

**Annex**

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**Foreign Trade (1/6)**  
**Total Export**

	(Unit : Thousand US\$)			
	1992	1993	1994	1995
<b>Total Export (FOB)</b>	<b>46,195,623</b>	<b>51,885,965</b>	<b>60,882,218</b>	<b>79,823,459</b>
<b>I Agriculture and Forestry</b>	<b>1,679,337</b>	<b>1,960,977</b>	<b>2,220,959</b>	<b>3,323,463</b>
<b>II Livestock and Fishing</b>	<b>433,020</b>	<b>543,236</b>	<b>457,434</b>	<b>692,692</b>
<b>III Mining</b>	<b>7,775,739</b>	<b>6,763,563</b>	<b>6,994,362</b>	<b>8,004,666</b>
<b>IV Manufacturing</b>	<b>36,168,722</b>	<b>42,500,081</b>	<b>51,075,243</b>	<b>67,634,907</b>
A. Food, beverages and tobacco	1,364,821	1,589,639	1,895,620	2,529,152
B. Textile and footwear	2,316,738	2,770,151	3,255,787	4,907,277
C. Wood products	498,565	573,806	586,133	620,540
D. Printing	654,848	662,324	561,644	873,026
E. Petroleum products	623,804	718,970	544,459	652,817
F. Petrochemicals	263,251	214,124	262,948	339,932
G. Chemicals	2,298,306	2,343,856	2,756,356	3,972,668
H. Plastic and rubber products	794,279	1,005,277	1,064,373	1,218,580
I. Non-metal products	919,009	1,125,141	1,214,795	1,405,561
J. Iron and steel	1,145,085	1,398,532	1,534,714	3,088,819
K. Minerometalurgia	929,213	1,024,006	1,085,078	1,801,257
L. Machinery and metal products	23,711,483	28,352,389	35,324,351	44,913,424
1. for agriculture and livestock	48,521	89,384	105,303	135,319
2. for railway	15,339	30,646	19,335	30,418
3. for other transportation and communications	7,356,143	8,960,010	10,867,081	15,339,221
<i>automobiles</i>	3,378,022	4,251,471	5,076,920	7,575,079
<i>automobiles for cargo</i>	588,386	670,494	827,152	1,852,507
<i>chassis for all kinds of vehicles</i>	80,982	134,313	212,771	216,538
<i>motors for automobiles</i>	1,202,724	1,302,179	1,778,112	2,122,644
<i>motors for boat</i>	13,995	15,759	15,959	18,604
<i>springs and sheets for automobiles</i>	63,015	106,036	125,719	125,761
<i>parts for automobiles</i>	1,524,715	1,888,961	2,106,949	2,300,796
<i>parts for airplanes</i>	44,941	44,122	55,063	44,749
<i>parts for motors</i>	271,530	316,752	404,798	468,722
<i>others</i>	187,833	229,914	263,638	613,819
4. special machinery for various industries	3,683,029	4,233,407	6,007,049	7,297,261
5. professional and scientific equipment	547,026	591,822	652,258	755,936
6. electric & electronic apparatus	11,729,615	14,031,700	17,276,585	20,893,045
<i>electric accumulator and its parts</i>	176,360	190,009	94,613	214,006
<i>cable and wire</i>	2,060,880	2,762,137	2,929,841	3,426,995
<i>magnet tape and photographic disk</i>	387,735	404,003	497,551	520,058
<i>instruments for electric communication</i>	86,806	151,558	112,499	328,310
<i>electric motor</i>	381,099	510,074	571,744	601,857
<i>other electric instruments</i>	1,655,863	1,690,189	2,098,406	2,481,620
<i>parts for radio and TV</i>	873,692	909,879	1,065,220	1,163,434
<i>electric battery</i>	1,379	3,167	3,225	37,158
<i>parts for electric installations</i>	1,320,132	1,414,183	1,846,270	2,214,952
<i>refrigerator and its parts</i>	162,301	174,717	204,660	296,732
<i>record player</i>	73,173	137,756	185,471	185,713
<i>electric transformer</i>	585,040	678,616	665,994	785,227
<i>others</i>	3,965,148	5,005,413	7,001,086	8,636,986
7. photography, optics and watch	331,808	415,420	396,745	462,225
M. Other industries	649,325	721,859	988,982	1,311,845
<b>V. Others</b>	<b>138,804</b>	<b>118,113</b>	<b>134,217</b>	<b>167,732</b>
<b>VI. Non Classified Products</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Foreign Trade (2/6)**  
**Export (Maquiladora)**

(Unit : Thousand US\$)

	1992	1993	1994	1995
<b>Export (FOB)</b>	<b>18,680,054</b>	<b>21,853,024</b>	<b>26,269,246</b>	<b>31,311,095</b>
<b>I Agriculture and Forestry</b>	-	-	-	-
<b>II Livestock and Fishing</b>	-	-	-	-
<b>III Mining</b>	-	-	-	-
<b>IV Manufacturing</b>	<b>18,661,918</b>	<b>21,849,832</b>	<b>26,265,525</b>	<b>31,301,632</b>
A. Food, beverages and tobacco	234,368	226,363	243,118	248,131
B. Textile and footwear	1,427,697	1,789,063	2,105,504	2,840,704
C. Wood products	264,784	304,996	319,360	315,529
D. Printing	437,847	472,352	332,225	374,299
E. Petroleum products	-	-	-	-
F. Petrochemicals	-	-	-	-
G. Chemicals	199,063	226,887	274,282	329,321
H. Plastic and rubber products	636,737	791,717	770,634	769,530
I. Non-metal products	245,239	320,907	361,213	372,507
J. Iron and steel	276,978	331,770	310,756	344,196
K. Minerometalurgia	85,803	77,966	75,538	80,730
L. Machinery and metal products	14,344,489	16,726,217	20,650,758	24,584,076
1. for agriculture and livestock	29,148	67,053	76,588	91,774
2. for railway	121	-	10	14
3. for other transportation and communications	1,264,730	1,659,446	2,042,788	2,307,590
<i>automobiles</i>	-	822	588	-
<i>automobiles for cargo</i>	-	391	136	-
<i>chassis for all kinds of vehicles</i>	-	-	1	-
<i>motors for automobiles</i>	422	2,038	10,452	17,359
<i>motors for boat</i>	874	673	1,550	2,492
<i>springs and sheets for automobiles</i>	3,787	8,298	27,958	19,410
<i>parts for automobiles</i>	1,054,242	1,392,101	1,635,109	1,754,959
<i>parts for airplanes</i>	10,249	8,402	11,171	13,007
<i>parts for motors</i>	112,932	148,051	206,039	285,528
<i>others</i>	82,224	98,669	149,784	214,832
4. special machinery for various industries	1,931,619	2,007,680	2,952,258	3,269,371
5. professional and scientific equipment	510,134	559,468	614,464	702,298
6. electric & electronic apparatus	10,476,406	12,315,898	14,850,333	18,097,511
<i>electric accumulator and its parts</i>	149,229	163,900	61,692	172,396
<i>cable and wire</i>	1,887,425	2,155,212	1,810,794	2,271,786
<i>magnet tape and photographic disk</i>	289,356	318,531	400,215	395,725
<i>instruments for electric communication</i>	63,213	114,784	85,906	286,126
<i>electric motor</i>	340,271	462,373	522,694	521,358
<i>other electric instruments</i>	1,248,765	1,292,699	1,681,608	2,052,894
<i>parts for radio and TV</i>	832,986	878,822	1,042,732	1,143,656
<i>electric battery</i>	371	1,227	2,007	22,836
<i>parts for electric installations</i>	1,238,378	1,333,537	1,682,795	2,029,794
<i>refrigerator and its parts</i>	68,726	65,795	78,968	91,393
<i>record player</i>	71,169	110,923	133,388	105,458
<i>electric transformer</i>	530,131	637,104	615,464	726,568
<i>others</i>	3,756,380	4,780,993	6,732,065	8,277,521
7. photography, optics and watch	132,334	116,669	114,322	115,518
M. Other industries	508,918	581,593	822,134	1,042,604
<b>V. Others</b>	<b>18,136</b>	<b>3,193</b>	<b>3,718</b>	<b>9,464</b>
<b>VI. Non Classified Products</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Foreign Trade (3/6)**  
**Export (Excluding Maquiladora)**

(Unit : Thousand US\$)

	1992	1993	1994	1995
<b>Export (FOB)</b>	<b>27,515,569</b>	<b>30,032,941</b>	<b>34,612,972</b>	<b>48,512,364</b>
<b>I Agriculture and Forestry</b>	<b>1,679,337</b>	<b>1,690,977</b>	<b>2,220,959</b>	<b>3,323,463</b>
<b>II Livestock and Fishing</b>	<b>433,020</b>	<b>543,236</b>	<b>457,434</b>	<b>692,692</b>
<b>III Mining</b>	<b>7,775,739</b>	<b>6,763,563</b>	<b>6,994,362</b>	<b>8,004,666</b>
<b>IV Manufacturing</b>	<b>17,506,804</b>	<b>20,650,249</b>	<b>24,809,718</b>	<b>36,333,275</b>
A. Food, beverages and tobacco	1,130,453	1,363,276	1,652,502	2,281,021
B. Textile and footwear	889,041	981,088	1,150,283	2,066,573
C. Wood products	233,781	268,810	266,773	305,011
D. Printing	217,001	189,972	229,419	498,727
E. Petroleum products	623,804	718,970	544,459	652,817
F. Petrochemicals	263,251	214,124	262,948	339,932
G. Chemicals	2,099,243	2,116,969	2,482,074	3,643,347
H. Plastic and rubber products	157,542	213,560	293,739	449,050
I. Non-metal products	673,770	804,234	853,582	1,033,054
J. Iron and steel	868,107	1,066,762	1,223,958	2,744,623
K. Minerometalurgia	843,410	946,040	1,009,540	1,720,527
L. Machinery and metal products	9,366,994	11,626,172	14,673,593	20,329,348
1. for agriculture and livestock	19,373	22,331	28,715	43,545
2. for railway	15,218	30,646	19,325	30,404
3. for other transportation and communications	6,091,413	7,300,564	8,824,293	13,031,631
<i>automobiles</i>	3,378,022	4,250,649	5,076,332	7,575,079
<i>automobiles for cargo</i>	588,386	670,103	827,016	1,852,507
<i>chassis for all kinds of vehicles</i>	80,982	134,313	212,770	216,538
<i>motors for automobiles</i>	1,202,302	1,300,141	1,767,660	2,105,285
<i>motors for boat</i>	13,121	15,086	14,409	16,112
<i>springs and sheets for automobiles</i>	59,228	97,738	97,761	106,351
<i>parts for automobiles</i>	470,473	496,860	471,840	545,837
<i>parts for airplanes</i>	34,692	35,726	43,892	31,742
<i>parts for motors</i>	158,598	168,701	198,759	183,194
<i>others</i>	105,609	131,245	113,854	398,987
4. special machinery for various industries	1,751,410	2,225,727	3,054,791	4,027,890
5. professional and scientific equipment	36,892	32,354	37,794	53,638
6. electric & electronic apparatus	1,253,209	1,715,802	2,426,252	2,795,534
<i>electric accumulator and its parts</i>	27,131	26,109	32,921	41,610
<i>cable and wire</i>	173,455	606,925	1,119,047	1,155,209
<i>magnet tape and photographic disk</i>	98,379	85,472	97,336	124,333
<i>instruments for electric communication</i>	23,593	36,774	26,593	42,184
<i>electric motor</i>	40,828	47,701	49,050	80,499
<i>other electric instruments</i>	407,098	397,490	416,798	428,726
<i>parts for radio and TV</i>	40,706	31,057	22,488	19,778
<i>electric battery</i>	1,008	1,940	1,218	14,322
<i>parts for electric installations</i>	81,754	80,646	163,475	185,158
<i>refrigerator and its parts</i>	93,575	108,922	125,692	205,339
<i>record player</i>	2,004	26,833	52,083	80,255
<i>electric transformer</i>	54,909	41,512	50,530	58,659
<i>others</i>	208,768	224,420	269,021	359,465
7. photography, optics and watch	199,474	298,751	282,423	346,707
M. Other industries	140,407	140,266	166,848	269,241
<b>V. Others</b>	<b>120,668</b>	<b>114,920</b>	<b>130,499</b>	<b>158,268</b>
<b>VI. Non Classified Products</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

Source : Banco de Mexico, "Indicadores del Sector Externo"

**Foreign Trade (4/6)**  
**Total Import**

(Unit : Thousand US\$)

	1992	1993	1994	1995
<b>Total Import (FOB)</b>	<b>62,129,350</b>	<b>65,366,542</b>	<b>79,345,901</b>	<b>72,475,939</b>
<b>I Agriculture and Forestry</b>	<b>2,402,001</b>	<b>2,324,262</b>	<b>2,993,314</b>	<b>2,478,930</b>
<b>II Livestock and Fishing</b>	<b>456,154</b>	<b>308,682</b>	<b>378,065</b>	<b>164,695</b>
<b>III Mining</b>	<b>520,180</b>	<b>390,004</b>	<b>438,104</b>	<b>600,453</b>
<b>IV Manufacturing</b>	<b>58,235,149</b>	<b>61,567,742</b>	<b>74,424,845</b>	<b>67,523,033</b>
A. Food, beverages and tobacco	3,335,575	3,356,160	3,988,860	2,616,328
B. Textile and footwear	3,023,138	3,524,969	4,167,429	3,617,664
C. Wood products	550,526	570,647	694,537	349,977
D. Printing	2,188,927	2,366,361	3,039,149	2,898,716
E. Petroleum products	1,457,976	1,368,180	1,275,362	1,242,550
F. Petrochemicals	512,908	600,290	758,571	920,173
G. Chemicals	4,412,856	4,855,326	5,817,666	5,520,504
H. Plastic and rubber products	3,152,543	3,403,740	3,972,401	4,157,006
I. Non-metal products	716,539	819,576	1,009,812	910,069
J. Iron and steel	3,461,437	3,312,284	3,930,863	3,693,062
K. Minerometalurgia	1,047,958	967,520	1,194,504	1,203,489
L. Machinery and metal products	33,731,147	35,672,779	43,489,559	39,731,778
1. for agriculture and livestock	172,479	191,431	290,573	143,665
2. for railway	106,704	89,957	187,531	147,125
3. for other transportation and communications	9,796,291	9,924,873	12,120,113	9,695,888
<i>automobiles</i>	384,289	404,575	1,249,526	446,461
<i>automobiles with special equipment</i>	122,667	86,571	149,127	27,300
<i>airplane and its parts</i>	595,638	424,652	598,722	151,262
<i>truck - 1</i>	55,445	27,830	23,732	10,340
<i>truck - 2</i>	3,166	4,778	10,722	4,695
<i>chassis for automobiles</i>	24,861	9,382	50,064	17,883
<i>boat and its parts</i>	40,012	32,851	52,771	23,843
<i>assemble materials for automobiles</i>	6,007,099	6,439,314	6,733,137	3,649,430
<i>motors and its parts for automobiles</i>	376,917	394,219	565,446	997,742
<i>maintenance parts for automobiles and trucks</i>	1,337,861	1,377,121	1,980,573	3,919,961
<i>non automatic trailer for vehicles</i>	41,606	22,456	31,481	26,588
<i>others</i>	806,729	701,125	677,164	420,378
4. special machinery for various industries	10,884,130	11,029,205	13,324,796	11,401,765
5. professional and scientific equipment	1,214,597	1,251,593	1,485,520	1,348,081
6. electric & electronic apparatus	10,969,890	12,511,059	15,310,284	16,443,060
<i>apparatus of X-ray and its parts</i>	45,879	77,797	73,382	38,685
<i>electric soldering machine</i>	59,591	59,110	88,185	69,899
<i>apparatus for radio and record player</i>	332,242	406,528	441,472	489,528
<i>apparatus of telegraph</i>	856,226	844,284	924,588	589,423
<i>various apparatus and parts</i>	224,264	229,205	238,261	160,359
<i>generators, transformer, and electric motors</i>	536,750	606,782	771,597	912,581
<i>electric oven</i>	75,626	19,511	27,270	9,701
<i>electric lamp valve and parts</i>	1,312,559	1,418,695	2,080,933	2,968,269
<i>manual tool and its parts</i>	25,359	26,841	43,631	23,385
<i>parts for electric installation</i>	3,524,745	4,035,993	4,547,347	5,311,819
<i>transmitter of radio and TV</i>	1,091,275	1,117,124	1,355,299	946,587
<i>maintenance parts for radio and TV</i>	1,075,667	1,352,492	1,657,172	1,881,559
<i>shade for lighting</i>	12,273	12,932	15,513	18,023
<i>others</i>	1,797,432	2,303,761	3,045,635	3,023,251
7. photography, optics and watch	587,055	674,666	770,745	552,190
M. Other industries	643,623	749,909	1,086,139	661,709
<b>V. Others</b>	<b>515,849</b>	<b>775,846</b>	<b>1,111,536</b>	<b>1,708,824</b>
<b>VI. Non Classified Products</b>	<b>17</b>	<b>-</b>	<b>32</b>	<b>1</b>

Source : Banco de Mexico, "Indicadores del Sector Externo"

**Foreign Trade (5/6)**  
**Import (Maquiladora)**

(Unit : Thousand US\$)

