

CHAPTER 12

(e) Pipes and tubes

Table 12-3-7 shows trends in apparent consumption and Fig. 12-3-9 shows the consumption pattern.

Pipes and tubes were mostly consumed in the construction sector. Their apparent consumption increased moderately, while their share in total consumption remained substantially constant. Increasing public construction works consumed large quantities of small-diameter welded products for water and gas lines. Supported by increasing domestic production, the self-supply ratio rose from 34.8% in 1968 to 66% in 1978.

Table 12-3-7 Trends in apparent consumption of pipes and tubes (t.)

Year	(A) Domestic production		(B) Imports		(C) Total		Self-supply ratio (A)/(C) (%)
		Compared with Previous Year (%)		Compared with Previous Year (%)		Compared with Previous Year (%)	
1968	23,207		43,400		66,607		34.8
1969	22,776	-1.9	33,100	-23.7	55,876	-16.1	40.8
1970	18,096	-20.5	41,100	24.2	59,196	5.9	30.6
1971	28,673	58.4	28,800	-29.9	57,473	-2.9	49.9
1972	31,120	8.5	27,400	-4.9	58,520	18.2	53.2
1973	38,944	25.1	37,600	37.2	76,544	30.8	50.9
1974	32,314	-17.0	19,000	-49.5	51,314	-33.0	63.0
1975	45,442	40.6	37,100	95.3	82,542	60.9	55.1
1976	44,737	-1.6	35,300	-4.9	80,037	-3.0	55.9
1977	40,000	-10.6	31,300	-11.3	71,300	-10.9	56.1
1978	47,300	18.3	24,675	-21.2	71,975	0.9	65.7

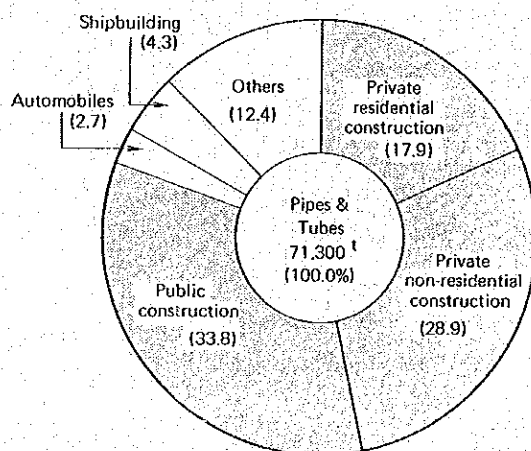


Fig. 12-3-9 Consumption pattern of pipes and tubes in 1977

(f) Plates

Table 12-3-8 shows trends in apparent consumption and Fig. 12-3-10 shows the consumption pattern.

Up to 1977, apparent consumption of plates remained below the 1968 all-time peak of 84,000^t. With sharply increased imports and domestic production, 1978 recorded a new peak of 118,000^t, though the share of plates in overall steel consumption, 9.8%, failed to top the 1968 peak of 10.6%. Until 1977, the Philippines depended mostly on imports for the supply of plates, because no substantial tonnage was produced domestically. Consequently, apparent consumption was directly affected by import prices. This seemed to be responsible for the slackened plate consumption, especially between 1969 and 1971. After the oil crisis, however, consumption increased gradually, supported by brisk activities in such heavy-plate-consuming sectors as shipbuilding and construction. The increase in 1978 was remarkable.

Table 12-3-8 Trends in apparent consumption of plates (t.)

Year	(A) Domestic production		(B) Imports		(C) Total		Self-supply ratio (A)/(C) (%)
		Compared with Previous Year (%)		Compared with Previous Year (%)		Compared with Previous Year (%)	
1968	—		84,000		84,000		—
1969	—		82,200	-2.1	82,200	-2.1	—
1970	6,976		66,200	-19.5	73,176	-11.0	9.5
1971	5,493	-21.3	54,200	-18.1	59,693	-18.4	9.2
1972	—		72,600	33.8	72,600	21.6	—
1973	—		70,000	-3.6	70,000	-3.6	—
1974	—		71,800	2.6	71,800	2.6	—
1975	—		76,300	6.3	76,300	6.3	—
1976	—		82,400	8.0	82,400	8.0	—
1977	3,590		58,900	-28.5	62,490	-24.4	5.7
1978	26,987	651.7	90,750	54.1	117,737	88.4	22.9

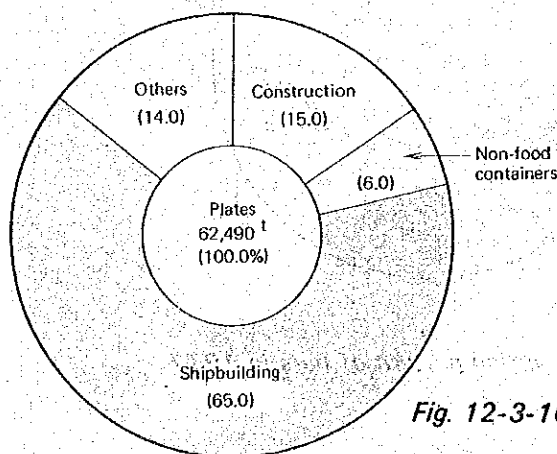


Fig. 12-3-10 Consumption pattern of plates in 1977

CHAPTER 12

(g) Bars

Table 12-3-9 shows trends in apparent consumption and Fig. 12-3-11 shows the consumption pattern.

Reflecting the buoyancy in the construction sector, apparent consumption of bars increased steadily; their 1978 share in total steel consumption was 35.8%. The peak share of 41.7% was attained in 1975. The demand for bars is mostly filled domestically, their self-supply ratio ranging between 86 and 95%.

Table 12-3-9 Trends in apparent consumption of bars (t.)

Year	(A) Domestic production		(B) Imports		(C) Total		Self-supply ratio (A)/(C) (%)
		Compared with Previous Year (%)		Compared with Previous Year (%)		Compared with Previous Year (%)	
1968	183,999		31,037		215,036		85.6
1969	196,490	6.8	27,195	-12.4	223,685	4.0	87.8
1970	201,579	2.6	29,245	7.5	230,824	3.2	87.3
1971	230,753	14.5	14,332	-51.0	245,085	6.2	94.2
1972	209,662	-9.1	18,775	31.0	228,437	-6.8	91.8
1973	214,168	2.1	18,773	-0.0	232,941	2.0	91.9
1974	250,938	17.2	35,808	90.7	286,746	23.1	87.5
1975	390,788	55.7	25,385	-29.1	416,173	45.1	93.9
1976	352,000	-9.9	19,644	-22.6	371,644	-10.7	94.7
1977	389,035	10.5	29,194	48.6	418,229	12.5	93.0
1978	391,350	6.0	40,005	37.0	431,355	31.4	90.7

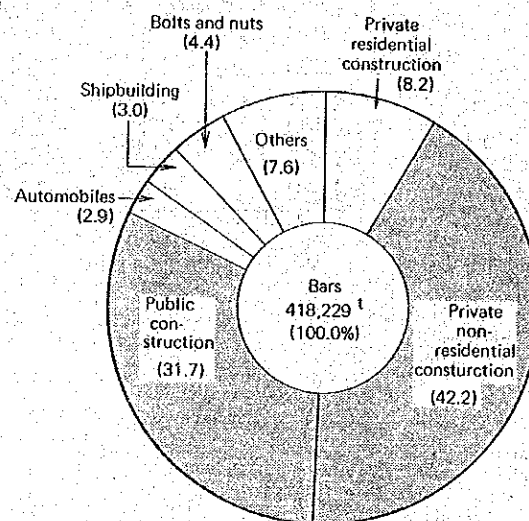


Fig. 12-3-11 Consumption pattern of bars in 1977

(h) Wire rods and wire

Table 12-3-10 shows trends in apparent consumption and Fig. 12-3-12 shows the consumption pattern.

Apparent consumption of wire rods and wire remained the same as 10 years ago, and their share in overall consumption declined. Though their consumption bottomed out in 1974, the annual increase rate between 1974 and 1978 averaged 6%, running considerably below the average figure for all rolled steel products.

Table 12-3-10 Trends in apparent consumption of wire rods and wire (t.)

Year	(A) Domestic production		(B) Imports		(C) Total		Self-supply ratio (A)/(C) (%)
		Compared with Previous Year (%)		Compared with Previous Year (%)		Compared with Previous Year (%)	
1968	57,418		38,829		96,247		59.6
1969	64,088	11.6	21,143	-45.5	85,231	-11.4	75.2
1970	44,887	-30.0	59,182	179.9	104,069	22.1	48.1
1971	57,447	28.0	24,670	-58.3	82,117	-21.1	70.0
1972	52,814	-8.1	19,567	-20.7	72,381	-11.9	73.0
1973	59,987	13.6	19,561	-0.0	79,548	9.9	75.4
1974	33,986	-43.3	37,941	94.0	71,927	-9.6	47.3
1975	65,134	91.6	23,579	-37.9	88,713	23.3	73.4
1976	64,035	-1.7	28,781	22.0	92,816	4.6	69.0
1977	82,519	28.9	15,300	-46.8	97,819	5.4	84.4
1978	68,467	-17.0	22,796	49.0	91,263	-6.7	75.0

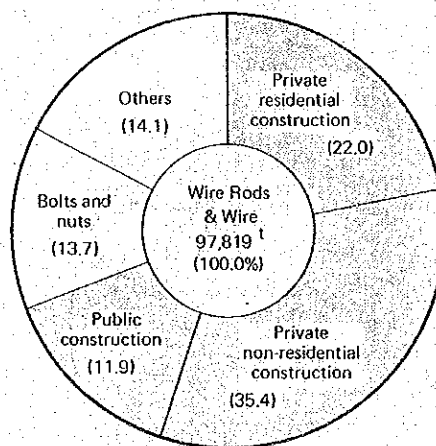


Fig. 12-3-12 Consumption pattern of wire rods and wire in 1977

CHAPTER 12

(i) Shapes and sections

Table 12-3-11 shows trends in apparent consumption and Fig. 12-3-13 shows the consumption pattern.

Apparent consumption of shapes and sections showed a basic tendency to decrease. Their share in total steel consumption dropped from the peak figure of 7% to 1.6% in 1978. Total dependence on imports seems to be one of the major causes for this decline.

Table 12-3-11 Trends in apparent consumption of shapes & sections (t.)

