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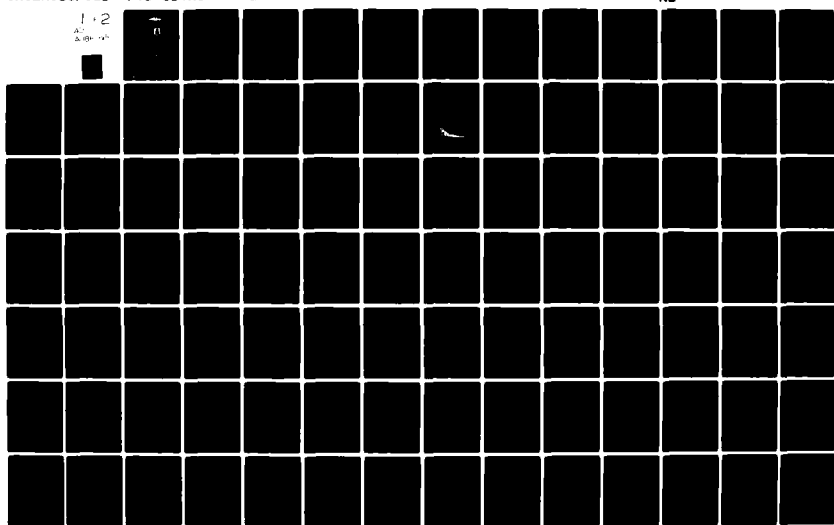
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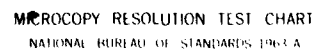
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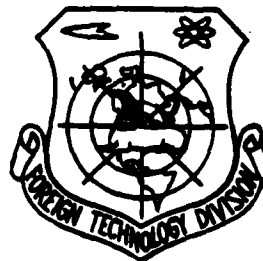
FOREIGN TECHNOLOGY DIVISION



ECONOMY AND TECHNOLOGY OF CHINA
ANALYSIS AND EVALUATION OF THE INDUSTRIAL
TECHNOLOGICAL STANDARDS OF CHINA

(Selected Pages)

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I. CHINESE ECONOMY

I-1 Changes of the Chinese economy and its present status.

(1) Changes of the Chinese economy.

The 30-year history of the Chinese economy since her independence (October 1949) can be characterized by the following points:

1. Relatively high rate of economic growth: As a developing nation in her transient stage of development, China showed a relatively high rate of real economic growth. The potential growth of the Chinese economy seems to be quite high. The tendency of the long-term economic growth during 1952-1975 shows the annual average of 5.8%. The average growth rate of the past 5 years is 6.4%.

2. Political disturbances and natural disasters: However, the 5-year economic plans made four times since 1953 could not be realized except for the first five-year plan (1953-57). The foundation of economic progress is not necessary today because of the slowdown of economical activity due to political disturbances and agricultural development caused by natural disasters.

Political disturbances

- (1) "Great Leap Forward" movement (1958-59).
- (2) Deepening of China-Soviet conflicts (1960-the first half of 1970).
- (3) "Cultural Revolution" (1966-69).
- (4) "Gang of Four" Period (1973-76).

Slowdown of agricultural development caused by natural disasters

- (1) "Big disasters continued for three years" (1959-61).
- (2) Drought in Kahoku (1972).
- (3) The great earthquake in Kahoku (July, 1976) and abnormal weather (1976-77).

TABLE I-1. Real GNP growth rate (\$10⁹, %)

standard year up to the year of	GNP 1975 price	1952	1965	1970
1952	82			
65	163	5.4		
70	219	5.6	6.1	
75	299	5.8	6.3	6.4

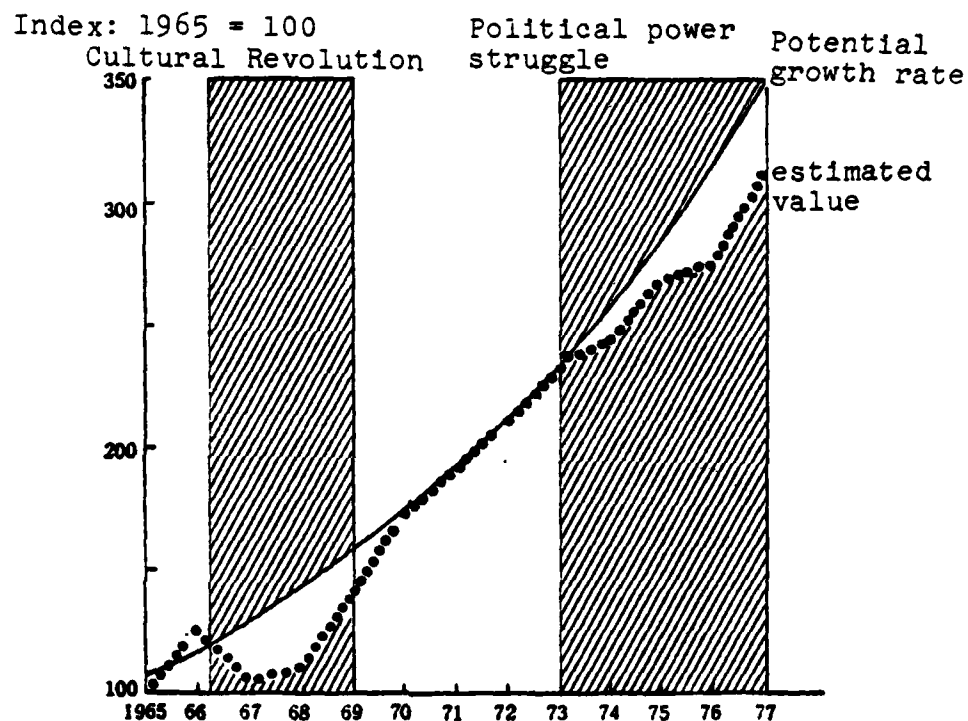
Materials: Made from U. S. Central Intelligence Agency, Research Aid--People's Republic of China: Handbook of Economic Indicators. (ER76-10540), August 1976, p 3.

TABLE I-2. Real GNP growth rate per person (annual rate %)

standard year up to the year of	GNP 1975 price	1952	1965	1970
1952	\$144			
65	217	3.3		
70	261	3.4	3.8	
75	320	3.6	4.1	4.2

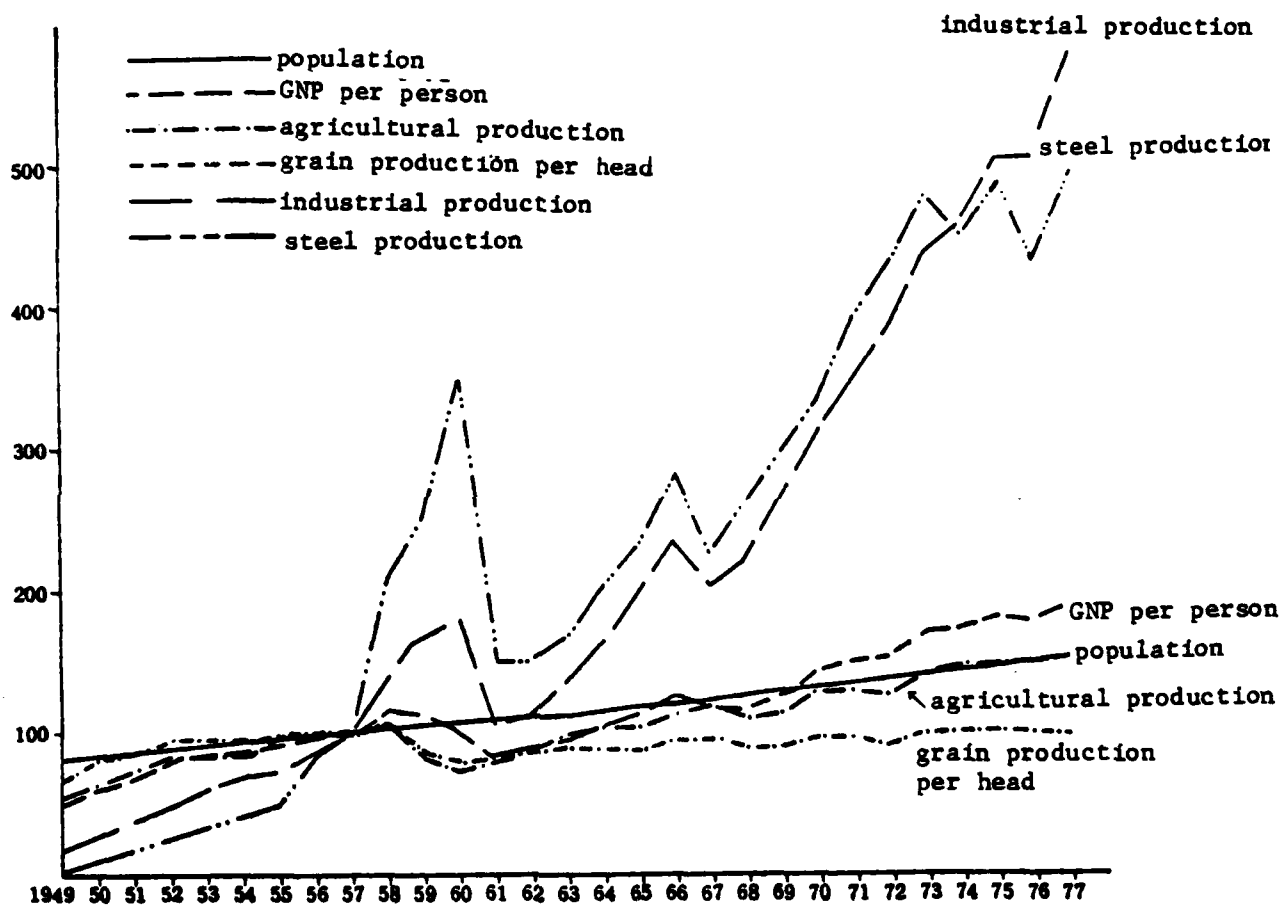
Materials: Made from U. S. CIA op. cit., p 3, p 7.

FIGURE I-1. Political disturbances and industrial productions



Material: U. S. Senate and Congress joint economic committee.

FIGURE I-2. Changes of the macroeconomic index in China.



Material: U. S. Senate and Congress joint economic committee.

TABLE I-3. Macro economic indices in China

	GNP price in 1977 10 ⁸	total popul- ation (mil- lion)	% rate of pop- ulation increase	GNP per person price in 1977 \$	agri- cultur- al pro- duction (1957=100)	grain produc- tion (10 ⁶ tons)	grain produc- tion per ha.	indus- trial produc- tion (1957=100)	steel produc- tion (10 ⁶ tons)	trade with Comm- unist zone nations
1949-52 : restor- ation										
1949	54	538	120	101	54	111	206	20	0.16	(26)
1950	67	547	135	122	64	130	237	27	0.61	29
1951	78	558	151	139	72	141	253	38	0.90	51
1952	92	570	180	162	84	161	283	48	1.35	70
1953-57 1st 5-year plan										
1953	98	583	225	168	84	164	282	61	1.77	68
1954	102	596	231	172	84	166	279	70	2.22	74
1955	112	610	239	183	94	180	295	73	2.85	74
1956	121	625	243	193	97	188	301	88	4.46	66
1957	128	640	236	201	100	191	298	100	5.35	64
1958-60 : Great progress										
1958	153	655	226	233	108	206	314	142	11.08	63
1959	145	670	214	217	83	171	255	173	13.35	69
1960	141	683	182	206	74	156	228	181	18.67	66
1961-65 adjustment and recov- ery										
1961	112	695	153	161	78	168	242	105	8	56
1962	124	707	201	176	89	180	255	111	8	53
1963	139	722	212	193	96	190	263	134	9	45
1964	157	737	217	212	102	194	263	161	10.8	34
1965	174	754	226	231	104	194	257	199	12.5	30
1966-70 Cultural Revolution and 1970										
1966	196	771	222	254	113	215	279	232	15	26
1967	186	789	230	238	118	225	285	202	12	21
1968	189	807	235	234	110	210	260	221	14	22
1969	210	827	239	254	113	215	260	266	16	20
1970	244	847	238	288	127	243	287	316	17.8	20
1971-75 4th 5-year plan										
1971	261	867	231	301	130	246	284	349	21	23
1972	273	886	220	308	126	240	271	385	23	22
1973	308	906	210	340	142	266	294	436	25.5	17
1974	320	924	200	346	146	275	297	455	23.8	17
1975	342	943	198	362	148	284	301	502	26	16
1976-85 10-year plan										
1976	342	962	198	355	148	285	296	502	23	18
1977	373	983	226	379	149	285	290	572	26	17

3. Unorganized economic planning: The past four 5-year economic plans were not well organized and consistent because of political struggles among the leaders of the Chinese Communist Party. Therefore, it repeated many trial-and-error processes and it was inefficient.

TABLE 1-4. Summary of the 5-year Plan

Period	Policy	Targets and Contents of the policy
Economic Restoration period, (1949-52)	Socialist Revolution	°building foundations of the socialistic economy (inflation control, land revolution, confiscation of racial capitals)
1st 5-year plan (1953-57)	Soviet-type economic plan emphasizing heavy industries	°socialization of agriculture and industry (construction of heavy industry, collective and large-scale farming)
2nd 5-year plan (1958-59)	Mao's Leftist Line	°"Three-Phase Red Flag" policy (1) Great Progress (2) People's corporation (3) general route of the socialist build-up
Adjustment period (1960-65)	"Real Power" line	Intensification of agricultural production(「三自一包」 「三包一獎」 「單幹風」政策) °Increase freedom of enterprise ("Technical leaders in charge")
3rd 5-year plan (1966-70)	Mao's Leftist Line	°Cultural Revolution (mass economic movement) No. 5 and 7 specifications by Mao
4th 5-year plan (1971-75)	policy struggle	°Lin Piao case (Sept. 1971) °comeback of Tei-ShoHei (April 1973) °build-up of the "Gang of Four"

Period	Overall economy	Industry	Agriculture	Foreign Trade	National living conditions
Restoration period 1949-52	Recovered to the pre-war level.	Raw-material production was restarted and operations started.	Land Revolution - Abolishment of landlord. Land distribution to farmers.	Changed to a strict government control and trades with Communist countries.	The war ended. Inflation and starvation. Establishment of rationing.
1st 5-year plan 1953-57	Establishment of the industrial foundation by Soviet aids.	Increased production of steel, coal, cement, electric power & simple machines.	Mass movement of agriculture.	Increased trade with the Soviet Union.	living standard was stabilized and increased percentage of workers.
Great Progress 1958-60	Uncontrolled economical growth by the movement for increased production. Soviet aids stopped.	Excessively high target for production, lowering of quality	Drastic decrease of production due to natural disasters. Set-back of the people's corporation. Unrealistic policy of the Central Government.	Sudden increase, then stagnation because of the crisis of domestic economy.	Serious food shortages caused by the failure of the Great Leap Forward. Deterioration of willingness. Conflict of opinions among the military leaders
Adjustment & Recovery Period 1961-65	Early recovery due to total policy changes from the Great Progress movement.	Industrial rationalization. Emphasis on oil, electronics & industries related to agriculture.	Increased production by the priority of agriculture.	Improved relations with Japan and other nations. Import of machines and industrial materials and grain.	Recovery of living standards. Expansion of inhabited areas.
Cultural Revolution 1966-70	Political disturbances interrupted economical activities. Serious damage in urban economy.	Drastic decrease in industrial production during 1967-68. Production facilities increased.	Production increased by the priority in agriculture.	Sharp decrease in production due to policy changes.	In spite of political disturbances, the living standard was stable.

TABLE I-5. China: Economic Facts, 1949-77

Period	Overall economy	Industry	Agriculture	Foreign Trade	National living conditions
4th 5-year plan 1971-75	Improved except for the period of political disturbances in 1974.	Increased production facilities and production. Oil increased. Coal and steel stagnated. Factory strikes during 1974-5.	Production increased by the priority in agriculture.	Trade increased because of recovery of domestic economy. Carefully started trades on credit.	Improvement in food, clothing, housing, hard goods, health, working conditions, etc. Dissatisfaction with wages. Policy for population control.
10-year plan 1976-85	Economy stagnated because of political disturbances after the death of Mao and Chou En-Lai. Economic restoration was planned.	Sharp decrease in production due to expansion of facilities and disturbances in factories.	Sharp decrease in production due to abnormal weather. Mechanization; improved irrigation and improvement of breeding.	Profit of 1977 trades. Increased imports became possible.	Lowering of wages and the rate of population increase.

(con'd) TABLE I-5. China: Economic Facts, 1949-77.

4. Changing production structures. However, in spite of various disturbances in the social experimentation, the production structure of Chinese economy was gradually industrialized and the output of the mining industry also has been increasing.

TABLE 1-6. Comparison of the production structure of the Chinese economy

(price of 1957, 10^8 gens, the structure rate is in parenthesis)

	1952	1957	1962	1965	1970	1974
Agriculture	321.5 (45.7)	447.2 (42.7)	353.0 (32.6)	491.0 (32.6)	599.6 (29.4)	670.9 (25.2)
Industry (includes transportation)	193.1 (27.4)	341.6 (32.6)	456.7 (42.2)	646.0 (42.9)	969.9 (47.6)	1388.4 (52.1)
Construction	14.8 (2.1)	40.0 (3.8)	44.8 (4.1)	80.0 (5.3)	98.0 (4.8)	139.6 (5.2)
Services	174.7 (24.8)	218.0 (20.8)	228.4 (21.1)	289.4 (19.2)	371.5 (18.2)	463.5 (17.4)
G N P	704.1 (100.0)	1,046.8 (100.0)	1,082.9 (100.0)	1,506.4 (100.0)	2,039.0 (100.0)	2,662.4 (100.0)

Materials: Hsiao Maeda: "Economic Accomplishments"
Chinese Review, 1978 p 266

FIGURE I-3. Changes of the Industrial Production in China

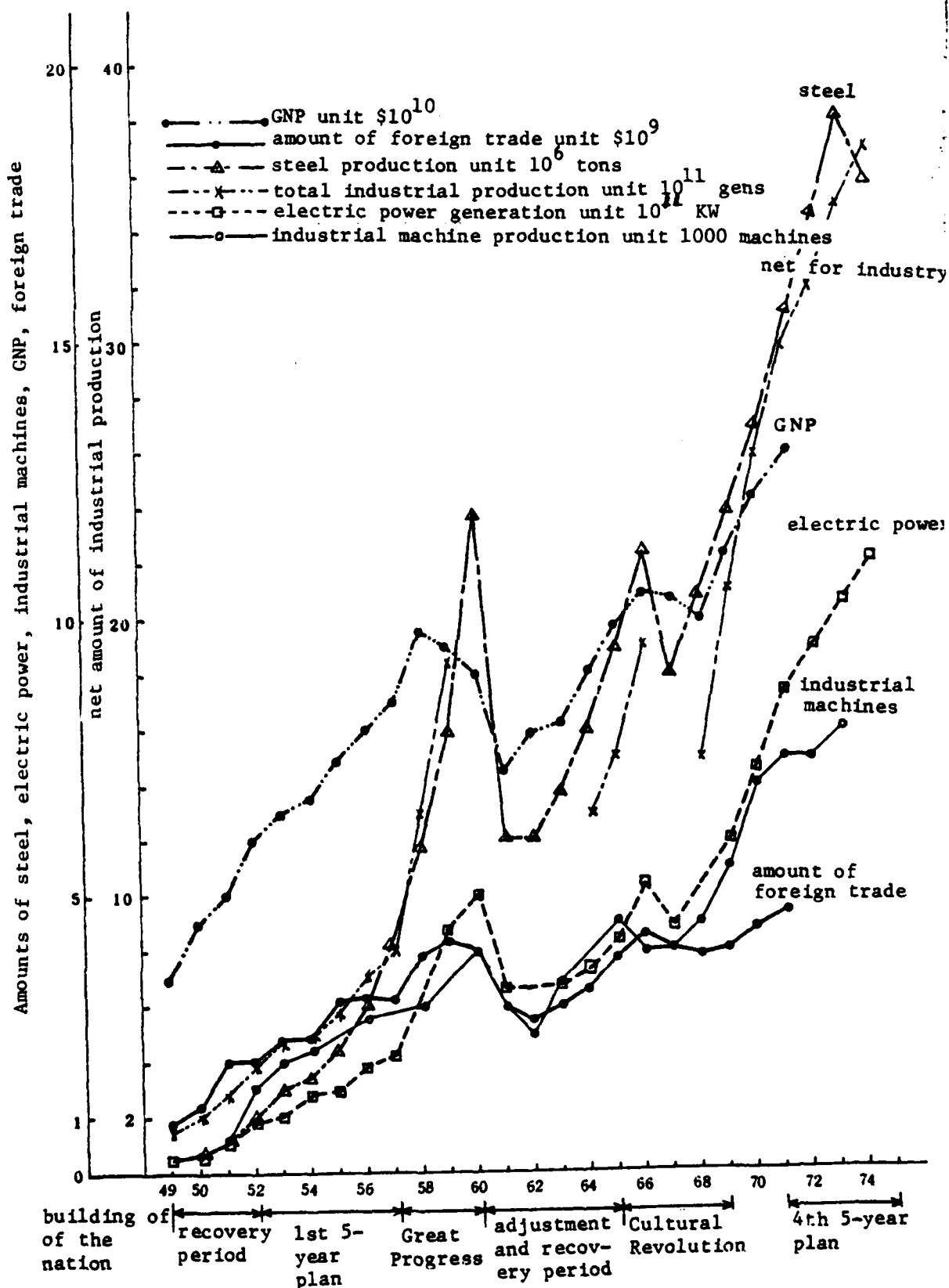
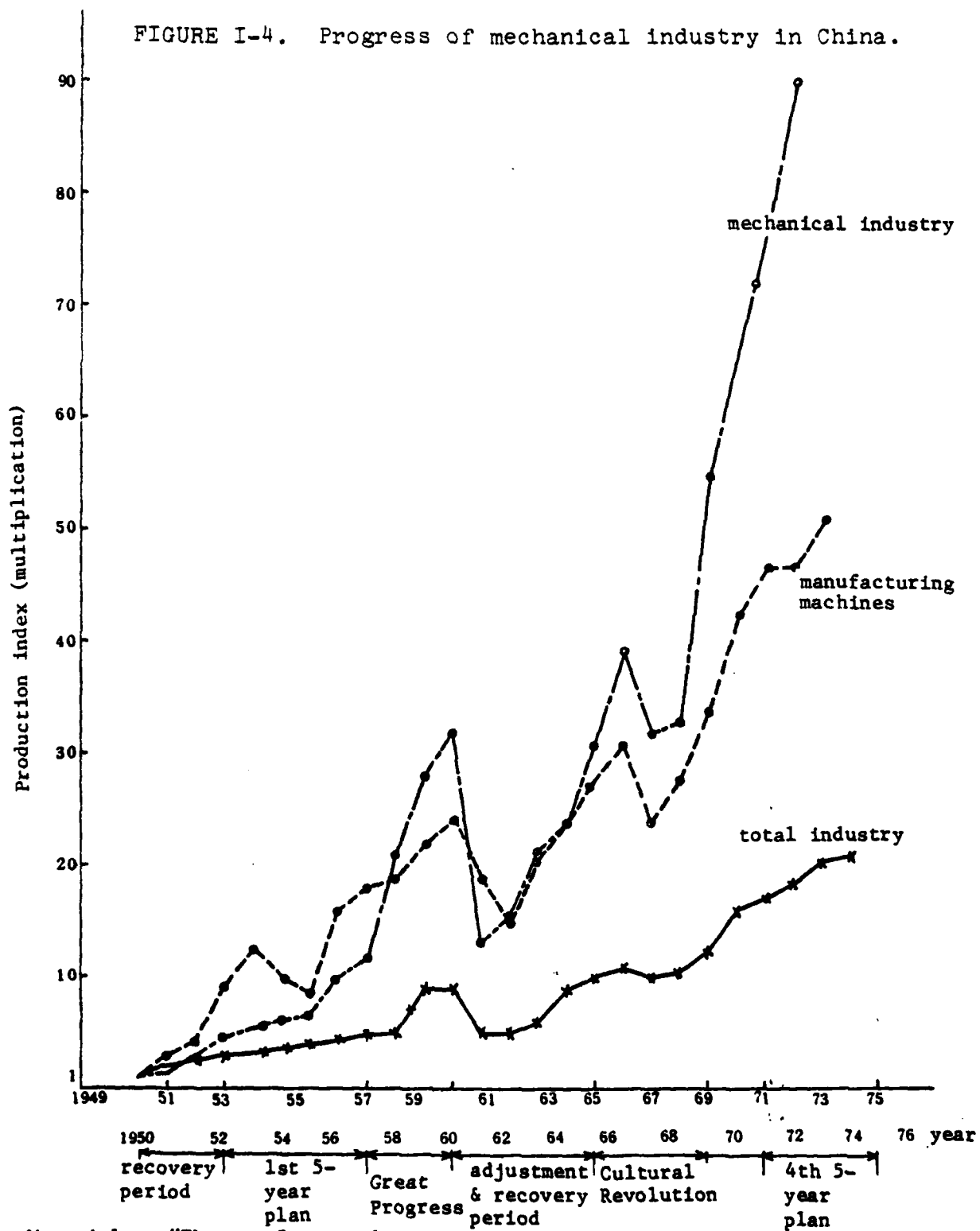


FIGURE I-4. Progress of mechanical industry in China.