	1992	1993	1994	1995
<b>Import (FOB)</b>	<b>13,936,719</b>	<b>16,442,963</b>	<b>20,466,167</b>	<b>26,178,810</b>
<b>I Agriculture and Forestry</b>	<b>22,465</b>	<b>39,036</b>	<b>32,239</b>	<b>20,944</b>
<b>II Livestock and Fishing</b>	<b>8,307</b>	<b>6,875</b>	<b>7,621</b>	<b>10,484</b>
<b>III Mining</b>	<b>15,094</b>	<b>15,147</b>	<b>17,368</b>	<b>25,496</b>
<b>IV Manufacturing</b>	<b>13,603,732</b>	<b>15,857,147</b>	<b>19,581,831</b>	<b>24,794,252</b>
A. Food, beverages and tobacco	57,111	42,834	36,262	29,611
B. Textile and footwear	1,055,626	1,397,685	1,817,483	2,276,614
C. Wood products	138,488	157,905	172,318	161,648
D. Printing	608,666	601,642	748,161	859,476
E. Petroleum products	13,686	14,910	11,629	15,637
F. Petrochemicals	6,865	13,846	14,070	20,029
G. Chemicals	432,527	451,855	562,173	797,128
H. Plastic and rubber products	1,762,178	1,882,126	2,009,276	2,408,697
I. Non-metal products	180,605	213,599	285,900	380,147
J. Iron and steel	992,554	1,109,895	1,277,435	1,455,641
K. Minerometalurgia	240,689	252,173	351,295	441,463
L. Machinery and metal products	7,971,161	9,556,412	12,046,198	15,698,667
1. for agriculture and livestock	2,600	3,148	3,128	1,729
2. for railway	687	52	167	10
3. for other transportation and communications	485,630	457,273	596,799	896,275
<i>automobiles</i>	2,028	1,103	-	-
<i>automobiles with special equipment</i>	6	-	204	-
<i>airplane and its parts</i>	5,460	4,627	16,430	15,454
<i>truck - 1</i>	-	-	68	-
<i>truck - 2</i>	-	-	12	-
<i>chassis for automobiles</i>	80	6	25	141
<i>boat and its parts</i>	134	14	262	484
<i>assemble materials for automobiles</i>	16	-	-	-
<i>motors and its parts for automobiles</i>	37,758	42,911	82,943	116,828
<i>maintenance parts for automobiles and trucks</i>	341,468	257,345	404,654	639,759
<i>non automatic trailer for vehicles</i>	821	1,687	2,116	3,341
<i>others</i>	97,858	149,581	92,437	120,267
4. special machinery for various industries	1,318,754	1,509,022	1,769,234	2,110,556
5. professional and scientific equipment	129,498	178,715	268,224	282,765
6. electric & electronic apparatus	5,976,672	7,328,573	9,293,651	12,304,294
<i>apparatus of X-ray and its parts</i>	27	31	1,131	4,093
<i>electric soldering machine</i>	1,512	997	6,602	862
<i>apparatus for radio and record player</i>	221,338	290,394	288,377	379,253
<i>apparatus of telegraph</i>	89,617	150,566	210,890	257,327
<i>various apparatus and parts</i>	61,423	65,085	55,742	74,272
<i>generators, transformer, and electric motors</i>	259,741	336,016	454,340	651,641
<i>electric oven</i>	52	92	71	3
<i>electric lamp valve and parts</i>	1,100,710	1,193,771	1,701,828	2,569,706
<i>manual tool and its parts</i>	1,149	1,269	11,758	7,700
<i>parts for electric installation</i>	2,439,411	2,705,585	3,027,477	3,920,708
<i>transmitter of radio and TV</i>	87,078	231,575	500,967	573,554
<i>maintenance parts for radio and TV</i>	846,842	1,101,056	1,459,908	1,775,581
<i>shade for lighting</i>	3,413	4,957	4,692	4,843
<i>others</i>	864,359	1,247,178	1,569,866	2,084,757
7. photography, optics and watch	57,320	79,633	114,998	103,035
M. Other industries	143,578	162,267	249,631	249,492
<b>V. Others</b>	<b>287,110</b>	<b>524,753</b>	<b>827,108</b>	<b>1,327,631</b>
<b>VI. Non Classified Products</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Foreign Trade (6/6)**  
**Import (Excluding Maquiladora)**

(Unit : Thousand US\$)

	1992	1993	1994	1995
<b>Import (FOB)</b>	<b>48,192,631</b>	<b>48,923,579</b>	<b>58,879,734</b>	<b>46,297,129</b>
<b>I Agriculture and Forestry</b>	<b>2,379,536</b>	<b>2,285,226</b>	<b>2,961,075</b>	<b>2,457,986</b>
<b>II Livestock and Fishing</b>	<b>447,847</b>	<b>301,807</b>	<b>370,444</b>	<b>154,211</b>
<b>III Mining</b>	<b>505,086</b>	<b>374,857</b>	<b>420,736</b>	<b>574,957</b>
<b>IV Manufacturing</b>	<b>44,631,417</b>	<b>45,710,595</b>	<b>54,843,014</b>	<b>42,728,781</b>
A. Food, beverages and tobacco	3,278,464	3,313,326	3,952,598	2,586,717
B. Textile and footwear	1,967,512	2,127,284	2,349,946	1,341,050
C. Wood products	412,038	412,742	522,219	188,329
D. Printing	1,580,261	1,764,719	2,290,988	2,039,240
E. Petroleum products	1,444,290	1,353,270	1,263,733	1,226,913
F. Petrochemicals	506,043	586,444	744,501	900,144
G. Chemicals	3,980,329	4,403,471	5,255,493	4,723,376
H. Plastic and rubber products	1,390,365	1,521,614	1,963,125	1,748,309
I. Non-metal products	535,934	605,977	723,912	529,922
J. Iron and steel	2,468,883	2,202,389	2,653,428	2,237,421
K. Minerometalurgia	807,269	715,347	843,209	762,026
L. Machinery and metal products	25,759,986	26,116,367	31,443,361	24,033,111
1. for agriculture and livestock	169,879	188,283	287,445	141,936
2. for railway	106,017	89,905	187,364	147,115
3. for other transportation and communications	9,310,661	9,467,600	11,523,314	8,799,613
<i>automobiles</i>	382,261	403,472	1,249,526	446,461
<i>automobiles with special equipment</i>	122,661	86,571	148,923	27,300
<i>airplane and its parts</i>	590,178	420,025	582,292	135,808
<i>truck - 1</i>	55,445	27,830	23,664	10,340
<i>truck - 2</i>	3,166	4,778	10,710	4,695
<i>chassis for automobiles</i>	24,781	9,376	50,039	17,742
<i>boat and its parts</i>	39,878	32,837	52,509	23,359
<i>assemble materials for automobiles</i>	6,007,083	6,439,314	6,733,137	3,649,430
<i>motors and its parts for automobiles</i>	339,159	351,308	482,503	880,914
<i>maintenance parts for automobiles and trucks</i>	996,393	1,119,776	1,575,919	3,280,202
<i>non automatic trailer for vehicles</i>	40,785	20,769	29,365	23,247
<i>others</i>	708,871	551,544	584,727	300,111
4. special machinery for various industries	9,565,376	9,520,183	11,555,562	9,291,209
5. professional and scientific equipment	1,085,099	1,072,878	1,217,296	1,065,316
6. electric & electronic apparatus	4,993,218	5,182,486	6,016,633	4,138,766
<i>apparatus of X-ray and its parts</i>	45,852	77,766	72,251	34,592
<i>electric soldering machine</i>	58,079	58,113	81,583	69,037
<i>apparatus for radio and record player</i>	110,904	116,134	153,095	110,275
<i>apparatus of telegraph</i>	766,609	693,718	713,698	332,096
<i>various apparatus and parts</i>	162,841	164,120	182,519	86,087
<i>generators, transformer, and electric motors</i>	277,009	270,766	317,257	260,940
<i>electric oven</i>	75,574	19,419	27,199	9,698
<i>electric lamp valve and parts</i>	211,849	224,924	379,105	398,563
<i>manual tool and its parts</i>	24,210	25,572	31,873	15,685
<i>parts for electric installation</i>	1,085,334	1,330,408	1,519,870	1,391,111
<i>transmitter of radio and TV</i>	1,004,197	885,549	854,332	373,033
<i>maintenance parts for radio and TV</i>	228,825	251,436	197,264	105,978
<i>shade for lighting</i>	8,860	7,975	10,821	13,180
<i>others</i>	933,073	1,056,583	1,475,769	938,494
7. photography, optics and watch	529,735	595,033	655,747	449,155
M. Other industries	500,045	587,642	836,508	412,217
<b>V. Others</b>	<b>228,739</b>	<b>251,093</b>	<b>284,428</b>	<b>381,193</b>
<b>VI. Non Classified Products</b>	<b>5</b>	<b>-</b>	<b>32</b>	<b>1</b>















<b>Centro de Investigación en Materiales Avanzados, S.C. (CIMAV)</b>		
Address : Leon Tolstoi 166, C.P.31109, Chihuahua		
Tel : (14)81-0054 Fax : (14)81-0182		
Status : Public (SEP-CONACYT)	Establishment : 1994	Staff : 58
Facilities available for services to supporting industries (SIs) : Attached		

<p><b>Main Roles</b></p> <p>Research and development of materials and education of researchers</p>												
<p><b>Main activities available for SIs</b></p> <p>To offer R&amp;D service for</p> <ol style="list-style-type: none"> <li>1) analysis of materials</li> <li>2) research and finding solutions for deterioration of materials</li> <li>3) development of new materials</li> </ol> <p>To offer testing and inspection services using facilities installed in the center</p> <p>To conduct a seminar or dispatch a specialist</p>												
<p><b>Recent achievement</b></p> <p>N.A.</p>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><u>Limitations</u></p>  <p><u>Advantages</u></p> <ol style="list-style-type: none"> <li>1) Well equipped with advanced calibration equipment</li> <li>2) The center is staffed with high educated personnel : Ph.D. 8, M.A. 8</li> </ol>												
<p><b>Available services for SIs</b></p> <table style="width: 100%; border: none;"> <tr> <td>1) <input checked="" type="checkbox"/> Seminar/workshop</td> <td>2) <input type="checkbox"/> Vocational training</td> <td>3) <input type="checkbox"/> Extension services</td> </tr> <tr> <td>4) <input checked="" type="checkbox"/> Technical consultation</td> <td>5) <input checked="" type="checkbox"/> R&amp;D services</td> <td>6) <input type="checkbox"/> Inspection/Testing</td> </tr> <tr> <td>7) <input type="checkbox"/> Calibration</td> <td>8) <input type="checkbox"/> Industrial standardization</td> <td>9) <input type="checkbox"/> Consultation for investment/management</td> </tr> <tr> <td>10) <input type="checkbox"/> Technical information supply</td> <td>11) <input type="checkbox"/> Credit/Loan</td> <td></td> </tr> </table>	1) <input checked="" type="checkbox"/> Seminar/workshop	2) <input type="checkbox"/> Vocational training	3) <input type="checkbox"/> Extension services	4) <input checked="" type="checkbox"/> Technical consultation	5) <input checked="" type="checkbox"/> R&D services	6) <input type="checkbox"/> Inspection/Testing	7) <input type="checkbox"/> Calibration	8) <input type="checkbox"/> Industrial standardization	9) <input type="checkbox"/> Consultation for investment/management	10) <input type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan	
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10) <input type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan											

**Attachment : Facilities Available for Services to SIs**

**Scientific Equipment of the Research Center for Advanced Materials (CIMAV)**

Transmission electron microscope  
Scanning electron microscope  
10 and 50 tons servo-hydraulic mechanical testing machines  
5 tons electromechanical testing machine  
Powder x-ray diffractometer  
X-ray fluorescence spectrometer  
Infra-red spectrometer  
Sequential plasma spectrometer  
Optical microscopes  
Thermal analysis equipment  
Equipment for metallographic samples preparation  
Corrosion test equipment for stress assisted and high temperature corrosion and Electrochemical Characterization  
surface area determination system  
Gas chromatography  
Water and emissions monitoring and characterization equipment  
Dark room facilities  
Work station  
Vibration magnetometer  
Mossbauer spectrometer  
Hardness, micro-hardness, impact and erosion machines  
Equipment for the preparation of electron microscopy samples  
Impedance analyzer  
Powder micro atomizer, attrition type mill, 30 tons hydraulic press, etc  
Environmental and UV-salinity chambers

**Scientific Equipment that would be of interest for the Research Center for Advanced Materials (CIMAV)**

Field emission, ultra high resolution transmission electron microscope  
Particle size optical analyzer  
Liquid nitrogen production plant  
High power (150KW) no-break  
Rheometer  
Hot isostatic press  
High temperature torsion machine  
Laboratory rolling mill.  
Induction furnace  
Confocal microscope  
Wave length dispersion spectrometer  
High temperature vacuum electrical furnace  
Atomic absorption spectrometer  
Work station type computers  
Equipment for optical characterization  
UV-Vis. Spectrometer

Ser. No.

<b>Centro de Investigación y Asistencia Técnica del Estado de Querétaro, A.C. (CIATEQ)</b>			
Address : Calzada del Retablo 150, 76150 Querétaro, QRO.			
Tel : 16-34-29		Fax : 16-99-63	
Status : Public (SEP-CONACYT)		Establishment : 1978	Staff : 130
Facilities available for services to supporting industries (SIs) : Attached			

**Main Roles**

To contribute modernization of metal-mechanics and metallurgical industries

**Main activities available for SIs**

- 1) To design and manufacture automated production lines for autoparts
- 2) To conduct experimental research works and to construct prototype machinery
- 3) To conduct research works on melting, casting and surface treatment
- 4) To conduct technical training course (Pneumatic course, Hydraulic course, Turbo-machinery course, Mechanical failure analysis course)
- 5) To offer calibration services in the field of temperature, mass, volume, dimension (Aguascalientes branch labo.)
- 6) To offer metallurgical testing and inspection services (Labo. under construction)

**Recent achievement**

Number of performed projects in 1995 : 150

**Limitations and advantages in services for SIs**

*Limitations*

Availabilities of facilities and services for SMEs are limited.

*Advantages*

**Available services for SIs**

- |                                                                      |                                                        |                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop              | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                     |
| 4) <input checked="" type="checkbox"/> Technical consultation        | 5) <input checked="" type="checkbox"/> R&D services    | 6) <input checked="" type="checkbox"/> Inspection/Testing          |
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| 10) <input checked="" type="checkbox"/> Technical information supply | 11) <input type="checkbox"/> Credit/Loan               |                                                                    |



**Attachment : Facilities Available for Services to SIs**

**Material technology department**

Cupola (4 tons/Hr)	1 set
Induction furnace (180kg)	3 sets
Induction furnace for holding (500kg)	1 set
Surface treatment furnace (fluidized-bed type)	1 set
Salt bath (Electric heating)	1 set
Molding equipment using lost foam pattern	1 set
Centrifugal casting machine	2 sets

**Mechanical construction department**

Horizontal lathe	3 sets
Vertical lathe	1 set
Milling machine	2 sets
Radial drilling machine	3 sets
Turning center	1 set
Vertical machining center	1 set
Cylindrical grinding machine	1 set
Surface grinding machine	1 set
Broaching machine	1 set

**Metrology laboratory**

3D CMM	1 set
Profile projector	1 set
Granite surface plate	1 set
Rockwell hardness tester	1 set
Brinell hardness tester	1 set
Gauge blocks	1 set

**Centro de Ingeniería y Desarrollo Industrial (CIDESI)**

**Address** : Playa Pie de la Cuesta 702, Fracc. Habitacional San Pablo, Querétaro, QRO. 76130  
**Tel** : 20-63-64      **Fax** : 20-63-65  
**Status** : Public (SEP-CONACYT)      **Establishment** : 1984      **Staff** : 205  
**Facilities available for services to supporting industries (SIs)** : Attached

**Main Roles**

To give technical assistance to the micro, small and medium scaled enterprises

**Main activities available for SIs**

- 1) To develop products, machinery and equipment, automation and control systems
- 2) To design and make mold & die
- 3) To offer metallurgical testing and inspection services
- 4) To conduct research and development work of advanced material
- 5) To offer calibration service in the field of dimension, mass, volume and temperature
- 6) To conduct technical training course

**Recent achievement**

Number of calibration services in 1995 : 1,340

**Limitations and advantages in services for SIs**

Limitations

Obsolete machinery and equipment in machine shop, testing and metrology laboratories

Advantages

Maintaining close relation to the local SIs

**Available services for SIs**

- |                                                                      |                                                        |                                                                               |
|----------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop              | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                                |
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| 10) <input checked="" type="checkbox"/> Technical information supply | 11) <input type="checkbox"/> Credit/Loan               |                                                                               |

**Attachment : Facilities Available for Services to SIs**

<b>1) Non-destructive testing laboratory</b>	
Magnetic flaw detection facilities	1 set
Eddy current flaw detection facilities	1 set
Penetration inspection facilities	1 set
Ultrasonic flaw detection facilities	2 sets
X-ray inspection facilities	1 set
<b>2) Metallography laboratory</b>	
Optical microscope	3 sets
Specimen preparation facilities	1 set
<b>3) Chemical analysis laboratory</b>	
Atomic absorption flame emission spectrophotometers	2 sets
UV-VIS spectrophotometers	1 set
<b>4) Mechanical properties testing laboratory</b>	
Universal testing machine	1 set
Charpy-impact tester	1 set
Vickers hardness tester	1 set
Rockwell hardness tester	1 set
Brinell hardness tester	1 set
Universal hardness tester	1 set
Fatigue testing machine	5 sets
Twist testing machine	1 set
<b>5) Machine shop</b>	
Electric discharging machine	1 set
Surface grinding machine	2 sets
Cylindrical grinding machine	1 set
Milling machine	5 sets
Lathe	3 sets
Drilling machine	3 sets
<b>6) Metrology laboratory</b>	
3D CMM	1 set
Measuring machine (Length)	1 set
Roundness measuring machine	1 set
Profile projector	1 set
Gauge blocks	several sets
Gear measuring machine	1 set
Indication comparator for calibration	1 set
Electric comparator for gauge blocks calibration	1 set

<b>Centro de Investigación en Química Aplicada (CIQA)</b>	
<b>Address :</b> Apartado Postal 379, Blvd. Enrique Reyna No.140, Saltillo, COAH. 25100	
<b>Tel :</b> (84)15-28-27 <b>Fax :</b> (84)15-48 -04	
<b>Status :</b> Public (SEP-CONACYT)	<b>Establishment :</b> 1976 <b>Staff :</b> 146
<b>Facilities available for services to supporting industries (SIs) :</b> Attached	

<p><b>Main Roles</b></p> <p>To support and promote plastics industries</p>												
<p><b>Main activities available for SIs</b></p> <ol style="list-style-type: none"> <li>1) To transfer the results of R&amp;D works to the industries</li> <li>2) To offer laboratory services such as chemical analysis and materials testing</li> <li>3) To hold seminars for the industries</li> <li>4) To develop prototype of plastics processing facilities</li> <li>5) To provide technological information service (library and computer internet service)</li> <li>6) To offer consulting service</li> </ol>												
<p><b>Recent achievement</b></p> <ol style="list-style-type: none"> <li>1) Research on ultra-violet absorbable agents</li> <li>2) Development of stretch film forming technology</li> </ol>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><u>Limitations</u>          Availabilities of facilities and services for SMEs are limited.</p> <p><u>Advantages</u>          Well equipped with high grade and advanced facilities</p>												
<p><b>Available services for SIs</b></p> <table style="width: 100%; border: none;"> <tr> <td>1) <input checked="" type="checkbox"/> Seminar/workshop</td> <td>2) <input type="checkbox"/> Vocational training</td> <td>3) <input type="checkbox"/> Extension services</td> </tr> <tr> <td>4) <input checked="" type="checkbox"/> Technical consultation</td> <td>5) <input checked="" type="checkbox"/> R&amp;D services</td> <td>6) <input checked="" type="checkbox"/> Inspection/Testing</td> </tr> <tr> <td>7) <input type="checkbox"/> Calibration</td> <td>8) <input checked="" type="checkbox"/> Industrial standardization</td> <td>9) <input type="checkbox"/> Consultation for investment/management</td> </tr> <tr> <td>10) <input checked="" type="checkbox"/> Technical information supply</td> <td>11) <input type="checkbox"/> Credit/Loan</td> <td></td> </tr> </table>	1) <input checked="" type="checkbox"/> Seminar/workshop	2) <input type="checkbox"/> Vocational training	3) <input type="checkbox"/> Extension services	4) <input checked="" type="checkbox"/> Technical consultation	5) <input checked="" type="checkbox"/> R&D services	6) <input checked="" type="checkbox"/> Inspection/Testing	7) <input type="checkbox"/> Calibration	8) <input checked="" type="checkbox"/> Industrial standardization	9) <input type="checkbox"/> Consultation for investment/management	10) <input checked="" type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan	
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**Attachment : Facilities Available for Services to Sis**

**Polymer analysis apparatus**

Size exclusion chromatography  
X-ray diffraction  
Nuclear magnetic resonance  
Infrared spectroscope  
Ultraviolet spectroscope  
Scanning & transmission electron microscope

**Compound tester**

Melt-index tester  
Plast-graph

**Molding product tester**

Universal testing machine  
Impact tester (Izod type)  
Cone fall down impact tester  
Friction tester  
Heat distortion temperature tester  
Ultraviolet irradiation apparatus  
etc.