Year	(A) Domestic production		(B) Imports		(C) Total		Self-supply ratio (A)/(C) (%)
		Compared with Previous Year (%)		Compared with Previous Year (%)		Compared with Previous Year (%)	
1968	—		56,400		56,400		—
1969	—		39,600	-29.8	39,600	-29.8	—
1970	—		24,200	-38.9	24,200	-38.9	—
1971	—		26,500	9.5	26,500	9.5	—
1972	—		26,800	1.1	26,800	1.1	—
1973	—		20,600	-23.1	20,600	-23.1	—
1974	—		40,000	94.2	40,000	94.2	—
1975	—		39,100	-2.3	39,100	-2.3	—
1976	—		41,000	4.9	41,000	4.9	—
1977	—		30,500	-25.6	30,500	-25.6	—
1978	—		18,969	-37.8	18,969	-37.8	—

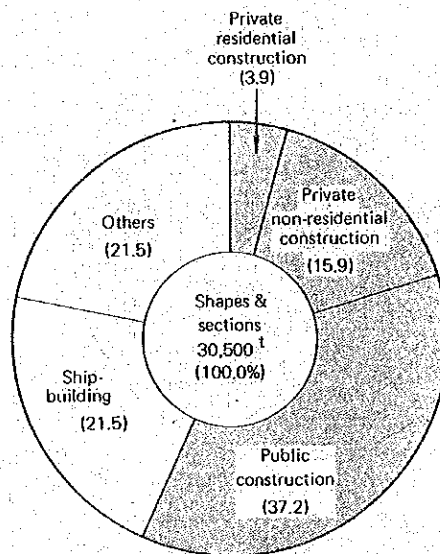


Fig. 12-3-13 Consumption pattern of shapes & sections in 1977

(3) Steel consumption pattern

Of 1,074,000^t of apparent steel consumption in 1977, construction accounts for 59.8%, containers 15.0%, shipbuilding 8.0%, and automobiles 4.9%. These four sectors account for nearly 90% of the total. Seen by products, bars represent 39%, tin plates 13.5%, galvanized sheets 10.8%, wire rods and wire 9.1%, and hot-rolled sheets and coil 8.1%. (See the *Table 12-3-12, 13* and *Fig. 12-3-14*)

Compared with 1973, the ratio of construction rose by 3%; especially private non-residential construction soared by 7% and public construction by 5%, while private residential construction declined by 9%. Shipbuilding increased by approximately 7% and automobiles by 1.7%.

Table 12-3-12 Steel consuming sectors pattern in 1977
(Consuming sectors percentage by products)

(Unit: t)

Consuming Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipe & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	53,986 (46.8)	-	-	-	12,763 (17.9)	-	34,295 (8.2)	21,820 (22.0)	1,190 (3.9)	123,754 (11.5)
II. Private Non-Residential Construction	28,262 (24.5)	-	4,890 (10.6)	22,461 (25.8)	20,606 (28.9)	7,499 (12.0)	176,492 (42.2)	34,628 (35.4)	4,850 (15.9)	299,688 (27.9)
III. Public Construction	20,533 (17.8)	-	185 (0.4)	16,802 (19.3)	24,099 (33.8)	1,875 (3.0)	132,579 (31.7)	11,641 (11.9)	11,346 (37.2)	219,060 (20.4)
Sub-Total	102,781 (89.1)	-	5,075 (11.0)	39,263 (45.1)	57,468 (80.6)	9,374 (15.0)	343,366 (82.1)	67,789 (69.3)	17,386 (57.0)	642,502 (59.8)
IV. Manufacturing and Fabrication										
IV-1: Food Containers	-	125,776 (86.9)	-	-	-	-	-	-	-	125,776 (11.7)
IV-2: Non-Food Containers	1,038 (0.9)	18,960 (13.1)	10,887 (23.6)	609 (0.7)	-	3,749 (6.0)	-	-	-	35,243 (3.3)
IV-3: Appliances & Related products	2,192 (1.9)	-	14,023 (30.4)	4,005 (4.6)	998 (1.4)	-	1,673 (0.4)	2,543 (2.6)	-	25,434 (2.4)
IV-4: Automobiles	3,230 (2.8)	-	14,532 (31.5)	20,110 (23.1)	1,925 (2.7)	-	12,129 (2.9)	293 (0.3)	-	52,219 (4.9)
IV-5: Shipbuilding and Repairing	2,076 (1.8)	-	323 (0.7)	20,981 (24.1)	3,066 (4.3)	40,618 (65.0)	12,547 (3.0)	-	6,557 (21.5)	86,168 (8.0)
IV-6: Steel Furniture & Fixture	-	-	277 (0.6)	-	2,282 (3.2)	1,250 (2.0)	-	-	-	3,809 (0.3)
IV-7: Bolts, Nuts, Rivets & Screws	-	-	-	-	-	-	18,402 (4.4)	13,401 (13.7)	-	31,803 (3.0)
IV-8: Others	4,037 (3.5)	-	1,015 (2.2)	2,089 (2.4)	5,561 (7.8)	7,499 (12.0)	30,112 (7.2)	13,793 (14.1)	6,557 (21.5)	70,663 (6.6)
TOTAL	115,954 (100.0)	144,736 (100.0)	46,132 (100.0)	87,057 (100.0)	71,300 (100.0)	62,490 (100.0)	418,229 (100.0)	97,819 (100.0)	30,500 (100.0)	1,073,617 (100.0)
Reference										
Breakdown of IV-1		44,000 (30.4)								
Fruits and Fruit-Juices		67,736 (46.8)								
Others		14,040 (9.7)								

Table 12-3-13 Steel consumption pattern in 1977
(Products percentage by consuming sectors)

(Unit: %)

Steel Products Consuming Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	Total
I. Private Residential Construction	43.6	-	-	-	10.3	-	27.7	17.4	1.0	100.0
II. Private Non-Residential Construction	9.4	-	1.6	7.5	6.9	2.5	58.9	11.6	1.6	100.0
III. Public Construction	9.4	-	0.1	7.7	11.0	0.8	60.5	5.3	5.2	100.0
Sub-Total	16.0	-	0.8	6.1	8.9	1.5	53.4	10.6	2.7	100.0
IV. Manufacturing and Fabrication										
IV-1: Food Containers	-	100.0	-	-	-	-	-	-	-	100.0
IV-2: Non-Food Containers	2.9	53.9	30.9	1.7	-	10.6	-	-	-	100.0
IV-3: Appliances & Related Products	8.6	-	55.1	15.8	3.9	-	6.6	10.0	-	100.0
IV-4: Automobiles	6.2	-	27.8	38.5	3.7	-	23.2	0.6	-	100.0
IV-5: Shipbuilding and Repairing	2.4	-	0.4	24.3	3.6	47.1	14.6	-	7.6	100.0
IV-6: Steel Furniture & Fixture	-	-	7.3	-	59.9	32.8	-	-	-	100.0
IV-7: Bolts, Nuts, Rivets & Screws	-	-	-	-	-	-	57.9	42.1	-	100.0
IV-8: Others	5.7	-	1.4	3.0	7.9	10.6	42.6	19.5	9.3	100.0
Total	10.8	13.5	4.3	8.1	6.6	5.8	39.0	9.1	2.8	100.0

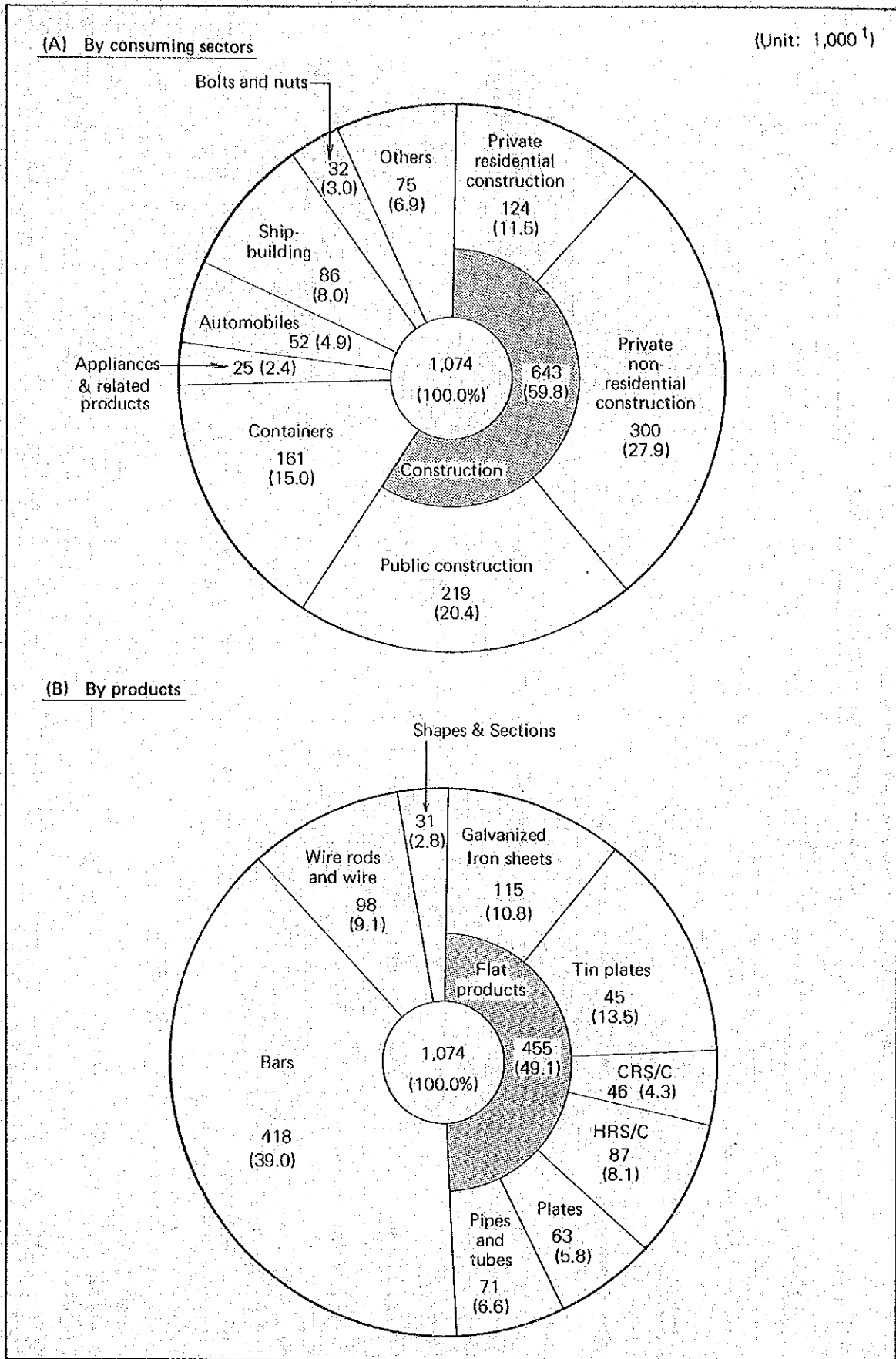


Fig. 12-3-14 Steel consumption patterns in 1977

12-3-2 Consideration of activity levels in demanding areas

(1) Area of building constructions started

The area of building constructions started, continuously decreasing since 1967, leaped in 1975 but declined again thereafter. (See the *Table 12-3-14*) According to the NEDA's data, during the 10-year period between 1960 and 1970, the population increased 3.0% annually, whereas the increase rates of the number of households and houses were only 2.8 and 2.4%, respectively. This tendency continued until the sudden leap in 1975, which apparently followed an appreciable increase in per-capita GNP brought about by the 1973—74 boom. The housing increase rate lower than the population growth rate indicates a worsening of the housing situation. This trend will not last for a long time. Private residential construction will increase at a pace comparable to the growth of per-capita GNP. (See the *Table 12-3-15*)