Materials: "The new 5-year plan and industrial economy in China" edited by the Japan International Trade Promotion Society, published by Nikkan Kogyo Newspaper, 1977.

5. Regional unbalances: The Chinese economy developed in a regionally unbalanced way due to (1) industrial development patterns before gaining freedom, (2) materials, (3) natural factors, such as weather and (4) availability of transportation. Industrial production in Tohoku, Kahoku and Kato occupy 75% (1974) of the total national production.

TABLE I-7. Changes of net industrial productions different regions.

(unit, 10^6 gens, price in 1952, numbers in parenthesis are percentage)

area	1952	1957	1965	1970	1974* price of 1957
total	34,330 (100.0)	78,390 (100.0)	153,194 (100.0)	257,427 (100.0)	344,865 (100.0)
Tohoku	7,740 (22.5)	18,081 (23.1)	34,233 (22.3)	52,585 (20.4)	66,463 (19.3)
Kahoku	7,297 (21.3)	17,752 (22.6)	38,334 (25.0)	71,652 (27.8)	91,398 (26.5)
Kato	10,837 (31.6)	21,297 (27.2)	43,380 (28.3)	71,522 (27.8)	99,996 (29.0)
Ka-chu	2,200 (6.4)	5,840 (7.4)	10,913 (7.1)	20,219 (7.9)	50,011 (14.5)
Ka nan	2,502 (7.3)	5,834 (7.4)	11,459 (7.5)	18,720 (7.3)	
Sei nan	2,362 (6.9)	6,576 (8.4)	10,980 (7.2)	14,184 (5.5)	20,494 (5.9)
Sei hoku	893 (2.6)	2,409 (3.1)	3,895 (2.5)	8,289 (3.2)	16,503 (4.8)

11 Material: "Geographic Illustration of Chinese Economy"
edited by Toyama and Sudo, 1978

6. High population pressure. The population in China was increasing at the average annual rate of ~2% in the past. The estimated Chinese population in 1975 is 943,000,000 and the population increase is 18,860,000. This population increase has been a heavy load on the Chinese economy. Also, since most of the agriculture areas lie along the eastern seaboard, the huge agricultural population tended to concentrate in the eastern seaboard regions.

TABLE I-8. Composition of the population

		1960			1965			1970		
		1 mil- lion	ratio of comp- osit- ion	60/55	1 mil- lion	ratio of comp- osit- ion	65/60	1 mil- lion	ratio of comp- osit- ion	70/65
Asia	total population		-	-	1,824	100.0	-	2,028	100.0	111.2
	agriculture pop.		-	-	1,241	68.0	-	1,316	64.9	106.0
	A econ. act. pop. NA		-	-	787	43.1	-	860	42.4	109.3
	B agric. " pop.		-	-	536	29.4	-	557	27.5	103.9
	B/A					68.1			64.8	
China	total population	636	100.0	104.6	698	100.0	109.7	757	100.0	108.5
	agriculture pop.	480	75.5	91.3	500	71.6	104.2	517	68.3	103.4
	A econ. act. pop.	301	47.3	-	330	47.3	109.6	356	47.0	107.9
	B agric. " pop.	223	35.1	-	235	33.7	105.4	240	31.7	102.1
	B/A		74.1			71.2			67.4	
India	total population	433	100.0	113.4	482	100.0	111.3	543	100.0	112.7
	agriculture pop.	321	74.1	-	346	71.8	107.8	377	69.4	109.0
	A econ. act. pop.	186	43.0	-	199	41.3	107.0	218	40.1	109.5
	B agric. " pop.	138	31.9	-	143	29.7	103.6	151	27.8	105.6
	B/A		74.1			71.7			69.3	
		1975			1976			1977		
		"	"	75/70	"	"	76/75	"	"	77/76
Asia	total population	2,256	100.0	111.2	2,306	100.0	102.2	2,349	100.0	101.9
	agriculture pop.	1,388	61.5	105.5	1,403	60.8	101.1	1,413	60.2	100.7
	A econ. act. pop.	941	41.7	109.4	958	41.5	101.8	973	41.4	101.6
	B agric. " pop.	577	25.6	103.6	581	25.2	100.7	583	24.8	100.3
	B/A		61.3			60.6			59.9	
China	total population	823	100.0	108.7	837	100.0	101.7	850	100.0	101.6
	agriculture pop.	526	63.9	101.7	528	63.1	100.4	529	62.2	100.2
	A econ. act. pop.	383	46.5	107.6	389	46.5	101.6	397	46.7	102.1
	B agric. " pop.	246	29.9	102.5	247	29.5	100.4	247	29.1	100.0
	B/A		64.2			63.5			62.2	
India	total population	613	100.0	112.9	629	100.0	102.6	645	100.0	102.5
	agriculture pop.	408	66.6	108.2	415	66.0	101.7	421	65.3	101.4
	A econ. act. pop.	240	39.2	110.1	245	39.0	102.1	250	38.8	102.0
	B agric. " pop.	160	26.1	106.0	162	25.8	101.3	164	25.4	101.2
	B/A		66.6			66.0			65.3	

Material: Japan Economy Center, "Study of Sino-Japanese Economical Relations", 1978.

TABLE I-9. Change of Chinese trades

	total amount of foreign trade				trade with Communist countries				trade with the Soviet Union			
	total	ex- port	im- port	bal- ance	total	import (fob)	export (cif)	bal- ance	total	export (fob)	import (cif)	bal- ance
1950-54	1210	620	590	30	350(29)	210(34)	140(24)	70	NA	NA	NA	NA
55	3035	1375	1660	285	2250(74)	950(69)	1300(78)	Δ350	1700(56)	645(47)	1055(64)	Δ410
60	3990	1960	2030	Δ 70	2620(66)	1335(68)	1285(63)	50	1565(42)	850(43)	815(40)	35
65	3880	2035	1845	190	1165(30)	650(32)	515(28)	135	415(11)	225(11)	190(10)	35
70	4290	2050	2240	Δ190	860(20)	480(23)	380(17)	100	45(1)	20(1)	25(1)	Δ 5
75	14385	7025	7360	Δ335	2360(16)	1370(20)	990(13)	380	279(2)	150(2)	129(2)	21

NOTE: Nos. in parenthesis show % to the amount of the total foreign trade.

trade with capitalist countries				trade with Japan			
total	export (fob)	import (cif)	bal- ance	total	export (fob)	import (cif)	bal- ance
860(71)	410(66)	450(76)	Δ 40	59(5)	39(5)	20(3)	19
785(26)	425(31)	360(22)	65	109(4)	81(6)	29(2)	52
1370(34)	625(32)	745(37)	Δ120	23(1)	21(1)	3(0)	18
2715(70)	1385(68)	1330(72)	55	470(12)	225(11)	245(13)	Δ 20
3430(80)	1570(77)	1860(83)	Δ290	823(19)	254(13)	569(25)	Δ315
12025(84)	5655(80)	6370(87)	Δ715	3790(26)	1531(22)	2259(31)	Δ728

TABLE I-10.
The export and import structure
of China according to merchandise
(official announcement)

	import		export		
	production material	consumer goods	mining products	農産 加工品	農家 生産物
1950	87.2	128	9.3	33.2	57.5
51	83.1	16.9	14.0	31.4	54.6
52	90.6	9.4	17.9	22.8	59.3
53	93.0	7.0	18.4	25.9	55.7
54	92.8	7.2	24.0	27.7	48.3
55	94.5	5.5	25.5	28.4	46.1
56	92.4	7.6	26.1	31.3	42.6
57	92.7	7.3	28.4	31.5	40.1
58	93.7	6.3	27.5	37.0	35.5

agri- ↑ (agri-
cultural cultural
processed products
products

TABLE I-11.
Chinese trade percentage of
world trade.

	export	import	total
1958	1.8	1.6	1.7
63	1.0	0.7	0.9
68	0.8	0.7	0.8
69	0.7	0.6	0.7
70	0.7	0.7	0.7
71	0.7	0.6	0.7
72	0.7	0.7	0.7
73	0.9	0.9	0.9
74	0.8	0.9	0.8
75	0.8	0.8	0.8
76	0.7	0.6	0.6

TABLE I-12.
Dependence on trade in major
countries

	export dependence			import dependence		
	China	Japan	India	China	Japan	India
1952	1.0	NA	NA	1.2	NA	NA
55	1.3	2.5	NA	1.6	3.1	NA
60	1.5	3.4	1.3	1.5	3.8	2.3
65	1.2	4.4	1.5	1.1	4.3	2.6
70	0.9	5.8	2.7	1.0	5.7	2.3
71	1.0	6.6	3.1	0.9	5.4	2.6
72	1.2	6.2	3.8	1.1	5.1	2.4
73	1.7	6.5	5.4	1.8	6.8	3.4
74	2.2	10.7	6.7	2.4	12.0	5.8
75	2.2	10.7	6.7	2.3	11.1	7.1
76	2.1	12.1	NA	1.8	11.7	NA

7. Weak dependence on foreign trade. The percentage of Chinese foreign trade to total world trade is less than 1%. The dependence on foreign trade (1975) is also low, export being 2.2% and import, 2.3%. This is probably the weak margin of China for export and her policy of self-support. The trade structure of China has the following characteristic features:

(1) the trade partners in 1955 were Communist countries (74%), but the weight was significantly shifted to capitalist nations in 1975 (84%);

(2) imports are mainly production materials; exports are mainly agricultural products and processed products and light-weight industries;

(3) trade with advanced nations showed a deficit and trade with the third world showed profits.

TABLE I-13. Changes of exported and imported merchandise in China.

	1959		1964		1966		1970		1973		1974		1975	
	amt. of \$	comp. ratio	amt. of \$	comp. ratio	amt. of \$	comp. ratio	amt. of \$	comp. ratio	amt. of \$	comp. ratio	amt. of \$	comp. ratio	amt. of \$	comp. ratio
total import	2,060	100	1,470	100	2,035	100	2,240	100	5,130	100	7,380	100	7,360	100
food	20	1	580	39	510	25	355	16	1,000	19	1,470	20	930	13
grains			475	32	400	20	230	13	840	16	1,180	16	680	9
raw materials														
fuel & cooking oil	445	22	375	26	340	17	370	17	1,070	21	1,435	19	1,035	14
oil	120	6	N A	N A	0	0	0	0	0	0	0	0	0	0
chemicals	155	8	115	8	250	12	330	15	485	9	595	8	815	11
chem. fertilizer	70	3	65	4	155	8	230	10	220	4	220	3	405	6
indus. prods.	1,195	58	390	27	910	45	1,175	52	2,545	50	3,825	52	4,560	62
mach & Eqpt.	980	48	180	12	455	22	395	13	860	17	1,605	22	3,765	51
others	250	12	10	1	25	1	10	0	30	1	55	1	25	0
total export	2,230	100	1,750	100	2,210	100	2,050	100	4,960	100	6,570	100	7,025	100
food	835	37	420	24	615	28	645	31	1,530	31	2,050	31	2,100	30
raw materials														
fuel & cooking oil	495	22	320	18	480	22	430	21	880	18	1,420	22	1,900	27
chemical	90	4	65	4	90	4	105	5	255	5	400	6	300	4
indus. prod.	810	36	885	51	920	42	855	42	2,260	46	2,655	40	2,565	37
textile & fibres	620	28	495	28	305	14	340	17	855	17	940	14	985	14
others	0	0	60	3	105	5	15	1	35	1	45	1	160	2

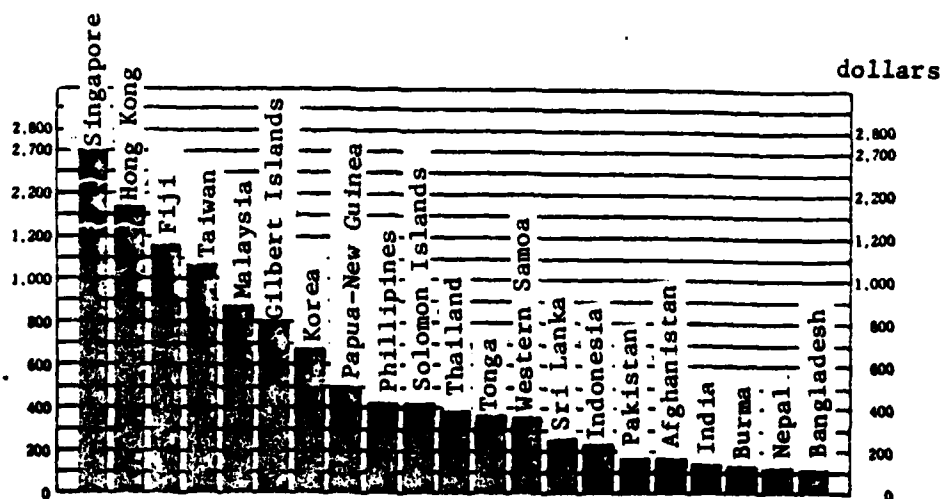
Material: The above; Japan Economy Center "Study of Sino-Japanese Economic Relations". 1978.

(2) Present status of Chinese economy.

Judging from various economic indices, the present status of the Chinese economy seems to be still at the level of developing nations in the world. Therefore, we can understand well why China set "four modernizations" as the target of the 10-year plan and the long-term objective of her economic policy is to catch up to the economic level of the advanced nations.

1. GNP per person is comparable to those of Thailand and the Phillipines. Economic statistics in China remain in only estimations. However, according to estimates by the U. S. Senate and Congressional Economic Committee, the scale of Chinese economy is 3730×10^8 dollars (GNP valued in 1977 price), but GNP per person is \$379, which is comparable to the levels of Thailand and the Phillipines. This is still the level of a developing nation.

Figure I-5. GNP per person in Asian nations, 1976.



Material: World Bank, "World Bank Atlas, 1977".

2. Low economic level: The level of individual products (consumer goods) is extremely low compared to Japan. If Japan is taken to be 100, the consumption levels of representative products are given below (1975). They are only slightly above India.

Food consumption	82.18%
blister steel	7.21
fibers	21.38
sugar	20.23
paper for newspaper	6.12
primary energy	19.13
electric power generation	3.00

Figure I-6. Annual consumption of major products per person and GNP per person, 1975.

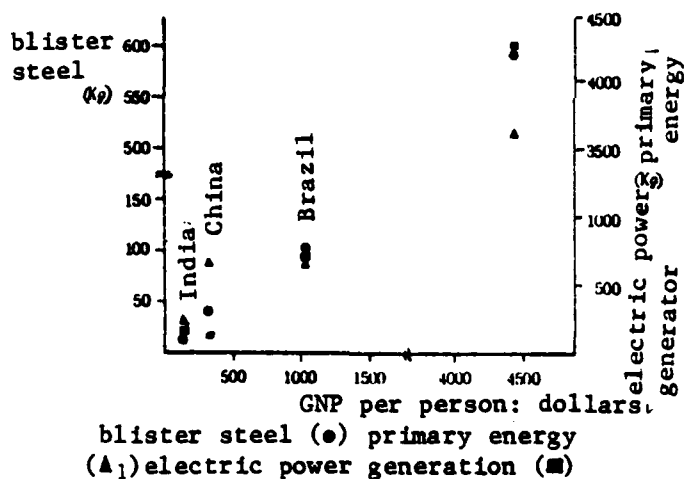
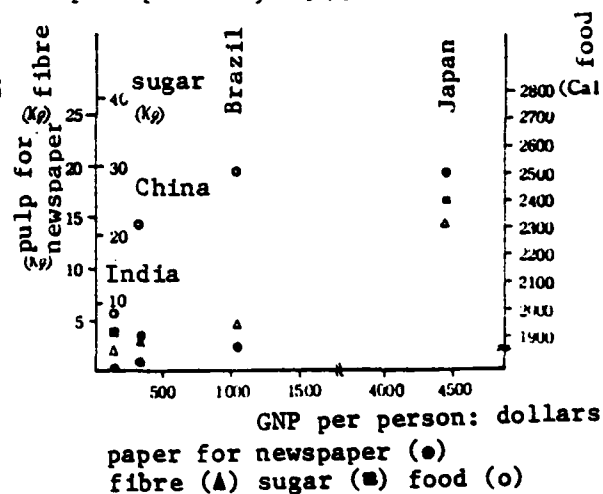


Figure I-7. Annual consumption of major products per person and GNP per person, 1975.



3. Industrial structures of low level: The industrial structure in China has features common to all developing nations, namely: 1) a high weight of the agricultural living; 2) a low ratio of the third industry. Also, the rate of population increase is high and urbanization has not progressed in the social structure. However, industrialization has rapidly progressed and the weight of the secondary industry is high, suggesting the future growth.

