Output: 20A (AC, DC), Accuracy: 0.025%	1
125	Current Shunt	Range: 200 Micro A-100A (AC/DC), Accuracy: +-0.01%	1
126	Differential Voltmeter	Range: 1-1000VDC, Accuracy: +-25ppm	1
127	AC Standard Voltage Source	Max. Voltage: 120V (10-1 Mega Hz), Accuracy: 1nV-100 micro V	1
128	Power Amplifier	Output: 100-1099.99V, Resolution: 1mV	1
129	AC/DC Comparator	Range (V): 225mV-1100V (RMS), Range (F): DC, 10Hz-100MHz	1
130	Digital Voltmeter	Range: 200mV-1000V, Resolution: 1 Micro V	1
131	AC/DC Voltage and Current Supply	Output (V): 0-1100V (AC, DC), Output (A): 0-2A (DC), 0-2A (AC 10-50Hz)	1
132	Power Amplifier	Output: 20A (AC, DC), Accuracy: 0.025%	1
133	Current Shunt	Range: 200 Micro A-100A (AC/DC), Accuracy: +-0.01%	1
134	Differential Voltmeter	Range: 1-1000VDC, Accuracy: +-25ppm	1
135	Standard Register	Resistance: 1 Ohm, Accuracy: 0.0005%	1
136	Standard Register	Resistance: 10 k-Ohm, Accuracy: +-1ppm	1
137	Standard Register	Resistance: 0.001 Ohm, Accuracy: +-0.02%	1
138	Standard Register	Resistance: 0.01 Ohm, Accuracy: +-0.02%	1
139	Standard Register	Resistance: 0.1 Ohm, Accuracy: +-0.002%	1
140	Standard Register	Resistance: 100 k-Ohm, Accuracy: +-0.002%	1
141	Standard Register	Resistance: 10 Ohm, Accuracy: +-0.02%	1
142	Standard Register	Resistance: 100 Ohm, Accuracy: +-0.002%	1
143	Standard Register	Resistance: 10 k-Ohm, Accuracy: +-0.005%	1
144	Oil Bath	Range: 0-65 Deg. C, Stability: 0.002 Deg. C	1
145	Resistance Transfer Standard	Standard Value: 1 k-Ohm/step, Transfer Accuracy: +-1ppm	1
146	Resistance Transfer Standard	Standard Value: 10 k-Ohm/step, Transfer Accuracy: +-1ppm	1
147	Resistance Transfer Standard	Standard Value: 100 k-Ohm/step, Transfer Accuracy: +-1ppm	1
148	High Resistance Measurement Set	Measuring Range: 1 k-Ohm-100 M-Ohm, Resolution: 20 Micro-Ohm	1
149	Current Source	Output Range: 0-200A, Drift: 0.03%	1
150	Switch	Max. Current: 100A, Max. Switching Frequency: 0.5Hz	1
151	Direct Current Comparator Resistance & Temperature Bridge (DCCB)	Range: 10**-6 to 10**9 Ohm, Accuracy: +-0.2ppm, Stability: +-0.2ppm	1
152	Standard Register	Resistance: 1 Ohm, Accuracy: 0.0005%	1
153	Standard Register	Resistance: 10 k-Ohm, Accuracy: +-1ppm	1
154	Standard Register	Resistance: 0.001 Ohm, Accuracy: +-0.02%	1
155	Standard Register	Resistance: 0.01 Ohm, Accuracy: +-0.02%	1
156	Standard Register	Resistance: 0.1 Ohm, Accuracy: +-0.002%	1

No.	Name	Specification	Q'ty
157	Standard Register	Resistance: 100 k-Ohm, Accuracy: +-0.002%	1
158	Standard Register	Resistance: 10 Ohm, Accuracy: +-0.02%	1
159	Standard Register	Resistance: 100 Ohm, Accuracy: +-0.002%	1
160	Standard Register	Resistance: 10 k-Ohm, Accuracy: +-0.005%	1
161	Extender	Ratio: 1000:1/100:1/10:1, Max. Input Current: 100A (1000:1)	1
162	Portable standard kWh meter class 0.05		1
Mobile Facility			
163	4WD + equipment		10
164	4 automobile + equipment		10
165	Motorbike		20
Other Equipment			
166	Computer		20
167	LCD projector		5
168	Printer Laser		20
169	Pinset		10
170	Stop Watch		10
171	3D-coordinate measuring instrument		10
172	Caliper Checker		1
173	Dial Gauge Checker		1
174	Depth Micrometer Checker		1
175	Inside Micrometer Checker		1
176	Height Gauge		1
177	Dial Gauge		1
178	Digimatic Indicator		1
179	Cylinder Gauge		1
180	Standard Outside Micrometer		1
181	Digimatic Standard Outside Micrometer		1
182	Rod Inside Micrometer		1
183	Indicating Micrometer		1
184	Electronic Micrometer		1
185	Digimatic Bench Micrometer		1
186	Digimatic Caliper		1
187	Standard Caliper		1
188	Dial Caliper		1
189	Standard Scale		1
190	Standard Scale		1
191	Standard Wedge Angle Block		1
192	Autocollimeter & Polygon Mirror		1
193	Master for Square		1
194	Surface Roughness Tester		1
195	Optical Parallel		1
196	Optical Flat		1
197	Profile Projector		1
198	Precision Level		1
199	Base Plate		1
200	Standard Glass Scale		1