Table 12-3-14 Trends in the area of building constructions started, in 10⁶m²

Calendar Year	(a) Floor Area of Private Construction			(b) Area of Building Construction Started				
	Floor Area of Private Construction	Compared with Previous Year (%)	Index * (%)	Private Residential Construction	Private Non-Residential Construction	Total	Compared with Previous Year (%)	Index * (%)
1966	2,793		93.3					
1967	3,220	15.3	107.5					
1968	3,039	-5.6	101.5					
1969	2,994	-1.5	100.0	1,536	1,200	2,736		100.0
1970	2,899	-3.2	96.8	1,716	900	2,616	-4.4	95.6
1971	2,476	-14.3	82.7	1,356	900	2,256	-15.8	82.5
1972	2,746	10.9	91.7	1,476	1,056	2,532	12.2	92.5
1973	2,656	-3.3	88.7	1,332	1,008	2,340	-7.6	85.5
1974	2,477	-6.7	82.7	1,044	1,224	2,268	-3.1	82.9
1975	3,711	49.8	123.9	1,668	1,716	3,384	49.2	123.7
1976	2,497	-32.7	83.4	2,556	2,100	4,656	37.6	170.2
1977	1,563	-37.4	52.2	2,052	1,572	3,624	-22.2	132.5

Note: Column (a): Data furnished by the Philippine Counterpart.

Column (b): United Nations' statistics (monthly average x 12)

Collected by a different method, data for 1968 and earlier are not used.

* Index base figure: 1969 = 100.0

Table 12-3-15 Estimate of per-capita GNP

Description Unit Calendar Year	GNP	Population	GNP per-capita	
	Million Pesos	1,000 person	Pesos	Compared with previous year (%)
1977	77,958	45,020	1,732	—
1978	82,477	46,350	1,779	2.7
1979	88,663	47,719	1,858	4.4
1980	95,312	49,137	1,940	4.4
1981	102,937	50,557	2,036	4.9
1982	111,172	52,026	2,137	5.0
1983	120,066	53,514	2,244	5.0
1984	129,671	55,045	2,356	5.0
1985	140,045	56,619	2,473	5.0
1986	151,249	58,238	2,597	5.0
1987	163,348	59,903	2,727	5.0
1988	176,416	61,616	2,863	5.0
1989	190,530	63,378	3,006	5.0
1990	205,770	65,191	3,156	5.0

Note 1. GNP is based on Table 12-2-1.

Note 2. Population is based on the NEDA's "Five-Year Development Plan." Populations for the unmentioned years were calculated at an annual increase rate of 2.86%

CHAPTER 12

(2) Construction

Table 12-3-16 shows trends in construction cost.

Government spending on construction increased gradually between 1961 and 1969, but decreased to half in 1970. The investment amount recovered to the 1970 level in 1973, then became 3.3 times larger in the 5 years between 1973 and 1978. This confirms that Government spending on construction led the economic growth of that period. Improvement of infrastructures is essential for the Philippines to achieve future economic development. Therefore, government-led construction investment will remain at a high level. This trend is evident in the DEDA's "Five-Year Philippine Development Plans," which set the Government construction investment increase rate at 12.1% for 1978—1982 and 11.3% for 1982—1987.

Following the 1967 peak, private construction gradually decreased until 1974. But the figure nearly doubled in 1975 and 1976, registering a growth of 55 and 27% over the year-earlier levels, 1977 and 1978 also remained on a plateau, maintaining a growth of 4 and 5%, respectively. Private construction investment and business climate have a reciprocal relationship; the former depends heavily on the latter and, at the same time, the trend of the former exercises a material influence on the latter. In other words, private construction investment has a function to accelerate a change in the business condition. When the economy is turning upward, private construction increases to further stimulate the economy. Conversely, when the economy looks downward, it decreases to cool the economy. For this reason, private construction investment has a tendency to repeat sharp fluctuations in the short run. Therefore, its long-term trends should be studied. The increase rate for the 17-year period between 1961 and 1978 averaged 5.6% for private construction, 7.7% for durable equipment, and 6.8% for private fixed capital formation that consists of private construction plus durable equipment. The NEDA's plan figures are slightly above this 6.8% trend line; 8.6% for 1978—82 and 8.8% for 1982—87. To achieve modernization through the development of industry, the Philippines will have to keep private fixed capital formation at a high level. According to the NEDA's data, however, in 1978 the ratio of GDCF to GNP was 30.5%, while that of gross domestic saving (GDS) was 25.6%; a gap of 4.9% between investment and saving. This gap will be filled by introducing foreign investment and loans. But some apprehension are felt about the worsening of the debt service ratio from 13.7% of 1977 (actual) to 18.0% in 1978 (projected in service ratio is improved, the introduction of foreign capital will be impeded, which in turn will hamper capital formation.

(3) Milk production

Milk is indispensable to the table of the Philippines, so its production increased smoothly except for an unusual decrease in 1974. According to the Philippine Counterpart's data, the annual increase rates of personal consumption, expenditures and milk production average 4.3 and 7.7%, over 13 years between 1964 and 1977. (See the *Table 12-3-17*)

Table 12-3-16 Trends in construction cost (Based on 1972 prices: in 10⁶ Pesos)

Calendar Year	Fixed Capital Formation (FCF)												
	Total			Government			Private			Private Construction		Durable Equipment	
	10 ⁶ Pesos	Compared with Previous Year (%)	10 ⁶ Pesos	Compared with Previous Year (%)	10 ⁶ Pesos	Compared with Previous Year (%)	10 ⁶ Pesos	Compared with Previous Year (%)	10 ⁶ Pesos	Compared with Previous Year (%)	10 ⁶ Pesos	Compared with Previous Year (%)	
1961	4,982		454		4,528		2,103		2,425		2,425		
1962	4,713	-5.4	460	1.3	4,253	-6.1	1,935	-8.0	2,318	-4.4	2,318	-4.4	
1963	5,639	19.6	542	17.8	5,097	19.8	2,413	24.7	2,680	15.6	2,680	15.6	
1964	6,685	18.5	422	-22.1	6,263	22.9	2,932	21.5	3,331	24.3	3,331	24.3	
1965	7,022	5.0	526	24.6	6,496	3.7	3,178	0.4	3,318	-0.4	3,318	-0.4	
1966	6,988	-0.5	607	15.4	6,381	-1.8	2,917	-8.2	3,464	4.4	3,464	4.4	
1967	8,402	20.2	743	22.4	7,659	20.0	3,189	8.3	4,500	29.9	4,500	29.9	
1968	8,661	3.1	767	3.2	7,894	3.1	2,767	-12.4	5,127	13.9	5,127	13.9	
1969	8,905	2.8	1,108	44.5	7,797	-1.2	2,716	-1.2	5,081	-0.9	5,081	-0.9	
1970	7,919	-11.1	496	-55.2	7,423	-4.8	2,593	-4.5	4,830	-4.9	4,830	-4.9	
1971	8,690	9.7	628	26.6	8,062	8.6	2,445	-5.7	5,617	16.3	5,617	16.3	
1972	8,931	1.6	1,034	64.6	7,797	-3.3	2,531	3.5	5,266	-6.2	5,266	-6.2	
1973	9,085	2.9	1,183	14.4	7,902	1.3	2,510	-0.8	5,392	2.4	5,392	2.4	
1974	11,382	25.3	1,508	27.5	9,874	25.0	2,494	-0.6	7,380	36.9	7,380	36.9	
1975	15,037	32.1	2,294	52.1	12,743	29.1	3,858	54.7	8,885	20.4	8,885	20.4	
1976	16,316	8.5	3,128	36.4	13,188	3.5	4,883	26.6	8,305	-6.5	8,305	-6.5	
1977	16,643	2.0	3,565	14.0	13,078	-0.8	5,054	3.5	8,024	-3.4	8,024	-3.4	
1978	17,850	7.3	3,905	9.5	13,945	6.6	5,325	5.4	8,620	7.4	8,620	7.4	
1979	19,522	9.4	4,378	12.1	15,144	8.6							
1980	21,354	9.4	4,908	12.1	16,446	8.6							
1981	23,362	9.4	5,502	12.1	17,860	8.6							
1982	25,564	9.4	6,168	12.1	19,396	8.6							
1983	27,968	9.4	6,865	11.3	21,103	8.8							
1984	30,601	9.4	7,641	11.3	22,960	8.8							
1985	33,454	9.4	8,474	11.3	24,980	8.8							
1986	36,610	9.4	9,432	11.3	27,178	8.8							
1987	40,068	9.4	10,498	11.3	29,570	8.8							
1988	43,886	9.5	11,684	11.3	32,172	8.8							
1989	48,007	9.5	13,004	11.3	35,003	8.8							
1990	52,556	9.5	14,473	11.3	38,083	8.8							

Note 1. Figures for 1961-1976 are based on the Philippine Counterpart's dated and "Philippine Statistical Yearbook 1978."

Note 2. Figures for 1977-1978 are based on the NEDA's data in The Times Journal of January 1, 1979.

Note 3. Figures for 1979-1990 are based on the following increase rates in the NEDA's "Five-Year Philippine Development Plans."

Description	Increase rate (%)	
	1978-1982	1982-1990
FCF government	12.1	11.3
FCF private	8.6	8.8

Table 12-3-17 Trends in milk production and personal consumption expenditures

Calendar year	Milk Production		Personal consumption expenditures	
	Ton*	Compared with previous year (%)	10 ⁶ pesos	Compared with previous year (%)
1964	79,565		28,885	
1965	80,645	1.4	30,300	4.9
1966	84,003	4.2	31,845	5.1
1967	98,296	7.0	33,342	4.7
1968	108,583	10.5	35,033	5.1
1969	111,565	2.7	36,435	4.0
1970	118,655	6.4	37,088	1.8
1971	126,542	6.6	38,499	3.8
1972	145,598	15.1	39,922	3.7
1973	146,555	0.7	42,317	6.0
1974	104,602	-28.6	44,385	4.9
1975	146,775	40.3	46,160	4.0
1976	161,953	10.3	47,868	3.7
1977	208,016	28.4	49,830	3.8
Average		7.7		4.3

Note: Personal consumption expenditures are based on the 1972 prices.

Source: NCSO — milk production.

NEDA — personal consumption expenditures; figures for 1977 are based on the NEDA's data issued on January 1, 1979 (previously mentioned).