TABLE I-14. International comparison of the annual consumption of major products per person (1975)

	China	India	Thailand	Brazil	Japan	world average
	カロリー #	カロリー	カロリー	カロリー	カロリー	カロリー
Food (1974) per day	2,330 Kg	1,971 Kg	2,360 Kg	2,515 Kg	2,835 Kg	2,568 Kg
blister steel	42 Kg	14 Kg	20 Kg	105 Kg	583 Kg	n.a.
fibre (1974)	3.1 Kg	2.1 Kg	3.4 Kg	4.8 Kg	14.5 Kg	6.6 Kg
sugar	5.1 Kg	6.2 Kg	12.7 Kg	45.3 Kg	25.2 Kg	19.6 Kg
rubber (natural & synthesized)	0.3 Kg	0.3 Kg	n.a. Kg	2.3 Kg	7.9 Kg	2.0 Kg
paper for newspaper	1.2 Kg	0.3 Kg	1.3 Kg	2.8 Kg	19.6 Kg	n.a.
primary energy (standard coal conversion)	693 Kg	221 Kg	284 Kg	670 Kg	3,622 Kg	2,028 Kg
elec. power generation	129 kwh	143 kwh	n.a.	729 kwh	4,288 kwh	1,632 kwh

Material: Japan Export Bank "Chinese Performance of Economic Development and Future Industrial Policies", 1978

calories

FIGURE I-8. The percentage of agricultural and fishing industries in GDP and GNP per person

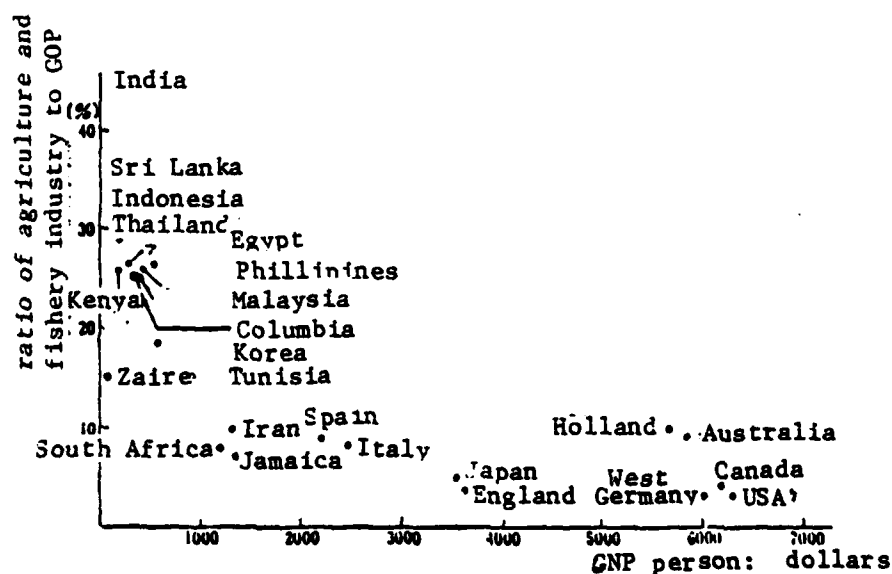


Figure I-9. The percentage of manufacturing, communications, construction and transportation in GDP and GNP per person

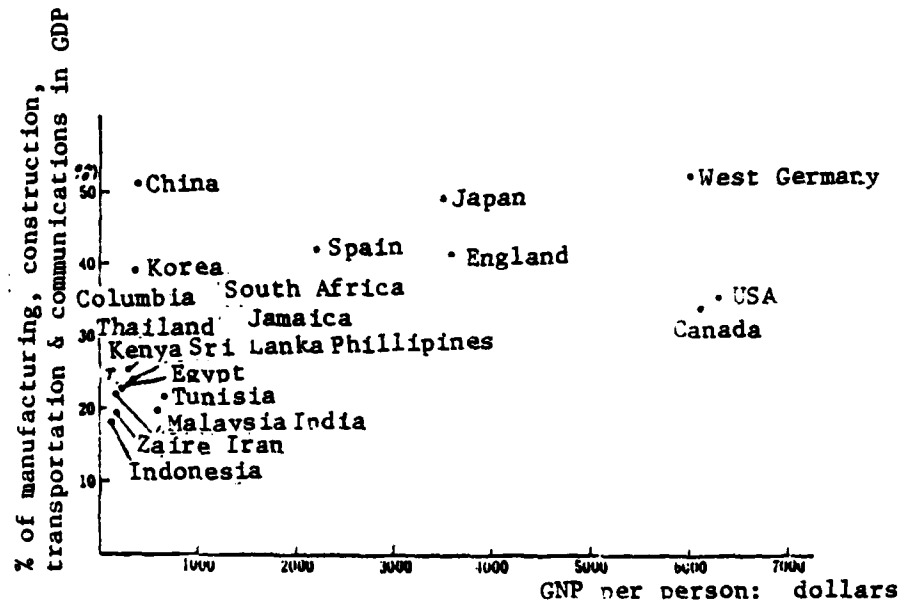


Figure I-10. The percentage of business and services in GDP and GNP per person

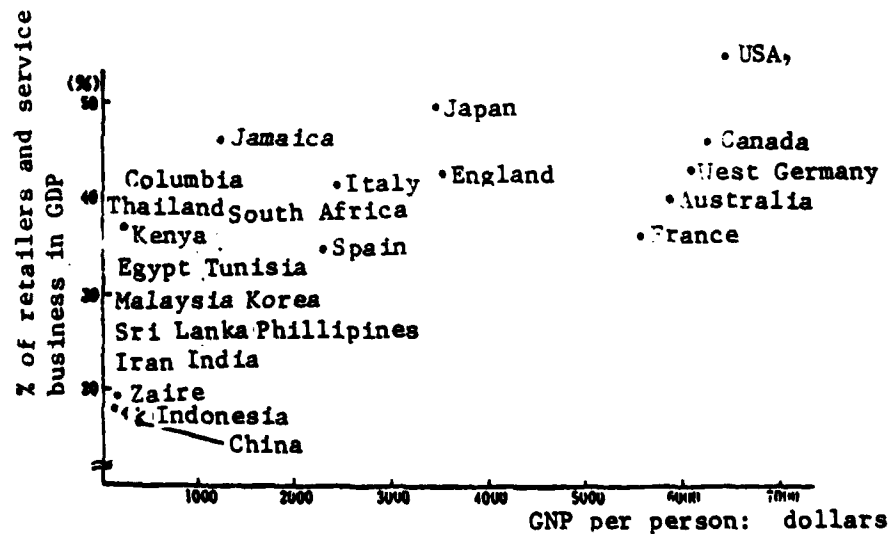


Figure I-11. The relation between the rate of population increase and GNP per person

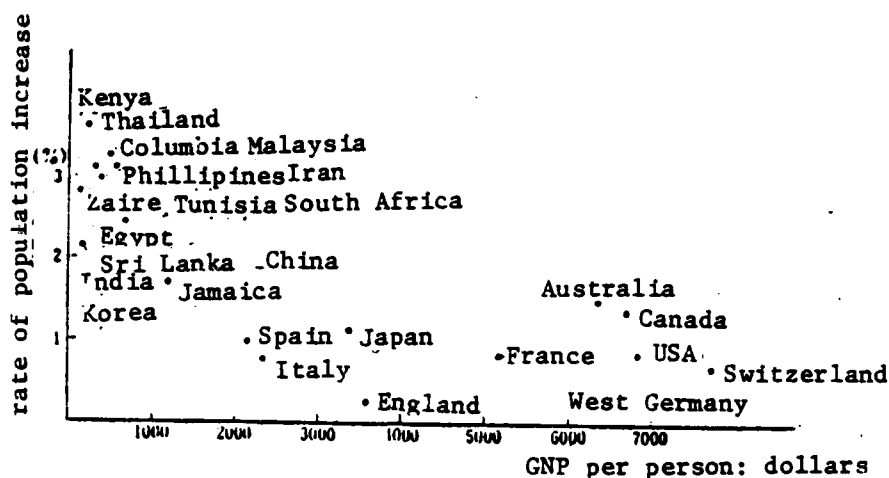
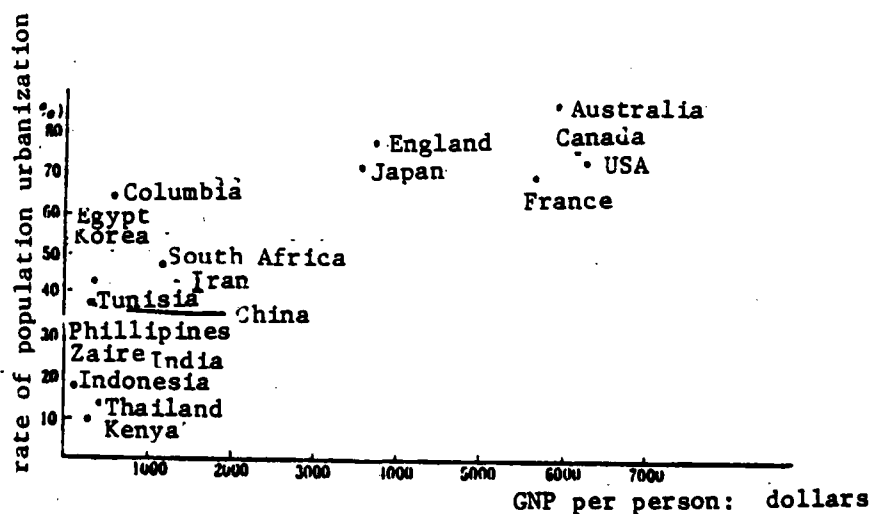


Figure I-12. The relation between the rate of population urbanization and GNP per person



The numbers for China are estimated. Comparison of cross-sections in 1975.

Materials: Yasuhiko Torii, "Theory of Economical Development", 1978.

4. A low living standard of the nation: The wage level is such that even the staff of the highest government agents receive only 560 gens (70,560 yen, 1 gen = 126 yen) per month. In the case of factory workers, the upper class workers get 117 gens (14,742 yen). The average wage of factory workers is estimated at about 60-70 gens per month (7,500 to 8,800 yen).

TABLE I-15. Table of the standard wages for factory workers

1 工場企業名	2 賃金 (単位: 元)							
	3 1級	3 2級	3 3級	3 4級	3 5級	3 6級	3 7級	3 8級
4 國営北京第一織紡織廠機械修理工人	34.0	39.8	46.6	54.5	63.6	74.5	87.0	102.0
5 國営鞍山鋼鐵公司製鉄工人	39.0	45.6	53.4	62.4	72.9	85.4	99.8	117.0
6 新疆ウルムチ炭鉱工人	38.7	44.2	51.8	60.5	70.7	81.5	97.1	113.0
7 黒龍江省ジーゼルトラクター機手	33.0	38.6	45.2	52.8	61.7	72.3	84.5	99.0
8 広州市六榕五金工廠工人	32.0	40.0	48.0	54.0	60.0	13 (5級制採用)		
9 広州鋼鐵公司製鉄工人	39.0	45.6	53.4	62.4	72.9	85.4	99.8	117.0
10 北京製薬廠工人	31.7	37.12	43.43	50.72	59.28	69.42	81.15	95.1
11 北京市公路建設機械工人	35.0	40.95	47.95	56.0	65.45	76.65	89.6	105.0
12 新疆國営農場工人	24.0	27.9	31.0	35.5	40.6	46.3	54.8	63.5

Key: 1) name of factory; 2) wage (unit: gen); 3) class; 4) machine repairman in the National Peking Frontline Textile Factory; 5) steel workers at the National Anzan Steel Factory; 6) workers at Shinkyo Urmuti Coal Mine; 7) Diesel tractor operators in Kokuryuke state; 8) Rokuyo-Go-Kin Metal Factory workers in Kosu city; 9) workers in Kosu Steel Factory; 10) workers in Peking Drug Factory; 11) mechanics in Peking road construction; 12) workers at Shinkyo National Farm; 13) a 5-class system is used.

TABLE I-16. The standard wages in each section of different fields

15 類別又は職種	16 賃金等級	17 最高賃金額と最低賃金額
18 国家機関幹部	19 30級	20 1級が月560元。30級が月18元
21 技師(工、農)、技術員	22 5類13級	23 1類の1級が月210元。19級が月22元
24 医療衛生技術人員	25 6等26級	26 3等10級が月119元。5等20級が37元
27 司法人員	28 29級	29 1級が月500元。29級が18元
30 大学高等教授、講師、助教	31 12級	32 1級が月300元。12級が54元
33 中学教師	34 級	35 最高月90元。最低35元
36 小学教師	37 級	38 最高月70元。最低25元
39 翻訳通訳人員	40 5等15級	41 1等1級が月200元。5等15級が40元
42 警察人員	43 8級	44 5級が月62元。1級が40元
45 銀行人員	46 24級	47 1級が月300元。24級が20元
48 商業サービス人員	49 級	50 最高月45元。最低月25元
51 機関運転、電話工員	52 10級	53 1級が月70元。10級が22元
54 気象人員	55 27級	56 1級が月101.5元。27級が32.5元

Key: 15) occupational category; 16) wage class; 17) maximum and minimum wages; 18) government organization staff; 19) 30 classes; 20) 1st class, 560 gens per month, 30th class, 18 gens per month; 21) engineer (factory, farm), technician; 22) 5 classes, 13 grades; 23) 1st grade in the 1st class, 210 gens per month; 19th class, 22 gens per month; 24) medical and hygiene technician; 25) 6 classes, 26 grades; 26) 3rd class, 10th grade, 119 gens per month; 5 class 20th grade, 37 gens per month; 27) legal staff; 28) 29 classes; 29) 1st class, 500 gens per month, 29th class, 18 gens per month; 30) professor, lecturer and assistant at universities and colleges; 31) 12 classes; 32) 1st class, 300 gens per month, 12th class, 54 gens per month; 33) high school teacher; 34) class; 35) maximum 90 gens per month, minimum 35 gens per month; 36) elementary school teacher; 37) class; 38) maximum 70 gens per month, minimum 25 gens per month; 39) translator, interpreter; 40) 5 classes 15 grades; 41) 1st class, 1st grade, 200 gens per month; 5th class, 15 grades, 40 gens per month; 42) policeman; 43) 8 classes; 44) 5th class, 200 gens per month, 5th class, 15 grades, 40 gens; 45) banking staff; 46) 24 classes; 47) 1st class, 380 gens per month, 24th class, 20 gens per month; 48) commercial servicemen; 49) class; 50) maximum 45 gens per month, minimum 25 gens per month; 51) engine operator, telephone serviceman; 52) 10 classes; 53) maximum 45 gens per month, minimum 25 gens per month; 54) meteorology staff; 55) 27 classes; 56) 1st class 101.5 gens per month, 27th class, 32.5 gens per month

TABLE I-17. Income of farmers.

58 省 別	59 戸当り年平均収入	60 1人当り年平均収入
61 甘 肅 省	62 399元(月33.25元)	63 34.2元
64 江 蘇 省	454元(月37.83元)	90.8元
67 四 川 省	306元(月25.2元)	61.2元
68 河 北 省	171元(月14.25元)	79.8元

69 資料：藤井彰治著「中国社会と大衆生活」 1979年

Key: 58) state; 59) annual income per family; 60) annual income per person; 61) Kanshuku; 62) gens; 63) gen; 64) kaso; 65) gens; 66) monthly; 67) Shisen; 68) Kahoku; 69) material: Shoki Fujii "Chinese Society and the Life of the General Public", 1979.

Concerning the content of consumer's items, the percentages of "food" and "clothing" are relatively high. Among durable goods of consumers, "bicycles", "sewing machines" and "wristwatches" are still holding the positions of "three treasures". The housing problem is especially serious. In one residential area for factory workers in Shanghai, three families live in a 4LDK house and use common kitchens and bathrooms.

TABLE I-18. Income of laborers, office workers and farmers

1 年 次	2 労働者・職員の平均賃金			3 農民収入	
	4年平均賃金 (元)	5月平均賃金 (元)	6 1952年 =100	7 1人当たり年収 (元)	8 1952年 =100
1949	262	22	59	42	78
50	322	27	72	—	—
51	379	32	85	—	—
52	446	37	100	60	100
53	496	41	111	63	107
54	519	43	116	65	111
55	534	45	120	71	121
56	610	51	137	73	125
57	637	53	143	76	128
58	656	55	147	85	143
1971	650	54	146	—	—
72	715	60	160	—	—

Key: 1) year; 2) average wages of laborers, office workers; 3) farmer's income; 4) annual average income (gen); 5) monthly average income (gen); 6) year of 1952=100; 7) annual income per person (gen); 8) year of 1952=100.

TABLE I-19. Monthly cost of living (1974)

	10 中国の生活費		13 日本生活費	14 中国	15 日本
	11 元)	12 元=150円 換算 (円)	(円)	16 構成比 (%)	17 構成比 (%)
18 収入	154	23,100	187,825	100	100
19 食費	76.95	11,543	43,819	50	23
20 家賃	0.84	126	15,322	0.5	8(4)
21 光熱費	2.95	442	4,961	2	3
22 衣料	21.35	3,203	15,430	14	8
23 その他*)	11.16	1,674	62,671	7	33
24 支出計	113.25	16,988	142,203	73	75
25 貯蓄	40.75	6,112	45,622	27	25
26 消費性向	73.5		75.7		

Key: 10) cost of living in China; 11) gen; 12) conversion (yen)
 (1 gen=150 yen); 13) cost of living in Japan; 14) China; 15) Japan;
 16) ratio %; 17) ratio %; 18) income; 19) food; 20) housing; 21)
 electricity and heating; 22) clothing; 23) others; 24) net expense;
 25) saving; 26) consumer index

TABLE I-20. Popularization of durable consumer items

	2 年間生産高		4 累積高			7 普及率(%)		10 価格 (元)
	(万台)	3 1台当たりの 人数(人)	5 (万台)	6 1台当たりの 人数(人)	1台当たりの 世帯数	8 中国	9 日本 (1977年)	
11 ミシン	389	231	2,838	32	7	14	85	140~180
12 自転車	546	171	4,982	19	4	25	68	150
13 ラジオ受信機	1,800	52	8,079	12	3	33	—	トランジスター 60
14 ラウドスピーカー	2,474	37	14,131	65	1.4	71	—	—
15 テレビ	20	4,474	51	1,811	402	0.25	95	300
16 腕時計	780	115	4,085	22	5	20	—	100

17 資料: 日経センター 「日中経済関係の研究」

Key: 2) annual production (10,000 pieces); 3) persons per piece
 (person); 4) accumulated amount; 5) persons per piece (person); 6)
 families per piece; 7) popularization %; 8) China; 9) Japan (1977);
 10) price (gen); 11) sewing machine; 12) bicycle; 13) radio receiver;
 14) loudspeaker; 15) television; 16) wristwatch; 17) material: Japan
 Economy Center "Study of Sino-Japanese Relations".

(3) Productivity of basic industries

The economic planning in China emphasized heavy industries in the past. However, the productivity of the basic industry is still at a low level. One of the typical examples is steel production.

1. The steel production in China was 3,160,000 tons in 1978, and the announced target of the 10-year plan was 6,000,000 tons (1985). However, this target was lowered to 4,500,000 tons.

2. This is because, in spite of rich natural resources for steel, China is inferior in refinery technology, steel making and rolling technology. She also lacks in coherent production technology. Therefore, the yield rate is generally low and the ratio of steel import is high.

3. The production of blister steel in China (1976) is 25% of that in Japan and the level of consumption per person is 60% which is extremely low. Consequently, even though they switched the target of the 10-year plan from heavy industry to farming and light industries, their policy of emphasizing "steel" as the major point will not change. Also, the production levels of industrial raw materials non-iron metals such as aluminum and copper are about 10~20% of those in Japan. Similar situations exist concerning petrochemical products.

Table I-26. Blister steel production in China (1976)

Key: A) Production (10,000 tons);
1. USSR; 2. USA; 3. Japan; 4. West Germany; 5. China

	A	生産量(万トン)
1. ソ連		14,480
2. アメリカ		11,612
3. 日本		10,739
4. 西独		4,241
5. 中国		2,700

Table I-27. International comparison of iron and steel consumption per person (1976)

	1 人当り粗鋼消費量 (Kg)	2 日本 = 100
3 中国	32	6
4 日本	534	100
5 韓国	151	28
6 インド	13	2
7 アメリカ	604	113
8 ブラジル	98	18

Key: 1) blister steel consumption per person (Kg); 2) Japan = 100; 3) China; 4) Japan; 5) Korea; 6) India; 7) USA; 8) Brazil

Table I-28. Changes of steel production in China

	2 鉄鉄 (万トン)	3 粗鋼 (万トン)	4 歩留り率 (%)	5 鋼材 (万トン)	6 歩留り率 (%)	7 鋼材輸入率 (%)
1955	387.2	285.3	74	250.5	88	35
60	2,750	1,845	67	1,130	61	7
65	1,380	1,300~1,400	98	940	70	8
70	2,200	1,780	81	1,340	75	16
74	3,140	2,500	80	1,780	71	17

9 資料: 「鉄鋼年鑑」 50年 — アメリカ上下合同経済委員会

Key: 2) pig iron; 3) 10,000 tons; 4) blister steel; 5) yield rate; 6) steel; 7) yield rate; 8) ratio of steel import; 9) Material: "Steel Year Book", 1975. U. S. Senate and Congress Economic Committee.

Table I-29. Aluminum production in major countries

	11 生産量 (万トン)	12 日本 = 100
13 中国	20	22
14 日本	92	100
15 韓国	1.7	2
16 インド	21	23
17 アメリカ	385	418
18 西独	69	75

Key: 11) production (10,000 tons); 12) Japan = 150; 13) China; 14) Japan; 15) Korea; 16) India; 17) USA; 18) West Germany

Table I-30. International comparison of major products

	20 機械パルプ [千Mトン]		21 化学パルプ [千Mトン]		22 新聞用紙 [千Mトン]		23 コークス [千Mトン]	
	1966	1975	1966	1975	1966	1975	1966	1975
24 中国	365	658	563	965	393	998	17,000	⑤ 30,000
25 日本	1,012	1,320	④ 4,676	③ 7,293	④ 1,177	③ 2,160	⑤ 17,032	③ 45,166
26 インド	25	20			29	52	8,341	8,846
27 アメリカ	② 3,167	② 4,004	① 28,367	① 32,812	② 2,129	② 3,120	② 64,786	② 55,794
28 カナダ	① 6,918	① 5,903	② 7,599	② 8,804	① 7,736	① 6,966	3,780	5,096
29 フランス	473	385	1,058	1,368	461	238	13,200	11,445
30 イギリス	245	179	40	140	749	319	④ 17,765	15,859
31 西ドイツ	682	805	728	726	232	486	③ 39,891	④ 34,817
32 ソ連	③ 1,445	③ 1,842	3,328	⑤ 6,340	③ 882	④ 1,334	① 68,493	① 83,543
33 世界	21,092	22,940	62,363	79,913	18,325	20,770	316,050	369,070
	34 スウェーデン 1,278	34 スウェーデン 1,626	34 スウェーデン 5,265	34 スウェーデン 6,718	34 フィンランド 1,317	34 スウェーデン 1,182		
	35 フィンランド 1,534	35 フィンランド 1,605	35 フィンランド 3,964					

Key: 20) machine pulp (1000 M tons); 21) chemical pulp (1000 M tons); 22) newspaper pulp (1000 M tons); 23) coke for coke furnace (1000 M tons); 24) China; 25) Japan; 26) India; 27) USA; 28) Canada; 29) France; 30) England; 31) West Germany; 32) USSR; 33) the world; 34) Sweden; 35) Finland

Table I-31. International comparison of major products
(major production parts)

	2 銅(スメルタ) [千Mトン]		3 銅(精銅) [千Mトン]		7 鉛(一次) [千Mトン]		5 マグネシウム [千Mトン]		6 亜鉛(一次) [千Mトン]	
	1966	1975	1966	1975	1966	1975	1966	1975	1966	1975
7 中 国	100.0	100.0	100.0	150.0	100.0	100.0	100.0	100.0	90.0	100.0
8 日 本	275.0	③ 821.5	③ 404.8	③ 818.9	114.2	③ 184.4	① 10,514	③ 17,936	③ 428.8	① 701.8
9 イ ン ド	9.4	16.3	9.4	16.3	2.5	4.8			-	25.7
10 ア メ リ カ	① 1,330.3	① 1,312.8	① 1,999.8	① 1,620.2	① 410.0	① 581.6	① 86,113	③ 36,526	① 929.9	④ 397.4
11 カ ナ ダ	③ 384.4	496.3	④ 392.8	③ 529.2	④ 167.7	④ 171.5	③ 6,099	4,501	④ 347.1	③ 426.9
12 フ ラ ン ス			42.7	40.3	108.6	101.6	3,419	③ 7,532	196.0	181.1
13 イ ギ リ ス			179.8	151.5	62.1	105.1	3,758	2,671	101.3	53.4
14 西 ド イ ツ	70.2	168.1	⑤ 352.3	422.2	109.6	92.2	1,516	751	123.0	174.4
15 ソ 連	② 700.0	② 1,100.0	② 900.0	② 1,420.0	② 375.0	② 480.0	② 35,000	① 63,000	② 510	② 690
16 世 界	5210.0	7350.0	6,390	8,220	2,730	3,250	157,000	264,000	4,070	4,800
	③ チリ ¹⁷ 631.8	④ チリ ¹⁷ 724.4		④ チリ ¹⁷ 535.2	③ オーストラリア ¹⁸ 196.2	⑤ オーストラリア ¹⁸ 170.5	③ ノルウェー ¹⁹ 25,795	② ノルウェー ¹⁹ 383,000	⑤ オーストラリア ¹⁸ 195.7	⑤ オーストラリア ¹⁸ 243.2
	④ ザンビア ²⁰ 587.2	③ ザンビア ²⁰ 640.3			⑤ メキシコ ²¹ 164.1					

Key: 2) copper (smelted) (1000 M tons); 3) copper (refined) (1000 M tons); 4) lead (1000 M tons); 5) magnesium (1000 M tons); 6) Zinc (1000 M tons); 7) China; 8) Japan; 9) India; 10) USA; 11) Canada; 12) France; 13) England; 14) West Germany; 15) USSR; 16) the world; 17) Chile; 18) Australia; 19) Norway; 20) Zambia; 21) Mexico

Table I-32. International comparison of major products
(major production parts)

	綿糸 (純+交織) 1 [千Mトン]		レーヨンおよび アセテート短繊維 2 [千Mトン]		非セルロース系長繊維 3 [千Mトン]		非セルロース系短繊維 4 [千Mトン]	
	1966	1969	1966	1975	1966	1975	1966	1975
5 中国*	1,409.0	1,450.0	21.3	61.3	0.70	13.10	2.30	32.60
6 日本*	493.6	506.2	① 375.2	② 287.6	② 200.14	② 490.63	② 260.34	③ 570.57
7 インド	901.0	951.1	43.1	66.8	1.91	19.70	2.54	13.50
8 アメリカ	2,005.7	1,593.9	② 326.2	③ 173.7	① 528.30	① 1,455.70	① 416.40	① 1,214.70
9 カナダ	77.1	85.0	23.4	14.6	32.93	66.50	12.07	29.30
10 フランス	288.9	267.0	70.1	55.6	56.40	85.59	52.89	123.97
11 イギリス*	206.8	166.2	⑤ 134.4	④ 138.9	④ 95.84	⑤ 184.00	④ 78.93	⑤ 177.10
12 ドイツ	280.7	251.1	③ 202.1	63.0	③ 105.51	③ 309.09	③ 107.87	③ 309.09
13 ソ連	1,323.1	1,437.7	④ 180.6	① 309.0	⑤ 69.83	④ 230.33	26.53	134.26
14 世界			2,005	1,860	1,330	3,840	1,140	3,620
15 *純のみ				⑤ 東ドイツ 135.6			⑤ イタリア 71.917	④ イタリア 198.07

18 資料: 「国連統計年鑑」 1976

Key: 1) silk thread (pure and mixed) (1000 M tons); 2) rayon and acetate textile (1000 M tons); 3) noncellulose long fibre (1000 M tons); 4) non-cellulose short fibre (1000 M tons); 5) China*; 6) Japan*; 7) India; 8) USA; 9) Canada; 10) France; 11) England*; 12) West Germany; 13) USSR; 14) the world; 15)* only pure ones; 16) East Germany; 17) Italy; 18) "United Nations Statistics Year Book", 1976.