**Compounding machine**

Henschel mixer  
Extruder for pellet

**Molding machine**

Injection machine	2 sets
Extruder	3 sets
Blow molding machine	1 set

**Corporación Mexicana de Investigación en Materiales, S.A. de C.V. (COMIMSA)**

**Address :** Blvd. Oceania 190, Fracc. Saltillo 400, Apdo. Postal 491, C.P.25290, Saltillo, COAH.  
**Tel :** (84)11-32-00 **Fax :** (84)15-21-51  
**Status :** Public (Part of SEP-CONACYT System) **Establishment :** 1992 **Staff :** 388  
**Facilities available for services to supporting industries (SIs) :** Attached

**Main Roles**

- To develop and apply modern and reliable technologies
- To support industrial operations and maintenance

**Main activities available for SIs**

- 1) New products development
- 2) Prototype development
- 3) Environmental engineering
- 4) Product certification under national and international standards
- 5) Subcontractor certification (procedures and quality system)
- 6) Development and evaluation of quality assurance systems
- 7) Metrology services

**Recent achievement**

Projected sales amount in 1996 : 7 million US\$  
 Number of clients in 1995 : 400  
 of which 333 were small sized enterprises.

**Limitations and advantages in services for SIs**

Limitations

Most of the services offered are designed for basic industries such as oil, power, steel and cement.

Advantages

Well equipped with high grade and advanced facilities

**Available services for SIs**

- |                                                                      |                                                                   |                                                                    |
|----------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------|
| 1) <input type="checkbox"/> Seminar/workshop                         | 2) <input type="checkbox"/> Vocational training                   | 3) <input checked="" type="checkbox"/> Extension services          |
| 4) <input checked="" type="checkbox"/> Technical consultation        | 5) <input checked="" type="checkbox"/> R&D services               | 6) <input checked="" type="checkbox"/> Inspection/Testing          |
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| 10) <input checked="" type="checkbox"/> Technical information supply | 11) <input type="checkbox"/> Credit/Loan                          |                                                                    |

**Attachment : Facilities Available for Services to SIs**

X-ray fluorescent analyzer	1 set
Optical emission quantometer	1 set
X-ray spectrometer	1 set
C.S. analyzer	3 sets
10 ton universal testing machine	1 set
Brinell hardness tester	1 set
Rockwell hardness tester	1 set
60 ton universal testing machine	1 set
Micro Vickers hardness tester	1 set
Impact testing machine (Charpy & Izod)	1 set
Atomic absorption flame emission spectrophotometer	1 set
Emission spectrometer	1 set
Optical microscope	1 set
Scanning electron microscope	1 set

**Fondo de Información y Documentación para la Industria (INFOTEC)**

Address : Av. San Fernando No. 37, C.P.14050, D.F.

Tel : 624-2800 Fax : 624-2822

Status : Public (SEP-CONACYT)

Establishment : 1975 Staff : 85

Facilities available for services to supporting industries ( N.A.)

**Main Roles**

Its mission is to contribute to the improvement of productivity, principally, of the small- and medium-sized companies.

**Main activities available for SIs**

- Information Network Service
- Enterprises Information Services (ESI)
- Training Service
- Consulting Service

**Recent achievement**

N.A.

**Limitations and advantages in services for SIs**

Limitations

Advantages

It supports the industry in the identification and definition of technical problems and in the analysis of business opportunities. It helps to facilitate the access to the new world of productivity, competitively and to technological innovation and modernization for SMEs.

**Available services for SIs**

- |                                                                      |                                                        |                                                                               |
|----------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop              | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                                |
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<b>Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE)</b>			
<b>Address :</b> Domicilio Conocido Torantzintla, Puebla			
<b>Tel :</b> 91(22)474306 <b>Fax :</b> 91(22)474314			
<b>Status :</b> Public (SEP-CONACYT)		<b>Establishment :</b> 1972	<b>Staff :</b> 60
<b>Facilities available for services to supporting industries (SIs) :</b> None			

<p><b>Main Roles</b></p> <p>To foster researcher, professor, experts and technician in the field of astrophysics, optics and electronics.          To obtain the solution for scientific and technological problem in these fields.</p>												
<p><b>Main activities available for SIs</b></p> <p>N.A.</p>												
<p><b>Recent achievement</b></p> <p>N.A.</p>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><u>Limitations</u>          The center mainly covers scientific field of astrophysics and optics which are not directly related to SIs.</p> <p><u>Advantages</u>          In the field of electronics, the center is able to conduct research on design, manufacture and inspection of semi-conductor.</p>												
<p><b>Available services for SIs</b></p> <table style="width: 100%; border: none;"> <tr> <td>1) <input type="checkbox"/> Seminar/workshop</td> <td>2) <input type="checkbox"/> Vocational training</td> <td>3) <input type="checkbox"/> Extension services</td> </tr> <tr> <td>4) <input type="checkbox"/> Technical consultation</td> <td>5) <input type="checkbox"/> R&amp;D services</td> <td>6) <input type="checkbox"/> Inspection/Testing</td> </tr> <tr> <td>7) <input type="checkbox"/> Calibration</td> <td>8) <input type="checkbox"/> Industrial standardization</td> <td>9) <input type="checkbox"/> Consultation for investment/management</td> </tr> <tr> <td>10) <input type="checkbox"/> Technical information supply</td> <td>11) <input type="checkbox"/> Credit/Loan</td> <td></td> </tr> </table>	1) <input type="checkbox"/> Seminar/workshop	2) <input type="checkbox"/> Vocational training	3) <input type="checkbox"/> Extension services	4) <input type="checkbox"/> Technical consultation	5) <input type="checkbox"/> R&D services	6) <input type="checkbox"/> Inspection/Testing	7) <input type="checkbox"/> Calibration	8) <input type="checkbox"/> Industrial standardization	9) <input type="checkbox"/> Consultation for investment/management	10) <input type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan	
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<b>Centro de Asistencia y Servicios Tecnológicos (CAST), CONALEP</b>	
Address : Ave. Parque Ind. de los Aztecas, 2220 Cd. Juárez, Chihuahua	
Tel : (16)20-4881 Fax : (16)20-4880	
Status : Public (SEP)	Establishment : 1994 Staff :
Facilities available for services to supporting industries (SIs) : Attached	

<p><b>Main Roles</b></p> <p>To strengthen competitiveness of SMEs and to cope with the liberalization of economy</p>												
<p><b>Main activities available for SIs</b></p> <ol style="list-style-type: none"> <li>1) To train people dispatched from industries</li> <li>2) To offer technical assistance</li> <li>3) To assess skill level of operators</li> <li>4) To offer machining, testing and inspection services using facilities installed in the center</li> </ol>												
<p><b>Recent achievement</b></p> <p>N.A.</p>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><u>Limitations</u></p>  <p><u>Advantages</u></p> <ol style="list-style-type: none"> <li>1) The center maintains close relations with local SIs.</li> <li>2) Well equipped with high grade and advanced facilities</li> </ol>												
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10) <input type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan											

**Attachment : Facilities Available for Services to SIs**

**Metrology equipment**

Laser micrometer	2 sets
Optical comparator	2 sets
Surface roughness tester	1 set
Profile projector	1 set
Hardness tester	2 sets
Roundness tester	1 set
CMM	2 sets

**Machine tool**

Machining center	1 set
CNC lathe	1 set
CNC milling machine	1 set
Universal milling machine	3 sets
Conventional lathe	5 sets
CNC-manual lathe	1 set
EDM	1 set
Wire-cut EDM	1 set
Rectifier	3 sets
Drilling machine	2 sets

**Welding equipment**

TIG welding machine	4 sets
MIG welding machine	3 sets
Electrical soldering machine	1 set
Oxygen acetylene welding	5 sets
Plasma process cutting machine	1 set
MIG welding robot	1 set

Note) Educational facilities are not included.

<b>Centro de Asistencia y Servicios Tecnológicos (CAST), CONALEP</b>	
Address : Av. Dr. Jorge Jimenes Cantu, No. 1000 Sun. Col. San Juan Atlamica Cuautitlan Izcalli, Edo. de México	
Tel : (5)837-9565 Fax : (5)837-9565	
Status : Public (SEP)	Establishment : N.A. Staff : 11
Facilities available for services to supporting industries (SIs) : Attached	

<p><b>Main Roles</b></p> <p>To strengthen competitiveness of regional small &amp; medium scaled industries and to foster operators</p>												
<p><b>Main activities available for SIs</b></p> <ol style="list-style-type: none"> <li>1) To train people dispatched from industries</li> <li>2) To offer technical assistance</li> <li>3) To manufacture products ordered by regional industries</li> <li>4) To offer machining, testing and inspection services using facilities installed in the center</li> </ol>												
<p><b>Recent achievement</b></p> <p>N.A.</p>												
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**Attachment : Facilities Available for Services to SIs**

Vertical machining center	1 set
Milling machine	1 set
Turning center (NC)	1 set
Wire cut EDM	1 set
EDM	1 set
3D CMM	1 set
Roundness tester	1 set
Hight gauge	3 sets
Hight master	1 set
Roughness tester	1 set
Profile projector	1 set
Optical microscope	1 set
Universal hardness machine	3 sets
Electric micrometer	1 set
X-ray inspection equipment	1 set

Note) Educational facilities are not included.

**Centro de Asistencia y Servicios Tecnológicos (CAST), CONALEP**

**Address :** Av. Dr. Jorge Jimenes Cantu, No. 1000 Sun. Col. San Juan Atlamica Cuautitlan Izcalli, Edo. de Mexico  
**Tel :** (5)837-9565 **Fax :** (5)837-9565  
**Status :** Public (SEP) **Establishment :** N.A. **Staff :** 11  
**Facilities available for services to supporting industries (SIs) :** Attached

**Main Roles**

To strengthen competitiveness of regional small & medium scaled industries and to foster operators

**Main activities available for SIs**

- 1) To train people dispatched from industries
- 2) To offer technical assistance
- 3) To manufacture products ordered by regional industries
- 4) To offer machining, testing and inspection services using facilities installed in the center

**Recent achievement**

N.A.

**Limitations and advantages in services for SIs**

Limitations

Advantages

- 1) The center maintains close relations with local SIs.
- 2) Well equipped with high grade and advanced facilities

**Available services for SIs**

- |                                                               |                                                            |                                                                    |
|---------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop       | 2) <input checked="" type="checkbox"/> Vocational training | 3) <input type="checkbox"/> Extension services                     |
| 4) <input checked="" type="checkbox"/> Technical consultation | 5) <input type="checkbox"/> R&D services                   | 6) <input checked="" type="checkbox"/> Inspection/Testing          |
| 7) <input type="checkbox"/> Calibration                       | 8) <input type="checkbox"/> Industrial standardization     | 9) <input type="checkbox"/> Consultation for investment/management |
| 10) <input type="checkbox"/> Technical information supply     | 11) <input type="checkbox"/> Credit/Loan                   |                                                                    |

**Attachment : Facilities Available for Services to SIs**

Vertical machining center	2 sets
Milling machine	4 sets
Turning center (NC)	1 set
Wire cut EDM	1 set
EDM	2 sets
Lathe	3 sets
Radial drilling machine	1 set
Surface grinding machine	4 sets
Electrical furnace	2 sets
Heat treatment furnace	1 set
Die-cast machine	1 set
Roundness tester	1 set
Hight gauge	1 set
Hight master	1 set
Roughness tester	1 set
Profile projector	1 set
Optical microscope	1 set
Universal hardness machine	2 sets
Torque measurement	1 set
Granite surface plate	1 set
Surface roughness tester	1 set

Note) Educational facilities are not included.

<b>Centro Reginal de Optimización y Desarrollo de Equipo de Chihuahua (CRODE)</b>			
Address : Av. Homero No.350 Esq. N.Gogol Complejo Industrial Chihuahua			
Tel : 81-06-41		Fax : 81-06-41	
Status : Public (SEP)	Establishment :	Staff :	
Facilities available for services to supporting industries (SIs) : Limited			

<p><b>Main Roles</b></p> <ol style="list-style-type: none"> <li>1) Maintenance of laboratory equipment</li> <li>2) Design and fabrication of educational equipment</li> <li>3) Training of laboratory staff</li> </ol> <p style="padding-left: 20px;">All services for eight "Institutos Tecnologicos" under SEP</p>												
<p><b>Main activities available for SIs</b></p> <p>Accept employees of SMEs to take the training course organized for the staff of "Institutos Tecnologicos"</p>												
<p><b>Recent achievement</b></p> <p>Started the Training of Technical staffs of private companies one year ago</p>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><u>Limitations</u>                  The original objective of the center is only to support "Institutos Tecnologicos".</p> <p><u>Advantages</u>                  Most of the facilities and equipment could be favorably utilized in the training course for SIs.                  Space is available for additional students and facilities.</p>												
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<b>Centro de Investigación y Desarrollo Condumex</b>	
<b>Address</b> : Carr. Constitución a S.L.P. Km. 9.6, Parque Industrial Jurica, C.P. 76120 Querétaro, QRO.	
<b>Tel</b> : (42)18-18-02 <b>Fax</b> : (42)18-07-17	
<b>Status</b> : Private company	<b>Establishment</b> : 1990 <b>Staff</b> : 79
<b>Facilities available for services to supporting industries (SIs)</b> : No facilities for services to SIs	

<p><b>Main Roles</b></p> <ul style="list-style-type: none"> <li>• Research and development work to support Carso (Parent company of Condumex) group companies</li> <li>• To develop new products</li> <li>• To develop production technology and processing facilities</li> <li>• To conduct various tests and inspections for production of group companies</li> </ul>												
<p><b>Main activities available for SIs</b></p> <p>No activities available for SIs</p>												
<p><b>Recent achievement</b></p> <p>N.A.</p>												
<p><b>Limitations and advantages in services for SIs</b></p> <p><i>Limitations</i></p>  <p><i>Advantages</i></p>												
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<b>Transmisiones y Equipos Mecánicos, S.A. de C.V. (TREMEC)</b> <b>Research and Development Laboratory</b>	
<b>Address :</b> Ave. 5 de Febrero No.2115 C.P.76120, Apartado Postal 308, C.P.76000 Querétaro, QRO.	
<b>Tel :</b> (42)17-07-17 <b>Fax :</b> (42)17-03-45	
<b>Status :</b> Private company	<b>Establishment :</b> N.A. <b>Staff :</b> 12
<b>Facilities available for services to supporting industries (SIs) :</b> No facilities for services to SIs	

<p><b><i>Main Roles</i></b></p> <ul style="list-style-type: none"> <li>• To develop new products of transmission</li> <li>• To develop production technology and production lines</li> </ul>												
<p><b><i>Main activities available for SIs</i></b></p> <p>No activities available for SIs</p>												
<p><b><i>Recent achievement</i></b></p> <p>N.A.</p>												
<p><b><i>Limitations and advantages in services for SIs</i></b></p> <p><u>Limitations</u></p>  <p><u>Advantages</u></p>												
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10) <input type="checkbox"/> Technical information supply	11) <input type="checkbox"/> Credit/Loan											

**Centro de Moldes y Troqueles, S.C. (CEMYT)**

Address : Juan Ruiz Alarcon 350 Compl. Industrial, Chihuahua  
 Tel : (14)81-1449 Fax : (14)81-1961  
 Status : Private Establishment : 1994 Staff : N.A.  
 Facilities available for services to supporting industries ( Attached

**Main Roles**

To develop design, engineering, fabrication and maintenance technology of mold and die to support the regional industry  
 To supply molds and dies to regional automobile and electronic industries.