Estimates in Table 12-5-18 were obtained from the following equation that was derived from Table 12-3-17, with the abnormal 1974 milk production eliminated.

$$Y = 5.315X - 79,056 \quad (r = 0.9149)$$

where Y = milk production in 10³t

X = personal consumption expenditures in 10⁶ pesos

Fig. 12-3-15 shows the relationship between milk production and personal consumption expenditures.

Table 12-3-18 Estimate of milk production

Calendar year	Milk Production		Personal consumption expenditures	
	Ton*	Compared with previous year (%)	10 ⁶ pesos	Compared with previous year (%)
1978	199,030	-4.3	52,329	5.0
1979	217,383	9.2	55,774	6.6
1980	236,947	9.0	59,455	6.6
1981	257,803	8.8	63,379	6.6
1982	280,036	8.6	67,562	6.6
1983	305,888	9.2	72,426	7.2
1984	333,606	9.1	77,641	7.2
1985	363,317	8.9	83,231	7.2
1986	395,170	8.8	89,224	7.2
1987	429,313	8.6	95,648	7.2
1988	465,918	8.5	102,535	7.2
1989	505,158	8.4	109,918	7.2
1990	547,221	8.3	117,832	7.2

Note 1. Personal consumption expenditures are based on 1972 prices.

Note 2. Personal consumption expenditures for 1978 are based on the NEDA's data issued on January 1, 1979, and those for 1979-1990 on the increase rates in the NEDA's "Five-Year Philippine Development Plans."

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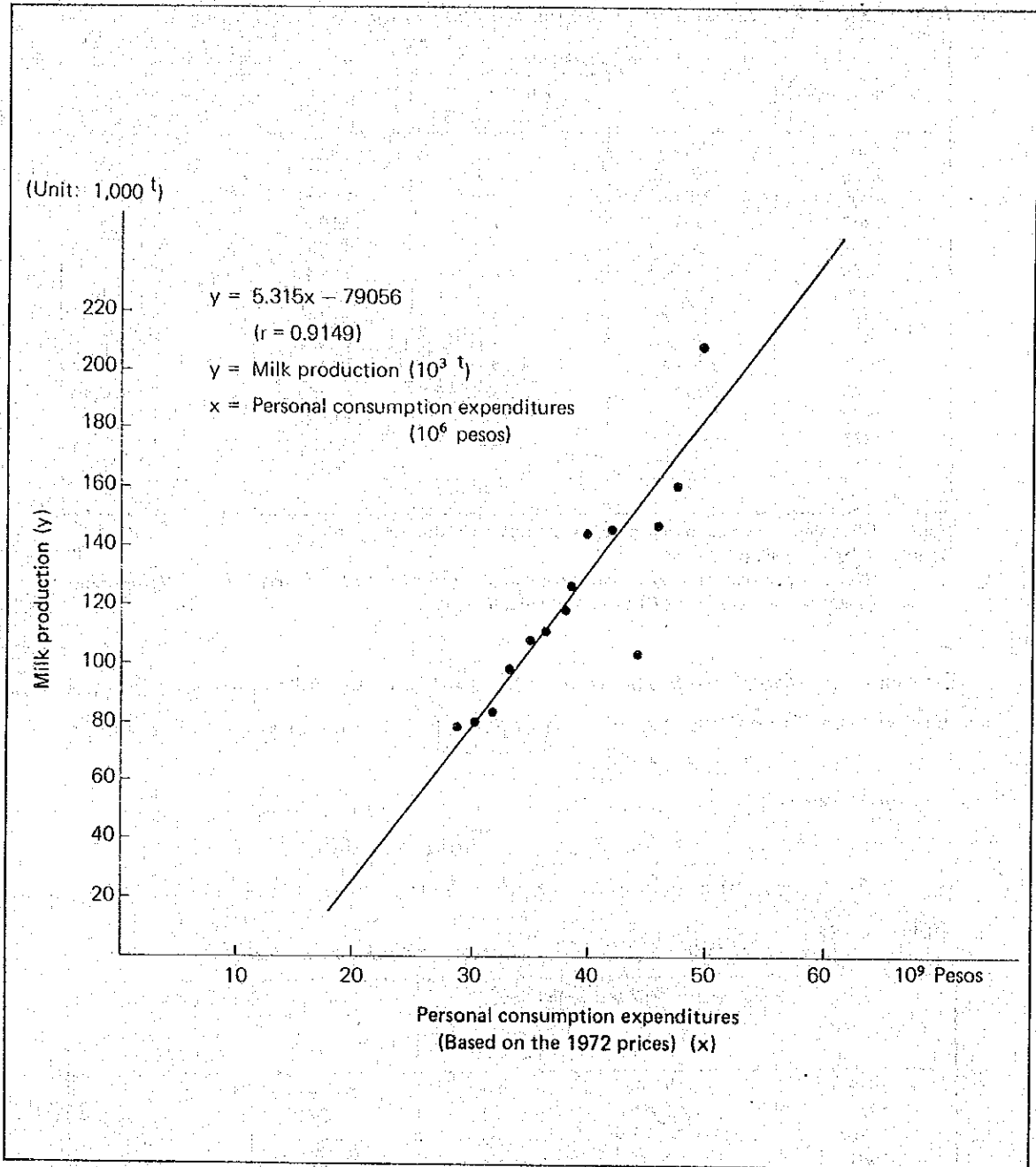


Fig. 12-3-15 Relationship between milk production and personal consumption expenditures

(4) Fruit production

Of the *Table 12-3-19* listed three kinds of fruit, a large percentage of pineapple is canned. During the 16 years from 1960 to 1976, pineapple production increased at an average rate of 7.4% annually. The NEDA's "Domestic Supply of Fruit" projects the mean annual increase rate at 5.5% for 1978—1982 and 4.4% for 1982—1987.

Table 12-3-19 Trends in pineapple, banana and mango production

Calendar year	Pineapple		Banana		Mango	
	10 ³ tons*	Compared with previous year (%)	10 ³ tons	Compared with previous year (%)	10 ³ tons	Compared with previous year (%)
1960	133.9		307.3		57.6	
1961	115.8	-13.5	349.0	13.6	59.3	3.0
1962	139.6	20.6	524.9	50.4	66.1	11.5
1963	151.4	8.5	556.9	6.1	92.3	39.6
1964	155.7	2.8	754.9	35.6	95.1	3.0
1965	176.1	13.1	684.8	-9.3	129.4	36.1
1966	188.2	6.9	682.7	-0.3	131.5	1.6
1967	208.1	10.6	765.4	12.1	134.1	2.0
1968	226.0	8.6	780.6	2.0	126.5	-5.7
1969	238.4	5.5	746.9	-3.3	140.6	11.1
1970	233.4	-2.1	896.0	20.0	151.7	7.9
1971	234.3	0.4	1,034.8	15.5	137.5	-4.1
1972	282.1	20.4	980.1	-5.3	143.4	4.3
1973	293.4	4.0	1,012.6	3.3	187.6	30.8
1974	338.3	15.3	1,235.5	22.0	191.5	2.1
1975	424.4	25.5	1,686.0	36.5	239.3	25.0
1976	419.9	-1.1	3,067.9	82.0	330.9	38.3

Source: 1978 Philippine Statistical Yearbook

(5) Production of oil, etc.

Evidently affected by the oil crisis, production of motor gasoline, kerosene and fuel oil dropped in 1973 and 1974. Their long-term annual increase rates also indicate low averages. By contrast, the increase rates of LPG and coconut oil averaged above 10%.

(See the *Table 12-3-20*)

Table 12-3-20 Trends in production of oil, etc.

Calendar Year	Motor Gasoline		Kerosene		Fuel Oil, Distillate		L. P. G.		Coconut Oil Crude	
	10 ³ barrels	Compared with Previous Year (%)	10 ³ barrels	Compared with Previous Year (%)	10 ³ barrels	Compared with Previous Year (%)	10 ³ barrels	Compared with Previous Year (%)	10 ³ barrels	Compared with Previous Year (%)
1964	9,314		2,702		7,125		n.a.		256,776	
1965	9,821	5.4	2,304	-14.7	7,220	1.3	n.a.		279,873	9.0
1966	10,111	3.0	2,145	-6.9	7,450	3.2	n.a.		365,764	30.7
1967	11,647	15.2	2,727	27.1	8,180	9.8	n.a.		344,620	-5.8
1968	13,628	17.0	2,848	4.4	10,144	24.0	n.a.		395,257	14.8
1969	13,929	2.2	4,363	53.2	11,735	15.7	n.a.		328,401	-16.9
1970	15,521	11.4	3,365	-22.9	13,925	18.7	1,007		385,312	17.3
1971	15,618	0.6	3,309	-1.7	13,967	0.3	981	-2.6	394,223	2.3
1972	17,752	13.7	3,839	16.0	15,141	8.4	1,669	70.1	507,450	28.7
1973	16,447	-7.4	3,580	-6.7	13,855	-8.5	2,040	22.2	525,731	3.6
1974	14,381	-12.6	2,859	-19.1	11,974	-13.6	1,914	-6.2	530,611	0.9
1975	16,037	11.5	3,288	15.0	13,499	12.7	2,318	21.1	642,170	21.0
1976	15,568	-3.0	3,037	-7.6	14,430	6.9	1,976	-14.8	820,680	27.8
Average		4.4		1.8		6.1		11.9		10.8

Source: 1978 Philippine Statistical Yearbook.

The Philippines' energy plan (*Table 12-3-21*) contemplates lowering the degree of dependence on oil by increasing the use of water, geothermal, nuclear and coal energies in the power generating sector. The ratio of coal will rise also in the non-power-generating sector. More specifically, the oil-dependency will be lowered from 94.1% in 1977 to 68.1% in 1987. Consequently, oil production will increase at an average rate of 5.2% between 1977 and 1982 and 5.0% between 1982 and 1987, as compared with 8.8 and 8.4% for all energies. Non-power generating oil, which has a relation with the demand for steel drums and pails, will increase at an average annual rate of 3.7 and 8.4% during the corresponding periods. But the Philippines will have a brighter future if the Off-Palawan oil project, now under development, proves successful.

Table 12-3-21 Energy plan

Calendar year		1977		1982		1987	
Unit		MMB	Share (%)	MMB	Share (%)	MMB	Share (%)
Energy source							
	Hydro	4.42	5.3	9.76	7.7	20.79	10.9
	Oil	18.55	22.2	29.33	23.1	21.55	11.4
	Coal	0.01	0.0	2.00	1.6	3.90	2.1
	Geothermal			4.80	3.8	10.62	5.6
	Nuclear			2.51	2.0	6.00	3.1
	Non-conventional			1.00	0.8	3.30	1.7
Total — Power generation		22.98	27.5	49.40	39.0	66.16	34.8
	Oil	59.93	71.9	72.00	56.6	107.64	56.7
	Coal	0.50	0.6	4.20	3.3	10.00	5.3
	Non-conventional			1.50	1.1	6.70	3.2
Total — Non-power generation		60.43	72.5	77.70	61.0	123.84	65.2
Total		83.40	100.0	127.10	100.0	190.00	100.0
Of which oil		78.48	94.1	101.33	79.7	129.19	68.1

Source: NEDA

Note: MMB: Million Metric Barrels

(6) Electrical appliances

We selected refrigerators and air-conditioners as electrical appliances and production quantity are shown in *Table 12-3-22*.