(4) Industrial bases and infrastructures

Other bottlenecks in Chinese economy are concerned with the industrial bases and infrastructures.

1. The electric power generation per person is only 3.14% of that in Japan and cannot fulfill the demand for the people. This is a big hindrance to realization of the real industrial growth rate of 10%.

2. The territory of China is 26 times larger than Japan. Therefore, transportation of passengers and cargo is a great problem. 57% of the capacity of transportation is the railroad and the number of vehicles consists of about 10,000 locomotives and passenger coaches and about 200,000 cargo carriers. In Japan, we have 9,600 locomotives, 23,450 passenger coaches (electric engines) and 15,000 cargo carriers. However, the number of passengers in China is about 1,000,000,000 (about 1/7 of Japan) and cargos reach about 1,000,000,000 tons, 7 times that in Japan.

3. The number of available tracks is only 91,000. Automobile production per year is 150,000 which is 1.91% of that in Japan.

As seen from the above description, establishment of the industrial base and infrastructure is a big problem to be solved in long-term planning.

TABLE I-33. International comparison of Automobile production (1976).

			生産台数 (万台)
2	米	国	1,147
3	日	本	784
4	西	ドイツ	387
5	フ	ランス	384
6	ソ	連	202
7	カ	ナダ	164
8	イ	タリア	158
9	ブ	ラジル	92
		:	:
10	中	国	15

資料：世界統計年鑑より作成

Key: 1) No. of automobiles (10,000 vehicles); 2) USA:
 3) Japan; 4) West Germany; 5) France; 6) USSR; 7) Canada;
 8) Italy; 9) Brazil; 10) China; 11) Reference: Made from
 "World Statistic Yearbook".

TABLE I-34. Status of available transportation vehicles

	幹線機関車 ¹⁾ (1,000台)				貨車 ²⁾ (1,000台)	商船 ³⁾		トラック ⁴⁾ (1,000台)
	合計	ディーゼル	蒸気	電気		隻 ⁹⁾	1,000 積重量トン ¹⁰⁾	
1950	2.9 ¹⁾				41 ¹⁾			
1952	3.3 3.2 ¹⁾	0	3.3	0	58 54 ¹⁾	101	270	42 50 ¹⁾
1957	3.7	0	3.7	0	86 89 ¹⁾	93	302	63
1958	4.1 ¹⁾				100 ¹⁾			100 ¹⁾
1960	6.0 ¹⁾				135 ¹⁾			150 ¹⁾
1965	5.4 5.5	0	5.4	0	143 150 ¹⁾	174	933	230 250 ¹⁾
1970	6.4	0.7	5.7	0	175	269	1,944	434
1971	6.7 6.0 ¹⁾	0.9	5.8	0	185 185 ¹⁾	305	2,290	506 500 ¹⁾
1972	7.1	1.1	5.9	0.1	197	329	2,657	590
1973	7.5	1.4	6.0	0.1	209	368	3,291	677
1974	7.9	1.7	6.1	0.1	222	430	4,592	793
1975	8.3	2.0	6.2	0.1	237	495	6,082	914
1976	...	...	...		...	556	7,081	...
1978	10.0 ²⁾				200 ²⁾			

出所：アメリカ政府 "China : Economic Indicators"

1) J. E. C. C. of US

2) 1978年7月の日本国鉄訪中団調べ

Key: 1) locomotives for the main route¹⁾(1000 locomotives); 2) cargo coaches¹⁾ (1000 coaches); 3) commercial boats¹⁾; 4) tracks¹⁾ (1000 tracks); 5) total; 6) Diesel; 7) vapour; 8) electric; 9) boats; 10) 1,000 payload (ton); 11) Source: USA government "China: Economic Indicators". 1) J. E. C. C. of US; 2) Study by the Japanese Steel delegate to China 1978

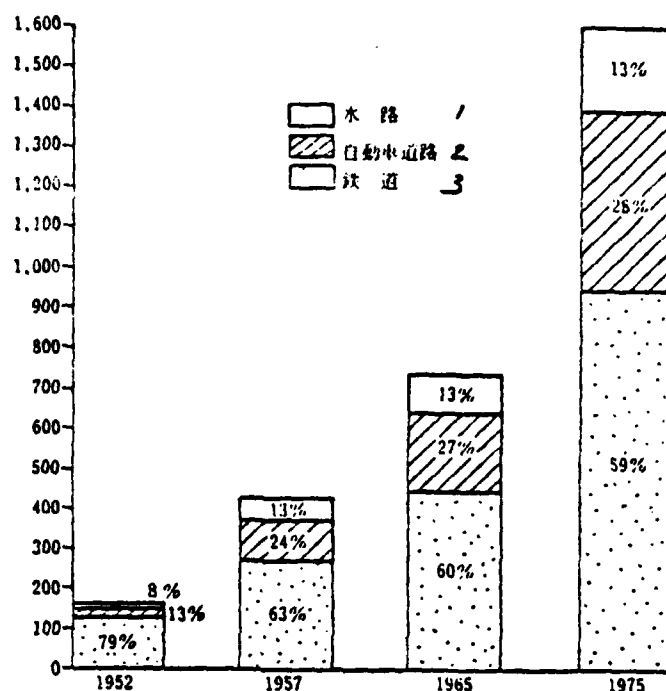
TABLE I-35. International comparison of the electric power generation; the power generation capacity and the annual power generation per person (1975)

		1 発 電 量 (億 KWH)	2 発 電 能 力 (万 KW)	3 年 間 1 人 当 り 発 電 量 (KWH)
4 中	国	1,210 (注)	3,400	128 (3.14)
5 日	本	4,450	11,040	4,077 (100.00)
6 韓	国	200	510	555 (13.61)
7 イ	ン	820	2,136	137 (3.36)

9 注: 米国上下両院 (1978) によると、中国の 1977 年発電量は 1,360 億 KWH である。

Key: 1) the amount of generated power (10^8 KWH); 2) capacity of power generation (10^4 KW); 3) annual power generation per person (KWH); 4) China; 5) Japan; 6) Korea; 7) India; 8) note; 9) Note: according to the U. S. Senate and Congress (1978), the annual electric power generation in China in 1977 is 1300×10^8 KWH.

FIGURE I-15. Changes of the situation in transportation
(the transported amount in 10^6 tons)



出所: U. S. "China Economic Indicators"

Key: 1) water route; 2) automobile roads; 3) railroads; 4)
Source: U. S. "China Economic Indicators"

I-3. The medium and long-term prospect of Chinese economy.

(1) The growth rate of Chinese economy

The overall real growth rate of Chinese economy in the past was the annual average rate of 5.8% and the real GNP growth rate per person was 3.6% which are relatively high. Also, the annual average growth rate of agriculture is 2.3% and 10.7% in industry. The industrial sector continued a relatively smooth development.

The 10-year economic plan of China aims at a growth rate of 4% in agriculture and 10% in industry. These targets are equivalent

of 8.4% in the GNP base. Except for the agriculture sector, they are reasonably realistic targets.

However, MRI judges that the Chinese 10-year economic plan will become "a reduced plan type" (case II) because of the reduction of the scale of the 10-year plan (balanced between agriculture and industry, reduced investment in the basic construction, reduction of import of foreign technologies and plants because of limited payment capability, etc.). The real economic growth rate in China based on the "reduced type" is estimated to be 7.4%. The financial base is 1.724×10^8 gens in 1985. The economy construction is estimated to be 1.207×10^8 gens and investment on basic construction 965×10^8 , industrial investment 579×10^8 gens.

TABLE I-36. The real GNP growth rate (10^9 dollars, %)

2 1 1952 65 70 75	基準年 1 (1975年価格)	1952	1965	1970
1952	82	...	...	...
65	163	5.4	...	...
70	219	5.6	6.1	...
75	299	5.8	6.3	6.4

Key: 1) standard year; 2) until; 3) price

TABLE I-37. The real GNP growth rate per person (annual rate %)

2 1 1952 65 70 75	基準年 1 (1975年価格)	1952	1965	1970
1952	144ドル	...	...	...
65	217	3.3	..	...
70	261	3.4	3.8	...
75	320	3.6	4.1	4.2

Key: 1) standard year; 2) until; 3) GNP per person (1975 price)

TABLE I-38. Changes of the real annual growth rates in agriculture and industry (%)

	1 農 業	2 工 業
1952~57	3.8	15.8
57~65	1.7	9.0
65~70	2.5	9.7
70~75	1.8	9.7
52~75	2.3	10.7

Key: 1) Agriculture; 2) Industry; 3) Reference: MRI report 1, p. 26.

TABLE I-39. Projection of Chinese economy (Kakukaho, report)

unit: 10⁹ dollars, %

	1975年 (実績)	1985年 (予測)	85/75
3 GNP (1976年価格)	323	722.4	8.4
農業生産	86.1	133.7	4~5
工業生産	176.2	478.2	10~11
サービス	60.7	110.8	6.2
4 人口(100万人)	935	1,114.0	1.8
1人当りGNP	345	649.0	6.5
1人当り消費(ドル)	207	389.0	6.5

5 資料: アメリカ上下合同経済委員会

Key: 1) reality; 2) projection; 3) GNP (1976 prices) - Agriculture production - Industrial production - services; 4) Population (10⁶ persons) - GNP per person - consumption per person (dollars); 5) Reference: U. S. Senate and Congress Joint Economic Committee

TABLE I-40. Comparison table summary of the Chinese Economy

	1 三菱総研 ケースⅠ(計画縮小型)	2 米国議会 (78.11)	3 石川滋教授 (79.3)
4 実質経済成長率 (75~85年)	5 7.4 (GNPベース)	6 6.5 (GNPベース)	7 7.8 (NDPベース)(注)
8 展望の特徴	9 <ul style="list-style-type: none"> 投資比率(貯蓄率)は以前よりは上昇するが、それほど急激ではない。 農業部門からの貯蓄は出ない。出たとしても内部留保に行く。 技術革新はゆるやかに進行。 外資は外貨借入れ中心に取られるが、依存率はそれほど高くない。 	10 <ul style="list-style-type: none"> 投資比率は以前と変化する。 農業生産の増加率は低い。 技術革新にもそれほど期待できない。 外貨はほとんど取入れない、自力更正を前提。 自ら、悲観的予測と称している。 	11 <ul style="list-style-type: none"> 中国政府10か年計画(当初)をベースに推定。 農業生産増加率は政府計画より低い、3.6%。 国内産出のネット分だけで、海外からの所得は除いてある。

12 資料: MRIレポート1., p.58

Key: 1) Mitsubishi General Research Institute case II (reduced type plan); 2) US Congress; 3) Professor Shigeru Ishikawa; 4) real economic growth rate (1975-1988); 5) GNP base; 6) GNP base; 7) NDP base (note); 8) characteristic points of the summary; 9) the investment rate (saving rate) will increase but not so rapidly; 10) no savings from the agricultural sector; even if there is some, it will stay inside; 11) slow progress of technological revolution; 12) foreign investment is mostly on loans. However, the rate of dependence is

not so high. 10) o the investment rate does not change; o the rate of increase of agricultural production is low; o cannot expect much from technological revolution; o almost no foreign investment. Self reliance is assumed; o a "pessimistic prospect" is claimed by China. 11) o Estimated from the Chinese government 10-year plan (initial plan); o the rate of increase of agricultural products is lower than one expected by the government, 3.6%; o only the net domestic production was included and gains from abroad were excluded. 12) Reference: MRI report 1, p. 58.

TABLE I-41. Estimate of scale of the annual expenditure

(単位: 億元)

	2 費 出 規 模		
	3 (ケースI) 9.3%	(ケースII) 7.4%	(ケースIII) 5.9%
1 9 7 7	821.0	821.0	821.0
7 8	1,046.2	1,046.2	1,046.2
7 9	1,143.5	1,123.6	1,107.9
8 0	1,249.8	1,206.8	1,173.3
8 1	1,366.0	1,296.1	1,242.5
8 2	1,493.1	1,391.9	1,315.8
8 3	1,631.9	1,495.0	1,393.5
8 4	1,783.7	1,605.6	1,475.7
8 5 4	1,949.6	1,724.4	1,562.7
1978~85 合計	11,663.8	10,889.6	10,317.6

Key: 1) unit: 10^8 gens; 2) scale of annual expenditure; 3) case; 4) total

TABLE I-42. Estimates of investments on basic instructions in the 10-year plan period (unit: 10^8 gens)

	1 財 政 支 出		2 経 済 建 設		3 基 本 建 設		4 工 業 投 資	
	5 ケースI	5 ケースII	I	II	I	II	I	II
1 9 7 8	1,046.2	1,046.2	732.3	732.3	585.9	585.9	351.5	351.5
7 9	1,143.5	1,123.6	799.8	786.5	639.8	629.2	383.9	377.5
8 0	1,249.5	1,206.8	874.9	844.8	699.9	675.8	419.9	405.5
8 1	1,366.0	1,296.1	956.2	907.3	764.9	725.8	458.9	435.5
8 2	1,493.1	1,391.9	1,045.2	974.3	836.2	779.4	501.7	467.6
8 3	1,631.9	1,495.0	1,142.3	1,046.5	913.8	837.2	548.3	502.3
8 4	1,783.7	1,605.6	1,248.6	1,123.9	993.9	899.1	599.3	539.5
8 5	1,949.6	1,724.4	1,364.7	1,207.1	1,091.8	965.7	655.1	579.4
1978~85	11,663.8	10,889.6	8,161.0	7,622.7	6,531.2	6,098.1	3,918.6	3,658.8

6 資料: MRI レポート 1., p. 50

Key: 1) financial expense; 2) economic construction; 3) basic construction; 4) industrial investment; 5) case; 6) Reference: MRI report 1, p. 50

(2) Problems in the adjustment period and the modernization plan.

China decided to adjust her economy for three years during 1979-81. This is the second time since her independence that China set up a period of so-called economic adjustment. The first period was 1961-65. In that period, she set up a high production target ignoring the principles of economy, in her policy of the "great progress" started in 1958. Therefore, the economic balance was lost and she was forced to make adjustments.

In this time also, as it was the first time, the ambitious 10-year plan quickly created an unbalance between agriculture and industry and also within industries. Therefore, the plan stumbled from the beginning and she revised the plan and set a three-year adjustment period.

By the way, according to the evaluation by the present government, the "great progress" period and the Cultural Revolution period (until the purge of the Gang of Four) are the economic slow-down periods and also the periods when the economic plan was wrong. In contrast, it regards the first 5-year plan period (1953-1957, when heavy industry and chemical industry had priority by USSR aids) and the economic adjustment period (1961-65), the so-called Lin Biao line economic policy) were the period of commercial growth following the economic policy emphasizing principles of economy. It considers that "growth (progress) is made in the process of adjustment".

What are economic problems in the current adjustment period? This was explained already in the previous report to a certain extent. However, if we summarize them according to individual sectors, we have Table I-43.

In conclusion, food and steel production last year were both the highest in history. Especially, the official announcement of food production was 3,475,000 tons and an increase of 2,200,000 tons

from the previous year. The initial estimate of 4×10^8 tons in the 1985 production seems easily achievable. The same thing can be said of steel production. However, a problem is in their contents. In the case of food, we have to consider whether soy beans are included or not (if included, it will make a difference of ~ 10,000,000 tons).

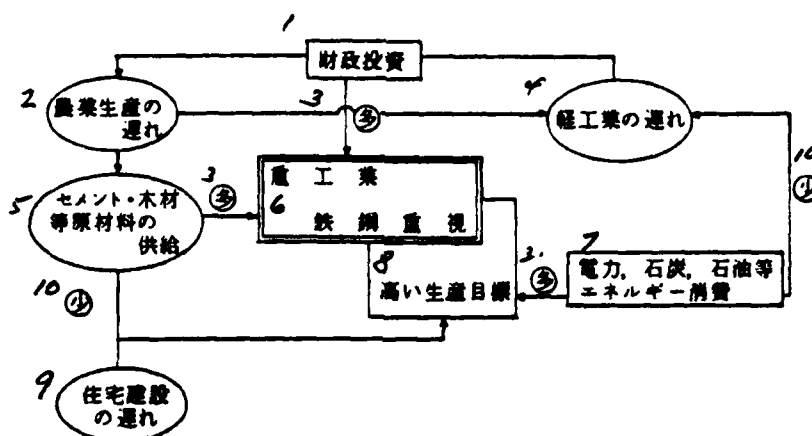
Also, agricultural products except for food did not increase noticeably compared to last year. Next, in the case ^{of} steel, the production rate of steel did not increase and also, expansion of the variety was not attempted. These are major problems.

According to the journal "Seventies", the last year's steel production was 21,000,000 tons. The rate of manufacturing from blister steel was 70%. They do not only meet 85% in the first 5-year plan period but also the world level of 80%. Import of steel is increasing every year and 8,000,000 tons were imported from Japan.

Import of agricultural products is also serious. 1/5 of the foreign exchange is believed to be spent for this.

As seen from these examples, even though the production became the highest in history, we have to question causes of the low rate of processing and scarcity in variety in reality.

The cause is "command economy" which looked like a fate of Chinese economy. In other words, since the production target is set high by the central government, they are keen to only achieve the production quarter beyond the capability of enterprise, farmers and themselves. They either ignore quality of products, improvement of varieties or give false reports. This kind of "command economy" creates the following negative effects in the economy:



Key: 1) financial investment; 2) slow-down of agriculture production; 3) many; 4) slow-down of light industry; 5) supply of raw material such as cement and timber; 6) heavy industry, steel is emphasized; 7) energy consumption such as electricity, coal and oil; 8) high production target; 9) slow-down of housing construction; 10) few

Namely, because of emphasis on steel (heavy industry), financial investment is done more in this section rather than in agriculture and light industry and also energies such as electricity, coal and raw materials such as cement and timbers are concentrated in the steel section. Therefore, the amount supplied to light industry and agriculture is relatively small. This delays agricultural development which causes delay of raw material supply to light industry. This vicious cycle is repeated.

This kind of situation seems to have been repeated many times since independence. Even then, some economic growth was achieved. This is due to the "sacrifice of the people"--since cement was sent to heavy industry, housing construction was delayed. The aim of the present adjustment period is to correct this economic unbalance and prepare the foundation for modernization. Concretely, they emphasize investment and increased production in agriculture, light industry, energy industry (electricity, coal, oil). The targets of steel production and the scale of the basic construction will be reduced.