**Main activities available for SIs**

To design, manufacture and repair molds and dies  
 To train mold-making engineers

**Recent achievement**

Under preparation, yet to start

**Limitations and advantages in services for SIs**

Limitations

Advantages

**Available services for SIs**

- |                                                           |                                                        |                                                                    |
|-----------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop   | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                     |
| 4) <input type="checkbox"/> Technical consultation        | 5) <input type="checkbox"/> R&D services               | 6) <input type="checkbox"/> Inspection/Testing                     |
| 7) <input type="checkbox"/> Calibration                   | 8) <input type="checkbox"/> Industrial standardization | 9) <input type="checkbox"/> Consultation for investment/management |
| 10) <input type="checkbox"/> Technical information supply | 11) <input type="checkbox"/> Credit/Loan               |                                                                    |

**Attachment : Facilities Available for Services to SIs**

Lathe	2 sets
Drilling machine	4 sets
Milling machine	2 sets
EDM	2 sets
Wire-cut EDM	2 sets

**Centro para la Innovación y el Desarrollo Competitivo Empresarial, S.C. (CIDCE)**

**Address :** Querétaro 434, Col. República Ote, Saltillo, Coah. 25280, AP16 CPI

**Tel :** 15-62-00      **Fax :** 16-38-81

**Status :** Private

**Establishment :** 1994

**Staff :** N.A.

**Facilities available for services to supporting industries (SIs) :** N.A.

**Main Roles**

To contribute to raise competitiveness level of the industries by means of developing human resources

**Main activities available for SIs**

- 1) Technology transfer
- 2) To offer consultancy services with regard to legal matter
- 3) To provide library service
- 4) To hold seminars on production management technology and TQC

**Recent achievement**

- Current number of clients are over 100, most of them are member of CAINTRA

**Limitations and advantages in services for SIs**

Limitations

Advantages

- To keep close relation with the local SMEs

**Available services for SIs**

- |                                                                      |                                                        |                                                                               |
|----------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop              | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                                |
| 4) <input checked="" type="checkbox"/> Technical consultation        | 5) <input type="checkbox"/> R&D services               | 6) <input type="checkbox"/> Inspection/Testing                                |
| 7) <input type="checkbox"/> Calibration                              | 8) <input type="checkbox"/> Industrial standardization | 9) <input checked="" type="checkbox"/> Consultation for investment/management |
| 10) <input checked="" type="checkbox"/> Technical information supply | 11) <input type="checkbox"/> Credit/Loan               |                                                                               |

**Unidad de Transferencia de Tecnología (UTT)**

**Address** : Av. San Antonio 256 Col. Ampliación, Napoles, delg. Benito Juárez, D.F.  
**Tel** : 563-3400 **Fax** : 611-2151  
**Status** : Private non-profit organization **Establishment** : 1993 **Staff** : N.A.  
**Facilities available for services to supporting industries (SIs)** : N.A.

**Main Roles**

To provide knowlege-base and environmentally sound technological tools to SMEs

**Main activities available for SIs**

- 1) In-plant technical assistance and training programs
- 2) Setting up of QA systems
- 3) Consulting services especially on environmental protection
- 4) Trading services
- 5) Information service and patents etc.

**Recent achievement**

Total number of services to the industry upto Feb. 1996 is 1500.

**Limitations and advantages in services for SIs**

Limitations

Advantages

Service charges are reasonable for SMEs.

**Available services for SIs**

- |                                                                      |                                                        |                                                                               |
|----------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Seminar/workshop              | 2) <input type="checkbox"/> Vocational training        | 3) <input type="checkbox"/> Extension services                                |
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### Processing Technology and Raw Materials for Autoparts (1/4)

#### A. ENGINE

	Components/Parts	Main Materials	Main Processing Method
Engine Body	Cylinder Block	Grey cast iron	Sand mould casting
	Cylinder Head	Grey cast iron	Sand mould casting
	Gasket		
	Engine Mounting Bracket	Ductile cast iron/Steel sheet	Sand mould casting/ Stamping & Welding
	Engine Mount	Rubber & Steel sheet	Stamping
	Oil Pan	Steel sheet/Aluminum alloy	
Piston and Crankshaft	Piston	Aluminum alloy	Gravity die casting
	Piston Pin	Structural alloy steel	Cold forging
	Piston Ring	Grey cast iron	Sand mould casting
	Crankshaft	Medium carbon steel, Low alloy steel	Forging
	Connecting Rod	Medium carbon steel	Forging
	Main Bearing	Kelmet	Sintering
	Connecting Rod Bearing	Kelmet	Sintering
Camshaft and Valve	Engine Valve	Heat resistant alloy steel	Forging & Welding
	Valve Spring	Piano wire	Ceiling & Heat treatment
	Rocker Arm	Aluminum alloy/Alloy steel	Pressure die casting/ Precision casting/Forging
	Valve Guide	Grey cast iron/Sinterd alloy	Sand mould casting/Sintering
	Valve Sheet	Sinterd alloy	Sintering
	Valve Spring Retainer	Carbon steel, Alloy steel	Cold forging
	Camshaft	Grey cast iron/Carbon steel	Sand mould casting/Forging
	Camshaft Sprocket	Sinterd alloy	Sintering
	Timing Belt	Rubber	
Fuel System	Fuel Pump	Lowerbody parts: Aluminum die cast	Machining & Assembling
	Fuel Injection Assy		Machining & Assembling
	injector		
	pressure regulator		
	Carburetor		
	Fuel Tank	Steel sheet	Stamping & Welding
	Fuel Hose	Rubber	Blow moulding
Intake and Exhaust	Intake Manifold	Aluminum alloy	Low pressure die casting/ Gravity die casting
	Exhaust Manifold	Grey cast iron	Sand mould casting
	Air Cleaner	Case & Cover : steel sheet/Plastics	Machining & Assembling
	Muffler	Steel sheet	Stamping & Welding
Lubricating and Cooling System	Oil Pump		Machining & Assembling
	rotor/gear	Fe-C-Cu Sintered alloy	Sintering
	case	Aluminum alloy	Pressure die casting
	shaft	Carbon steel	Machining & Heat treatment
	Water Pump		Machining & Assembling
	body	Grey cast iron/Aluminum alloy	Sand mould casting/ Pressure die casting
	impeller	Grey cast iron/Steel sheet	Sand mould casting/Stamping
	Radiator		Stamping & Soldering & Assembling
	fin	Copper sheet	
	tank	Brass sheet	
	tube	Brass sheet	
	Radiator Fan	Resin	Injection moulding
	Engine Oil Cooler		Stamping & Soldering & Assembling
Oil Filter		Assembling	

Source: JICA team's preparation.



## Processing Technology and Raw Materials for Autoparts (2/4)

## B. BODY

Components/Parts	Main Materials	Main Processing Method
Outer Panels	Almost all material of body is steel sheet.	Almost all processing method of body is stamping.
doors		
front food		
trunk lid quarter		
cowl top		
Inner Panels		
same as above		
Roof		
Roof rail		
Fender Panel		
Pillars		
Front & Rear Frame		
Side Sill		
Dash Panel (Instrument Cluster)		
Strut House Panel		
Floor Pan		
Cross & Side Member		
Front End Upper Bar		
Door Hinge Reinforce		
Bumper Reinforce		
Backbone Reinforce		

## C. TRIM

Components/Parts	Main Materials	Main Processing Method
Instrument Panel		
foundation	ABS Resin	Injection moulding
cushion	Polyurethane resin	Foaming
cuticle	PVC Resin	
Console Box		
foundation	ABC Resin	Injection moulding
cuticle	PVC Resin	
Seat		
seat frame	Steel sheet	Stamping
cushion spring	Spring steel	Ceiling & Heat treatment
back spring	Spring steel	Ceiling & Heat treatment
cushion	Polyurethane resin	Foaming
cuticle	Artificial leather, Fabric	
Door Trim		
foundation	Woodenfibre/Resin compound	Hot and cold compression moulding/ Injection moulding
cuticle	PVC Resin	
cushion	Polyurethane resin	Foaming
Ceiling (Formed Ceiling)		
foundation	Woodenfibre/Resin compound	Hot compression moulding/ Vacuum forming
cuticle	PVC Resin	
cushion	Polyurethane resin	Foaming
Floor		
carpet	Fibre	
antivibration material	Asphalt sheet	
insulator	Polyurethane resin, Felt	

## Processing Technology and Raw Materials for Autoparts (3/4)

## D. EXTERIOR

	Components/Parts	Main Materials	Main Processing Method
	Bumper Fascia	Resin/Steel sheet	Injection moulding/Stamping
	Grille	Resin	Injection moulding
	Garnish	Resin	Injection moulding
	side garnish		
	rear pin garnish		
	rear panel garnish		
	Mogol	Stainless steel/Resin	Stamping
	Rear Spoiler	Resin	Blow moulding/Injection moulding
	Lamp		
	bulb	Glass, Tungsten filament	
	lense	Resin/Glass	Injection moulding
	reflector	Resin/Steel sheet	Injection moulding/Stamping
	body	Resin	Injection moulding
	Wheel Cover	Resin/Steel sheet	Injection moulding/Stamping
	Window	Glass	
	front window sealed		
	side window		
	rear window		
	roof window		
	mirror		Assembling

## E. CHASSIS

	Components/Parts	Main Materials	Main Processing Method
Suspension	Spring	Spring steel	
	sheet spring		Stamping & Heat treatment
	coil spring		Ceiling & Heat treatment
	Stabilizer	Spring steel & Structural steel	Bending, Stamping
	Arms	Steel sheet/Medium carbon steel	Stamping/Forging
Steering Axle	Shock Absorber	Steel tube	Machining & Assembling
	Knuckle	Carbon steel/Ductile cast iron	Forging/Sand mould casting
	Axle		
	front axle	Medium carbon steel	Forging
	rear axle	Medium carbon steel	Forging
Steering	Wheel Hub	Grey cast iron/Medium carbon steel	Sand mould casting/Forging
	Steering Wheel	Steel tube/Aluminum alloy	Machining & Assembling/ Pressure die casting
	Steering Column	Steel tube	Machining & Assembling
	Steering Shaft	Medium carbon steel	Machining & Assembling
	Steering Gear	Carbon steel	Machining & Heat treatment
Brake	Gear Housing	Aluminum alloy	Pressure die casting
	Brake Master Cylinder	Aluminum alloy	Sand mould casting
	Brake Booster		Machining & Assembling
	Brake Hose	Rubber	
	Brake Tube	Steel tube	
	Brake Wheel		
	Disc for Disc Brake	Ductile cast iron	Sand mould casting
	Caliper for Disc Brake	Ductile cast iron	Sand mould casting
Brake Drum	Grey cast iron	Sand mould casting	

### Processing Technology and Raw Materials for Autoparts (4/4)

#### F. DRIVING SYSTEM

	Components/Parts	Main Materials	Main Processing Method
Transmission	Transmission		Machining & Assembling
	transmission case	Grey cast iron/Aluminum alloy	Sand mould casting/ Pressure die casting
	gear	Alloy steel	Machining & Heat treatment
	shaft	Alloy steel	Machining & Heat treatment
	Clutch		Machining & Assembling
	clutch housing		
	clutch pedal	Carbon steel	Forging
	clutch master cylinder		Machining & Assembling
	clutch release cylinder		Machining & Assembling
Driving Mechanism	Uniform Joints		Machining & Assembling
	Propeller Shaft	Steel tube	Machining & Assembling
	Differential Gear Mechanism		Machining & Assembling
	Wheel	Steel sheet/Aluminum alloy	Stamping/Casting/Forging
	Tyre	Rubber	Moulding

#### G. ELECTRICAL PARTS

	Components/Parts	Main Materials	Main Processing Method
	Battery	Lead & Resin	Assembling
	Starter		Machining & Assembling
	housing	Aluminum alloy	Pressure die casting
	direct current motor	Magnetic steel sheet & Copper wire	Stamping & Wire winding
	magnet switch		Machining & Assembling
	Alternator		Machining & Assembling
	housing	Aluminum alloy	Pressure die casting
	stator	Steel sheet & Copper wire	Stamping & wire winding
	rotor	Carbon steel & Copper wire	Machining & Wire winding
	pulley	Carbon steel	Forging
	Wire Harness		Assembling
	Spark Plug		Assembling
	Horn		Assembling





Processing Technologies used for Electronic Parts Manufacturing

Parts Item	Element Parts			Assembly Parts								Cabinet Parts				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
No	Resistors	Capacitors	Inductances	Transformers	Remote Controllers	PCBs	Tuners	Speakers	CRTs	Magnetic Heads	Motors	Switches	Panels	Metal Parts	Cabinets	Frames
No	Parts Common Technology															
1	Press															
2	Injection															
3	Lathe Cutting															
4	Gilding															
5	Polishing															
6	Painting															
7	Printing															
8	Adhesion															
9	Die and/or Mold															
10	SMT <sup>1/</sup>															

(Note) <sup>1/</sup> Surface mounting technology (SMT) is increasingly used to fix semiconductors and other surface mounting devices (SMDs) on printed circuit boards (PCBs). Mounting can be done manually, but surface mounting machines are required for highly integrated devices.

### Method of Estimated Cost Breakdown of Automobile

A cost breakdown of a 2,000 cc passenger car was estimated on the basis of the weight by materials used.

**Table 1 Weight by Materials used <sup>1)</sup>  
(2,000 cc passenger car)**

Materials	(kg)	(%)	Remarks
1) Steel plate & sheet	578	45.0	Cold-rolled sheets, Hot-rolled sheets, Galvanized sheets
2) Steel products	283	22.0	Bar, Steel pipe, Spring
3) Cast iron	143	11.1	Pig iron, Scrap
4) Non-ferrous metal	31	2.4	Cu, Pb, Zn
5) Aluminum	65	5.1	Al ingot
6) Plastic	97	7.5	PE, PP, ABS, PVC, PU
7) Rubber	13	1.0	SBR
8) Others	75	5.8	Paints, Fiber, Wood
	1,285	100.0	

Source : Automotive Industry, Vol.26, August

Note 1) : Except glass and tire

The "weight of materials" was converted to "costs by essential technologies" using the following formula:

$$\text{Costs by essential technology} = \text{Material weight (kg)} \times \text{Material unit cost (yen/kg)} \times \text{Processing cost (times of unit cost)}$$

**Table 2 Conversion Table from Materials to Costs of Essential Technologies**

Materials	(1) Material weight (kg)	(2) Material unit cost <sup>1)</sup> (Yen/kg)	(3) Processing costs <sup>2)</sup> (times)	Essential technology
1) Steel plate & sheet	578	62	2.63	1) Stamping
2) Steel products	283	33	2.39	2) Forging/Bending/Machining
3) Cast iron	143	18	11.25	3) Ferrous Casting
4) Non-ferrous metal	31	246	4.23	4) Non-ferrous Metal Processing
5) Aluminum	65	186	4.23	5) Die-Casting (Al-alloy)
6) Plastic	97	148	3.26	6) Plastic Processing
7) Rubber	13	300	2.87	7) Rubber Processing
8) Others	75	139	2.85	8) Others
	1,285			

Note : 1) Material costs in Japan, 1996

: 2) Source : Cost Index of Small and Medium Industries 1996,  
Small and Medium Enterprise Agency of Japan

**Table 3 Estimated Cost Breakdown by Essential Technologies  
(2,000 cc passenger car)**

Essential technology	Costs <sup>1)</sup> (1,000 yen)	(%)
1) Stamping	94.2	29.8
2) Forging/Bending/Machining	22.3	7.1
3) Ferrous Casting	28.9	9.2
4) Non-ferrous Metal Processing	32.3	10.2
5) Die-Casting (Al-alloy)	51.1	16.1
6) Plastic Processing	46.8	14.8
7) Rubber Processing	11.2	3.5
8) Others	29.7	9.4
	316.5	100.0

Note 1) : (1) x (2) x (3) of Table 2



## Estimated Cost Breakdown of Color TV and Refrigerator in Japan

### A. Color TV (20 inches)

Various essential technologies are involved for manufacturing a part or component of CTV. In this analysis, it is assumed that each part or components is expediently categorized into an essential technology that is mainly used for, as shown in Table 1.

An estimated cost breakdown of CTV by each essential technology is shown in Table 2. The costs in Table 2 are just an example of a CTV being manufactured in Japan.

**Table 1 Parts and Components of TV Categorized into an Essential Technology <sup>1)</sup>**

	Elements	Assembly	Cabinet
1) Stamping	Cases for electrolytic capacitors, Resistor caps, Ceramic capacitors	Transformers, Radiating fins, Switches, Chassis frames, Convergence yokes, PCB holders	Metal fittings and hinges for (cabinet reinforcement, Degaussing coils, Speakers, Power switches)
2) Plastic processing	Small size transistors, Molded resistors, Cement resistors	Power code assy, Connectors, Coils, Remote controllers, Core filters, knobs, Buttons, Deflection yoke, Sockets	Speaker grills, Escutcheon, Deflection yoke wedges, Back covers, Cushion for packing, Control panels
3) Cutting	Wires, Sheets, Metal fittings, Frames	Radiating sheets, Insulation sheets	Packings, Tape
4) Gilding	Washers, Eyelets	Metal frames, Metal fittings, Springs	Antenna terminal, Emblems
5) Polishing	Ceramic boards	Yoke magnets, Magnet for convergence	Antenna, Brand name plates
6) Painting	Color cord resistors	Switch knobs, Buttons	Door panels
7) Printing	Electrolytic capacitor tubes, Outer-tube of electrolytic capacitors	Labels, Sheet panels	Packing cases
8) Adhesion	Adhesive tape	Rubber sheets	Tape
9) Casting	Metal fittings for radiating fins	Relays, Magnets	-
10) SMT		Fuze, Ferite, Peakings, Small size semiconductors, Leads, Carbon resistors, Anti-fire resistors	-

Note : 1) excludes panel and funnel for CRT.

**Table 2 Estimated Cost Breakdown of CTV (20 inches) Manufactured in Japan <sup>1)</sup>**

	Estimated Cost (unit : yen)				Composition (%)
	Elements	Assembly <sup>2)</sup>	Cabinet	Total	
1) Stamping	500	2,000	1,000	3,500	24.5
2) Plastic processing	800	1,200	1,800	3,800	26.6
3) Cutting	200	100	100	400	2.8
4) Gilding	100	100	100	300	2.1
5) Polishing	80	20	100	200	1.4
6) Painting	50	50	200	300	2.1
7) Printing	60	40	100	200	1.4
8) Adhesion	20	40	40	100	0.7
9) Casting	50	50	-	100	0.7
10) Others <sup>3)</sup>	100	250	50	400	2.8
11) SMT	-	4,000	-	4,000	28.0
12) Molds & dies <sup>4)</sup>	-	-	1,000	1,000	7.0
	1,960	7,850	4,490	14,300	100.0

Note : 1) Refer to table 1 for parts & components categorized in each section.

2) Excludes CRT and IC.

3) Soldering, winding and etc.

4) Molds, and dies amounting to Yen 50 million are fully amortized for production of 50,000 sets of TVs.

## B. Refrigerator (300 liters)

Parts and components used for a refrigerator are broken down in an essential technology which is mainly used for, as shown Table 3.

An estimated cost breakdown of a refrigerator by each essential technology is shown in Table 4. The costs in Table 4 are just an example of a refrigerator being manufactured in Japan.