Production of refrigerators increased sharply at some times and flattened out at others. After recording 16 to 29% increase rates between 1964 and 1968, the production remained flat on the 30,000-level from 1968 to 1971, then jumped at 43 to 48% between 1971 and 1973. Probably, both demand- and supply-factors must have been responsible to those movements. The long-term annual increase rate averaged 17.1%. An increase in GNP and electrification must have raised the growth rate of modern electrical appliances represented by the refrigerator. (According to the NEDA's electrification plan, the

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Table 12-3-22 Trends in refrigerator and air-conditioner production (unit: t.)

Calendar year	Refrigerators		Air-conditioners	
	Quantity	Compared with previous year (%)	Quantity	Compared with previous year (%)
1964	14,270		11,331	
1965	16,575	16.2	14,550	28.4
1966	19,970	20.5	17,712	21.7
1967	23,502	17.7	17,722	0.1
1968	30,234	28.6	17,382	-1.9
1969	30,052	-0.6	17,299	-0.5
1970	31,500	4.8	34,492	99.4
1971	31,026	-1.5	34,852	1.0
1972	45,957	48.1	31,435	-9.8
1973	65,610	42.8	35,675	13.5
1974	71,359	8.8	50,242	40.8
1975	86,420	21.1	24,367	-51.5
1976	83,541	-3.3	32,401	33.0
1977	110,822	32.7	35,521	9.6
Average		17.1		10.0

electrification rate of 35% (2.6 million households) in 1977 will be raised to 60% (5.2 million households) in 1982, then to 85% (8.5 million households) in 1987).

With the production of washing machines and rice cookers started, home electrical appliances recently came to be increasingly diversified.

Considerably affected by business fluctuations, no definite statistics are available for the production of air-conditioners for domestic use. Presumably, the percentage of larger air-conditioners for office and business use is fairly high. Between 1964 and 1977 production of air-conditioners increased at an average rate of 10% annually. Since 1970, however, the figure remained in the vicinity of 35,000, except for a big takeoff in 1974 and a step-back in 1975.

Looking at the future, refrigerators will have a high latent growing power, because their production in the past 10 years amounted to only 586,000 units, with their ownership ratio standing below 10%. The increase rate of air-conditioners will be substantially equal to that of private capital investment, though it will depend considerably on suppliers' productivity.

(7) Automobiles

As regards the automotive sales and production in the Philippines, the 1960s exhibit a striking contrast to the 1970s. (See the *Table 12-3-23*) Until 1972, automobiles were made on the complete knockdown system. Assembly plants numbered as many as 35 in

Table 12-3-23 Trends in automotive sales

Calendar year	Passenger cars		Trucks		Total	
	Quantity	Compared with previous year (%)	Quantity	Compared with previous year (%)	Quantity	Compared with previous year (%)
1964	9,280		8,161		17,441	
1965	7,448	-19.7	5,097	-37.5	12,545	-28.1
1966	10,753	44.4	4,272	-16.2	15,025	19.8
1967	12,641	17.6	6,034	41.2	18,675	24.3
1968	11,292	-10.7	6,112	1.3	17,404	-6.8
1969	13,249	17.3	6,894	12.8	20,143	15.7
1970	7,562	-42.9	6,194	-10.2	13,756	-31.7
1971	9,347	23.6	9,690	56.4	19,007	38.2
1972	12,937	38.4	7,972	-17.7	20,909	10.0
1973	17,360	34.2	13,128	64.7	30,488	45.8
1974	23,824	37.2	20,422	55.6	44,246	45.1
1975	28,410	19.2	20,338	-0.4	48,748	10.2
1976	33,817	19.0	16,261	-20.0	50,578	3.7
1977	35,328	4.5	25,317	55.7	60,645	19.9
Average		10.8		9.1		10.1
1970-1977 Average		24.6		22.3		23.6

Source: NCSD (furnished by the Philippine Counterpart)

Note: Trucks include "Asian Utility Vehicles."

1964 and 19 in 1968. In 1971, the Board of Investment (B.O.I.) announced its Progressive Car Manufacturing Program (P.C.M.P.). Principal objects of the P.C.M.P. were to (a) save foreign currency spendings, (b) improve production technique and acquire technical know-how through the domestic production of automotive parts, and (c) export automotive parts under the ASEAN's mutual supplement plan. Under this program, auto-makers were reduced to five. As this program came on stream, automotive production increased rapidly. Between 1964 and 1977, automotive sales increased at an average rate of 10.1% annually. But from 1970 to 1977 the figure was as high as 23.6%.

Generally, demand for automobiles is said to increase sharply when per-capita GNP reaches the US\$1,000 level. The Philippines' per-capita GNP, US\$456 in 1977, will require some time to reach that level. Sales and fuel (oil) prices also affect the demand. In view of all this, automotive sales will not increase at an annual rate of over 20%, but probably at 15% or thereabout.

"Asian Utility Vehicles" are popular among the people, constituting approximately two-thirds of demand for trucks. Automotive assemblers are operating at full capacity. How to establish a new supply system and how to raise the ratio of domestic production are the problems to be solved hereafter.

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(8) Shipbuilding

According to the 1977 consumption pattern of *Fig. 12-3-4*, steel for ship-building and repairing constitutes a significant 8% of total apparent steel consumption. As seen from *Table 12-3-24*, the total tonnage of steel vessels built nearly quadrupled in 1978 (projected) from 11,432 GT of 1975.

Table 12-3-24 Construction of steel vessels

Vessel Type	Description	1975			1976			1977			1978*		
		Q'ty	GT	GT/Vessel	Q'ty	GT	GT/Vessel	Q'ty	GT	GT/Vessel	Q'ty	GT	GT/Vessel
Barges		27	9,387	348	33	7,038	213	23	13,438	584	42	21,236	506
Tugboats		4	234	59	9	484	54	13	997	77	10	948	95
Cargo or Cargo/Passengers		1	296	296	7	1,609	210	18	11,536	641	17	19,750	1,162
Fishing Boats		2	1,365	683	25	2,197	88	8	658	82	8	500	63
Other Type		2	150	75	9	1,497	166	35	420	12	52	1,232	24
For Exports					3	925	308	14	2,195	157			
Total		36	11,432	318	83	12,825	155	100	27,974	280	143	45,861	321
Compared with Previous Year (%)						12.3			118.1			63.9	

Source: Shipbuilding & Ship-repair Office, Maritime Industry Authority (through the Philippine Counterpart)

*1978e = estimate

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As seen from *Table 12-3-25*, the Philippines steel vessel imports ran between 100,000 and 200,000¹, two to three times greater than the tonnages built domestically. With increasing inter-island transportation, demand for vessels will be great. The problem is how to increase the domestic shipbuilding capacity. For some time to come, expansion efforts will be directed mainly at the construction of small steel vessels. But if a big joint-venture shipbuilder is established, the Philippines' shipbuilding capacity will leap from the present level.

Table 12-3-25 Imports of steel vessels (GT)

Calendar year Description Vessel type	1975		1976		1977		1978	
	GT	Share (%)	GT	Share (%)	GT	Share (%)	GT	Share (%)
Barges	5,829	2.9	12,323	12.6	10,021	5.6	7,595	4.1
Tugboats	—	—	1,793	1.8	1,484	0.8	1,204	0.7
Motor vessels	33,118	16.5	11,853	12.1	147,555	82.3	156,750	85.1
Motor ship	6,996	3.5	8,305	8.5	16,102	9.0	3,241	1.8
Cargo	328	0.2	19,013	19.4	3,001	1.7	1,008	0.5
Tanker	154,589	77.0	44,593	45.6	1,200	0.7	14,339	7.8
Total	200,859	100.0	97,881	100.0	179,363	100.0	184,136	100.0

Source: Data furnished by the Philippine Counterpart.

(9) Forecast of activity levels in main demanding sectors

Activity levels of the main steel demanding sectors were considered in the preceding sections (1) through (8). *Table 12-3-26* summarizes a forecast of their future activity levels on the basis of the foregoing analyses. Some bold assumptions were employed. Also for some demanding sectors, elasticity coefficients were used to derive steel-equivalent indices. The indices were established on two base-figure years: 1977=100.0 and 1978=100.0.

Table 12-3-26 Forecast of activity levels in demanding sectors
(in steel-equivalent index)