Based on the understanding of the above-mentioned economic problem in the second adjustment period, let us examine revised points

TABLE I-43. Economic problems in the adjustment period

	1 1978年 の「足額」	2 問 題 点	3 今後の展望
農 業 部 門	5 食糧生産 3億475万トン (史上最高) 農業生産額 前年比8.9%増	6 ・ 油類、綿花、砂糖などは水準に達せず。 ・ 農産品の輸入に外貨の1/3 をつかっている。 ・ 農業支出は10ヶ月前後(国家財政支出の)	7 ・ 穀物をカマメとして、林業、牧畜、漁業にも力を入れる。 ・ 農産品輸出。 ・ 外貨の節約。 ・ 農民生活向上のための農産品の販売を促す。 農業支出1.8倍に拡大。
8 林 工 業 部 門	9 財政収入の21.2% 輸出の 20.1%	10 ・ 農業発展の遅れ、重工業発展の急速化によって国家の需要を満たしていない。 ・ 製工業のための原料—棉花、油食品、木材の生産停滯。 ・ 重工業部門は製工業のための生産工具の需要を満たしていない。 ・ 電力消費は重工業に片寄り、製工業にまで回らない。 ・ 製工業部門への投資は30年未満で24年(基本建設投資の)であった。	11 ・ 軽工業投資の増大 ・ 新製品の開発拡大 向う2年間に、モーター(2倍)、電機自動具(1.5倍)、交通装置(自動車)の生産に3.0倍増以上増やす。
12 重 工 業 部 門	13 総額 3,178万トン エネルギー 石炭 6億1,800万トン 原油 1億1,000万トン 原材料 セメント 5,400万トン	14 ・ 基本建設規模が大きすぎる。 セメント、木材、電力、運輸工具などの供給が追いつかない。 ・ 製品の質が問題である。 ・ セメントは重工業部門に占有され、住宅建設にまわらない。 ・ 電力不足(香港から供給している)	15 ・ 基本建設規模の縮小 ・ 原材料生産の増大(セメント、木材) ・ 電力供給の確保
16 企 業 計 画			17 ・ 3年間の間に、大規模な企業に集中。 企業部門の徹底
18 計 画 工 作		19 ・ まともな統計数字がなくて、現代化が達成できるか? (郵小半売点)	20 ・ 企業収益性を高める(政府資金からの融資へ) ・ 建設30年間の新所統計をより発展
21 総 合 政 策	22 ・ 農業、製工業、エネルギー(電力、石炭、石油)、交通、鋼材の品種への投資の拡大と生産の増大を最優先とする ・ 資源生産目標と基本建設投資規模を縮小する。		

Key to Table I-43: 1) credit of 1978; 2) problems; 3) future problems; 4) agriculture sectors; 5) food production 3,475,000 tons (highest in history) - Amount of agricultural production 8.9% increase from the previous year; 6) o oil, fat, cotton and sugar did not reach the expected level; o 1/5 of the foreign exchange was used for importing food; o agricultural expenditure was 10% (of the federal expenditure). 7) o emphasis on food, forestry, livestock farming, side jobs and fishing, food being the key; o export of agricultural products; o saving of foreign exchanges; o promote development of agricultural products in order to improve farmers' living standards; o agricultural expenditure was increase to 18%. 8) light industry section; 9) 21.2% of financial income - 20.1% of export; 10) o the national need was not met because of delay in agricultural development and speed-up of growth of heavy industry; o production of materials for light industry - cotton, subsidiary food and timber - was stagnated; o the heavy industry section did not fulfill the demand from the light industry; o the electric power was used mostly in the heavy industry and not enough for light industry; o investment in light industry was only 2.4% (of the investment in the basic construction) in the past 30 years. 11) o increased investment in light industry; o exploration and development of new products; In the coming 2 years, production of quartz watches, high frequency wave automatic dating watches and bicycles with variable speeds will be increased by more than 30 species nationwide; 12) heavy industry section - energy - raw material; 13) Blister 31,780,000 tons; coal 618,000,000 tons; crude oil 44,000,000 tons; cement 54,000,000 tons. 14) o the scale of basic construction is too large; o supply of cement, timber, electricity and transportation cannot catch up; o qualities of new products are questionable; o cement was monopolized by heavy industry and not supplied to housing construction; o electric power shortage (imported from Hong Kong). 15) o reduction of the scale of basic construction; o increased production of raw material (cement, timber); o supply of electricity secured. 16) business management; 17) o reorganization of 350,000 businesses run by the government and groups; o thorough practice of business management; o increase profit from business (government loans to bank loans); 18) statistics section; 19) "without concrete numbers, who can accomplish modernization?" (stated by Vice President Tei-Sho-Hei); 20) economic statistical data for 30 years since the independence will be published next year; 21) general policy; 22) o the main emphasis is on agriculture, light industry, energy (electricity, coal, oil), transportation, investment in various kinds of steel and increased production; o the target of steel production and the scale of basic construction will be reduced.

of the 10-year plan which is a concrete manifestation of the adjustment.

The current adjustment period runs for three years starting this year. Therefore, the 10-year plan may be shifted to the 1981-90 period. In the second conference of the 5th general representatives, short term economic problems in 1979 were discussed. Therefore, the "10-year plan for national economic development" proposed by Kakokuho in 1978 will be modified based on the basic principles of the policy and short-term economic plans from this year to the next will be regarded as important.

In our previous report, we outlined the content of revisions of the 10-year plan. A significant change from the initial plan is expected of the steel production target. The policy of "emphasizing steel" was re-examined. It seems that a part of construction of large-scale steel factories (Yokuto and Hozan had already started although completion of the work is expected to be delayed) will be postponed and the money will be applied to agriculture, development of resources and infra-sections. The background of the present revision of steel can be clearly understood by the following examples:

"a rolling mill was built in Bukan combine in cooperation with Japan and West Germany, but it has not operated because of electric power shortage"

"even if a factory started operation, it stops production often and waits for raw materials because of shortages of raw materials"

"investment in steel was large but was not effective. This is because the fuel and power conditions for steel factory conditions were bad"

As shown by the above Chinese official announcements, the foundation of Chinese economy was not ready at the time she was moving to carry out the 10-year plan. Especially the basic defect of Chinese economy which does not have "industrial correlation table" was exposed. Therefore, in this adjustment period, she decided to put the higher priority order in fuel industry such as coal, oil and

electricity, infra-preparation such as transportation, communication construction material and raw material, also to increase investment in light industry for export and agricultural investment. However, we must be careful not to forget that steel was not removed from the plan. The above situation is purely a matter of priority and the amount of investment in steel and other heavy and chemical industries will still occupy a large share.

(3) Main problems of the Chinese economy and its scenario development.

When we consider the Chinese economic movement, the following points should be noticed:

1. Statistical numbers necessary for analysis and projection of the Chinese economic movement are truly estimated values. Therefore, excessive dependence on these numbers is dangerous.

2. Lack of information on real situations of the Chinese economy and society. Difficulty in understanding the Chinese economy and society because of explanations by Chinese policy makers by ideological expressions and also discussions of the type of "explaining today's matter by quoting the past".

3. Problems of conceptual framing in analyzing movements of the Chinese economy and society.

Therefore, a more reasonable method is to understand essential features and contents of the Chinese economy and society by standing on a long-term basis and considering (1) the present status of China, (2) political news, (3) targets and contents of economic plans, (4) hindering conditions and (5) methods of practicing. The following figures and tables were obtained from this kind of consideration.

Generally speaking, the development scenario of the Chinese economy can be summarized in the following way:

1. The problem facing China is increasing of the economic level by the "modernization plan". For this purpose, political stability in the country is essential. Political leaders in China will try to avoid excessive ideological struggles and to act based on politically justifiable reasons.

2. China will adopt policies based on cooperation with foreign nations in order to realize the modernization project.

(1) Necessity of importing advanced technologies, capital and plants from advanced nations.

(2) Long-term commitments of cooperative relations by long-term trade agreements and others in order to achieve expanded and balanced trade.

(3) Gradual rationalization of the nature of the Chinese economy.

(4) Reduced "tension against the USSR" because of the limited capability of her defense budget.

3. Concerning the economic policies, more reasonable and practical approaches to problems common in developing nations will be emphasized.

(1) population pressure

(2) establishment of employment opportunities

(3) improvement of labor productivity and creation of jobs

(4) self-supply of food by increased agricultural productivity

(5) investment in industrial development by taking effects of industrial relations into account

(6) priority setting of investment and consumption

(7) gradual distribution of capital investment

(8) promotion of export-oriented industry and those which substitute for imported goods

(9) multiple-angle trade policy

For references, we show the long-term prospect of the Chinese economy and society projected by the research organization and specialists of China problems. Their opinions have the following common views: (1) political stability in China will slowly improve; (2) hindrance to development of the Chinese economy is the infra-structure such as agriculture, productivities of basic industries, electricity and transportation. Development of these fields will be an important problem; (3) her foreign policy will be based on cooperative principles.

TABLE I-44. Major problems in the Chinese economy and society (1976-1985)

5 政策領域 議題と問題点	2 国内政治	3 対外関係	4 社会・経済問題
6 現 状	7 (1)毛沢東死後の政治 リーダーシップ確立 (2)左右イデオロギー 路線の調整 (3)共産党・人民解放軍 テクノクラート政策 集団の調整	8 (1)中ソ対立の継続 (2)自力更生路線から日 欧米接近路線 (3)第3世界との協調 (4)革命外交から経済外 交	9 (1)経済の後進性 (2)農業生産の停滞 (3)基幹産業の低生産 (4)電力、社会インフラ等 のボトルネック (5)重・軽工業のアンバラ ンス (6)周辺産業の未成熟 10 (7)中央と地方の関係 (8)科学技術教育の確立 (9)若手労働力の雇用問題 (下放青年) 11農村と都市の格差是正
11 政策ニーズ	12 (1)政治安定性の確立 (2)華鄧集団指導体制 (3)イデオロギー志向か ら政策志向への移行 (4)文革・四人組等の政 治混乱の回避 (5)制度化・民主化	13 (1)国境紛争の回避 (2)台湾問題の現状維持 (3)対ソ緊張・ヨーロッ パ軍事技術導入 (4)日欧米先端技術導入 (5)対外貿易拡大	14 (1)人口抑制 (2)農業の生産力 (3)基幹産業の能力拡充 (4)基本建設の重点的実施 (5)生産意欲向上 (6)先進的プラント技術導 入 15 (7)電力・鉄道・港灣等の近代 化ボトル・ネックの解消 (8)雇用確保 (9)技術者教育
16 4つの近代化政 策及び 「国民経済発展 10ヶ年計画」 (1975-1985)	17 (1)政策決定・計画 調整・管理の制度化 (2)国家計画・経済・基 本建設委員会等のリ ーダーシップ (3)長短期・部門間調整 (4)軍・農村・都市等の 利益調整	18 (1)対外貿易関係安定化 のための長期貿易協 定 (2)対外支払能力拡大の ための輸出拡大 (3)日欧米対外協調路線	19 農業・工業・国防・科学技術の近代化政策
20 阻 害 因	21 (1)指導者の高齢化 (2)イデオロギー紛争 (3)世代ギャップ (4)テクノクラートの政 策、計画、実行能力 (5)文革世代、下放青年 の不満	22 (1)対外技術・資本吸収 能力・速度 (2)支払能力 (3)開放経済政策に対す る路線紛争及び反動 (4)対ソ関係の処理	23 (1)農・工業間のアンバランス (2)工業部門における投資アンバランス (3)先端技術・プラント輸入に伴う貿易赤字 (4)経済運営及び企業管理の不効率性 (5)電力・鉄道等のボトルネック (6)労働力雇用と技術者不足
24 計画修正 調整ニーズ (1979-81)	25 (1)政策目標の調整 (2)優先順位・方法論・ 目標達成速度等の合 意 (3)極左反動の排除 (4)民意の反映 (5)人民解放軍・共産党 官僚の利害調整	26 (1)対外債務負担能力の 上限 (2)「自力更生」と対外 依存のバランス (3)日欧米対外依存のバ ランス	27 (1)農業重視(人民公社下部組織の強化、自留地耕作の承認、 農産物格額の引上げ等) (2)基本建設投資計画の増少と調整 (3)農産物加工、食品工業その他輸出指向型工業の振興
28 課題と問題点	29 (1)鄧小平の健康 (2)左右路線の調整 (3)毛沢東革命思想の解 釈 (4)政治制度の確立 (5)中国共産党と大衆と の分離 (6)文革派、戦後派世代 の体制化 (7)中央集権と地方分権 (8)経済計画の政治責任 (80年、85年)	30 (1)イデオロギーと日欧 米接近 (2)対ソ関係と東南アジ ア問題 (3)台湾問題の処理 (4)輸出市場の確保 (5)第3世界におけるリ ーダーシップ	31 (1)生活水準向上ニーズと福祉負担の増大 (2)生産効率と「三差」(農業と工業、都市と農村、精神勞 働者と肉体労働者) (3)近代化と「三自一包」「三結合」「走資派」等のイデオ ロギー (4)デモンストレーション効果と社会不満 (5)財政負担の増大(国防・文教・社会福祉、基本建設等) (6)農業生産性増大の上限、自然災害 (7)産業・生活基盤整備(ボトルネックの解消) (8)エリート教育と格差 (9)計画経済と市場経済の調整

Key to Table I-44. 1) policy area; 2) domestic policy; 3) foreign relations; 4) social and economical problems; 5) assignments and problems; 6) present status; 7) (1) policy after the death of Mao Tse Tung establishment of leadership (2) adjustment of the left and right groups (3) adjustment of communist party, people's liberation army and technocraft political groups; 8) (1) continued confrontation between China and USSR (2) from the self-reliance policy towards closer relations with Japan, Europe and USA (3) cooperation with the third world (4) from revolutionary policies to economical foreign policies; 9) (1) economical backwardness (2) stagnation of agricultural production (3) low productivity of basic industries (4) bottlenecks such as electric power and social infrastructures (5) imbalance between heavy industry and light industry (6) immature peripheral industries; 10) (7) relation between the central and rural governments (8) establishment of scientific and technological education (9) employment problems of young workers (10) correction of differences between urban and agricultural areas (11) policy news; 12) (1) establishment of political stability (2) system of leading the (illegible) group (3) transition from ideological trends to political trends (4) avoidance of political disturbances such as the Cultural Revolution and the Gang of Four (5) systematization and democratic policy; 13) (1) avoidance of border disputes (2) maintenance of the present status of Formosa problems (3) worsening of relations with USSR, introduction of European military technologies (4) introduction of advanced technologies from Japan, Europe and USA (5) expansion of foreign trade; 14) (1) population control (2) productivity of agriculture (3) expanded capacity of basic industries (4) basic constructions in priority (5) increased willingness in production (6) introduction of plant technology from advanced nations; 15) (7) modernization of electricity, railroads and ports, elimination of bottlenecks (8) job establishment (9) education of engineers; 16) four modernization policies and "National Economy Announcement of 10-year Project" (1975-1985); 17) (1) policy decision, planning, adjustment; administrative organization (2) leadership of the national projects, economy, basic construction committees (3) adjustment between the long term and short term plans and among individual sections (4) adjustment of benefits in army, agricultural areas and cities; 18) (1) a long term trade treaty for stabilizing foreign trade relations (2) increased export in order to increase foreign payments (3) cooperation with Japan, Europe and USA; 19) policies for modernization of agriculture, industry and defense; 20) obstructions; 21) (1) old age of leaders (2) ideological struggles (3) generation gaps (4) policies, planning and executive powers of technocrats (5) dissatisfaction of the lower class generation of the Cultural Revolution and youth; 22) (1) capability of absorbing foreign technologies and capital and its speed (2) payment capacity (3) struggle between different lines of the open economy policy and reactions (4) dealing with USSR; 23) (1) imbalance between agriculture and industry (2) imbalance of capital in different sections of industry (3) trade deficit due to import of advanced technology and plants (4) inefficiency of economic operation and business management (5) bottlenecks of electricity and railroads (6) labor employment and

lack of technicians; 24) revision of the plan and adjustment news (1979-81); 25) (1) adjustment of policy targets (2) agreement concerning priority, method and speed of achieving targets (3) expulsion of the extreme leftist reaction (4) reflection of the public mood (5) adjustment of interests between the People's Liberation Army and the Communist party bureaucrats; 26) (1) the upper limit of carrying foreign loans (2) balance between the "self reliance" and dependence on foreign nations (3) balance of dependence on Japan, Europe and USA; 27) (1) emphasis on agriculture (strengthening the lower organization of the people's corporation, recognition of privately owned farms and price increasing of agricultural products) (2) reduction of the investment plan for basic construction and adjustment (3) promotion of light industry for export such as agricultural product processing and food industry; 28) assignments and problems; 29) (1) health of Ten Shiao Pin (2) adjustment of the left and right (3) interpretation of Mao's idea of revolution (4) establishment of a political system (5) separation of the Chinese Communist party from the general public (6) organization of the Cultural Revolution generation and the after-war generations (7) centralization of the power and regional distribution of the power (8) political responsibility of the economic planning (1980, 1985); 30) (1) ideology and closer relations with Japan, Europe and USA (2) relation with USSR and southeastern Asia problems (3) dealing with Taiwan (4) securing export markets (5) leadership in the third world; 31) (1) needs for improving the level of the living standard and increased welfare (2) production efficiency and "three differences" (agriculture vs. industry, urban and agricultural areas, white collar and blue collar) (3) modernization and ideologies such as "three into one", "three combinations" and "running capital" (4) effects of demonstration and social dissatisfaction (5) increased financial load (defense, education, welfare, basic construction, etc.) (6) the upper limit of increase of the agricultural productivity and natural disasters (7) preparation for industry and foundations of living (removal of bottlenecks) (8) elite education and discrimination (9) adjustment of planned economy and market economy

TABLE I-45. Prospect of China in the 1980 Era

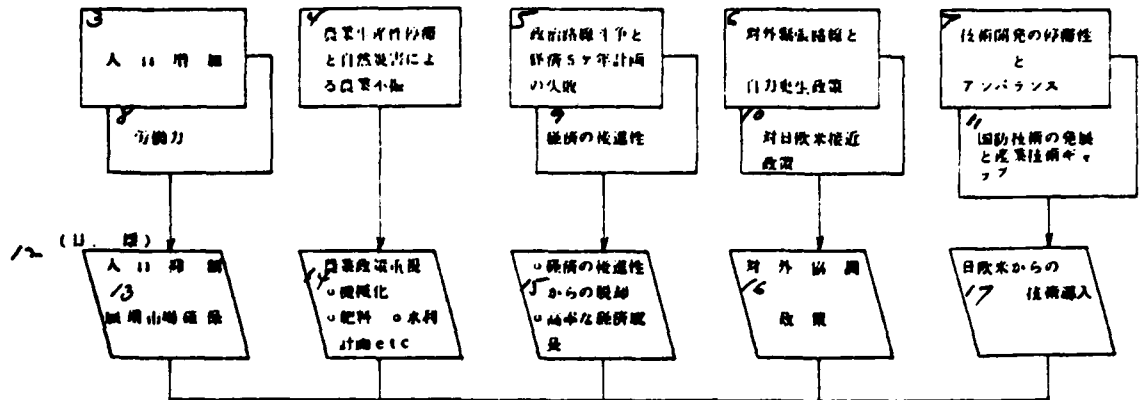
チェックポイント	
2 政治的安定度	3 <ul style="list-style-type: none"> ● 現政権の特色は党幹部の階級ではあるが、実務派（とくに鄧小平）の後継者選定の如何によって文革風の巻き返しも考えられる。 ● 文革派内部でも若干の対立はあるが、基本的に「近代化」路線は維持されるであろう。 ● 文革派復活の場合は、自力更生」路線が強化されよう。
4 独断的ナショナリズム	5 <ul style="list-style-type: none"> ● 農 業 改 革 ● 統 計 の 不 備 ● 経済計画の半計画化
6 経済的発展	7 教 育 <ul style="list-style-type: none"> ● 中 学 卒 生 (1949年149万人→1973年2392~3427万人)、自然科学大学卒生 (1949年63千人→1973年765千人)の推移からみて、教育水準は一定の段階に達してきた。
	9 労働力 <ul style="list-style-type: none"> ● 若年労働力が豊富でしかも完全雇用に近いものと推定される。 ● しかし、失業者400万人、1千万年2000万人といわれる中で、今後これらの人口に対する雇用機会の開拓がなされるか、近代化の成否を測っているともいえる。
	11 技 術 <ul style="list-style-type: none"> ● あらゆる主要分野が豊容に達しているが、その開発レベルは輸送・インフラ整備、外国技術の導入、合併、PS方式の可能性などが焦点となろう。
	13 資本蓄積と投資 <ul style="list-style-type: none"> (1) 外資導入の可能な内外の情勢変化 (2) 消費生活の向上は否かの政治的公約であるが、物質生産のデフレスには限界があるところから、生活向上はいささかには遠慮されたいだろう。 (3) 軍事削減——軍中、対ベトナムとの緊張関係はのこるが、国防予算は現在（支出の10~20%）より大幅な拡大はのめられないだろう。 (4) 生産部門——生産部門のバランス インフラ整備がどこまで進むか？
	15 技 術 <ul style="list-style-type: none"> ● 一般的に先進国より20~30年の遅れをもつ中国の技術が先進水準にいつまでたっても追いつけるか？
17 結 論	18 <ul style="list-style-type: none"> ● 近代化路線は基本的に継続されよう。 ● 政治的安定度が中期的に高いとすれば、経済改革を重んずる政策が今後も続く。 ● しかし、経済の成長は思々の制約から近代化路線が成功しても7%台が適当ではなかろうか。

資料 MRIレポート1, p.65

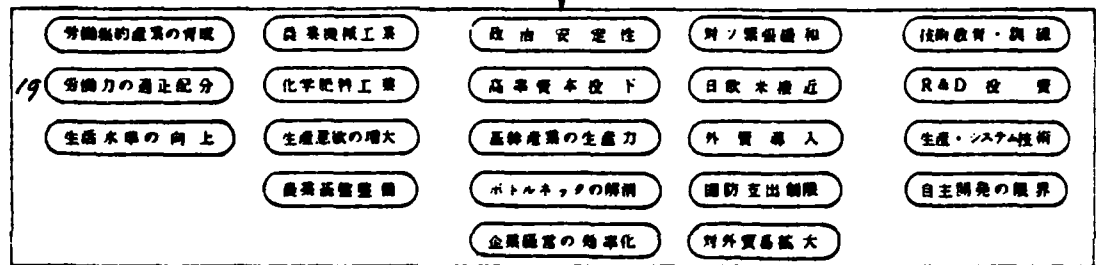
Key to Table I-45. 1) check point; 2) degree of political stability; 3) characteristic point of the current political power is of its line of practicality in priority. However, depending on the successor of this practical group (especially Ten Shiao Pin), return of the Cultural Revolution is not impossible - . there are some conflicts within this practical group but the line of "modernization" will in principle be continued - . if the Cultural Revolution group becomes dominant, the "self reliance" line will be emphasized; 4) mechanism of the system; 5) . vertically divided administration - . lack of statistics - incomplete planning of the planned economy; 6) economic side; 7) education; 8) labor force; 8) judging from changes of the number of junior high graduates (1.49 millions in 1949 + 23.92 ~ 34.27 million in 1973) and those of natural science universities (6.3 thousands in 1949 + 76.5 thousands in 1973), the level of education has reached a certain steady level; 10) . it is estimated that young labor forces are abundant and fully employed; 11) resources; 10 (con'd) . however, there are 4,000,000 unemployed people and 20,000,000 youths. Success of modernization will be decided by whether employment opportunities for these people can be created in the future or not; 12) . all sorts of mineral resources are abundant; however, the focal points of the speed of their exploration and development will be transportation, infrastructure introduction of foreign technologies, merging and the possibility of the PS method; 13) accumulation of capital and investment; 14) (a) changes of domestic and international situations affecting the possibility of importing foreign technologies (b) improving the living standard of the consumers is a political promise made by the Chinese government. However, the tempo of material production has a limit. Therefore, this improvement won't be realized soon (c) military side: Although tensions against the USSR and Vietnam will remain, the defense budget will not increase greatly from the present level (10~20% of the annual expenditures) (d) production section--balance among individual production sections. How far can the infrastructure be prepared?; 15) technology; 16) . can the Chinese technology, which is behind advanced nations by 20-30 years, catch up?; 17) conclusion; 18) (.) the line of modernization will in principle be continued (.) if political stability is high in the mid-term, the policy of emphasizing economic efficiency will continue; (.) however, economic growth, even if successful, will be at most ~7% because of various restrictions; 19) reference: MEI report 1, p. 65