**Table 3 Parts and Components of Refrigerator Categorized into an Essential Technology**

	Elements	Assembly	Cabinet
1) Stamping	Cases for capacitors, Metal fittings	Motors, Relays, Capacitors, Evaporator, Thermo holders, Drains, Leg spacers, Evaporator covers, Chillers	Doors, Back covers, Compressor covers, Back plate covers, Gaskets
2) Plastic processing	Rubber cushions (washers, spacers), Plastic cushions (washers, spacers)	Thermostats, Control boxes, Power code assy, Door stoppers, Hinges, door hinges, Gaskets, Compressor cover, Retainers	Inner doors, Outer panels, Trays, Racks, Boxes, Water evaporators
3) Cutting	Insulation sheets, Tubes	Harness, Leads, Roller pins, Filter nets, Sashes	Insulation materials, Sleeves
4) Gilding	Screws, Nuts, Washers	Bi-metal, Door switches, Thermostats, Metal fittings, Sash products	Metal trays & racks, Door knobs, Emblems
5) Polishing	Ceramic board	Spacers, Hinges	Lever, Exterior accessories, Brand name plates
6) Painting	Color display resistors	Compressor frames, Reinforcement frames, Legs fitting adjusters	Outer cabinets, Steel sheets, Frames, Emblems, Metal hinges & fittings
7) Printing	Electrolytic con-tubes, Filter tubes	Control knobs, Panel sheets	Packings, Labels
8) Adhesion	Tape	Insulation tape, Warning label	Rubber sealers, Sealing tape
9) Casting	Metal parts for radiation	Compressor	-
10) SMT	-	Electronic control print, Timer print, Carbon resistors, IC, Transistors, Capacitors, Chokes, Leads, Connectors	-

**Table 4 Estimated Cost Breakdown of Refrigerator (300 liters)  
Manufactured in Japan <sup>1)</sup>**

	Estimated Cost (unit : yen)				Composition (%)
	Elements	Assembly	Cabinet	Total	
1) Stamping	100	4,000	2,900	7,000	24.3
2) Plastic processing	100	2,000	6,900	9,000	31.2
3) Cutting	100	200	700	1,000	3.5
4) Gilding	-	100	400	500	1.7
5) Polishing	100	100	800	1,000	3.5
6) Painting	50	250	1,700	2,000	6.9
7) Printing	50	100	200	350	1.2
8) Adhesion	50	100	150	300	1.0
9) Casting	50	2,950	-	3,000	10.4
10) Others <sup>2)</sup>	100	300	100	500	1.7
11) SMT	-	3,000	-	3,000	10.4
12) Molds & dies <sup>3)</sup>	-	-	1,200	1,200	4.2
	700	13,100	15,050	28,850	100.0

Note : 1) Refer to table 3 for parts & components categorized in each section.

2) Soldering, winding and etc.

3) Molds, and dies amounting to Yen 60 million are fully amortized for production of 50,000 sets of



## Annex 9-1 Participants for PCM Workshops (1/11)

(1) The first workshop, February 7, 1996

	NOMBRE	CARGO / EMPRESA	FIRMA / TELEFONO
1	Ing. Palemón González Barraza	Subdirector de Promoción de Inversión Extranjera y Alianzas Estratégicas NAFIN	325 74 32 / 325 74 33
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## Annex 9-1 Participants for PCM Workshops (2/11)

The first workshop

	NOYBRE	CARGO / EMPRESA	FIRMA / TELEFONO
16	Lic. René Espinoza y Torres Estrada	Director General - CONCAMIN	566 78 22
17	Lic. Francisco Mendoza	Análisis de Información - CONCAMIN	703 25 91
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## Annex 9-1 Participants for PCM Workshops (3/11)

The first workshop

## MISSION MEMBERS

Name	Qualification	Assignment for the Study
1) Shozo INAKAZU	Principal Consultant	Team Leader, Overall Coordination & Management
2) Takenosuke KURODA	Senior Consultant	Industrial Development Study
3) Toru MORIGUCHI	Senior Consultant	Demand Survey of Parts and Components
4) Hideyo SHIMAZU *	Economist	Subcontracting System and PCM Moderator
5) Yoshinari YAMAMOTO	Economist	Investment and Export Promotion
6) Tadoru YAMAMOTO	Consulting Engineer	Factory Management / Production Management (Automotive parts and components)
7) Takeshi INOUE	Consulting Engineer	Technical Group Leader, Automotive parts and components (Metalworking)
8) Hiromi YOSHIKAWA	Consulting Engineer	Electrical / Electronic parts and components (Metalworking)

\* Moderator

## ADVISORS

Name	Organisation
9) Yasushi SUGIMOTO	First Secretary (Commercial Attache) Embassy of Japan
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12) Yoshiaki ENOMOTO	Subdirector, Mexico Office Japan International Cooperation Agency (JICA)
13) Daniel Gonzalez Gonzalez	Technical Secretary, Mexico Office Japan International Cooperation Agency (JICA)



## Annex 9-1 Participants for PCM Workshops (4/11)

## (2) The second workshop, June 13, 1996

	NOMBRE	CARGO / EMPRESA
1	Ing. Palemón González Barraza	Subdirector de Promoción de Inversión Extranjera y Alianzas Estratégicas NAFIN
2	Lic. Agustín Catrejón Pacheco	Gerente de Promoción de Inversión Extranjera y Alianzas Estratégicas - NAFIN
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6	Lic. Ana Pulido Castrellón	Jefa de Departamento de Investigación de Autotransporte - Dirección General de Industrias - SECOFI
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13	Fis. David Cervantes Romero	Subcontratación - CANACINTRA

## Annex 9-1 Participants for PCM Workshops (5/11)

The second workshop

	NOMBRE	CARGO / EMPRESA
* 14	Ing. Yoshitaka Enomoto	Subdirector - JICA
* 15	Lic. Daniel González González	Secretario Técnico - JICA
16	Ing. Reynaldo Castillo	Subgerente de Promoción del Sector Electrónico - BANCOMEXT
17	Lic. Ricardo Carrasco	Gerente de Promoción Sector Automotriz - BANCOMEXT
18	Lic. Guillermo Cochran	Director General - ANFAD
19	Ing. Carlos Ramos Burboa	Director de Estudios y Programas Sectoriales - Dirección General de Promoción Industrial - SECOFI
20	Lic. Humberto Noguera Blanco	Subdirector de Estudios Sectoriales - Dirección General de Promoción Industrial - SECOFI
21	Sr. Ulyses Balderas González	Subdirector de Programas Especiales - Dirección General de Promoción Industrial - SECOFI
22	Lic. Alfredo Lazcano X.	Subdirector de Competitividad Sectorial - Dirección General de Promoción Industrial - SECOFI

\* Advisors from JICA-Mexico

## Annex 9-1 Participants for PCM Workshops (6/11)

The second workshop  
(Japanese Side)

	NOMBRE	CARGO/EMPRESA
1	Shozo Inakazu	Principal Consultant - JICA Study Team (Team Leader)
2	Hideyo Shimazu (Moderator)	Economist - JICA Study Team (PCM Moderator)
3	Toru Moriguchi	Senior Consultant - JICA Study Team
4	Takeshi Inoue	Consulting Engineer - Technical Group Leader - JICA Study Team
5	Hiromi Yoshikawa	Consulting Engineer - JICA Study Team
6	Shiro Suzuki	Consulting Engineer - JICA Study Team
7	Hiroshi Imaizumi	Consulting Engineer - JICA Study Team

## Annex 9-1 Participants for PCM Workshops (7/11)

## (3) The third workshop, July 4, 1996

	NOMBRE	CARGO/EMPRESA
1	Ing. Patemón González Barraza	Subdirector de Promoción de Inversión Extranjera y Alianzas Estratégicas NAFIN
2	Dr. Francisco Flores	Dirección Adjunta de Coordinación Regional - NAFIN
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4	Ing. Roger Magar	Subdirector de Promoción a la Inversión - NAFIN
5	Ing. Carlos Martínez Nava	Director de Certificación Oficial - Dirección General de Normas - SECOFI
6	Ing. Jesús Palma Mota	Subdirector de Electrónica - Dirección General de Industrias - SECOFI
7	Lic. Ana Pulido Castrellón	Jefa de Departamento de Investigación de Autotransporte - Dirección General de Industrias - SECOFI
8	Lic. Ileana Ledezma Alvarez	Estudios Económicos - CANIECE
9	Ing. Raúl Ortiz	Gerente de Subcontratación - CAINTRA N.L.
10	C.P. Santiago Guzmán Monforte	Director General - CNIME
12	Lic. Beatriz Romo de Viver	Secretaría Técnica de la Dirección Adjunta de Modernización Tecnológica - CONACYT
13	Ing. Julio Moreno	Coordinador de Proyectos - FUNTEC
14	Lic. Francisco Fernández	Investigador de la Unidad de Apoyo Estadístico y discursos a la Presidencia - CONCAMIN
15	Lic. Ma. Teresa Kasuga	Vicepresidente Nacional - CANACINTRA

## Annex 9-1 Participants for PCM Workshops (8/11)

*The third workshop*

	NOMBRE	CARGO/ EMPRESA
16	Fis. David Cervantes Romero	Subcontratación - CANACINTRA
17	Lic. Ricardo Carrasco	Gerente de Promoción del Sector Autopartes - BANCOMEXT
18	Ing. Reynaldo Castillo	Subgerente de Promoción del Sector Electrónico - BANCOMEXT
19	Lic. Guillermo Cochran	Director General - ANFAD
20	Ing. Yoshitaka Enomoto	Subdirector - JICA
21	Lic. Daniel González González	Secretario Técnico - JICA
22	Ing. Yoshio Koyama	Experto en Pequeña y Mediana Empresa - SECOFI
23	Ing. Carlos Ramos B.	Director de Estudios y Programas Sectoriales - Dirección General de Promoción Industrial - SECOFI
24	Lic. Humberto Noguera Blanco	Subdirector de Estudios Sectoriales - Dirección General de Promoción Industrial - SECOFI
25	Sr. Ulyses Balderas González	Subdirector de Programas Especiales - Dirección General de Promoción Industrial - SECOFI
26	Lic. Alfredo Lazcano X.	Subdirector de Competitividad Sectorial - Dirección General de Promoción Industrial - SECOFI
27	Dr. Ignacio Navarro Z.	Director General- Dirección General de Promoción Industrial - SECOFI

\* Advisors from JICA-Mexico

## Annex 9-1 Participants for PCM Workshops (9/11)

The third workshop  
(Japanese Side)

	NOMBRE	CARGO/EMPRESA
1	Takeshi Naruse	Deputy Director, Planning Division, Mining & Industrial Development Planning Department - JICA
2	Haruya Yabuki	Industrial Development Study Division, Mining & Industrial Development Study & Department - JICA
3	Shozo Inakazu	Principal Consultant - JICA Study Team (Team Leader)
4	Hideyo Shimazu (Moderator)	Economist - JICA Study Team (PCM Moderator)
5	Toru Moriguchi	Senior Consultant - JICA Study Team
6	Takeshi Inoue	Consulting Engineer - Technical Group Leader - JICA Study Team
7	Hiromi Yoshikawa	Consulting Engineer - JICA Study Team
8	Shiro Suzuki	Consulting Engineer - JICA Study Team
9	Hiroshi Imaizumi	Consulting Engineer - JICA Study Team

## Annex 9-1 Participants for PCM Workshops (10/11)

## (4) The fourth workshop, September 9, 1996

	NAME	ORGANIZATION
1	ING. JESUS PALMA MORA	SECOFI
2	LIC. ANA PULIDO CASTRELLON	SECOFI
3	LIC. ABEL ARGUELLES	CANIECE
4	ING. RAUL ORTIZ	CAINTRA N.L.
5	C.P. SANTIAGO GUZMAN MONFORTE	CNIME
6	ING. GUILLERMO ROQUENI	CONACYT
7	ING. JULIO MORENO	FUNTEC
8	LIC. CESAR DAVID LOPEZ AVILA	CONCAMIN
9	LIC. MARIA TERESA KASUGA	CANACINTRA
10	FIS. DAVID CERVANTES ROMERO	CANACINTRA
11	LIC. RICARDO CARRASCO	BANCOMEXT
12	ING. REYNALDO CASTILLO	BANCOMEXT
13	LIC. GUILLERMO COCHRAN	ANFAD
* 14	ING. YOSHITAKA ENOMOTO	JICA
* 15	LIC. DANIEL GONZALEZ GONZALEZ	JICA
* 16	ING YOSHIO KOYAMA	SECOFI
17	DR. IGNACIO NAVARRO ZERMENO	SECOFI
18	ING. CARLOS RAMOS B.	SECOFI
19	LIC. HUMBERTO NOGUERA BLANCO	SECOFI
20	SR. ULYSES BALDERAS GONZALEZ	SECOFI
21	LIC. ALFREDO LAZCANO XOXOTLA	SECOFI
22	LIC. OSCAR BEJAR DE LA BARRERA	INA
23	LIC. FELIX ROJAS CRUZ	INA
24	LIC. AGUSTIN CASTREJON PACHECO	NAFIN
25	DR. ARTURO LARA RIEVERA	UAM
26	MTRO. JUAN MANUEL COLONA A.	UAM
27	SR. ANTONIO CERVERA	NAFIN
28	SR. ANTONIO RAMIREZ	CNIME
29	LIC. CLAUDIA RENATA CASTILLA R.	NAFIN

\* Advisors from JICA-Mexico

## Annex 9-1 Participants for PCM Workshops (11/11)

The fourth workshop  
(Japanese Side)

	NAME	ORGANIZATION
1	TAKESHI NARUSE	JICA-TOKYO
2	SHOZO INAKAZU	JICA STUDY TEAM, TEAM LEADER
3	HIROFUMI YAMAUCHI	JICA STUDY TEAM
4	TAKESHI INOUE	JICA STUDY TEAM
5	TADORU YAMAMOTO	JICA STUDY TEAM
6	HIROMI YOSHIKAWA	JICA STUDY TEAM
7	SHIRO SUZUKI	JICA STUDY TEAM
8	HIROSHI IMAIZUMI	JICA STUDY TEAM
9	AKIRA HATA	JICA STUDY TEAM
10	TORU MORIGUCHI	JICA STUDY TEAM
11	HIDEYO SHIMAZU	JICA STUDY TEAM
12	YOSHINARI YAMAMOTO	JICA STUDY TEAM





**Definition of Small- and Medium-scale Enterprises in Japan  
(Manufacturing Sector)**

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Small and Medium-Scale Enterprises : Less than 300 employees,  
or less than 100 million yen paid up capital

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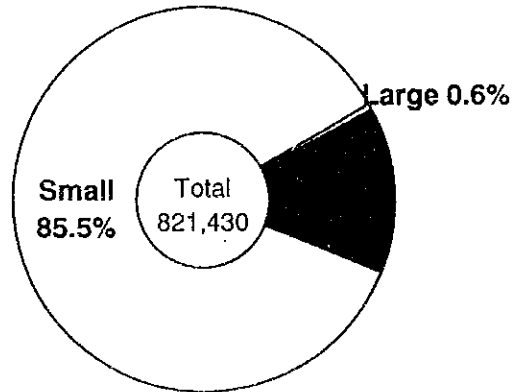
Small-Scale Enterprises : Less than 20 employees of SMEs

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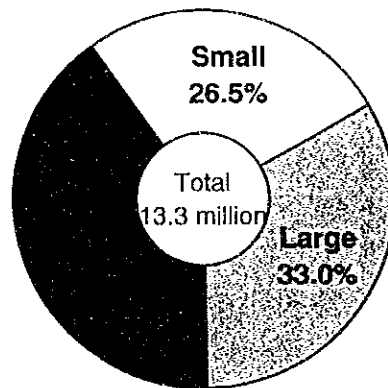
Note : Definition by Basic Law for Small- and Medium-Scale Enterprises

### Share of SMEs in Manufacturing Sector in Japan

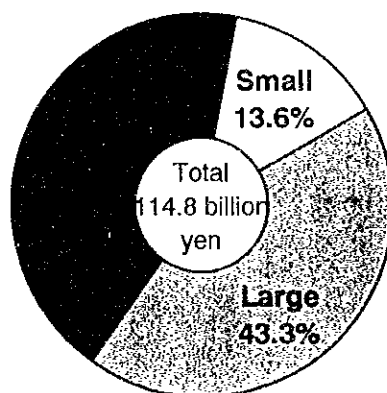
A. Number of Business Establishment (1994)



B. Number of Employees (1994)



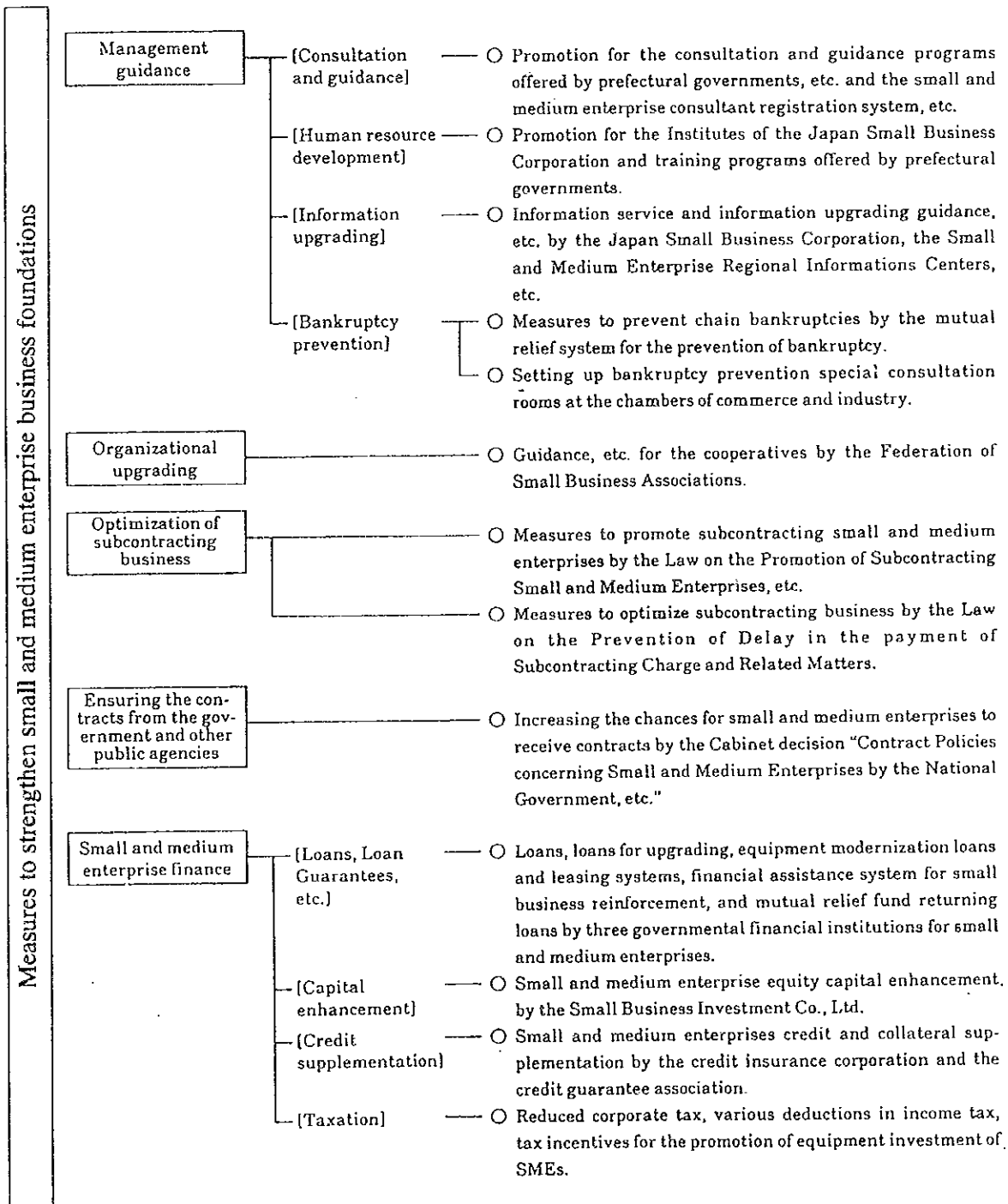
C. Value Added (1993)