Top : 1977 = 100.0
Bottom : 1978 = 100.0

Demanding Sectors	Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Remarks
Private-Residential Construction		100.0	102.7	107.3	112.0	117.6	123.4	129.6	136.0	142.8	149.9	157.4	165.3	173.6	182.2	(1) Growth rate of per-capita GNP.
		100.0	100.0	104.4	109.1	114.5	120.2	126.2	132.4	139.0	146.0	153.3	161.0	169.0	177.4	
Private Non-Residential Construction		100.0	104.5	111.0	117.9	125.2	133.2	141.7	150.8	160.5	170.8	181.7	193.3	205.7	218.9	(2) Growth rate of NEDA's private fixed capital formation x 0.725. 0.725 = elasticity coefficient for GDF and five construction-related products over 5 years.
		100.0	100.0	106.2	112.8	119.8	127.5	135.6	144.3	153.6	163.4	173.9	185.0	196.8	209.5	
Public Construction		100.0	106.6	116.0	126.2	137.3	149.4	161.7	175.0	189.4	204.9	221.7	240.0	259.7	281.0	(3) Growth rate of NEDA's government fixed capital formation x 0.725.
		100.0	100.0	108.8	118.4	128.8	140.2	151.7	164.2	177.7	192.2	208.0	225.1	243.6	263.6	
Milk Production		100.0	97.1	103.0	108.2	115.6	122.2	129.7	137.6	145.7	154.3	163.1	172.4	182.1	192.1	(4) Growth rate of milk production x 0.687. 0.687 = elasticity coefficient for milk and tin plates.
		100.0	100.0	106.1	112.5	119.1	125.8	133.6	141.7	150.1	159.9	169.0	177.5	187.6	197.8	
Fruit & Fruits Juice		100.0	105.5	111.3	117.4	123.9	130.7	136.5	142.5	148.8	155.3	162.1	169.2	176.6	184.4	(5) Growth rate of NEDA's fruit production.
		100.0	100.0	105.5	111.3	117.4	123.9	129.4	135.1	141.0	147.2	153.6	160.4	167.4	174.8	
Non-Food Containers		100.0	105.2	110.7	116.5	122.6	128.6	135.3	142.3	149.4	156.9	164.7	172.9	181.5	190.6	(6) Growth rate of NEDA's oil production.
		100.0	100.0	105.2	110.7	116.5	122.6	128.6	135.3	142.0	149.1	156.6	164.4	172.5	181.2	
Appliances & Related Products		100.0	110.0	122.1	135.5	150.4	166.9	185.3	205.7	228.3	253.4	281.3	312.2	346.5	384.6	(7) Refrigerator growth rate (15%) and air-conditioner growth rate (7%) were averaged to 11% based on an assumed 1:1 by-weight steel ratio.
		100.0	100.0	110.0	122.1	135.5	150.4	166.9	185.3	205.7	228.3	253.4	281.3	312.2	346.5	
Automobiles		100.0	115.0	132.3	152.1	174.9	201.1	231.3	266.0	305.9	351.8	404.6	465.3	535.1	615.4	(8) Assumed annual growth rate = 15%.
		100.0	100.0	115.0	132.3	152.1	174.9	201.1	231.3	266.0	305.9	351.8	404.6	465.3	535.1	
Shipbuilding and Repairing		100.0	110.0	121.1	133.1	146.4	161.0	177.1	194.8	214.3	235.7	259.3	285.2	313.7	345.1	(9) Assumed annual growth rate = 10%.
		100.0	100.0	110.0	121.1	133.1	146.4	161.0	177.1	194.8	214.3	235.7	259.3	285.2	313.7	
Steel Furniture & Fixture		100.0	104.5	111.0	117.9	125.2	133.2	141.7	150.8	160.5	170.8	181.7	193.3	205.7	218.9	(10) The same growth rate as for private non-residential construction, based on an assumption that office appliances constitute a greater percentage than home appliances.
		100.0	100.0	106.2	112.8	119.8	127.5	135.6	144.3	153.6	163.4	173.9	185.0	196.8	209.5	
Bolt, Nuts, Rivets & Screws		100.0	104.5	111.0	117.9	125.2	133.2	141.7	150.8	160.5	170.8	181.7	193.3	205.7	218.9	(11) The same growth rate as for private non-residential construction, based on an assumption that products for general industrial machinery constitute a greater percentage.
		100.0	100.0	106.2	112.8	119.8	127.5	135.6	144.3	153.6	163.4	173.9	185.0	196.8	209.5	
Others		100.0	104.5	111.0	117.9	125.2	133.2	141.7	150.8	160.5	170.8	181.7	193.3	205.7	218.9	(12) The same as above.
		100.0	100.0	106.2	112.8	119.8	127.5	135.6	144.3	153.6	163.4	173.9	185.0	196.8	209.5	

CHAPTER 12

12-3-3 Micro-forecast and study

(1) Micro-forecast

Micro-forecast was made on the basis of the following two calculations.

- ① 1977 consumption pattern furnished by the Philippine Counterpart multiplied by Activity levels in *Table 12-3-26*.
- ② 1978 consumption pattern, derived from 1978 apparent consumption by products, assuming that sector-wise consumption patterns were the same as in 1977 multiplied by Activity levels in *Table 12-3-26*.

Table 12-3-27 Estimate of 1978 consumption pattern, based on 1977 sector-wise shares (t)

Table 12-3-28 Micro-forecast for 1985, based on 1977 (t)

Table 12-3-29 Micro-forecast for 1990, based on 1977 (t)

Table 12-3-30 Micro-forecast for 1985, based on 1978 (t)

Table 12-3-31 Micro-forecast for 1990, based on 1978 (t)

Table 12-3-27 Estimate of 1978 consumption pattern, based on 1977 sector-wise shares (t.)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	59,178	-	-	-	12,884	-	35,371	20,078	740	128,251
II. Private Non-Residential Construction	30,980	-	9,244	24,810	20,801	14,129	182,032	32,307	3,016	317,119
III. Public Construction	22,508	-	349	18,410	24,328	3,532	136,740	10,860	7,056	223,783
Sub Total	112,666	-	9,593	43,020	58,013	17,661	354,143	63,245	10,812	669,153
IV. Manufacturing & Fabrication										
IV-1: Food Containers	-	141,438	-	-	-	-	-	-	-	141,438
IV-2: Non-Food Containers	1,137	21,321	20,581	667	-	7,064	-	-	-	50,770
IV-3: Appliances & Related Products	2,402	-	26,511	4,389	1,008	-	1,725	2,373	-	38,408
IV-4: Automobiles	3,541	-	27,470	22,035	1,943	-	12,509	274	-	67,772
IV-5: Shipbuilding and repairing	2,276	-	610	22,989	3,095	76,529	12,941	-	4,078	122,518
IV-6: Steel Furniture & Fixture	-	-	523	-	2,303	2,355	-	-	-	5,181
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	18,980	12,503	-	31,483
IV-8: Others	4,426	-	1,918	2,289	5,613	14,128	31,057	12,868	4,079	76,378
TOTAL	126,448	162,759	87,206	95,389	71,975	117,737	431,355	91,263	18,969	1,203,101
Reference Breakdown of IV-1										
		49,470								
		76,171								
		15,788								

Table 12-3-28 Micro-forecast for 1985, based on 1977 (t.)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	77,092	-	-	-	18,226	-	48,973	30,731	1,699	176,721 (9.4)
II. Private Non-Residential Construction	45,360	-	7,848	36,050	33,073	12,036	283,270	55,578	7,784	480,999 (25.5)
III. Public Construction	38,890	-	350	31,823	45,644	3,551	251,105	22,048	21,489	414,900 (22.0)
Sub Total	161,342	-	8,198	67,873	96,943	15,587	583,348	108,357	30,972	1,072,620 (56.9)
IV. Manufacturing & Fabrication										
IV-1: Food Containers	-	185,622	-	-	-	-	-	-	-	185,622 (9.9)
IV-2: Non-Food Containers	1,551	28,326	16,285	910	-	5,601	-	-	-	52,653 (2.8)
IV-3: Appliances & Related Products	5,004	-	32,015	9,143	2,278	-	3,820	5,806	-	58,066 (3.1)
IV-4: Automobiles	9,881	-	44,453	61,516	5,889	-	37,103	896	-	159,738 (8.5)
IV-5: Shipbuilding and repairing	4,449	-	692	44,962	6,571	87,044	26,888	-	14,052	184,658 (9.8)
IV-6: Steel Furniture & Fixture	-	-	444	-	3,663	2,006	-	-	-	6,113 (0.3)
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	29,535	21,509	-	51,044 (2.8)
IV-8: Others	6,479	-	1,629	3,353	8,925	12,036	48,330	22,138	10,524	113,414 (6.0)
TOTAL	188,706 (10.0)	213,948 (11.4)	103,696 (5.5)	187,757 (10.0)	124,269 (6.6)	122,274 (6.5)	729,024 (38.7)	158,706 (8.4)	55,548 (2.9)	1,883,928 (100.0)

Note: Figure in parentheses are % shares.

Table 12-3-29 Micro-forecast for 1990, based on 1977 (t.)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	98,963	-	-	-	23,254	-	62,486	39,209	2,168	225,480 (8.2)
II. Private Non-Residential Construction	61,866	-	10,704	49,167	45,107	16,415	386,341	75,801	10,616	656,017 (23.9)
III. Public Construction	57,698	-	520	47,214	67,718	5,269	372,547	32,711	31,882	615,559 (22.4)
Sub-Total	217,927	-	11,224	96,381	136,079	21,684	821,374	147,721	44,666	1,497,056 (54.5)
IV. Manufacturing & Fabrication										
IV-1: Food Containers	-	235,740	-	-	-	-	-	-	-	235,740 (8.6)
IV-2: Non-Food Containers	1,978	36,138	20,751	1,161	-	7,145	-	-	-	67,173 (2.4)
IV-3: Appliances & Related Products	8,431	-	53,933	15,403	3,838	-	6,434	9,780	-	97,819 (3.6)
IV-4: Automobiles	19,877	-	89,430	123,757	11,847	-	74,642	1,803	-	321,356 (11.7)
IV-5: Shipbuilding and Repairing	7,164	-	1,115	72,405	10,581	140,173	43,300	-	22,628	297,366 (10.8)
IV-6: Steel Furniture & Fixture	-	-	606	-	4,996	2,736	-	-	-	8,338 (0.3)
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	40,282	29,335	-	69,617 (2.5)
IV-8: Others	8,837	-	2,222	4,573	12,173	16,415	65,915	30,193	14,353	154,681 (5.6)
TOTAL	264,214 (9.6)	271,978 (9.9)	179,281 (6.5)	313,680 (11.4)	179,514 (6.5)	188,153 (6.8)	1,051,947 (38.3)	218,832 (8.0)	81,647 (3.0)	2,749,146 (100.0)

Note: Figures in parentheses are % shares.

Table 12-3-30 Micro-forecast for 1985, based on 1978 (t.)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	82,257	-	-	-	17,909	-	49,166	27,908	1,029	178,269 (8.9)
II. Private Non-Residential Construction	47,585	-	14,199	37,801	31,950	21,702	279,601	49,624	4,633	487,095 (24.2)
III. Public Construction	39,997	-	620	32,715	43,231	6,276	242,987	19,298	12,538	397,662 (19.8)
Sub-Total	169,839	-	14,819	70,516	93,090	27,978	571,754	96,830	18,200	1,063,026 (52.8)
IV. Manufacturing & Fabrication	-	204,498	-	-	-	-	-	-	-	204,498 (10.1)
IV-1: Food Containers	1,615	30,275	29,225	947	-	10,031	-	-	-	72,093 (3.6)
IV-2: Non-Food Containers	4,941	-	54,534	9,028	2,073	-	3,548	4,881	-	79,005 (3.9)
IV-3: Appliances & Related Products	9,419	-	73,070	58,613	5,168	-	33,274	729	-	180,273 (9.0)
IV-4: Automobiles	4,434	-	1,188	44,783	6,029	149,078	25,205	-	7,944	238,665 (11.9)
IV-5: Shipbuilding and Repairing	-	-	803	-	3,538	3,617	-	-	-	7,958 (0.4)
IV-6: Steel Furniture & Fixture	-	-	-	-	-	-	29,153	19,205	-	48,358 (2.4)
IV-7: Bolts, Nuts, Rivets and Screws	6,798	-	2,946	3,516	8,622	21,701	47,704	19,765	6,265	117,317 (5.8)
IV-8: Others	197,046 (9.8)	234,773 (11.7)	176,585 (8.8)	187,403 (9.3)	118,520 (5.9)	212,405 (10.6)	710,642 (35.3)	141,410 (7.0)	32,409 (1.6)	2,011,193 (100.0)

Note: Figures in parentheses are % shares.