Figure I-16. Scenario of development of the Chinese economy

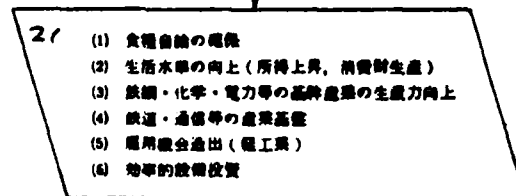
2 (前提条件)



18 (主要条件)



20 (主要課題・課題)



22 (中国経済の長期発展シナリオ)

23 政治路線	24 対外関係	25 経済政策	26 技術開発
<p>27</p> <ul style="list-style-type: none"> 過去の路線から過度な急激路線対立は避ける 経済政策が優先 長期的には変換路線が必要 政治組織の制度化が進展 	<p>28</p> <ul style="list-style-type: none"> 対ソ緊急緩和の方向 多角的日欧米接近 協調外交の進展 貿易拡大 外資導入積極化 台湾問題現状維持 国境紛争回避 	<p>29</p> <ul style="list-style-type: none"> 一定水準成長率確保 後進国経済脱却 農業重視 基幹重化学工業生産力拡大 電力・鉄道・輸送力通信等のボトルネックの解消 	<p>30</p> <ul style="list-style-type: none"> ソ連技術体系から西欧技術大系への移行 土産技術・自力更生の反省 設計・生産・管理技術の開発・導入 国防技術一定水準 (陸軍火力, 空軍機動能力, 制空権確保能力)

Key to Figure I-16. 2) prepositions; 3) population increase; 4) agricultural depression because of stagnated productivity and natural disasters; 5) political party struggles and failure of the 5-year plan; 6) tense foreign relations and self-reliance policy; 7) stagnation and imbalance of technical development; 8) labor force; 9) political backwardness; 10) policy of closer relations with Japan, Europe and the USA; 11) gap between development of defense technology and industrial technology; 12) TARGET population control; 13) establishment of a job market; 14) emphasis on agricultural policies - . mechanization - . fertilizer - . irrigation projects, etc.; 15) . growing out of the economical backwardness - . economic growth of high growth rate; 16) policy of international cooperations; 17) introduction of technology from Japan, Europe and the USA; 18) (main conditions); 19) (TR note: from left to right, column-wise) - growth of labor concentrated industry; proper distribution of labor forces; improved living standards - agricultural machine industry; chemical fertilizer industry; increased willingness of production; preparation of agricultural foundations - political stability; capital investment of high ratio; productivity of basic industry; removal of bottlenecks; improved efficiency of business management - reduced tension against the USSR; closer relations with Japan, Europe and the USA; introduction of foreign capital; restriction of defense expense; expansion of foreign trades - technical education and training; R & D investment; production system technique; limit of self-development; 20) major problems and assignments; 21) (1) establishing self-supply of food (2) improving the living standard (increased income and production of consumer goods) (3) increased production capacity of basic industries, such as steel, chemicals and electricity (4) foundation of industries, such as railroad and communication (5) creation of employment opportunities (light industry) (6) efficient capital investment in equipment; 22) (a scenario of the long term development of the Chinese economy); 23) political line; 24) foreign relations; 25) economic policy; 26) technical development; 27) . considering the past experience, extreme conflicts among political lines will be avoided - . economic policy in priority - . in a long term, the line of the present power will continue - . development of political organizations; 28) . direction toward reduced tension against the USSR - . closer relations with Japan, Europe and the USA from various angles - . progress of cooperative foreign policy - . expansion of foreign trades - . positive introduction of foreign capital - . maintenance of the present situation concerning Taiwan - . avoiding border disputes; 29) . establishing a certain level of growth rate - . growing out of economy of underdeveloped nations - . emphasis on agriculture - . increased productivity of basic, heavy and chemical industries - . removal of bottlenecks in electricity, railroads, transportation and communication; 30) . transition from the USSR type technology system to the European system - . reexamination of primitive, self-reliance - . development and introduction of design, production and management techniques - . defence technology reaches a certain level (army fire power, air force interception capability, restricted nuclear retaliation power)

Table I-46. An example of the long term prospect of the Chinese economy

研究機関・専門家	政治動向	経済動向	出所
5 トールズ・ジュラム教授 (ロンドン大学)	6 ○長期的には「改革」の革命イデオロギーの影響が低く、実質的な現実主義路線がとられる。 ○中ソ対立はナショナリズムの対立版今後も続く。	7 ○中国経済はまだ発展途上の水準にあり、今後一層の経済開発努力が促進されよう。	8 イギリス中国問題学会の発表 (1977・9)
9 W・クラット主任研究員 (オックスフォード大学)	10 ○4人組協議後、左右両派路線の確立が確くと予想される。 ○但し、左右の政策論争は、経済政策をめぐって進展に行われよう。	11 ○中国の5ヶ年経済計画成功したことがない。 ○中国経済のネックは農業問題にあり、多額の農業開発投資が必要。 ○第5次経済計画(1976-80)も初年度から政府統制、河北地震、上海労働者ストライキ、杭州事件、農業の自然災害等によって最初からつまづいている。 ○大規模農業開発、大規模工業開発には限界がある。	12 蘭利ヒヤリング (1977・9)
13 軍事問題専門家 ハンス・ハイマン (ランド研究所) ケネス・ハント (イギリス戦略研究所) ラッセル・スパー (FAR EASTERN ECONOMIC REVIEW) 著者	14 ○中ソ対立はイデオロギー、ナショナリズム、核戦争戦略、経済政策その他諸々の理由から今後10-20年は続く。 ○中国人民解放軍は対ソ戦略上その軍事力の強化が必要であり、脱農牧化、専門化する傾向が強い。 ○中国陸軍は120個師団中64個師団(53%)以上が対ソ戦役に配備されている。	15 ○中国の軍事力はその戦力は1950年代ノミの極東地域における軍事力の強化にともない「国防技術」「国防産業」の近代化は急務。 ○国防費支出(GNP 10%)、国防工業生産額(工業生産額の20%)は農業・工業の近代化計画の上限と考えられる。 ○近辺・周辺産業の近代化が必要、(部品数:モノ-10 ² , ラジオ・テレビ・工作機械-10 ³ , 自動車-10 ⁴ , ジェット機-10 ⁵ , ロケット-10 ⁶)	16 蘭利ヒヤリング 「中国概観」 (1978) アメリカ経済合同委員会 ランド研究所研究論文
17 前田寿夫 中国経済専門 (防衛研究所) 田川五郎 (脱光新聞社)	18 ○人口増加率は過去2%前後、今後1%代に低下させる努力がなされているが ○耕地面積の制限(可耕地面積・全国土の11%)から農業開発が中国経済のネック ○高度な経済成長は非常に困難 ○「四つの近代化」は(1)農業の生産性向上のための農業の機械化、水利化等の農業関連工業の設備投資及びインフラストラクチャーの強化、(2)石油化学関係の大規模プラントの建設、(3)原子力、電力、鉄鋼生産等のエネルギー、高炉産業の生産力の強化、(4)交通・通信等の産業インフラの開発、(5)各種機械工業の生産力強化等が不可欠となる。 ○資本投資のための開発の優先順位、投資配分の決定が合理的に実行される必要がある。	18 「中国の概観」 教育社1978 「中国概観」 1978 蘭利ヒヤリング	
20 石川忠雄 (慶応大学)	21 ○中国の過去30年間の歴史は中国共産党の左右両派の政策対立の歴史 (1)左派路線 毛沢東の連続革命の思想 (2)右派路線 現実主義路線(劉少奇・鄧小平) ○今後左右の対立の路線は低下、蘭利院、人民解放軍官僚、企業集団を支持勢力とする右派路線が中心となる。 ○但し短期的には鄧小平・華国鋒体制は不安定	22 ○経済開発は大量の期待が大きく、経済問題政治問題化する可能性大 ○「四つの近代化」を目標とする10ヶ年計画には種々の障害があり、進捗は低下する。 (1)中国の支払能力、(2)文革期に破壊された科学教育、(3)農村社会の小生産者の生活態度、(4)生産性向上と雇用機会増進との矛盾、(5)下放青年の不満	23 蘭利「中国共産党の現状と将来」 1979年6月
24 岡部直弘 (日経新聞社北京特派員)	25 ○鄧小平登場後、共産党の組織、宣伝、対外連絡、人民解放軍の中核、国家計画委員会等の機関の主要機関をかためる。 ○左右の対立は80年、85年に表面化してくると予想される ○左派(文革派)の巻き返しあり得る。 ○右派の西化志向、経済計画の失敗、西化技術導入の欠点に対する批判 ○鄧小平の路線が生き残りとなる。	26 ○農民の経済開発に対する期待大、西化日本の先進国のデモンストレーション。○結果 ○計画経済の種々の欠点、(1)設計不足、(2)産業連関知識不足、(3)増給ギャップ、(4)物流システムの未整備、(5)ヤミ市場、(6)エリート教育、(7)企業経営者層の試行錯誤	27 蘭利「鄧小平の中国」 1979年4月

Key to Table I-46: 1) research organization, specialist; 2) political movement; 3) economic movement; 4) source; 5) Professor Charles Shram; 6) . in a long term, influences of the revolutionary ideology by Mao decreases and a realistic practical line will be followed - . conflicts between China and the USSR will continue since this is a conflict of nationalism; 7) . the Chinese economy is still that of a backward nation. In the future, more efforts will be made for economic development; 8) speech at the China Problem Conference in England (1977-9); 9) Senior research staff W. Cratt (Oxford University); 10) . after the purge of the Gang of Four, the policy of compromising the left and right is expected to continue - . however, policy debates between the left and right concerning economic policy will be actively debated; 11) . the Chinese 5-year plans have not succeeded - . the bottleneck of Chinese economy is agricultural problems. A large investment in agricultural development is necessary - . the 5th economic plan (1976-80) also stumbled from the beginning because of political chaos, the Ka-sen earthquake, Shanghai labor strike, the Koshu incident and natural disasters in agriculture - . there are limits to agricultural development of Taisai type and industrial development of Taikai type; 12) individual hearings (1977-9); 13) military problem specialist - Hans Heimann (Land Corp.) Kenneth Hunt, English Strategy Research Institute) Russell Spur, Far Eastern Economic Review, Jugo Wakamatsu; 14) . confrontation between China and the USSR will continue for the next 10-20 years because of many reasons, such as ideology, nationalism, nuclear war strategy and economic policy - . the Chinese people's liberation army has to strengthen its military power for confronting the USSR; therefore, it will tend to be separated from politics and be specialized - . out of 120 divisions of the Chinese army, 64 divisions (53%) are placed along the border with the USSR; 15) . the military power is at the level of the 1950's - . with the intensification of the USSR military power in the far east, modernization of "defense technology" and "defense industry" is urgent - . the defense expense (GNP 10%) and defense industry production are both the upper limit of the modernization plan of agriculture and industry - . necessary to modernize the bottom line and peripheral industries (number of parts: sewing machines 10^2 , radio, television and manufacturing tools 10^3 , automobiles 10^4 , jet planes 10^5 , rockets 10^6); 16) individual hearings (China Review 1978) - USA Economic Joint Committee - Research paper from Rand Corp; 17) Hisao Maeda - Chinese economy specialist (Defense Research Institute) - Goro Tagawa (editorial staff, Yomiuri Newspaper); 18) . the rate of population increase was $\sim 2\%$ in the past and efforts have been made to lower it to $\sim 1\%$ - . because of limited agricultural land (area about 11% of the total area of China), agricultural development is a bottleneck of the Chinese economy - . high economic growth is very difficult - . the "four modernizations" includes (1) mechanization of agriculture to increase its productivity and irrigation and other agriculture-related problems (2) construction of large plants of oil and chemical industries (3) crude oil production, electricity, energy for steel production and increased productivity of basic industries (4) development of industrial infrastructure, such as transportation and communication (5) increased productivity of various machine manufacturing industry -

they are all indispensable - . development by capital investment in priority and decision of capital distribution must be reasonably executed; 19) "Chinese economy" Kyoiku-sha (1978) - "China Review 1978 - individual hearings; 20) Tadao Ishikawa (Keio University); 21) the past 3 years history of China is a history of political confrontation between the left and right of the Chinese Communist party (1) the left line - idea of continued revolution of Mao (2) the right line - practical moderate line (Ryusho-ki, Ten Piao Pin) - . the amplitude of the left and right confrontation will decrease in the future. The right line supporting department of state, People's Liberation Army, bureaucrats and business groups - . however, in a short period of time, the Ten Shiao Pin and Kakoku Ho system is unstable; 22) . People's expectation on economic development is great and economic problems can become political problems - . "there are many obstacles to the 10-year plan aiming at four modernizations" and its speed will decrease (1) payment capability of China (2) science education destroyed during the Cultural Revolution (3) the attitude of a small manufacturer type in the agricultural society (4) contradiction between increased productivity and stagnation of employment opportunities (5) dissatisfaction of youth in the lower classes; 23) lecture "the present and future of the Chinese Communist Party", June 1979; 24) Omihiko Okada (correspondent of Nikkei Newspaper in Peking); 25) . establish major organizations of the department of state, such as the Ten Shiao Pin power group, Communist Party organization, propaganda foreign communications, the center of the people's liberation army and the national economic planning committee - . the confrontation between the left and right is expected to surface in 1980-85 - return of the leftist (revolutionary group) is possible - . criticism of the right party of its inclination to the western nations, failure of economic plans and flaws of introducing western technologies - . health of Ten Shiao Pin is a key factor; 26) expectation of the people from the economic development is great. Effects of demonstrations by advanced nations in the west and Japan - . many flaws of planned economy (1) lack of statistics - . lack of knowledge of industry (3) gap between supply and demand (4) unpreparedness of the products flow system (5) black market (6) elite education (7) trial and error of method of business management; 27) lecture "Ten Shiao Pin's China", April 1979

Table I-46 (continued)

1 研究機関・専門家	2 政治動向	3 経済動向	4 出所
山内一男 中国経済 (産大大学) 5	文化革命以降の長期的傾向 ○大型工業と先進技術への積極的取組み ○対外経済交流の積極化 ○企業管理の健全化 ○農産品から工業品への転換 ○「七五」から「七六」へ ○「二本足で歩く」工業化計画(中央大工業と地方中小工業) ○いさすぎと偏向の是正 長期的には中国の工業化は急激に進捗する		「中国経済をどうみるか」 1977年 日経新聞
日経センター 8	○過去中国経済の成長は、政治的不安定に1つの大きな原因があり、国内及び対外的にも困難路線が重要視されよう。 ○中国の軍事力は米・ソに対して10~20年前後おくれであり、「対米ソ緊急緩和」は長期的な戦略となろう。	○中国の生活水準は低位にあるが、中国の成長ポテンシャルは高い。 ○成長促進条件は、(1)農産の労働力、(2)製造業及び外需性増及び資本輸入による生産性の向上、(3)石油その他の天然資源の豊富な賦存量 ○阻害条件は、(1)農業生産の不安定性 (2)政治的不安定性	「日中経済関係の研究」 1978年
アメリカ上下合同経済委員会 12	13 (政治動向) (1)中国の政治は構造的には不安定 (2)「経済路線」及び対外関係路線は中国の国際環境変化(対米ソ)に大きく依存する。 (3)過去の中国の政治動向から判断して、軍部及び農村寄りの、文革後不満:consumer goods 67.4 を支持勢力とする左派の巻きかえしが mfg. goods 108.8 1980年以前に起る可能性は充分 svc. industry 60.7 る。 pop(million) 936 (4)その場合には中央権力の低下、軍部 GNP per capita 345 指導力の強化が行 consumption per capita 207 (経済成長促進要因) (1)GNPの約1/4の投資、(2)農村部の基本建設投資、(3)軍事支出の抑制、(4)産業技術進歩、(5)対外貿易収支の増加、(6)輸入消費の増加、(7)人口抑制、(8)政治安定 (経済成長阻害要因) (1)食料更生イデオロギー、(2)近右の政治対立、(3)農業の不順、(4)電力、交通部門の立ちおくれ (工業の発展) (1)機械産業が国々の近代化のキー (2)電力不足を克服するため、工業生産の1.5~1.4倍の水準で増加する必要がある。そのため1978~83年3段階の発電設備、設備の輸入が必要 (3)工業生産年平均10%を可能にする電力供給は不可能	(Overview of macro-economic moves) annual average growth 1975 1985 GNP (10 ⁴ \$), 323 6061 6.5 1976 price agriculture 86.1 110.2 2~3 industry 176.1 398.1 8.5 consumer goods 67.4 126.5 6~7 mfg. goods 108.8 269.8 9~10 svc. industry 60.7 99.8 5.1 pop(million) 936 1,114.0 1.8 GNP per capita 345 544.0 4.7 consumption per capita 207 326.0 4.7 trade export 7.0 12.0 3~6 import 7.4 12.6 5~6 (農業の発展) 14 (1)肥田化学プラントが輸入され、農業生産は好転 (2)1985年目標4億トンは達成出来ないにしても1人当たり生産量は大幅に伸びる (3)多毛作化により肥料、水利、灌漑設備、労働力の需要が増加 (対外貿易) (1)中国の対外貿易依存度は低い(5%前後) (2)輸入需要は国内生産補充。 (3)対外貿易の拡大は石油、農工業品等の輸出増加に左右される。	Chinese Economy post Mao Nov. 1978

Key to Table I-46 (continued): 1) research organization, specialist; 2) political move; 3) economic move; 4) source; 5) Kazuo Yamauchi, Chinese Economy (Hosei University); 6) long term trends after the Cultural Revolution - positive approach towards large scale industries and advanced technology - intensification of foreign economic exchanges - sound business management - transition from an agricultural nation to an industrial nation - from the "domestic method" to the "Western method" - a "walk on two feet" type industrialization plan (large industries in the center and middle and small industries in rural areas) - correction of excessive and prejudices - in a long run, industrialization of China will smoothly progress; 7) "How to understand the Chinese Economy" Nikkei Newspaper, 1977; 8) Nikkei Center; 9) a major cause of economic chaos of China in the past is political instability; therefore, emphasis will be put on compromising lines both domestically and internationally - the Chinese military power is behind those of the USSR and the USA by 10-20 years. A long term policy of "detente with USA and USSR" will be adopted; 10) the living standard of China is low but the growth potential of China is high - conditions for accelerating the growth are (1) high quality labor force (2) increased productivity by industrial policies and introduction of foreign technologies and capital (3) natural resources, such as oil, are abundant - obstacles are (1) instability of agricultural production (2) political instability; 11) "Study of economic relations between Japan and China" (1978); 12) USA Senate and Congress Joint Economic Committee; 13) political move) (1) Chinese politics is potentially unstable (2) "the compromising line" and "international cooperation line" greatly depend on changes of international environments surrounding China (against the USA and the USSR) (3) judging from the past political move of China, it is quite possible that the leftist group supported by the military, young generations in agricultural areas and dissatisfied groups of the Cultural Revolution will return and gain a power around 1980 (4) in that case, the power of the central government will decrease and the power of the military will increase - (Factors for promoting economic growth) (1) investment which is about 1/4 of GNP (2) investment in basic construction in agricultural areas (3) control of military expense (4) progress of industrial technology (5) increase of foreign trade balance (6) increase of individual's consumption (7) population control (8) political stability - (Factors obstructing the economic growth) (1) "self reliance" ideology (2) political confrontation between the left and right (3) agricultural depression (4) backwardness of electricity and transportation sections - (overview of industry) (1) mechanization of industry is the key for "four modernizations" (2) in order to overcome shortages of electricity, it must be increased 1.3-1.4 times faster than industrial production. Therefore, import equivalent of 300 million dollars of electric generators and facilities is necessary in 1978-1985 (3) supply of electricity which enables making the average industrial production of 10% is impossible; 14) (overview of industry) (1) chemical fertilizer plants will be imported and agricultural production will improve (2) even if the target of 4×10^8 tons in 1985 may not be realized, production per capita will greatly increase (3) demand for fertilizer, irrigation

Key to I-46 continued: facilities and labor forces increases because of multiple harvesting - (foreign trade) (1) dependence of China on foreign trades is low (~5%) (2) imports will supplement domestic production (3) expansion of foreign trade depends on increase of export of oil and light industry products

Table I-46 (continued)

1 研究機関・専門家	2 政治動向	3 経済動向	4 出所
<p>本下設部 (日本輸出入銀行 海外投資研究所)</p> <p>5</p>	<p>(政策路線)</p> <ul style="list-style-type: none"> ○中国は経済開発計画を重要に実現するための外国の新工業技術及び外資の導入が不可欠であり、主要貿易相手国との間に、長期安定的な政治・外交・貿易関係を確立しようとするだろう。 ○基本的な政策は「経済合理性」の追求と貿易収支の拡大均衡政策がとられよう。 <p>(中国経済の課題)</p> <ul style="list-style-type: none"> (1)高い人口圧力の削減 (2)食料、工業用生産物の増産 (3)農業の機械化と大量の雇用機会の創出 (4)工業生産の拡大 (5)輸送体系の拡充 (6)エネルギー生産 (7)投資資金の拡充 <p>(貿易政策)</p> <ul style="list-style-type: none"> (1)産業政策の支援(基礎産業の能力、拡大、生産性向上、ボトルネック解消、エネルギー開発、輸出、食料増産) (2)貿易収支拡大均衡 (3)借款、投資、援助と「自力更生」とのバランス (4)輸入プラント、導入技術と関連技術体系との関係 <p>6</p>	<p>(マクロ動向)</p> <ul style="list-style-type: none"> ○現在の中国の所得・消費水準は世界の平均以下であり、中国経済の近代化は中国の長期的な大きな国家目標 ○中国経済の長期的実質経済成長率(1952~75)は年平均5.8%であるが、今後長期的には成長率7.5%、人口伸び率1.3%とみるのが妥当 ○2000年の1人当りGNPは1,344ドル(1975年価格)と推計 <p>7</p> <p>(今後の産業政策の展開)</p> <ul style="list-style-type: none"> (1)漸進的資金配分の徹底 (2)資源開発及び工業の生産効率の向上(成土立地、大型化、近代化、既存設備の改良、協業・専業化、製品標準化、製造原単位の引き下げ、交通体系の確立) (3)農業生産性引き上げ(多毛作化、化学肥料の投入、農業機械化、インフラ整備) (4)農林部門の多角経営化と農村工業化の推進(農村余剰労働力吸収、農家所得の増大) (5)大工場と中小工場の役割分担(「規模の利益」と労働集約) (6)生産基盤部門の打固(発電設備と輸送) <p>(工業政策)</p> <ul style="list-style-type: none"> (1)投資配分の優先順位(鉄鋼、非鉄等の基礎工業、農業支援工業、重機械工業、軽工業、耐久消費財) (2)産業過剰バランスと投資効率(「両方過剰効果」と「後方過剰効果」) (3)消費増進に対応した工業政策(「必需品消費」から「耐久消費財」) (4)雇用創出工業政策(年間6~8百万の追加的雇用機会) 	<p>「中国の経済発展パフォーマンスと今後の産業貿易政策」</p> <p>8 1978年3月</p>