## Structural Chart of Small and Medium Enterprise Policies

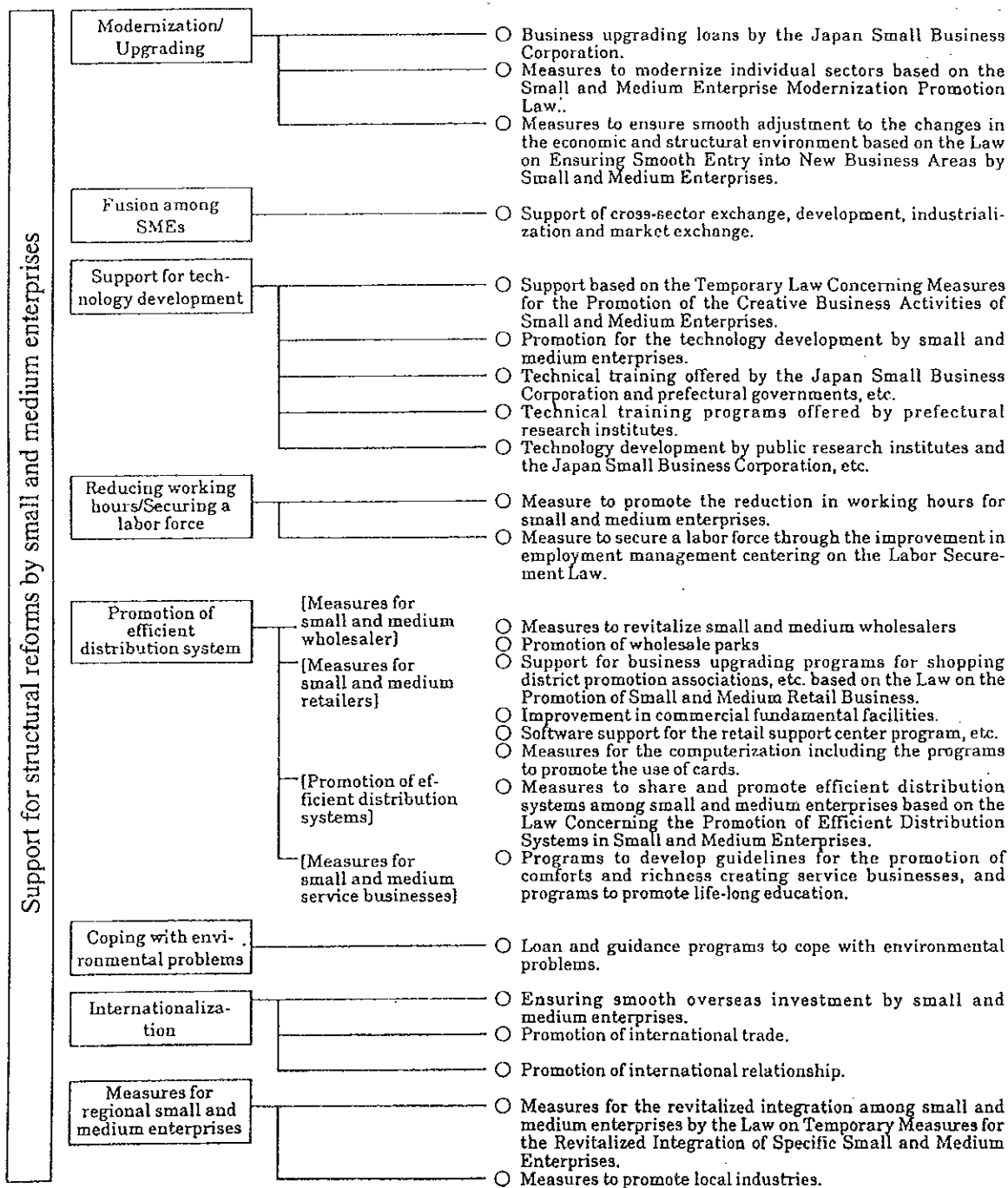
### I. Strengthening small and medium enterprise business foundations

— Intend to improve the environment in which small and medium enterprises can prosper through their own efforts taking part in the competitive market by correcting the disadvantages of small and medium enterprises caused by their economic and social limitations. —



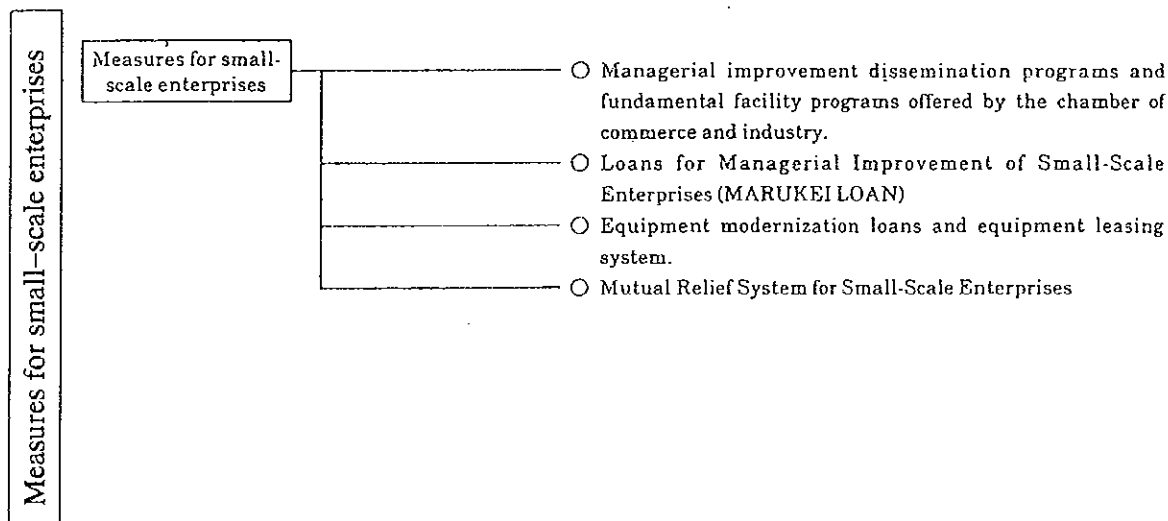
## II. Support for structural reforms by small and medium enterprises

-- Considering the major changes in the economic and social environment surrounding small and medium enterprises, ensure their smooth adjustment and support their structural reforms. --



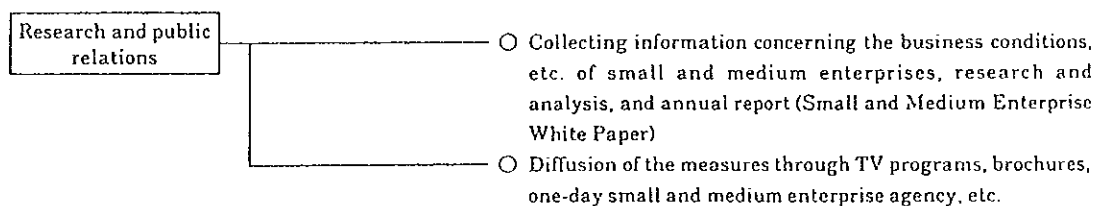
### III. Measures for small-scale enterprises

– Small-scale enterprises that have small-scale business and fewer employees are particularly unstable in terms of management among small and medium enterprises. Special supporting measures are taken in addition to general measures for small and medium enterprises. –



### IV. Research and public relations

– In order to take effective measures, research and analysis on the business conditions, etc. of small and medium enterprises are conducted intending to promote the understanding of the measures for small and medium enterprises. –



Source : Small and Medium Enterprise Agency, MITI







## Structure of Laws for SMEs of Japan (36 Laws)

**Basic Law**

- Small and Medium Enterprise Basic Law (1963)

／中小企業基本法

**I. Strengthening SMEs Foundation (経営基盤の強化)****Management guidance (経営指導)**

- Small and Medium Enterprise Retirement Allowance Cooperative Law (1960)
- Small and Medium Enterprise Guidance Law (1963)
- Law on Mutual Relief System for the Prevention of Bankruptcies of small and Medium Enterprises (1977)

／中小企業退職金共済法  
／中小企業指導法  
／中小企業倒産防止共済法

**Organizational upgrading (組織化)**

- Law on the Cooperative Association of Small and Medium Enterprises (1949)
- Law Concerning the Organization of Small and Medium Enterprises Organizations (1957)
- Shopping District Promotion Association Law (1962)

／中小企業等協同組合法  
／中小企業団体の組織に関する法律  
／商店街振興組合法

**Optimization of subcontracting business (下請取引適正化)**

- Law on the Prevention of Delay in the Payment of Subcontracting Charges and Related Matters (1956)
- Law on the Promotion of Subcontracting Small and Medium Enterprises (1970)
- Law on Securing Business Opportunities for Small and Medium Enterprises by Adjusting the Business Activities of Large Enterprises (1977)

／下請代金支払遅延等防止法  
／下請中小企業振興法  
／中小企業の事業活動の機会の確保のための大企業者の事業活動の調整に関する法律

**Ensuring the contract from the government and other public agencies (官公需の受注確保)**

- Law on Ensuring the Receipt of Orders from the Government and Other Public Agencies by Small and Medium Enterprises (1966)

／官公需についての中小企業者の受注の確保に関する法律

**SME finance (融資・保証・税制等)**

- Shoko Chukin Bank Law (1936) - Bank for Commerce and Industrial Cooperatives
- People's Finance Corporation Law (1949)
- Small and Medium Enterprise Credit Insurance Law (1950)
- Small Business Finance Corporation Law (1953)
- Credit Guarantee Association Law (1953)
- Small Business Credit Insurance Corporation Law (1958)
- Small Business Investment Co. Limited Law (1963)

／商工組合中央金庫法  
／国民金融公庫法  
／中小企業信用保険法  
／中小企業金融公庫法  
／信用保証協会法  
／中小企業信用保険公庫法  
／中小企業投資育成株式会社法

**II. Support for Structural Reforms by SMEs (中小企業の構造改革支援)****Modernization/Upgrading (近代化・高度化)**

- Small and Medium Enterprise Modernization Promotion Law (1963)
- Law on Financial and Other Assistance for Small Business Modernization (1963)
- Small Business Corporation Law (1980)
- The Temporary Law Concerning Measures for Smooth Adaptation to Structural Changes in Economy by Advancement of Specific Small and Medium Enterprises to New field, etc. (1993)

／中小企業近代化促進法  
／中小企業近代化資金等助成法  
／中小企業事業団法  
／特定中小企業者の新分野進出等による経済の構造的変化への対応の円滑化に関する臨時措置法

**Fusion among SMEs (融合化)**

- Extraordinary Law Concerning the Promotion of the Development of New Business Areas through Fusion of the Knowledge of Small and Medium Enterprises in Different Industries (1988)

／異分野中小企業者の知識の融合による新分野の開拓の促進に関する臨時措置法

**Support for technology development (技術開発等の支援)**

- Law on Extraordinary Measures for the Technology Development Promotion for Small and Medium Enterprises (1985)
- Temporary Law Concerning Measures for the Promotion of the Creative Business Activities of Small and Medium Enterprises (1995)

／中小企業技術開発促進臨時措置法

／中小企業の創造的・事業活動の促進に関する臨時措置法

**Reducing working hours/Securing a labor force (時短・労働力確保)**

- Law Concerning the Improvement of Employment Management Aimed at Securing a Labor Force for Small and Medium Enterprises (1991)

／中小企業における労働力の確保のための雇用管理の改善の促進に関する法律

**Promotion of efficient distribution system (流通合理化)**

- Law on Special Measures for the Adjustment of Retail Business (1959)
- Law on the Promotion of Small and Medium Retail Business (1973)
- Law Concerning the Promotion of Efficient Distribution Systems in Small and Medium Enterprises (1992)

／小売商業調整特別措置法  
／中小小売商業振興法  
／中小企業流通業務効率化促進法

**Coping with environmental problems (環境問題への配慮)****Internationalization (国際化)****Measures for regional SMEs (地域中小企業対策)**

- Law Concerning Special Fiscal Aid for Coping with Disasters (1962)
- Law Concerning Special Measures, etc. Related to Small and Medium Enterprise Credit Insurance for small and medium Entrepreneurs in Coal-Producing Regions (1963)
- Law on Temporary Measures for Small and Medium Sized Enterprises in Specified Areas (1986)
- Law on Temporary Measures for Concerning the Activation of Specific Small and Medium Enterprises (1992)

／激甚災害に対処するための特別の財政援助等に関する法律

／産炭地域における中小企業者についての中小企業信用保険に関する特別措置等に関する法律

／特定地域中小企業対策臨時措置法

／特定中小企業業績の活性化に関する臨時措置法

**III. Measures for Small-Scale Enterprises (小規模企業対策)****Measures for Small-Scale Enterprises (小規模企業対策)**

- Law Concerning the Organization, etc. of Commerce and Industry Association (1960)
- Small Enterprise Mutual Relief Projects Law (1965)
- Law on Supporting Small Industries (1993)

／商工会の組織等に関する法律

／小規模企業共済法

／商工会及び商工会議所による小規模事業者の支援に関する法律







## 中小企業診断士

- **中小企業診断士とは**

国または地方自治体などが実施する中小企業指導事業において、経営の診断を担当する者として資格ある者を通商産業大臣が認定し、登録している者である（中小企業指導法台6条第2項及び第3項）。
- **資格分野**

中小企業診断士は工鉱業、商業、情報の3分野に分かれる。
- **受験資格**

義務教育を終了した者。
- **資格試験の内容**

（商業部門の場合）

一次試験（合格ライン：解答率6割）

  1. 商業に関する経済的知識
  2. 経営基本管理
  3. 財務管理
  4. 店舗施設管理
  5. 仕入管理
  6. 販売管理
  7. 労務管理
  8. 商品知識

二次試験（事例を基に、実際の報告書を作成する。合格ライン：解答率6割）

  1. 中小企業対策
  2. 中小企業診断実務の事例 I
  3. 中小企業診断実務の事例 II
  4. 中小企業診断実務の事例 III
- **登録の要件**
  - ・ 通産大臣が指定した法人（（社）中小企業診断協会）がおこなう試験に合格した者であって、申請の日前3年以内に10回以上診断実施機関がおこなった診断の実務に従事し、または診断実施機関は指定した法人（（社）中小企業診断協会）がおこなう診断の実習を15日以上受けたことがある者。
  - ・ 中小企業事業団中小企業大学校の中小企業診断士養成課程を終了した者
  - ・ 認定有効期間は3年間で、引き続き登録されるためには、3年ごとに再認定を受けねばならない。

## 技術士

- 技術士とは

科学技術庁長官の指定する社団法人日本技術士協会の主催する技術士資格認定試験に合格し、技術士として登録をする者をいう。

- 資格分野

①機械部門、②船舶部門、③航空・宇宙部門、④電気・電子部門、⑤化学部門、⑥繊維部門、⑦金属部門、⑧資源工学部門、⑨建設部門、⑩水道部門、⑪衛生工学部門、⑫農業部門、⑬林業部門、⑭水産部門、⑮情報工学部門、⑯応用理学部門、⑰生物工学部門、⑱環境部門、⑲経営工学部門の 19 部門に分けられ、複数部門の資格取得も可能である。

- 受験資格

認定試験は、受験する専門分野の必修科目と選択専門科目の 2 科目の一次（筆記）試験と、一次試験合格者を対象とした専門分野の口答面接試験（二次試験）からなる。

一次試験：

- ① 科学技術に関する専門的応用能力を必要とする事項についての計画、研究、設計、分析、試験又は評価の業務に従事した期間が通算して 7 年を超える者
- ② 技術士補として技術士を補助した期間が通算して 4 年を超える者