Table 12-3-31 Micro-forecast for 1990, based on 1978 (t.)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	104,982	-	-	-	22,856	-	62,748	35,618	1,313	227,517 (7.7)
II. Private Non-Residential Construction	64,903	-	19,366	51,558	43,576	29,600	381,357	67,663	6,319	664,364 (22.5)
III. Public Construction	59,331	-	920	48,529	64,129	9,310	350,447	28,627	18,599	589,892 (20.0)
Sub-Total	229,216	-	20,286	100,087	130,563	38,910	804,552	131,928	26,231	1,481,773 (50.2)
IV. Manufacturing & Fabrication	-	260,051	-	-	-	-	-	-	-	260,051 (8.8)
IV-1: Food Containers	-	260,051	-	-	-	-	-	-	-	260,051 (8.8)
IV-2: Non-Food Containers	2,060	38,634	37,293	1,208	-	12,800	-	-	-	91,995 (3.1)
IV-3: Appliances & Related Products	8,323	-	91,861	15,208	3,493	-	5,977	8,222	-	133,084 (4.5)
IV-4: Automobiles	18,948	-	146,992	117,909	10,397	-	66,936	1,466	-	362,648 (12.3)
IV-5: Shipbuilding and Repairing	7,140	-	1,914	72,116	9,709	240,071	40,596	-	12,793	384,339 (13.0)
IV-6: Steel Furniture & Fixture	-	-	1,095	-	4,825	4,934	-	-	-	10,854 (0.4)
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	39,763	26,194	-	65,957 (2.3)
IV-8: Others	9,273	-	4,018	4,796	1,759	29,598	65,064	26,958	8,546	160,012 (5.4)
TOTAL	274,960 (9.3)	298,685 (10.1)	303,459 (10.3)	311,324 (10.5)	170,746 (5.8)	326,313 (11.1)	1,022,888 (34.7)	194,768 (6.6)	47,570 (1.6)	2,950,713 (100.0)

Note: Figures in parentheses are % shares.

CHAPTER 12

(2) Macro-comparison of demand forecast results

Table 12-3-32 shows the comparison of demand forecast values.

Table 12-3-32 Comparison of demand forecast values (1,000 t)

Classification	Base data	Forecast method	Estimated apparent crude-steel consumption		Remarks
			1985	1990	
Macro-forecast	1962—1978	Relationship with GNP (r=0.9247)	2,456	3,560	Model A
		Relationship with GDCF (r=0.9264)	2,332	3,319	Model B
		Relationship with GNP and GDCF/GNP (r=0.9409)	2,178	2,966	Model C
	1968—1978	Relationship with GNP (r=0.8850)	2,176	3,030	Model D
		Relationship with GDCF (r=0.9198)	2,045	2,775	Model E
		Relationship with GNP and GDCF/GNP (r=0.9008)	2,006	2,662	Model F
Micro-forecast	1977	Forecast by products and Sectors	2,415	3,525	Model G
	1978	Ditto	2,578	3,783	Model H

As mentioned in Section 12-2-3 on Macro-Demand-Forecast, macro-models D, E and F based on the 1968-78 data give lower forecast values and correlation coefficients, strongly affected by the 1968-73 slump. Therefore, these three macro-models were eliminated, and three macro-models, A, B and C, and two micro-models, G and H, were compared. Macro-model C gives the highest correlation coefficient among the macro-models A, B and C, but its forecast values rank lowest among the five models A, B, C, G and H. Model C shows an average annual growth rate of 5.1% for 1978—1985 and 6.4% for 1985—1990, considerably lower than 7.5% for 1962—1978. Moving into a growth period, the Philippines' demand for steel is thought to grow at higher rates; the course of demand growth will be more close to model A than model C.

The micro-models give higher forecast values. Forecast values based on the 1978 consumption pattern are higher than those on the 1977 consumption pattern, because consumption in 1978 increased 12.0% from the 1977 level. Between 1977 and 1978, cold-rolled sheets and coil increased by 89.1% from 46,000^t to 87,000^t, and plates by 87.3% from 63,000^t to 118,000^t. Conversely, shapes P decreased by 38.7% from 31,000^t to 19,000^t.

To reflect the latest product trends, forecast values based on the 1978 consumption pattern should be preferred.

Consequently, long-term trends were estimated on the values obtained from model A. Product-wise trends were based on the values from model H, with some fine adjustment.

Table 12-3-33 and *12-3-34* give demand forecasts by products/sectors for 1985 and 1990, on the basis of the apparent crude-steel consumption forecast derived from model A, with product shares determined by model H. Low percentages of shapes are pronounced in both tables. This is due to their apparent consumption decline from 56,000^t of 1968 to 19,000^t in 1978.

The share of shapes in the Philippines is low, as compared with their shares in Korea and Taiwan whose production structures are somewhat more advanced than in the Philippines. (See *Tables 12-3-35* and *12-3-36*). Higher latent demand is thought to exist in the construction sector. Such latent demand is not limited to not-rolled angles and channels, but includes C-channels, light-gauge shapes and sheet-piles, guard rails and the like that are roll-formed from hot-rolled strip.

Based on this consideration, the following modifications were made. For 1985, apparent consumption of bars for construction use was reduced by 10%; then half of the reduced tonnage was added to the hot-rolled shapes and the other half to the roll-formed shapes. For 1990, similarly, apparent consumption of bars for construction use was cut by 15%; each half of the reduced tonnage was added to the hot-rolled and roll-formed shapes.

Table 12-3-33 Demand forecast for 1985 in tons by products/sectors
(Total figures derived from model A)

Demanding Sectors	Steel Products	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	TOTAL
I. Private Residential Construction	78,351	-	-	-	-	17,058	-	46,831	26,583	980	169,803 (8.9)
II. Private Non-Residential Construction	45,325	-	-	13,525	36,006	30,433	20,671	266,323	47,267	4,413	463,963 (24.2)
III. Public Construction	38,097	-	-	590	31,161	41,178	5,978	231,447	18,362	11,943	378,776 (19.8)
Sub-Total	161,773	-	-	14,115	67,167 [+27,230] [94,397]	88,669	26,649	544,601 [-54,460] [490,141]	92,232	17,336 [+27,230] [44,566]	1,012,542 (52.9)
IV. Manufacturing & Fabrication	-	-	194,786	-	-	-	-	-	-	-	194,786 (10.2)
IV-1: Food Containers	-	-	194,786	-	-	-	-	-	-	-	194,786 (10.2)
IV-2: Non-Food Containers	1,538	-	28,837	27,837	902	-	9,555	-	-	-	68,669 (3.6)
IV-3: Appliances & Related Products	4,707	-	-	51,944	8,599	1,974	-	3,380	4,849	-	75,253 (3.9)
IV-4: Automobiles	8,972	-	-	69,600	55,830	4,923	-	31,694	694	-	171,713 (8.9)
IV-5: Shipbuilding and Repairing	4,223	-	-	1,132	42,656	5,743	141,998	24,012	-	7,567	227,331 (11.9)
IV-6: Steel Furniture & Fixture	-	-	-	765	-	3,370	3,445	-	-	-	7,580 (0.4)
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	-	27,769	18,293	-	46,062 (2.4)
IV-8: Others	6,475	-	-	2,806	3,349	8,212	20,671	45,438	18,826	5,967	111,744 (5.8)
TOTAL	187,688 (9.8)	223,623 (11.7)	168,199 (8.8)	178,503 [205,733] (10.7)	112,881 (5.9)	202,318 (10.5)	676,894 [622,434] (32.5)	134,694 (7.0)	30,870 [58,100] (3.0)	1,915,680 (100.0) 2,456,000 (Crude Steel)	

Note: Figures in square brackets are forecast values corrected for products, and those in parentheses are % shares (corrected for products).

Table 12-3-34 Demand forecast for 1990 in tons by products/sectors
(Total figures derived from Model A)

Steel Products Demanding Sectors	Galvanized Iron Sheets	Tin Plates	CRS/C	HRS/C	Pipes & Tubes	Plates	Bars	Wire Rods & Wire	Shapes & Sections	T O T A L
I. Private Residential Construction	98,794	-	-	-	21,509	-	59,050	33,519	1,236	214,108 (7.7)
II. Private Non-Residential Construction	61,078	-	18,225	48,519	41,010	27,856	358,880	63,694	5,946	625,208 (22.5)
III. Public Construction	55,834	-	866	45,669	60,349	8,761	339,202	26,939	17,503	555,123 (20.0)
Sub-Total	215,706	-	19,091	94,188 [+56,785] [150,973]	122,868	36,617	757,132 [-113,570] [643,562]	124,152	24,685 [-56,785] [81,470]	1,394,439 (50.2)
IV. Manufacturing & Fabrication	-	244,724	-	-	-	-	-	-	-	244,724 (8.8)
IV-1: Food Containers	-	244,724	-	-	-	-	-	-	-	244,724 (8.8)
IV-2: Non-Food Containers	1,939	36,357	35,095	1,137	-	12,046	-	-	-	86,574 (3.1)
IV-3: Appliances & Related Products	7,832	-	86,447	14,312	3,287	-	5,625	7,737	-	125,240 (4.5)
IV-4: Automobiles	17,831	-	138,328	110,960	9,784	-	62,991	1,380	-	341,274 (12.3)
IV-5: Shipbuilding and Repairing	6,719	-	1,801	67,866	9,136	225,921	38,203	-	12,039	361,685 (13.1)
IV-6: Steel Furniture & Fixture	-	-	1,030	-	4,541	4,643	-	-	-	10,214 (0.4)
IV-7: Bolts, Nuts, Rivets and Screws	-	-	-	-	-	-	37,420	24,660	-	62,070 (2.2)
IV-8: Others	8,727	-	3,781	4,513	11,066	27,853	61,229	25,369	8,042	150,580 (5.4)
T O T A L	258,754 (9.3)	281,081 (10.1)	285,573 (10.3)	292,976 [349,761] (12.6)	160,682 (5.7)	307,080 (11.1)	962,600 [849,030] (30.6)	183,288 (6.6)	44,766 [101,551] (3.7)	2,776,800 (100.0) 3,560,000 (Crude Steel)

Note: Figures in square brackets are forecast values corrected for products, and those in parentheses are % shares (corrected for products).

CHAPTER 12

Table 12-3-35 Production trends in shapes, wire rods and bars in Korea

Calendar Year	Shapes		Wire rods & bars		All rolled steels	
	1,000 ^t	Share (%)	1,000 ^t	Share (%)	1,000 ^t	Share (%)
1969	60.4	6.7	527.3	58.7	897.8	100.0
1970	49.8	4.3	659.5	56.7	1,163.5	100.0
1971	60.4	4.5	697.6	52.0	1,340.8	100.0
1972	85.4	4.9	647.9	37.2	1,743.9	100.0
1973	132.2	5.0	664.6	25.1	2,643.6	100.0
1974	199.0	6.5	879.7	28.5	3,083.2	100.0
1975	149.1	5.5	1,031.5	37.9	2,722.5	100.0
1976	215.4	5.8	1,202.2	32.1	3,742.2	100.0
1977	236.5	4.9	1,654.2	34.2	4,834.7	100.0

Source: Korea Iron & Steel Federation, "Statistical Steel Yearbook."