Key to Table I-46 (continued): 1) research organization, specialist; 2) political move; 3) economic move; 4) source; 5) Toshihiko Kinoshita (Foreign Investment Research Institute of Japan, Export and Import Bank); 6) (political line) - in order for China to steadily realize the economic development plans she has to introduce new mining and industrial technology and capital from foreign countries; therefore, she will try to establish a long term stable political, diplomatic and trade relations with major trading nations - the basic policy will be pursuit of "economic reasonableness" and expanded balance of trades - (tasks of Chinese economy) (1) reduction of large population pressure (2) increased production of food and agricultural products for industrial use (3) mechanization of agriculture and creation of a large number of employment opportunities (4) expanded industrial production (5) expansion of the transportation system (6) energy production (7) expansion of investment capital - (trade policy) (1) support of industrial policies (improvement of capability of basic industries, productivity, removal of bottlenecks, energy exploration, export, increased food production) (2) increased balance of trade (3) balance between loan, investment, aid and "self-reliance" (4) harmony between imported plants and technologies and the domestic technology system; 7) (macro movement) - the present income and consumer level in China are below the average in the world. Modernization of Chinese economy is a long term important target of China - the long term actual growth rate of Chinese economy (1952-1975) is the annual average of 5.8%. However, in the long run, the growth rate and population increase will be 7.5% and 1.3% respectively - GNP per capita in 2000 A. D. is estimated to be \$1344 (price in 1975) - (Future development of industrial policies) (1) thorough practice of graduated capital distribution (2) improved productivity in resource development and industry (optimal locations, large scale, modernization improvement of the present facilities, combined and specialized work, standardization of products, reduction of original cost of products, establishment of transportation systems) (3) increase of agricultural productivity (multi-harvesting, use of chemical fertilizers, mechanization of agriculture, preparation of infrastructures) (4) multi-phase operation of the agricultural section and promotion of agricultural industrialization (absorption of excess labor forces in agricultural areas, increase of farmer income) (5) assignment of separate roles to large and small and medium factories (advantage of the scale and labor concentration) (6) removal of obstacles to production (electric power generation and transportation) - (Industrial policy) (1) priority order of capital investment distribution (basic industry of steel and non-iron, agriculture-supporting industry, heavy machine industry, light industry, durable consumer goods) (2) balance among individual industries and effective capital investment ("Effects of forward relations" and "effects of backward relations") (3) industrial policies corresponding to consumption structures (from "daily necessities" to "durable consumer goods") (4) industrial policies for creating employment (annually 6-8 million additional employment opportunities); 8) "performance of the economic development in China and future industrial and trade policies", March 1978.

II. TECHNOLOGY IN CHINA

II-1. Process of technological development in China.

The process of development of scientific and industrial technologies in China may be understood by the following three stages:

The first stage (1949-60) technological development by introduction and absorption of Soviet technology -

the second stage (1960-70) based on the Soviet technology system, "self-reliance": domestic technology was developed -

the third stage (1970 -) introduction of advanced Western technology.

However, evaluation of the level of the Chinese technology differs considerably depending on positive evaluation and negative evaluation.

Positive evaluation

1. China succeeded in making the first atomic bomb in October, 1964, and in June, 1967, she succeeded in hydrogen bombs. In April, 1970, she succeeded in launching the first satellite. Therefore, China seems ahead of Japan in the forefront military technology, such as nuclear weaponry, missile, artificial satellite and jet planes.

2. The rocket industry has a feature which involves fine processing of 10^6 parts and is a system industry. It demands the most advanced technology. China is already at a high level in this field and the level of Chinese scientific technology should be highly estimated.

3. In China, differing from democratic societies, one can carry on technological research and development by ignoring costs. Although there are some imbalances in the technology system, emphasis was put on development of military science, technology and basic industrial technology.

4. Almost 30 years have elapsed since the independence of China. Starting with the introduction of Soviet technology, China went through four economic plans. The design technology of China started by copying imported machines is now at the stage of proceeding her own way.

5. Under the authority of the Science Academy, which has been playing a central role in development of science and technology in China, more than 130 scientific research institutes were built. It is estimated that the budget for research and development is 1% of GNP and the number of scientists are 110,000, 600,000 engineers and the total number of researchers are about 1,200,000.

6. China is positively importing large scale plants from Europe and Japan in the basic industries, such as steel, chemical and shipbuilding. Also, most of those plants are the most advanced types in Japan and Europe. Automobile production in China has already reached the level of 30,000 vehicles annually. As seen from these, China is capable of introducing the most advanced technology from foreign countries. The effects of propagation of these industrial technologies will be great.

7. Industrial production in China has been smoothly progressing even in the period of the Cultural Revolution. It is dangerous to underestimate the level of Chinese technology.

Negative evaluation

1. Scientific technology in China rapidly progressed until

around 1960 by technical aids from the USSR. However, she was later forced to self-development because of deepening confrontation with the Soviets. In the meantime, technological development in other nations progressed rapidly. In order to catch up from this delay, China is eager to import technology from the West and Japan in recent years. The level of Chinese technology is about 10-20 years behind, compared to Europe and the USA.

2. Japanese technological progress was greatly aided by license introduction of advanced technology from Europe and the USA. China has been only doing level-up of prototype copied productions technology by herself until recent years. She is inferior in design and management technology.

3. Scientific technology in China has been developed in priority based on national plans. Therefore, considerable imbalances exist among different fields. Total systematization of highly advanced technology levels cannot be done and her capability of technological revolution is weak.

4. Development of technology and industry in China has a small base and peripheral technology and industry have not developed. In the case of automobile industry, the internal manufacturing rate of "Choshun 1st vehicle factory", a representative factory, is estimated to be ~70%. In shipbuilding, more than a half of the main engines, complementary machines, crankshafts, gear speed reducers, propellers, anchors, chains, rudders, cranes and electric power generators are made in the shipbuilding plant.

5. The level of production technology in China is low. She is inferior in production planning necessary for mass production, process management, assembly plan, design and planning of parts, individual progress control, design of production facilities, quality control, tools, factory management, management and planning of introducing electronic computers, and her productivity is low.

6. The level of military science and technology also remains at the level of self-improvement of technology of Soviet weaponry system of the 1950's. For example, the performance of the T59 tank, which is a prototype copy of the Soviet 54A model tank, is inferior to its original. The number of jet planes equipped with all weather flight is limited. The maintenance capability is also weak. The Trident jet plane which was imported from England by the Chinese commercial aviation bureau is still serviced in Hong Kong.

7. Chinese lacks in stimula of free market competition in a free economy society, These stimulations cause technological advancement. Therefore, she cannot help being behind free economy societies in the technological level.

8. Education of science and technology in China was greatly affected during the Cultural Revolution. The effects, such as intensified political ideologies, sending educated youths to farms, interruption of education and academic activities, etc., are beyond the scope. The education level of science and technology in China is low. The number of skilled laborers is also limited. This is a big obstacle to technological progress.

As mentioned in the above, the positive and negative evaluations of the technological level and future development of research are quite different from each other. The interpretation depends on an author's attitude, viewpoint and emphasis, etc. However, the following points should be noted.

1. Although the overall level of science and technology in China has not reached the level of the USA, the USSR and advanced European nations, there are some sections which are ahead of Japan (nuclear and missile technology, etc.).

2. In China, research and development can be done by ignoring the cost of economy. Also for national purposes, she can draft

human and material resources. Therefore, a concentrated progress is possible.

3. Because of technology introduction from Japan and the western nations, technological progress after the 1970's will be accelerated.

Judging from the above points, it is not proper to underestimate the technological level and capability of development in China.

Table II-1. The history of Chinese politics and technical development

	1 政 治	2 技 術
1949	3 10/1 新中国誕生	4 旧日本, ソ連援助による技術復興
'50	経済復興 5	6 ソ連技術的役割、旧エリート
'51		
'52		
'53		
'54	第一次五カ年計画	ソ連, 東欧からの技術導入 9 ①
'55	8 4/25 毛沢東「十大関係について」指示	
'56	10 社会主義建設総路線提起	
'57	11 第二次五カ年初期	
'58	12 大躍進, 人民公社	自主技術育成…土法小型高炉など 14 大庆油田発見(9/26) ソ連技術者総引上げ 農民・下級労働者が技術の担い手として登上 19
'59	13 自力更生, 三大差別の除去 「鞍鋼憲法」指示	
'60	15 全面調整	
'61	16 突権派による重工業優先論の巻きかえし	
'62	21 文化大革命始る	17 大庆石油コンビナート建設 18 ② 西欧からの技術, プラント導入
'63	22 第三次五カ年計画	
'64	23 総路線の確認斗争	
'65	25 文化大革命終結	
'66		自力更生の強調 24 地方小型工業復活 26
'67		
'68		
'69		
'70		29 ③ 日本, 西欧より大型石油コンビナート導入 日本, アメリカ, 西欧より大型アンモニア-尿素プラント導入
'71	27 批林批孔	
'72	28 9月中国交回復	
'73	29 批資派批判	
'74	30 四人組批判	32 74 石油プラント
'75		
'76		
'77		
'78		
'79		
1980		

資料：日中経済協会編「中国における産業技術の進歩と産業構造の変動について」。

1977年3月

Key to Table II-1: 1) politics; 2) technology; 3) 10/1 new China was born; 4) technological recovery by aids from the Soviets and Japan; 5) initial planning period
 6) main grinding role was played by Soviet engineers and old elite classes; 7) first 5-year plan; 8) 4/25 Mao Tse Tung specifies "10 Great Relations"; 9) introduction of technology from the USSR and eastern European nations; 10) proposal of the socialistic construction line; 11) second 5-year plan, initial stage; 12) great leap forward
 13) great progress, people's corporation, self-reliance, removal of three discriminations, specification of "Aukou Constitution"; 14) growth of free technology--such as domestic compact furnaces - discovery of Taikeli oil field; pull-out of Soviet engineers; 15) total adjustment; 16) return of priority of heavy industry by the actual power group; 17) construction of the Taikeli oil field combine; 18) introduction of plants and technology from the western nations; 19) farmers and lower class laborers came up as the practitioners of technology; 20) third 5-year plan was prepared; 21) Cultural Revolution started; 22) third 5-year plan; 23) struggle for establishing the general policy lines; 24) emphasis on self-reliance; 25) Cultural Revolution ended; 26) recovery of local small scale industries; 27) fourth 5-year plan; 28) criticism of Lin Hi Ko - in September diplomatic relations between Japan and China was restored; 29) introduction of large oil combines from Japan and western nations; introduction of large ammonia-urea plants from Japan, the USA and Europe; 30) fifth 5-year plan; 31) criticism of the capital spending group - criticism of the Gang of Four; 32) import of plants in the fourth period; 33) Source: "Progress of industrial technology and changes of industrial structures in China", edited by Japan-China Economic Society, May 1977

II.2. Analysis and evaluation of the level of industrial technology in China.

It is not easy to evaluate the level of industrial technology of a nation and compare with others. We often express the technological gap between two nations by being behind by 10 or 20 years; however, although it can be objective to a certain extent for individual merchandise, for example, automobiles, the expression is not accurate if we try to talk on the overall technological level of a nation. It only remains to be an initiative and subjective expression and not a quantitative one. Therefore, we have to rely on an indirect method in evaluating the technological level of a nation. Here we investigate it from three viewpoints. The first is a research gap, namely, the gap in assigning resources to research. The second is a management gap or "a gap in techno-

logical progress". This is a difference in the capability of applying scientific discoveries to mass production. In China, the government plays an important role in closing the gap between her and advanced nations. Therefore, we analyzed the research and development plans by the government for this purpose.

The third point is consideration of technological trade balance of OECD. This is a difference between payments of a nation for importing technical know-how, rights of application and patents and the amount received from other nations for exporting them. If the difference shows that the received amount is larger, the nation is exporting technology, namely, the gap is plus and if payment to other nations is larger, the nation is importing technology and the gap is negative.

(1) The level of research and development and its direction.

1) Comparison of the level of investment in research and development.

Considering the research gap, namely, assignment of resources, the assignment of resources was estimated to be 40×10^8 yuan in 1973 and about 1% of GNP. This ratio to GNP is, if applied in 1977, about 1/2 of that of Japan and the absolute value is about 1/4, as shown in the table below.

Table II-2. Comparison of the level of investment in research and development

	1977 $\times 10^9$ ratio to GNP	
China	100 yen	1.0 %
Japan	389	2.1 %
W. Germany	3.16	2.6 %
France	2.04	2.0 %
England	1.51	2.3 %
USA	10.95	2.4 %

NOTE: Calculation was done assuming the GNP ratio of 1% for China. For Japan, the USA and Europe, governmental and private investments were combined.

Source: Scientific and Technological White Paper, International Financial Statistics, Nov. 1978, were used for calculations.

2) Comparison of the number of researchers.

According to study by OECD, the number of people who are engaged in research and development in China was recorded to be 1,190,000 in 1973. Compared with other nations, this figure is extremely large. This is probably the definition of "researcher" is different and includes a wide range of workers. Therefore, we must say that we do not have sufficient information for extracting some evaluation from this angle.

Table II-3. Comparison of the number of researchers

	No. of researchers 1000 persons	No. of researchers per 1000 persons
China (1973)	1,191	13
Japan (1975)	255	23
(1977)	272	24
W. Germany (1975)	94	15
France (1975)	62	12
England (1972)	77	14
USA (1975)	533	25

NOTE: Estimations for China was done using Table I-1-2.
Reference: Scientific and Technological White Paper (1978).

3) Main items in research and development.

China held the National Science and Technology Planning Conference during December, 1977 to January, 1978, and made "The 1978-1985 National Science and Technology Development Plan Summary (draft)". This 8-year plan summary (draft) contains 27 fields, such as natural resources, agriculture, industry, defense, transportation, traffic, marine, environmental protection, medicine, finance and commerce, culture and education, and two sections of

the fundamental science and engineering science. It covers all research in science and technology. It establishes 108 items among them as important items in national science and technology research.

When we compare these 108 items with the Japanese science and technology 10-year basic plan, there are several differences.

One of them is that items which were already used in industry in Japan and not considered in the basic plan are included in important items in China. For example, agricultural mechanization, composite fertilizers, crude oil processing techniques, mechanization of mining power and hydraulic electricity generation, electric power transmission techniques and energy saving techniques are included as problems of the national scale. Computers are also mostly related to industrial use. In these fields, China recognized her considerable backwardness. However, as seen from the fact of launching artificial satellites, there are some fields in which research problems in China are similar to those in Japan. In space exploration technology, high energy physics and genetic engineering, China picked up problems in common with Japan.

As a summary, there are many Chinese research problems which have been used already in Japan. However, remembering excellent results achieved in the past by Chinese scientists and engineers, a rapid technological progress is expected unless policies are reversed in the future.

NOTE: Concerning comparison of research items in China and Japan, see Table I.1.4, pages 6-8 of part 3 of this series.

4) The number of papers in each field of technology.

As a manifestation of research and development, the number of published papers can be regarded as one of the evaluation indices. Especially the papers collected by the International Data Bank are

those estimated to a certain degree by advanced nations, and these have the potential of narrowing the gap of "technological revolution" between China and advanced nations. As data banks, we chose CAC (Chemical Abstracts Condensates) and COMPENDEX (Computerized Engineering Index) and searched scientific and technological papers from China during 1977-78. As a result, we found 339 papers and they are classified according to fields as shown below:

Table II-4. The number of scientific and technical papers published in China in the past two years

a 技 術 分 野	b 論 文 数
① 農業科学技術	38
② エネルギー科学技術	15
③ 材料科学技術	109
④ コンピュータ科学技術	1
⑤ レーザー科学技術	10
⑥ 宇宙科学技術	2
⑦ 高エネルギー物理学	18
⑧ 遺伝子工学	13
⑨ 総合利用	4
⑩ その他	129
Total	339

Key: a) technical field; b) number of paper; (1) agricultural science; (2) energy science and technology; (3) material science; (4) computer science; (5) laser science and technology; (6) space science; (7) high energy physics; (8) genetic engineering; (9) general applications; (10) others. Total

Reference: CAC, COMPENDEX

NOTE: At the time of the end of 1978, Taiwan and Hong Kong were not included.

Research papers in material science are 109, which is the maximum. Following the itemization of the science and technology

plan, we included papers on mining also. Most of these papers deal with metallurgy of iron, and non-iron, alloys and synthetic materials in petrochemistry.

The next is papers in agricultural science and technology. There are 38 papers including those on species improvement, plant diseases and fertilizers.

The third is 18 papers in high energy physics. As a nation possessing nuclear weapons, this field seems to be in an advanced stage.

We included papers on nuclear fusion and nuclear power. Generation in the field of energy science and technology. However, high energy physics itself forms the basic theory of nuclear power generation.

There are 15 papers in energy science and technology. Besides those dealing with nuclear power, many of them are concerned with oil exploration.

The next one is in the field of genetic engineering. There are 13 papers in this field and although this is a new field, China has already started research. A similar comment can be made on laser science and technology. There are 10 papers in this field. There are only a few papers in space science and computer science. This may be partly because the data banks did not pay attention to information from China.

There are some papers dealing with general usage of resources. Including those in environmental science, which we categorized separately, China is quite interested in this field.

Those classified as the other fields include medicine, acupuncture, basic chemistry, geology and basic physics.

(2) The technological level in each major industry and the trend.

1) The technological level viewed from the balance of trade.

As one of the methods for evaluating technological gaps, OECD checks the balance of technological trade. However, in the case of China, they did not have a concept of payment for obtaining know-how and patents. Naturally, there are no available statistical data; therefore, we decided to measure the technical level of China by studying the balance of trade with advanced nations, Japan, the USA, Europe, in each product.

This method represents the technology concretely demonstrated in imported factories, facilities and other imported parts and also the technical difference which is seen in the import and export competition. We evaluated the Chinese technical level in each item by following the next five stages.

We define that

IM = Import to China from advanced nations (Japan, the USA, Europe)

EX = Export from China to advanced nations (Japan, the USA, Europe)

1. Items of which China is definitely inferior ($EX = 0$)
2. Items of which China is relatively inferior ($0 < \frac{EX}{IM} < 0.3$)
3. Items of which China has a competitive power ($0.3 \leq \frac{EX}{IM} < 1$)
4. Items of which China is relatively superior ($1 \leq \frac{EX}{IM}$)
5. Items of which China is definitely superior ($IM = 0$)

Of course, the balance of trade in one item does not directly reflect the technical superiority or inferiority. It depends on the availability of raw materials, quality of labor and the wage level, and productivity, etc., and the technical level is only one of the deciding factors. However, in a socialistic society like China, the trade is not determined by the market principle only.

It is more influenced by the national planning. Especially in importing, those items which the government feels necessary are heavily imported. Therefore, those items which have a large cost of import or a large growth rate can be regarded as the items in which China herself feels her technological backwardness. Even then, evaluation of the technology level from the balance of trade is purely an indirect analysis and must be recognized as an indirect proof. If we use it by knowing its limit, we can take advantage of the fact that there are available statistics of many items regarding the balance of trade.

When we checked items in the four figure classification of SITC (International Standard of Trade Classification) we found 530 items traded between China and the advanced nations (Japan, the USA and Europe). Among them, 298 items were those of which China is relatively or absolutely superior. This amounts to 56% of the total. This percentage represents food products, animals, non-diet raw materials, raw individual products classified by raw materials and miscellaneous products. However, in the products classified by raw materials, a large percentage was taken by leather, wood, fiber and non-metallic minerals. Concerning steel and non-iron metals, many items belong to the category of relatively or absolutely inferior.

The fields in which China has many relatively inferior or absolutely inferior items are, besides steel and non-iron metals, chemical industry products, machines and transportation facilities, optical, medical, precision and photographic instruments. However, in each of these fields, China has some items of which she is competitive and relatively or absolutely superior. This shows that China is gaining her competitive power.

If we select major items in each classification of which China is inferior, we obtain the following results (see Table I-2.2, pp 20-37 of the third division of this paper for details).

- ° Food and animals: Horses for breeding, cattle and poultry.
- ° Food and tobacco: beer, cold drinks.
- ° Non-dietary raw materials: paper, synthesized fibers, raw fertilizer, bulbs for planting .
- ° Mineral fuel, lubrication oil, etc.: technology for increased supply.
- ° Animal or vegetable fat: generally inferior.
- ° Chemical industry products, radio active elements, radioactive isotopes and their chemical compounds, carbohydrates and their halogen derivatives, drugs from coal and oil, petrochemical synthetic materials, nitrogen fertilizer, potassium fertilizer.
- ° Products separated by raw materials: rubber belts, processed processed rubber products, newspaper pulp, synthesized fibers, textiles, cement, heat resistant bricks, most of steel products and non-iron products excluding tin and zinc.
- ° Machines and transportation facilities: most of machines, electric machines, vehicles, automobiles, aeroplanes, ships.
- ° Miscellaneous products: boilers, radiators, air heaters, optical instruments, medical apparata, photographic or movie cameras, watches.

To be noted is that even among the above inferior items, some items such as radio receivers, bicycles, some watches and their frames are becoming considerably competitive.

Also, some items which are inferior to those made in Japan can still compete in the USA and Europe where the cost is high. They are, for example, movie cameras and projectors.

In summary, in most of the fields the technical level reflected on the trade statistics are over-all quite behind those advanced nations. However, the products which can compete because of low wages are increasing. In these fields, they have technology which can manufacture products saleable in the international market.