二次試験：

技術士第二次試験の受験資格は一次試験に合格した者を対象とする

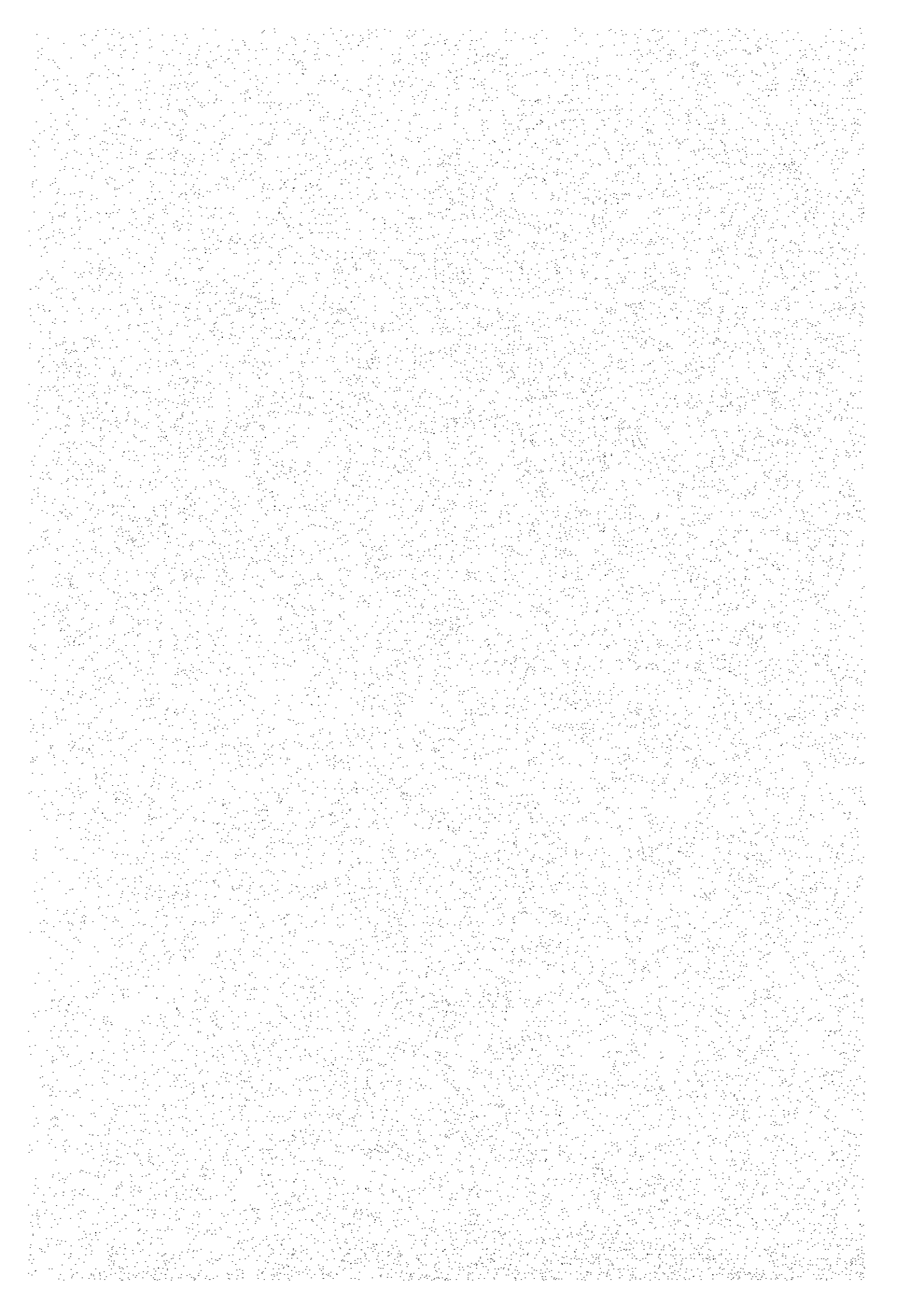
- 登録

上記の認定試験に合格後、社団法人 日本技術士協会に登録をおこなう。

注 ① 技術士補試験の受験は、年齢、学歴、業務経歴等による制限はない。

## **Appendix**

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## Appendix - 1 州別産業集積度

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自動車工業および電気・電子工業の州別産業集積度を分析した。それぞれの産業のGDPの高い州を示したのが、Figure A1-1とA1-2<sup>1)</sup>であり、それらを合計した図がFigure A1-3である。Figure A1-3でみるように電気・電子および自動車工業のGDPの高い州はメキシコ市（D.F.）、メキシコ州（México）、プエブラ州（Puebla）の首都圏地域とコアウイラ州（Coahuila）とヌエボレオン州（Nuevo León）の北部国境地域である。また自動車工業と電子工業の就業人口の大きい州を示したものが、Figure A1-4とA1-5である。GDPと同様に首都圏と北部国境州に工業が集積していることがわかる。なお、産業ごとのGDPおよび就業人口の州別データをそれぞれTable A1-1、A1-2に示した。

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<sup>1)</sup> Figure A1-2 の電気・電子を Division 8, Group 53, 54, 55 とした。重電である Division 8, Group 52 は除いた。