Table 12-3-36 Production trends of shapes, wire rods and bars in Taiwan

Calendar Year	Shapes		Wire rods & bars		All rolled teels	
	1,000 ^t	Share (%)	1,000 ^t	Share (%)	1,000 ^t	Share (%)
1969	175.8	25.1	336.3	48.1	699.4	100.0
1970	184.8	21.9	422.2	50.1	843.3	100.0
1971	220.8	22.3	501.4	50.7	988.5	100.0
1972	275.8	24.0	586.4	51.1	1,148.5	100.0
1973	395.8	28.1	676.7	48.0	1,410.4	100.0
1974	342.5	26.0	686.5	52.1	1,318.8	100.0
1975	291.3	24.9	665.1	56.7	1,172.1	100.0
1976	377.9	24.1	931.3	59.4	1,567.0	100.0
1977	478.0	25.8	1,001.1	54.1	1,851.7	100.0

Source: Taiwan Government, "Industry of Free China."

12-4 Results of demand forecast

The product-wise average annual growth rates for the 1978—85 and 1985—90 periods were calculated from the product-wise forecast values for 1985 and 1990 in *Tables 12-3-33* and *12-3-34*. *Table 12-4-1* shows the product-wise average annual growth rates calculated for all years covered by the afore-mentioned two periods, or the final results of this demand forecast work and *Fig. 12-4-1* shows trends in shares by products in 1978, 1985 and 1990. It should be understood that these forecast values indicate only trend lines, which may be affected by economic policies, business fluctuations and other unexpected factors.

Table 12-4-1 Demand forecast for 1978 through 1990 by products

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Mean Increase Rate, %	
														1985/1978	1990/1985
Galvanized Iron Sheets	126,448	133,787	141,552	149,768	158,461	167,658	177,389	187,688	200,137	213,412	227,568	242,663	258,754	5.804	6.633
Tin Plates	162,759	170,316	178,224	186,499	195,158	204,219	213,701	223,623	234,089	245,044	256,512	268,517	281,081	4.643	4.680
CRS/C	87,206	95,785	105,208	115,558	126,927	139,414	153,130	168,199	186,983	207,865	231,079	256,886	285,573	9.838	11.168
HRS/C	95,889	106,460	118,816	132,806	147,996	165,172	184,342	205,733	228,789	254,384	282,867	314,540	349,761	11.606	11.197
Pipes & Tubes	71,975	76,755	81,852	87,238	93,085	99,267	105,859	112,891	121,149	130,011	139,521	149,727	160,682	6.641	7.315
Plates	117,737	127,204	137,432	148,483	160,423	173,323	187,260	202,318	219,926	239,066	259,872	282,489	307,080	8.041	8.703
Bars	431,355	454,553	478,999	504,760	531,906	560,512	590,656	622,434	662,307	704,734	749,879	797,916	849,030	5.378	6.406
Wire Rods & Wire	91,263	96,481	101,998	107,830	113,996	120,514	127,405	134,694	143,254	152,358	162,040	172,336	183,288	5.718	6.355
Shapes & Sections	19,969	22,258	26,118	30,647	35,961	42,197	49,514	58,100	64,955	72,641	81,224	90,821	101,551	17.340	11.815
TOTAL	1,203,101	1,283,599	1,370,199	1,463,439	1,563,913	1,672,276	1,789,266	1,915,680	2,061,579	2,219,515	2,390,562	2,575,897	2,776,800	6.871	7.707
Crude Steel Equivalent	1,542,437	1,645,640	1,756,665	1,876,204	2,005,017	2,143,944	2,293,931	2,456,000	2,643,050	2,845,532	3,064,823	3,302,432	3,560,000	6.871	7.707

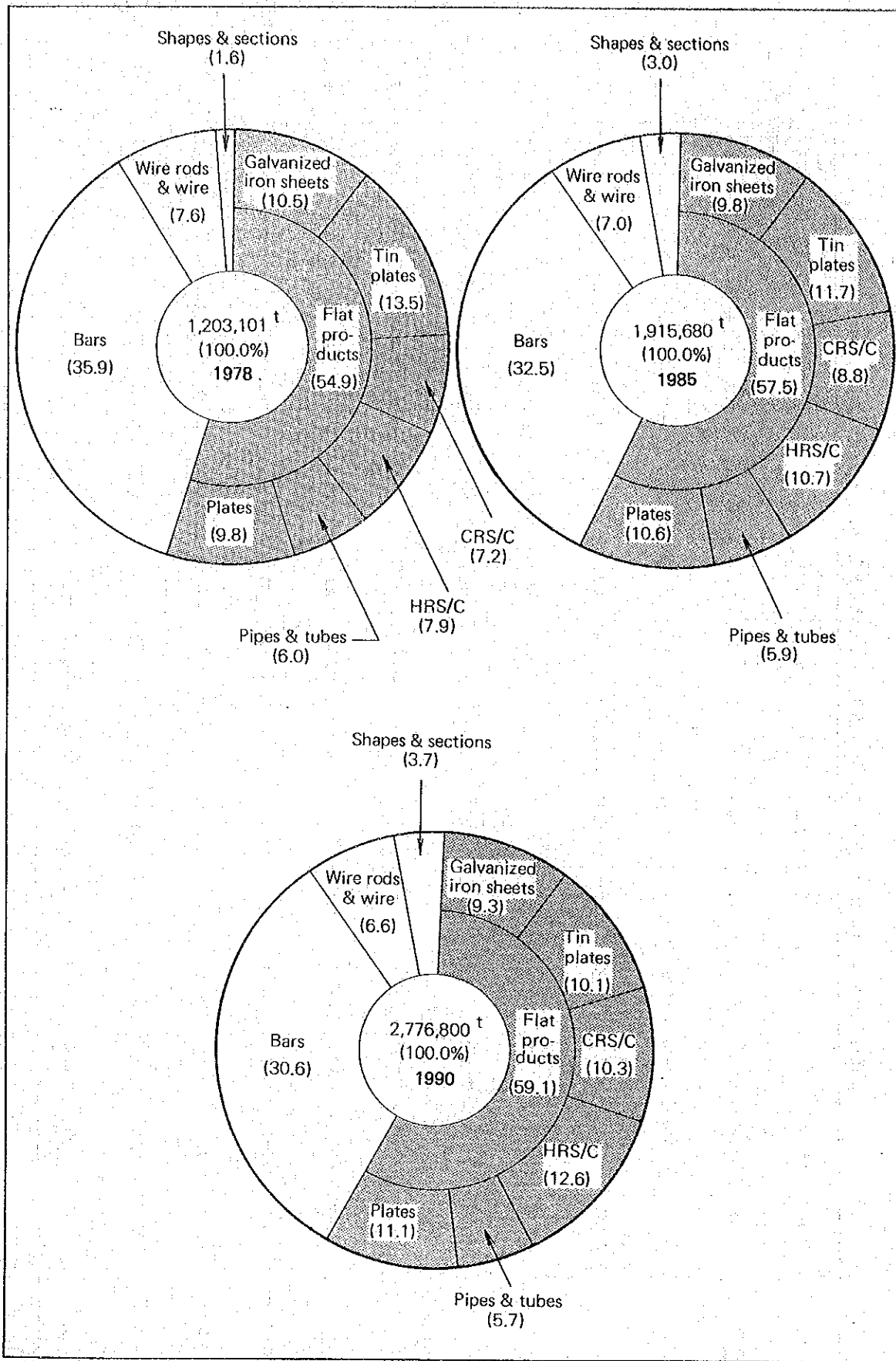


Fig. 12-4-1 Trends in shares by products

(Reference 1) Hot Strip Mill Width

Table 12-4-2 shows an estimate of demand for hot-rolled strip under 4-foot plus trimming allowance in width based on the forecast values for 1985, which constitutes 96.5% of the total. Producing 4-foot wide final products requires material hot-rolled strip that has a width of 4-foot plus trimming allowance.

Accordingly, a new hot-strip mill will be able to fill most of the demand for hot-rolled strip if it can provide a strip width of 4-foot plus trimming allowance.

Table 12-4-2 1985 Demand for hot-rolled strip under 4-foot plus trimming allowance in width (1,000 t)

Hot-rolled strip & related products	Forecast for 1985			Hot-rolled strip under 4-foot width plus trimming allowance	
	Demand	Consumption Coefficient	Hot-rolled strip requirement	Percent	Quantity
Galvanized Iron sheets	188	1.031	194	100	194
Tinplates	224	1.309	293	100	293
CRS/C	168	1.064	179	90	161
HRS/C	206	1.053	217	95	206
Pipes & tubes	113	1.092	123	95	117
Total	899		1,006	96.5	971

(Reference 2) Latent Demand

The demand forecast by products in Table 12-4-1 is based on apparent consumption which comprises domestically produced and imported steel products. Imported machinery and machine parts are not included. When they become domestically manufacturable, machinery and machine parts will add to the latent steel demand.

Table 12-4-3 shows steel equivalent translated from machinery and machine parts imported in 1977 by using consumption coefficients. As seen, 1977 machinery and machine parts imports amounted to 640,000^t of rolled-steel equivalent of 821,000^t of crude-steel equivalent. Major tonnages are 282,000^t for electrical machinery 120,000^t for general machinery, 75,000^t for ships, and 50,000^t for commercial vehicles (buses, trucks, trailers, etc.). If they grow at an average annual rate of 6.9% for rolled-steels, latent steel demand in 1985 will reach 1,091,000^t. How much of them will be domestically supplied? In view of the Philippine Government's domestic production encouraging policy, the percentage will be considerably high, though it is difficult to make definite quantitative estimation. Here, our discussion will be confined to the existence of this considerable latent demand. The reason why we used model A, which gives higher forecast values than other macro-models, lies in our expectation that such latent demand will progressively become actual.

CHAPTER 12

Table 12-4-3 Estimated indirect imports of the Philippines (unit: t.)

(Rolled-steel equivalent)

Products	Calendar 1971	Calendar 1977
1. Intermediate Products	15,853	14,157
2. Machinery (Except Electrical)	56,542	119,726
3. Electrical Machinery	105,512	282,251
4. Agricultural machinery & tractors	3,299	3,022
5. Railroad vehicles	1,076	2,398
6. Passenger cars	6,361	21,279
7. Commercial vehicles	46,860	49,689
8. Automotive parts	19,003	27,328
9. Home appliances	7,166	16,605
10. Other products	34,502	28,342
11. Shipbuilding	84,840	75,332
Total	381,014	640,129

Source: Foreign Trade Statistics of the

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Note: Estimated by demand forecast group.