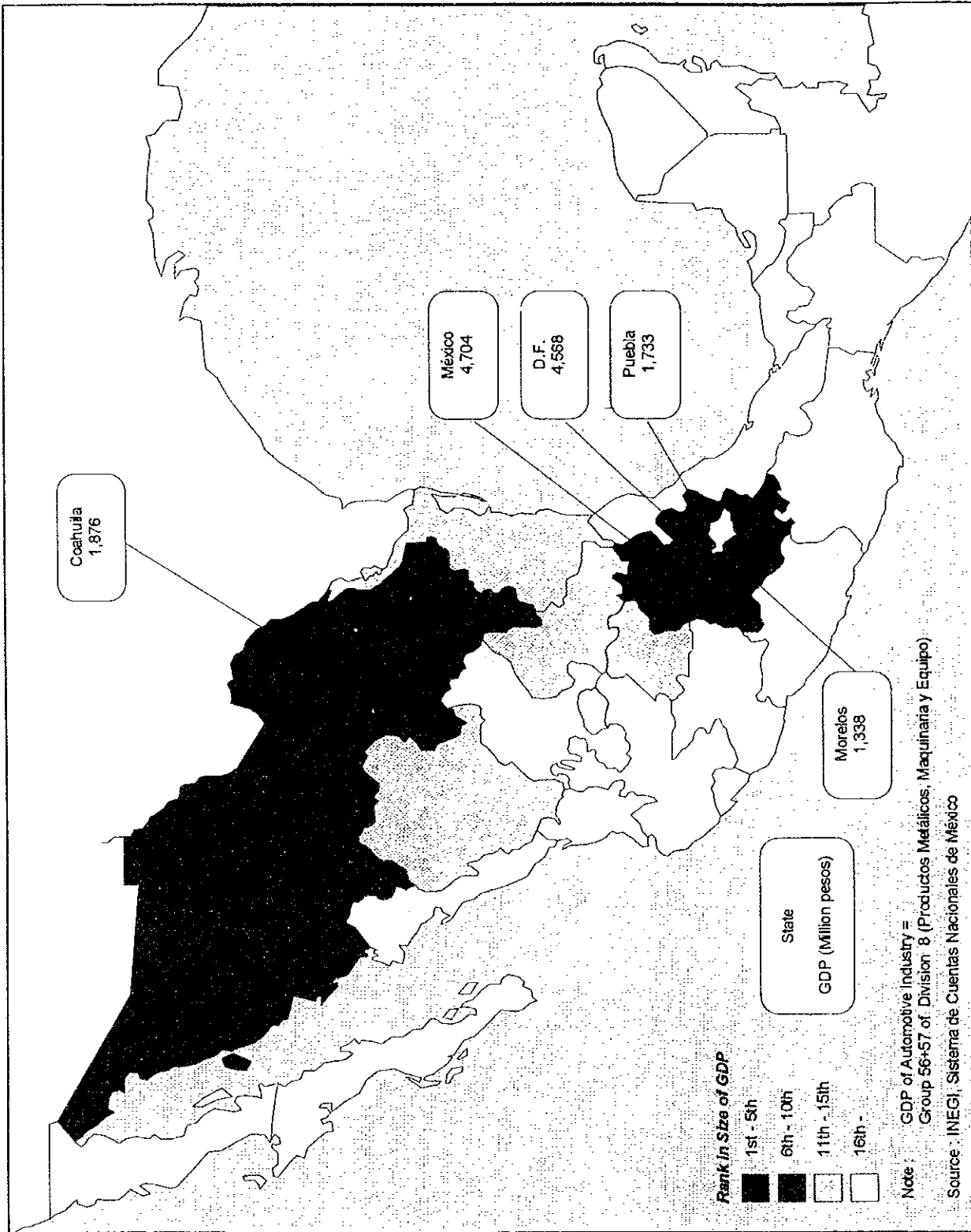


Figure A1 -1 Regional GDP of Automotive Industry, 1993

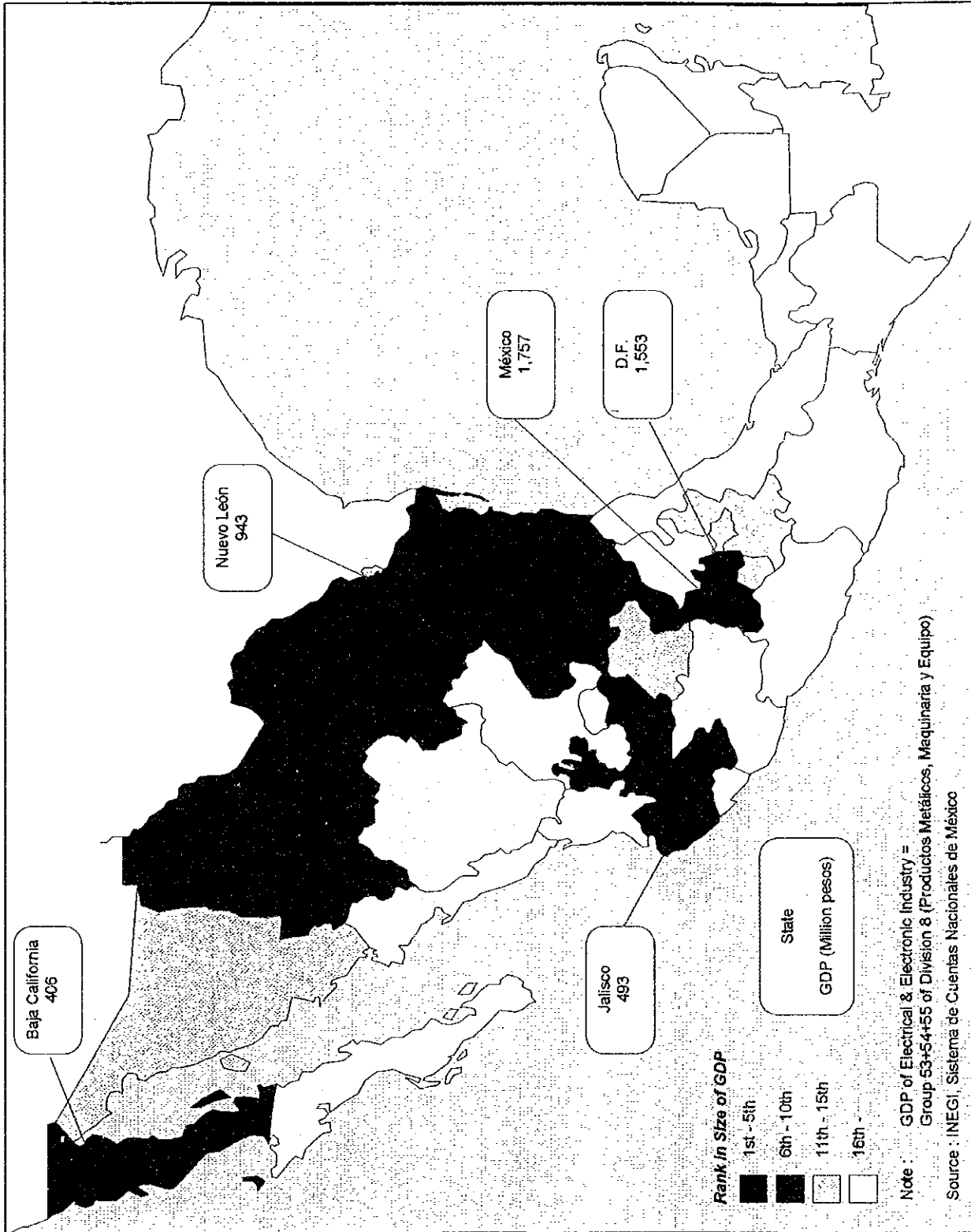


Figure A1-2 Regional GDP of Electrical & Electronic Industry, 1993

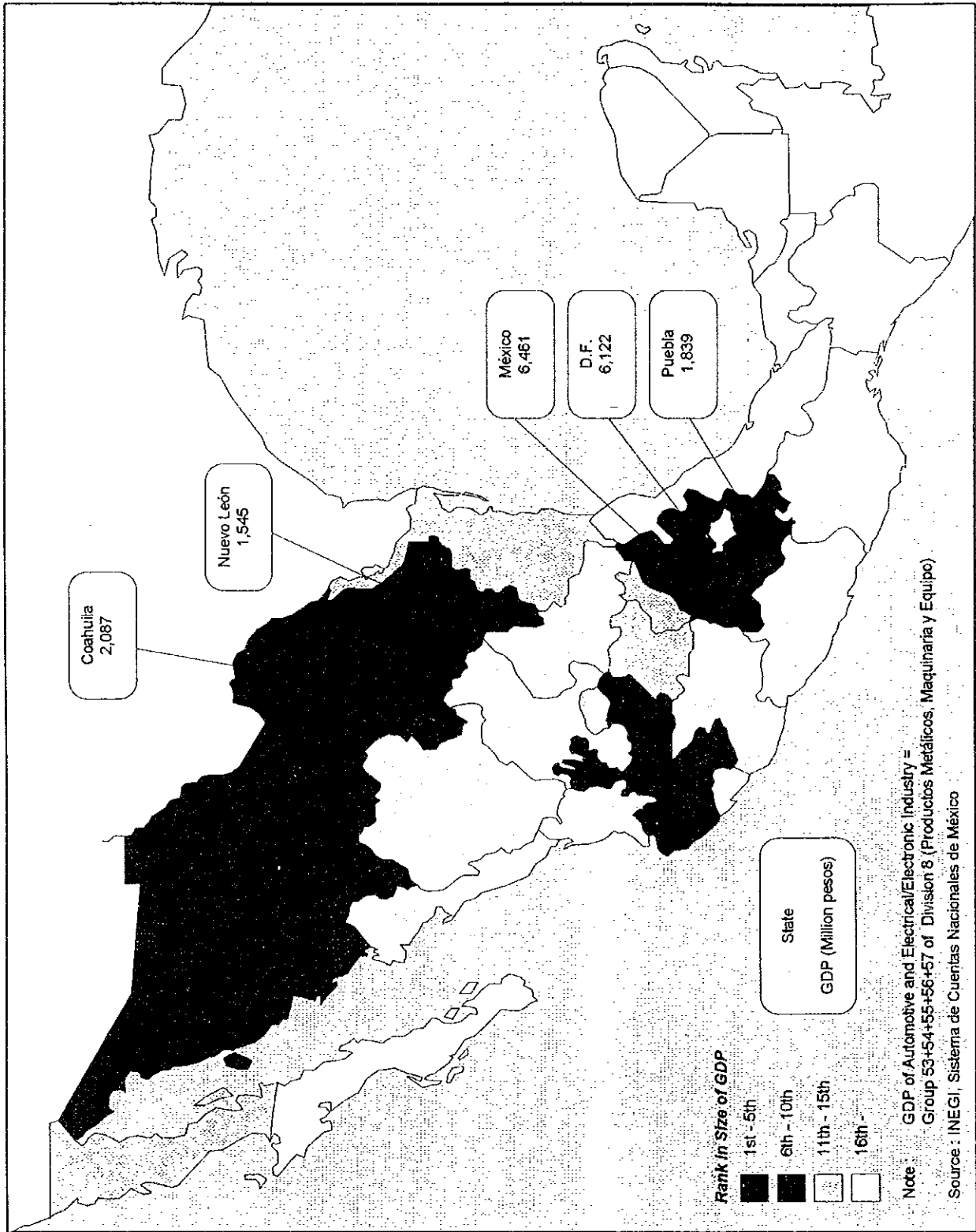


Figure A1-3 Regional GDP of Automotive and Electrical/Electronic Industry, 1993

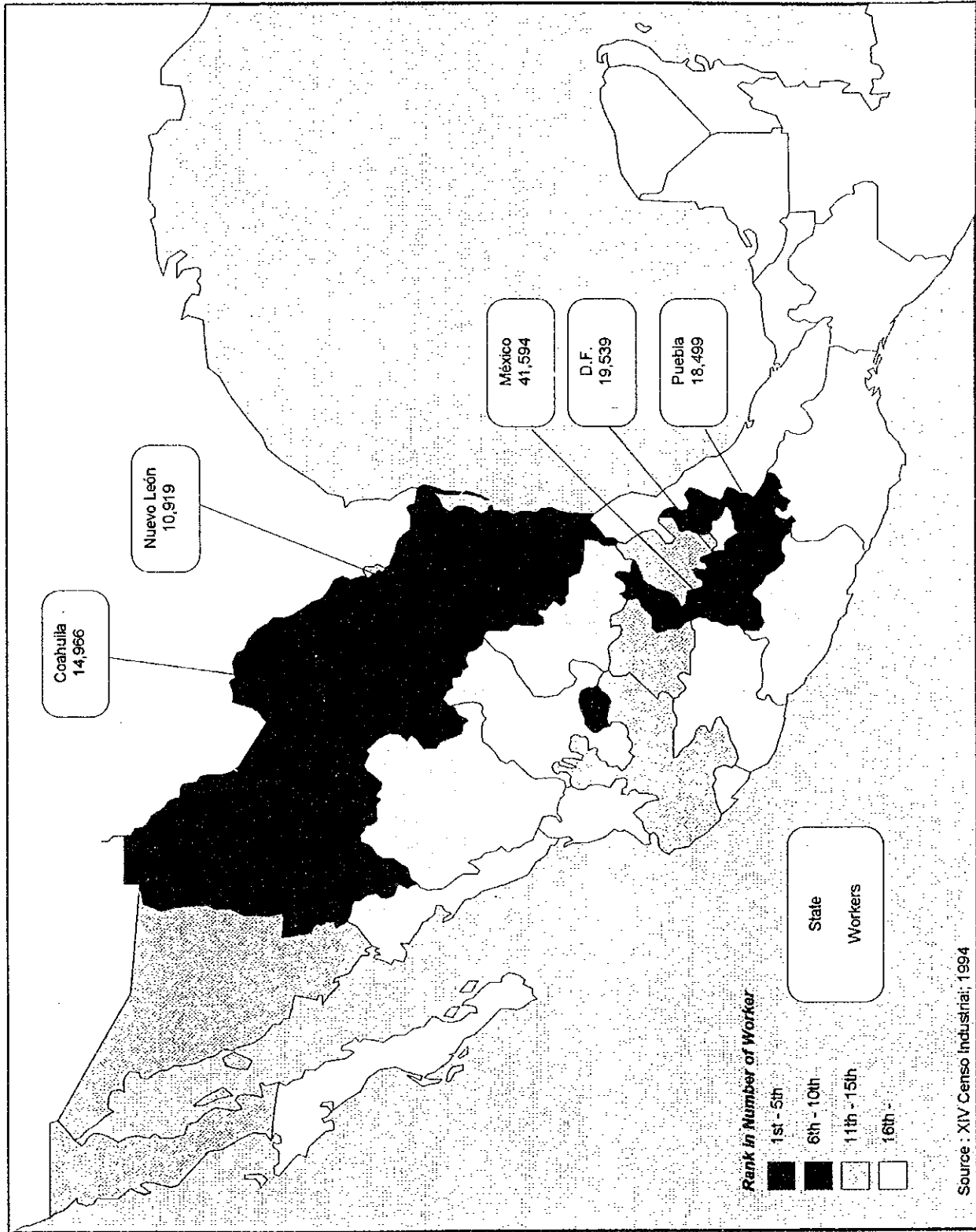


Figure A1-4 Distribution of Workers for Automotive Industry by State, 1993

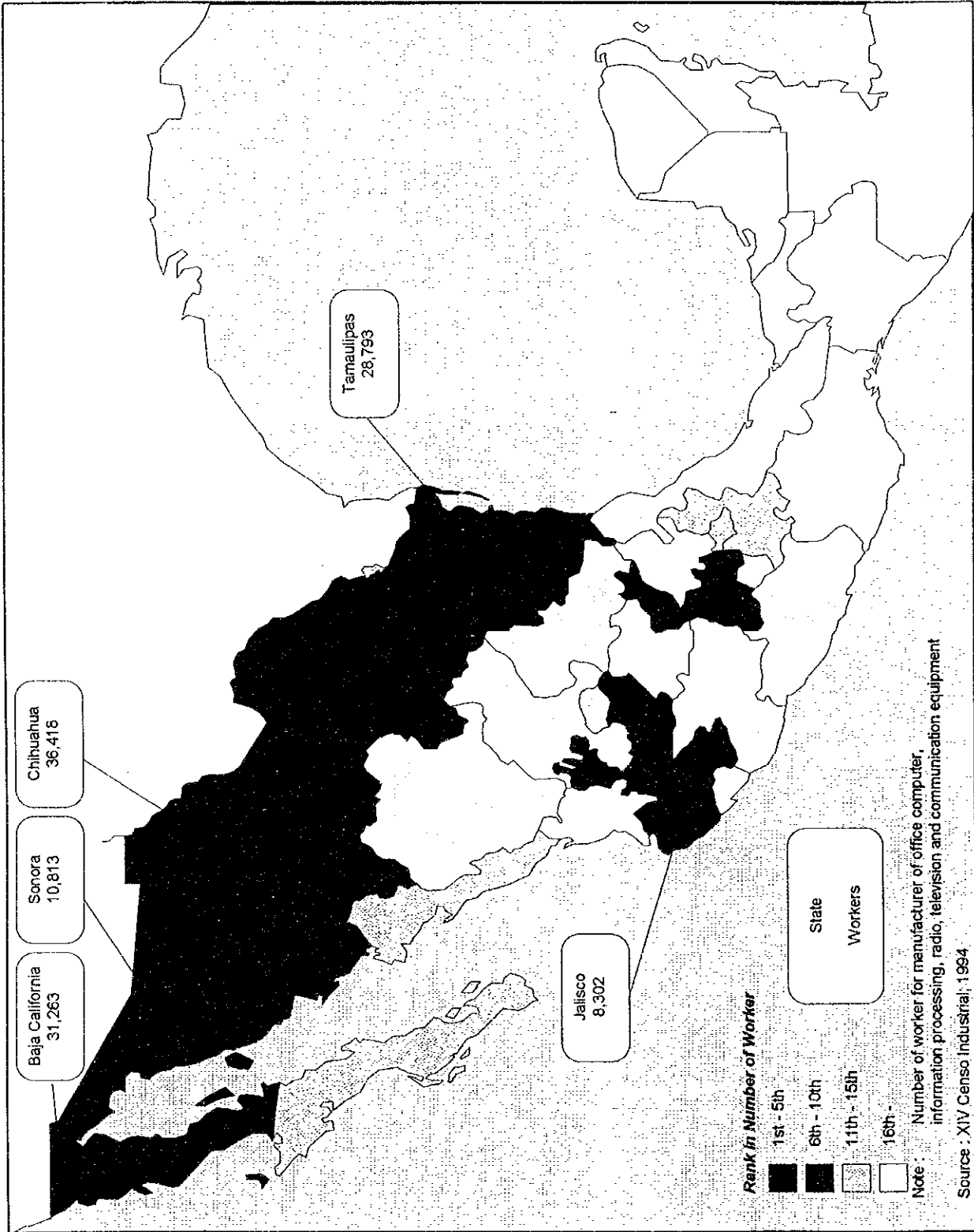


Figure A1-5 Distribution of Workers for Electronic Industry by State, 1993

(Unit : Thousand Pesos)

	Total	Grand Division 1 Agriculture	Grand Division 2 Mining	Grand Division 3 Manufacturing Industry	Grand Division 4 Construction	Grand Division 5 Electricity, Gas & Water	Grand Division 6 Commerce, Restaurants & Hotels	Grand Division 7 Transportation & Communications	Grand Division 8 Finance & Security	Grand Division 9 Services
Total	1,127,584,133	76,205,987	19,708,077	226,842,924	59,425,904	17,275,816	254,772,476	109,010,180	163,271,255	234,912,376
Aguascalientes	9,935,842	630,629	58,365	1,960,747	505,244	66,101	2,179,120	992,244	1,302,977	2,471,589
Baja California	27,661,436	1,171,348	161,158	4,030,627	1,389,290	1,062,958	6,648,634	2,967,035	4,690,431	6,246,916
Baja California Sur	5,250,894	472,122	299,636	300,191	259,696	124,549	1,331,926	504,420	920,007	1,111,362
Campeche	18,461,836	642,075	6,087,559	339,664	291,492	86,209	8,692,803	543,049	686,685	1,183,674
Coahuila	31,296,899	1,641,551	1,698,497	8,870,588	1,329,918	837,360	6,267,947	2,639,499	3,584,265	4,999,898
Colima	7,104,395	617,595	275,986	400,637	306,892	798,900	1,405,639	1,357,389	1,002,201	988,459
Chiapas	20,563,046	3,779,509	425,217	1,279,344	1,058,824	1,383,679	3,812,080	1,306,457	3,654,653	4,082,968
Chihuahua	33,072,552	3,506,096	576,440	5,425,066	1,917,576	451,416	6,928,598	3,252,114	5,113,932	6,851,988
Distrito Federal	271,271,933	378,704	736,980	58,517,064	16,472,328	1,696,192	57,937,983	29,398,595	45,392,506	77,873,831
Durango	13,570,609	2,365,772	189,310	2,372,263	674,599	257,376	2,809,287	934,246	1,876,627	2,293,346
Guanajuato	39,290,995	3,852,789	320,752	6,661,228	2,348,854	601,799	8,233,840	4,633,100	6,036,551	7,168,575
Guerrero	22,326,650	2,333,244	177,731	1,040,022	1,334,905	754,295	7,565,397	2,358,516	2,996,419	3,939,970
Hidalgo	17,891,045	1,616,868	233,597	4,450,070	994,457	860,830	3,205,568	1,182,853	2,200,381	3,291,498
Jalisco	74,206,802	6,459,244	661,972	15,504,716	3,393,560	462,610	19,022,545	6,587,205	10,711,054	14,165,071
Mexico	118,598,838	3,231,372	647,677	39,527,438	6,486,421	1,161,134	23,401,625	10,796,372	14,749,279	19,513,463
Michoacan	25,794,958	4,513,296	423,757	2,821,213	1,792,228	407,315	4,918,207	1,894,329	4,537,232	5,011,103
Morelos	18,143,275	2,117,249	116,579	4,116,397	1,027,343	73,199	3,866,020	1,457,839	1,788,924	3,795,979
Nayarit	8,186,643	1,683,057	43,873	1,523,824	436,770	11,650	1,605,436	676,944	912,078	1,373,575
Nuevo Leon	72,916,189	1,046,515	554,175	21,259,766	2,749,330	755,786	15,318,536	6,539,775	11,690,586	15,537,708
Oaxaca	19,322,297	3,642,480	157,315	2,276,557	1,002,852	167,602	3,730,081	1,433,010	3,230,982	3,831,495
Puebla	36,304,528	3,251,506	382,660	7,717,615	1,843,678	378,455	7,558,074	3,085,562	5,737,530	7,308,942
Queretaro	15,867,729	722,867	81,918	4,660,582	857,267	143,157	3,557,271	1,598,177	1,645,793	2,840,556
Quintana Roo	15,153,451	257,639	88,371	568,965	377,260	74,822	8,823,671	1,086,426	1,293,375	2,758,604
San Luis Potosi	19,956,259	2,549,168	435,843	4,480,212	1,017,436	408,815	3,753,075	1,591,771	2,886,328	3,301,459
Sinaloa	24,914,048	5,671,352	152,637	2,014,057	1,040,535	598,244	5,754,341	2,368,785	3,199,479	4,764,662
Sonora	29,744,180	4,016,163	901,762	4,780,505	1,232,728	769,131	6,989,787	2,992,000	3,779,948	5,267,239
Tabasco	16,637,207	1,247,373	2,170,955	1,230,306	658,613	490,253	5,393,150	1,062,339	1,820,730	2,836,998
Tamaulipas	28,840,064	2,809,026	235,947	3,983,486	1,666,932	797,705	6,057,627	4,952,566	3,550,469	5,341,796
Tlaxcala	6,274,110	540,182	29,539	1,718,032	432,517	43,065	1,035,278	606,242	909,790	1,015,614
Veracruz	55,655,682	5,812,071	840,713	10,788,551	3,142,021	1,246,671	12,112,441	5,887,285	7,337,964	9,170,553
Yucatan	14,255,737	1,292,778	143,845	1,777,661	910,582	229,725	3,160,463	1,691,633	2,406,853	2,986,986
Zacatecas	9,114,004	2,334,348	397,311	445,529	473,754	74,808	1,696,028	632,401	1,625,227	1,586,501

Table A1-1 Sectional GDP by State (2)

(Unit : Thousand Pesos)

	Division 8	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58
	Metal Product, Machinery & Equipment	Electrical Machinery	Domestic Electric Equipment	Electronic Machinery and Equipment	Electrical Equipment	Automobile	Parts and Accessories for Automobile	Equipment and Materials for Transportation
Total	47,106,239	3,616,622	1,022,304	3,405,225	2,466,131	13,061,720	6,431,292	992,843
Aguascalientes	496,741	920	118	51,765	5,577	181,123	115,464	178
Baja California	885,697	50,472	62,858	283,723	59,675	179	37,776	72,872
Baja California Sur	13,974	46		2,480	137		1,559	1,662
Campeche	4,789	64		19	27			39
Coahuila	3,010,355	23,678	75,679	125,005	9,999	1,224,091	652,377	100
Colima	11,186				116		880	
Chiapas	18,639			292	65		1,573	
Chihuahua	1,712,062	201,873	25,431	190,719	61,114		965,634	21,887
Distrito Federal	11,763,094	924,780	219,161	787,986	546,339	3,595,704	972,732	164,124
Durango	400,654	87,734		47	407		227,941	
Guanajuato	765,868	66,854	57,394	13,860	32,287	234,112		309
Guerrero	12,430			138	152		341	
Hidalgo	1,304,977	11,502		24,754	4,929	643,580	74,570	360,658
Jalisco	2,272,248	279,324	1,286	421,398	70,515	1,484	109,449	46,134
Mexico	10,692,528	916,734	277,656	924,856	554,224	3,203,469	1,501,018	142,192
Michoacan	190,633	45,229		377	1,102		4,898	40
Morelos	1,515,926	10,735		84,590	10,182	1,335,061	3,028	
Nayarit	14,391	933			542		559	
Nuevo Leon	4,410,681	707,633	159,330	66,744	716,927	10,482	591,344	44,079
Oaxaca	21,164				210		6,510	124
Puebla	2,169,679	37,869	25,897	13,514	66,296	1,688,534	44,763	6,959
Queretaro	1,617,984	88,133	79,146	65,621	58,154	1,239	370,626	
Quitana Roo	13,189				329		84	42
San Luis Potosi	680,643	58,549	815	4,397	156,449		167,351	49,482
Sinaloa	1,115,733	6,211		446	268	10,516	2,280	13,311
Sonora	1,585,447	6,629		88,912	49,444	1,133,140	130,183	26,109
Tabasco	21,583	2,007			398		799	198
Tamaulipas	760,044	39,619	29,140	242,435	4,222	33,118	171,503	10,984
Tlaxcala	182,409	38,466	8,393	9,442	54,316		35,299	
Veracruz	359,605	2,328		676	840		6,005	27,428
Yucatan	71,749	8,300		991	510		634	3,932
Zacatecas	14,297			38	379			

Source: INEGI, Sistema de Cuentas Nacionales de México, 1993



**Table A1-2 Data of Selective Industries by State (1)**

		Unidades Economicas	Personal Ocupado Total promedio	Produccion bruta Total (Thousand Pesos)
<b>Total Nacional</b>	<b>Rama 3823</b>	<b>72</b>	<b>16,718</b>	<b>3,765,170.4</b>
	<b>Rama 3832</b>	<b>514</b>	<b>130,054</b>	<b>9,907,799.3</b>
	<b>Rama 3841</b>	<b>1,395</b>	<b>167,221</b>	<b>64,622,190.8</b>
Aguascalientes	Rama 3823		195	22,004.9
Aguascalientes	Rama 3832	6	853	164,628.4
Aguascalientes	Rama 3841	34	7,447	2,003,670.1
Baja California	Rama 3823	19	3,313	116,109.8
Baja California	Rama 3832	121	27,950	981,439.9
Baja California	Rama 3841	28	4,317	706,285.7
Baja California Sur	Rama 3823		64	3,021.8
Baja California Sur	Rama 3832		182	17,417.6
Baja California Sur	Rama 3841		17	2,156.6
Campeche	Rama 3823			
Campeche	Rama 3832		1	43.2
Campeche	Rama 3841			
Coahuila	Rama 3823			
Coahuila	Rama 3832	18	4,503	157,452.1
Coahuila	Rama 3841	53	14,966	7,846,703.2
Colima	Rama 3823			
Colima	Rama 3832			
Colima	Rama 3841	7	37	1,355.6
Chiapas	Rama 3823			
Chiapas	Rama 3832		2	62.4
Chiapas	Rama 3841	11	83	4,170.1
Chihuahua	Rama 3823	7	1,699	111,897.3
Chihuahua	Rama 3832	66	34,719	1,033,756.8
Chihuahua	Rama 3841	25	6,891	336,920.2
Distrito Federal	Rama 3823	7	1,357	146,776.1
Distrito Federal	Rama 3832	84	6,454	1,238,597.6
Distrito Federal	Rama 3841	273	19,539	7,453,636.6
Durango	Rama 3823		13	964.1
Durango	Rama 3832		15	823.6
Durango	Rama 3841	12	1,019	561,097.5
Guanajuato	Rama 3823		31	6,271.8
Guanajuato	Rama 3832		6	185.0
Guanajuato	Rama 3841	32	3,519	499,567.1
Guerrero	Rama 3823			
Guerrero	Rama 3832		8	1,538.4
Guerrero	Rama 3841	9	33	1,262.6
Hidalgo	Rama 3823			
Hidalgo	Rama 3832	5	128	13,901.0
Hidalgo	Rama 3841	41	4,771	2,544,918.0
Jalisco	Rama 3823	13	2,414	2,809,694.9
Jalisco	Rama 3832	30	5,888	762,004.3
Jalisco	Rama 3841	127	4,051	1,399,602.1
Mexico	Rama 3823	3	1,243	186,878.7
Mexico	Rama 3832	42	6,079	2,449,722.3
Mexico	Rama 3841	231	41,594	19,070,158.5
Michoacan	Rama 3823			
Michoacan	Rama 3832	4	98	7,994.5
Michoacan	Rama 3841	34	235	10,426.2
Morelos	Rama 3823		8	1,113.7
Morelos	Rama 3832		165	43,265.4
Morelos	Rama 3841	14	5,599	4,350,752.2

**Table A1-2 Data of Selective Industries by State (2)**

		Unidades Economicas	Personal Ocupado Total promedio	Produccion bruta Total (Thousand Pesos)
Nayarit	Rama 3823			
Nayarit	Rama 3832			
Nayarit	Rama 3841	8	37	2,261.9
Nuevo Leon	Rama 3823	7	1,991	47,469.1
Nuevo Leon	Rama 3832	34	3,551	213,932.4
Nuevo Leon	Rama 3841	143	10,919	1,533,587.9
Oaxaca	Rama 3823			
Oaxaca	Rama 3832			
Oaxaca	Rama 3841	14	767	49,767.7
Puebla	Rama 3823	3	462	54,257.0
Puebla	Rama 3832	11	289	22,036.6
Puebla	Rama 3841	108	18,499	8,625,598.8
Queretaro	Rama 3823		13	2,287.9
Queretaro	Rama 3832	11	2,540	797,149.9
Queretaro	Rama 3841	38	5,722	1,137,494.4
Quitana Roo	Rama 3823			
Quitana Roo	Rama 3832			
Quitana Roo	Rama 3841		2	43.8
San Luis Potosi	Rama 3823		9	1,026.9
San Luis Potosi	Rama 3832		18	193.4
San Luis Potosi	Rama 3841	30	2,300	836,863.2
Sinaloa	Rama 3823		210	35,653.9
Sinaloa	Rama 3832	4	19	1,410.5
Sinaloa	Rama 3841	12	171	46,949.9
Sonora	Rama 3823	9	1,823	159,106.3
Sonora	Rama 3832	38	8,990	347,964.0
Sonora	Rama 3841	12	3,224	4,520,122.1
Tabasco	Rama 3823			
Tabasco	Rama 3832			
Tabasco	Rama 3841	8	47	2,057.1
Tamaulipas	Rama 3823	4	1,289	38,378.1
Tamaulipas	Rama 3832	36	27,504	1,648,553.7
Tamaulipas	Rama 3841	33	10,121	832,118.0
Tlaxcala	Rama 3823		570	14,914.5
Tlaxcala	Rama 3832		51	2,249.6
Tlaxcala	Rama 3841	11	844	220,846.0
Veracruz	Rama 3823			
Veracruz	Rama 3832		27	1,299.5
Veracruz	Rama 3841	47	420	19,701.7
Yucatan	Rama 3823		14	7,343.6
Yucatan	Rama 3832	4	12	115.0
Yucatan	Rama 3841		30	2,096.0
Zacatecas	Rama 3823			
Zacatecas	Rama 3832		2	62.2
Zacatecas	Rama 3841			

SOURCE: XIV CENSO INDUSTRIAL 1994

Note: Rama 3823 Manufacture or/and assembly of office and information processing machinery  
Rama 3832 Manufacture or/and assembly of Radio TV & Communication Media  
Rama 3841 Automotive Industry







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