TABLE II-5. The technical level of China seen in the balance of trade with advanced nations in individual products - Summary of individual products (1977)
% in ()

2	品 種	中国が絶対的な品目 3 (EX=0)	中国が比較的な品目 4 ($0 < \frac{EX}{IM} < 0.3$)	中国が競争力を持ちつつある品目 5 ($0.3 \leq \frac{EX}{IM} < 1$)	中国が比較的な品目 6 ($1 \leq \frac{EX}{IM}$)	中国が絶対的な品目 7 (IM=0)	合 計
0	9 食品及び動物	7(9.1)		2(2.6)	27(35.1)	41(53.2)	77(1000)
1	10 飲料及びたばこ				4(5.00)	4(5.00)	8(1000)
2	11 食用に適しない原材料	10(13.0)	4(5.2)	2(2.6)	23(29.9)	38(49.3)	77(1000)
3	12 鉱物性燃料、潤滑油その他これらに類するもの	2(18.2)	1(9.1)		2(18.2)	6(54.5)	11(1000)
4	13 動物性又は植物性の油脂	5(41.6)	2(16.7)		2(16.7)	3(25.0)	12(1000)
5	14 化学工業製品	10(16.9)	21(35.6)	8(13.6)	15(25.4)	5(8.5)	59(1000)
6	15 原料製品	34(21.3)	36(22.5)	8(5.0)	58(36.2)	24(15.0)	160(1000)
	67 鉄 鋼	18(7.20)	5(2.00)	2(0.80)			25(1000)
	68 非鉄金属	9(5.29)	4(2.35)		2(1.18)	2(1.18)	17(1000)
	69 その他の金属製品	2(8.3)	8(33.4)	2(8.3)	9(37.5)	3(12.5)	24(1000)
7	16 機械及び輸送用機器類	15(22.7)	44(66.7)	1(1.5)	4(6.1)	2(3.0)	66(1000)
	71 機械類(電気機器を除く)	7(20.6)	26(76.5)			1(2.9)	34(1000)
	72 電気機器		13(7.65)	1(5.9)	3(17.6)		17(1000)
	73 車両航空機及び船舶	8(53.3)	5(33.3)		1(6.7)	1(6.7)	15(1000)
8	17 雑 品	3(5.5)	12(21.8)	3(5.5)	36(65.4)	1(1.8)	55(1000)
	86 光工機器類、医用機器類、航空機器類、下区用又は映画用の材料及び明計	1(7.1)	9(64.3)		4(28.6)		14(1000)
9	18 特殊取扱品			2(40.0)	1(20.0)	2(40.0)	5(1000)
19	合 計	86(16.2)	120(22.6)	26(4.9)	172(32.5)	126(23.8)	530(1000)

Key to Table II-5: 2) classification; 3) items of which China is absolutely inferior; 4) items of which China is relatively inferior; 5) items of which China has a competitive power; 6) items of which China is relatively superior; 7) items of which China is absolutely superior; 8) total; 9) food and animals; 10) drinks and tobacco; 11) non-dietary raw material; 12) mineral fuel, lubricating oil and others belong to this class; 13) animal or vegetable fat; 14) chemical industry product; 15) products classified by raw materials - 67 steel - 68 non-iron metal - 69 other metal products; 16) machines and transportation facilities - 7.1 machines (except for electric machines) - 7.2 electric instruments - 7.3 vehicles, aeroplanes and ships; 17) miscellaneous products - optical instruments, medical instruments, precision instruments and materials for photography equipment, movie cameras and watches; 18) specially handled products; 19) total

2) Trends of the technological renovation in China

We examined the present status of technological development of China in the fields where China was relatively behind using the past seven years' data. All of them were described as "the first test model in China", "the maximum capacity in China", "the first success in China". There are 211 such cases as shown in the table below. The number of cases in each section shows that 28 cases in precision and optical instruments is the maximum. The next is 24 cases in electronics, weak-electricity engineering which is followed by 18 cases in metal and metallurgy industry. There are many cases in various machines.

In the case of chemical, metal and metallurgical industries, many of them are related to domestic production of synthesized rubber, high pressure polyethylene, steel, copper and aluminum products. Concerning machines, some of them are related to resource and land development. They are, for example, oil exploration, earth moving equipment, civil engineering and agricultural machines, dump trucks, trailers and mining machines. Also, we can see China's effort in making a large and super large scale manufacturing tools and increasing the scale and precision in numerically controlled manufacturing machines.

TABLE II-6. The number of items technically renovated in China (1972-1978)

①化学工業	13
②金属・冶金工業	18
③造船業	9
④土木建設機械	9
⑤農業機械	12
⑥運搬用機械	16
⑦石油さく井機	12
⑧鑛山機械	14
⑨工作機械	10
⑩精密・光学機械	28
⑪医療用機械	10
⑫その他機械	16
⑬電子・弱電機工業	24
⑭重電機工業	13
⑮その他	7
⑯ 合 計	211

Key: (1) chemical industry; (2) metal, metallurgical industry; (3) shipbuilding; (4) civil engineering machines; (5) agricultural machines; (6) transportation machines; (7) oil drilling tools; (8) land moving machines; (9) manufacturing tools; (10) precision and optical instruments; (11) medical instruments; (12) other machines; (13) electronics and weak-electric industry; (14) heavy electric industry; (15) others; (16) total

Among precision optical instruments, many are related to the use of laser. In electronics and weak-electricity which had the maximum number of cases, 10 cases are related to semi-conductor materials and displays.

As seen from the above, China is positively working on technical development and has achieved considerable results. However, success of trial models and their application and propagation in mass production are independent. Judging from the stories told by people who visited China and trade statistics and announcements of important Chinese members, it seems that the accomplishments of technical renovation in China have not been fully used in practical operation. (For details of the technical renovation, see Table I-2-4, pp 39-40, of the third division of this paper).

II.3. Trends of the Chinese need for technology import.

(1) Potential market for technology export.

We have analyzed the level of industrial technology in China from the viewpoint of the technological gap between China and advanced nations (Japan, the USA and Europe). China is trying to fill the gap by "self-reliance". However, in proceeding "four modernizations", China decided to positively import advanced technology from advanced nations and speed up the modernization. Especially since the come-back of Vice Premier Ten Shiao Pin, import of plants has suddenly increased. This is a manifestation of her policy change.

1) Needs for technology import in self-reliance type modernization.

Industrialization of a developing nation by the self-reliance approach generally requires several conditions.

(1) Rise of the educational level and increased mobility in the society.

After the cases in education caused by the Cultural Revolution and restoration of the entrance examination system in October, 1977, China has been paying much effort to raising the level of education. We can think of technology export accompanying this move--a language education system, experimental facilities and new educational equipment.

(2) Making of developing organizations and promotion of development plans.

After the come-back of Tei Sho Hei, the developing organizations in China are in the hands of working bureaucrats. They were

interrupted in their middle manager's training during the chaotic period of the Cultural Revolution and they strongly feel a need for introduction of economic planning and management techniques. This is seen from frequent announcements of important members saying "we want to learn from Japan's high growth". The principles in marketing cannot work effectively at the stage where even a system of cost calculation has not been developed. Efforts to promote positive economic activities by the public is also hard to be successful without using the price mechanism.

(3) Accumulation of domestic capital and utilization of foreign capital.

China has been proceeding its development by accumulation of her domestic capital only. We can say that China poured residuals from agriculture into construction of industry. However, it has been recognized that a huge amount of capital necessary for modernization cannot be obtained by accumulation of domestic capital only and also in order to secure food for increasing populations agricultural investment must be increased. Therefore, for the first time this year, China is thinking of the introduction of foreign capital. In order to make use of foreign capital, some amounts of management know-how are necessary.

(4) Establishment of domestic markets and exploration of foreign markets.

To establish domestic markets by replacing imported capital resources and middle resources by domestic production and to promote export of primary products, also middle resources and completed products by increased processing are the tasks for industrial self-independence. In the case of China, first she has to aim at establishment of domestic supplies. However, in order to import capital for modernization, she has to arrange a short term supply system domestically. Also, promotion of export is important for increasing her payment capability.

(5) Development of agricultural production.

In China, differing from other Asian countries, agricultural revolution was thoroughly carried out in the beginning. However, because of the expectation of population transfer to urban areas due to industrialization, the basic theory of agriculture was again emphasized. Needs for technology import related to agricultural production is expected to be extremely great.

(6) Exploration of underground resources and development of heavy chemical industry.

Exploration of oil is a key for self-independence of China. There is nothing more effective than oil income as a source of payment for importing huge capital resources and know-how for industrialization of heavy chemistry, besides direct domestic oil consumption. Also, to promote industrialization of heavy chemistry, the 10-year plan included a huge construction project. However, because of its hastiness, it is already being re-examined. It is necessary to control practical needs for technology import.

(7) Need for an increase of employment opportunities and skilled labor forces.

Because the present technical renovation is increasing the rate of capital preparation per worker, increase of employment opportunities in the heavy chemical industry is not great compared to the amount of capital investment. Therefore, if a developing nation with a large population hastens her industrialization, a double economic structure develops. China now faces this problem. Even though she aims at heavy chemical industry, she has to pay attention to light industry which concentrates labor forces. Technology import in light industry which effectively expands employment opportunities will be continued in the future.

In the above, we studied that if China introduces technology for modernization, following the line of self-reliance, what kind

of need exists. According to Vice Premier Ko sei on of the National Economic Committee the future guidelines are

(1) foreign technologies will be imported stepwise, depending on situations in China

(2) to avoid construction of many huge projects at one time by foreign cooperation

(3) concerning small scale projects, such as light industry, textile and export products, seek the positive cooperation of foreign nations.

These three points are the basic guidelines (reported on April 4, 1979). The guidelines seem very practical.

2) Evaluation of needs of the import replacement type, the export promotion type and the development seeking type.

As mentioned earlier, modernization of China requires various kinds of foreign trade and especially technology import. In order to more concretely study Chinese needs in each item, we used export statistics as a guide. In other words, we compared the latest time, 1977, and the years before the proposal of "modernization", 1974, using OECD statistics and examined the relation between commercial merchandise and their needs by using the rate of change of export and import.

We tried the following classifications here:

- ° Import replacement type--the rate of increase of import is high and that of export is low. Domestic production is expected.
- ° Export promotion type--the rate of increase of Chinese export is high.
- ° Import replacement and export promotion type--both import and export have high rates of increase.
- ° development seeking type--the rate of increase of export is low but that of import is high.

Note: For details of classification, see pp 46-47 of the 3rd division of this work.

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China B5

Economy and Technology of China

3. Analysis and evaluation of the industrial technological standards of China.

May, 1979

Mitsubishi Research Institute

I. Technological Standards in Major Industry.

Gap in technology in comparison with Japan, and European-American Nations.

In analyzing and evaluating industrial technological standards of China, we took an approach of making an analysis in terms of the technological gap between developed nations and China. Specifically, attempts are made to evaluate the current standards of industrial technology in China by focusing on the relationship between technology and products. As has been shown in the flow of research in survey plans, this approach is necessary in identifying types of technology and merchandise with good potential with needs in the Chinese market where growth is anticipated.

Technological gaps between nations could be classified in a variety of manners, but the major ones are as follows (note):

Note, text p 1): D. L. Spencer, "Technology gap" Konuma and Kuriyama, 1970, see p. 30.

First of all, the research gap, more accurately, is the gap in terms of assignment of resources for research. This is measured by parameters such as the number of people staffing the research, amount of funds allocated for research and developments, etc.

The second type is the management gap, or so-called innovational disparity. The management gap is closely related with gaps in terms of research expenditure. In the majority of cases, American managers are exceedingly sensitive to opportunities created by research related to defense, nuclear and space technology. Through such research, new products and new methods of manufacturing are discovered, leading to an increase in sales profit. Here, the disparity or difference is that in the capability of carrying out scientific discoveries from the laboratory to market through appropriate steps in development. This capability includes details in marketing as well as servicing of manufactured goods sold to users. In China, the national government plays major roles in research and development, so that in closing or decreasing the gap between China and other developed nations, the role of government in planning research and development is considered to be much greater than that of Japanese government.

Thirdly, the technological gap could be defined in terms of technological balance of payments, developed by OECD. This is defined as the difference between the payments by a certain nation to others for technological knowhow, patent licenses and patent use, and the value received from abroad in return for such payments. However, this concept of technological balance of payments has been criticized because it does not take into consideration the fact that

even when payments are made abroad, the technology so received might result in productivity exceeding the amount of payments. This is exemplified by Japan, which paid relatively small amounts to obtain patent licences, and realized profits from exporting goods manufactured by technology obtained from abroad. Also, since technology comes with factories, facilities, and other imported goods purchased through foreign trade, a great deal of technology is said to be given away without payment of relative values.

Taking the three forms of technological gap mentioned above, industrial technological standards of China will be analyzed and evaluated.

I-1. Major points in research and development.

(1) Comparison of levels of investment for research and development.

First, we will see the research gap in terms of research and development funding and of number of researchers.

As of 1973, investment for research and development in China is estimated to be 46.0×10^9 Yuan (22.7×10^9 US dollars), which was about 1% of GNP of China at that time (Note). Comparison with investments in research and development is shown in the table below (note).

Note, Jon Sigurdson "Technology and Science-Some Issues in China's Modernization" U. S. Congress Nov. 1978

It could be seen that the ratio to GNP in China is about one half that of Japan, and absolute amount is about one quarter. For information, the 1977 GNP of China is $3,728 \times 10^9$ US dollars while that of Japan is $6,906 \times 10^9$ US dollars.

Breakdown of expenditure and number of staff for various types of research and development is shown in the table below.

(2) Comparison of number of research personnel.

Personnel engaged in research and development is broadly defined so that it exceeds 1 million persons. When their level of training or quality are not taken into consideration, comparisons with Japan, Europe and USA are as shown in the table below.

The number of research personnel per 10,000 population is about one half that of Japan or USA, but there are no significant differences between France and England.

The research gap between China and other developed nations in terms of ratio between research expenditure and GNP, or ratio between research personnel and population, is about 50%. However, these ratios in developed countries are approximately constant in the 1970's whereas those in China, with support by national policy are thought to increase, so that the difference between developed nations would be decreased.

(3) Items of emphasis in research and development.

In order to identify areas in which "innovational disparity" is present, we will next compare the items of emphasis in research and development in China and in Japan.

The nationwide scientific and technological planning conference was held in China from December 1977 to January, 1978, which published "The outline for Nationwide Scientific and Technological developmental plans (draft)".

In this planning outlines (draft), 27 fields such as natural resources, agriculture, industry, national defense, transportation,

oceanography, environmental protection, medicine, finance, commerce, culture, education, etc., and two areas of basic sciences and technological sciences are correlated comprehensively, from which 108 items are identified as priority items in nationwide research in science and technology ^{note}).

Note, text p. 4): Fuan Chi, Chairman, National Committee of Scientific Technology, "Report at Nationwide Scientific Conference," March, 1978.

Table I-1-4 organizes these 108 items into 8 areas of importance, and compares them with the 10 year basic plan of science and technology of Japan (presented in May, 1977).

The first area of importance, agricultural science and technology, includes 22 items, which are quite similar in many respects with the Japanese science and technology plan, and "the disparity in technological innovation" is considered to be not so great. The areas such as mechanization of agriculture and complex fertilizers, which are not mentioned in the Japanese plan, are thought to represent disparity.

Scientific technology on energy, which is the second area of importance, contains 25 items, of which oil drilling technology, coal utilization technology, natural energy and nuclear fusion are also mentioned in the Japanese plan, whereas disparity is noted to be present in items such as technology of refining crude oil, mechanization of coal miners, hydroelectric and fuel burning methods of electricity generation, technology of electricity transmission, nuclear powered electricity generation, technology

in energy saving.

The third area of importance, material science and technology, includes 17 items. Of these, materials for special functions and performance, high performance structural materials are mentioned in the Japanese plan as well, whereas most of the remainder is items which are no longer taken into consideration. Thus, this is the area for which China will have to place special emphasis in the future.

The fourth area, computer science and technology, includes 9 items. In this area, it is considered that "disparity in technological innovation" and "management gap" exist between Japan and China.

The fifth area, laser technology, includes 10 items, many of which are common with the Japanese plan, thus cooperative research appears to be feasible.

The sixth area, space science and technology, includes 8 items, many of which are common with the Japanese plan. Also, as exemplified by the purchase of communication satellites and ground facilities from the U.S. , through the science and technology pact, China exhibits high motivation in this area. Thus, in this area China has attained an appreciably high level of achievement to serve as a technological leader.

The seventh area, high energy physics, includes 8 items. In the Japanese plan, utilization technology of ultra high temperature plasma as one of ultimate scientific technology is the only single item mentioned, and research on high energy is included in basic science. In China, this is regarded as a high priority item of technology, in connection with defense technology, and the science

and technology pact with US specifies the induction of the 500×10^9 electron volt accelerator. An accelerator of this magnitude is not available in Japan at this time, and the one in China would become the fourth largest in the world.

Six items are included in the eighth area, gene engineering. Many of these items are also included in the Japanese plan, so that future cooperative research is thought to be possible.

Lastly, comprehensive utilization of resources is noted as an item pertinent to the 8 areas of importance noted above. These are included in the Japanese technology and science plan, and regarded as objectives in technological innovation in Japan as well.

In addition, environmental safety, health and medical science technology emphasized in the Japanese science and technology plan, is emphasized in the Chinese plan by items unique to Chinese culture such as technique in earthquake prediction, acupuncture, moxibustion, and Chinese medicine. Developed nations have problems unique to them such as that of urbanization and aging, so that it is difficult to pinpoint "disparity in technological innovation".

(4) Number of papers presented in China by fields of technology.

In order to know how the results of research on these areas of importance as enumerated in the science and technology plan of China over the past 2 years (1977 & 1978) we searched Chinese scientific and technological papers included in international data banks.

The Chinese Research papers included in international data banks are those recognized to be meritorious by developed nations, and as such are considered to be contributing in reducing "disparity in technological innovation", and supportive of the Chinese science and technology plan.

Criteria of selection of papers listed in table I-1-5 and figure I-1-1 included not only the availability of translation to English or other European languages, but also the inclusion of Chinese text as presented in China, the emphasis on applied rather than basic research, and the covering of entire areas of industrial technology. International data banks used, appropriate for literature search fulfilling the criteria noted above, included CAC (Chemical Abstracts Condensates) and COMPENDEX (Computerized Engineering Index). In addition, JOIS (JICST on-line Information System) which is the data file of the Japanese Information Center on Science and Technology (JICST) was considered, but it contained very few Chinese papers, translated in English or other European languages, so that it was not searched, as CAC and COMPENDEX are likely to render more information.

A table of Chinese research papers within the past 2 years included in international data banks by fields of technology is shown in appendix information 1. The number of papers is broken down by fields in table I-1-6.

The greatest number of papers, 109, are in the area of materials science and technology. In accordance with the listing of the Science and Technology plan, papers on mining are included (such as appended information No. 96, 97, 155, etc). Most of the papers in this area have to do with metallurgy and alloys of iron and non-iron metals, and synthetic materials of petrochemicals.

The next greatest number of papers, 38, are in agricultural science and technology. In addition to those papers on crop diseases and improvement of plants, papers on fertilizers (No. 36, 37) are included.

The third greatest number of papers, 12, are on high energy physics. Appropriate of a nation with nuclear capability, research

in this area appears to be quite advanced. Those papers on nuclear fusion and nuclear power generation are included in energy science and technology, but high energy physics itself is the basic theory of atomic energy.

Fifteen papers are noted on energy science and technology. In addition to nuclear power, quite a few papers are seen on petroleum prospecting.

The thirteen papers on gene engineering exemplify that China has already started research in this new field. The same is true for laser science and technology, for which 10 papers have been listed.

Only a few papers are noted on space science technology and computer science technology, but this may be due to the fact that data banks have not been looking for information from China.

There are several papers on comprehensive utilization of resources. When papers on environmental sciences listed under other categories are taken into consideration, it could be seen that China has a high degree of interest in this area.

In addition, papers on medicine, acupuncture and moxibustion, basic chemistry, geology, and basic physics are noted.

Information from the data bank alone is not sufficient to adequately describe the science and technology plan of China, but a certain level of standard could be discerned. It appears that China would be able to eliminate the gaps in technological innovation exceptionally and exceptionally (sic) in the future.

I-2 Standards by major types of industry and their trend.

Next, we would like to take into consideration the definition of technological gaps in terms of technological balance of payments, as developed by OECD, and its criticism, and measure the technological standards of China by studying export-import balances by products between developed countries (Japan, Europe, USA) and China.

This method was developed for convenience because of the unavailability of data that show the total export-import balance of China. At the same time, it takes into consideration the point that technology is realized in factories, equipments and other import items purchased through international trade so that a large amount of technology is being given without the payment of relative value.

We evaluated the Chinese technological standard in terms of the following 5 steps, with designations:

IM=import to China from developed countries (Japan, Europe, USA).

EX=Export from China to developed countries (Japan, Europe, USA), then

1. Items for which China is absolutely inferior ($EX=0$)
2. Items for which China is relatively inferior ($0 < EX/IM < 0.3$).
3. Items for which China is beginning to become competitive ($0.3 \leq EX/IM < 1$).
4. Items for which China is relatively in advantageous position ($1 \leq EX/IM$).
5. Items for which China is absolutely advantageous ($IM=0$).

For these 5 steps, items for which export from China to developed countries is zero and relying on import are evaluated as absolutely inferior, and those for which export from China does not reach one third of import are evaluated as relatively inferior. Those items for which export to developed countries exceed one third of import are considered as items for which China is beginning to become competitive in the international market. This dividing point of one third is based on the fact that recently export of Japanese electronic computers exceeded one third of import, and this was regarded as beginning to become competitive in the international market ^{note}).

Note, text p. 12): See Nikkei Shimbun, "Shoten", January 13, 1979

With this method of evaluation, unique technology for special products for an area and technology related to advantageous resources are evaluated more advantageously while products with contrasting conditions are evaluated with disadvantages.

Those items for which export from China exceed import are regarded as items with relative advantage, and those for which import is nil but are being exported are evaluated to be absolutely advantageous..

Items compiled in accordance with the foregoing criteria are summarized in table I-2-1 by major branches of industry, and concrete breakdown is shown in table I-2-2. Regional breakdown are shown in attached table 2 (relation with Japan), table 3 (relation with Europe) and table 4 (relation with North America).

(1) Technological standards of China-summary table by items..

According to summary table by items (table I-2-1), there were

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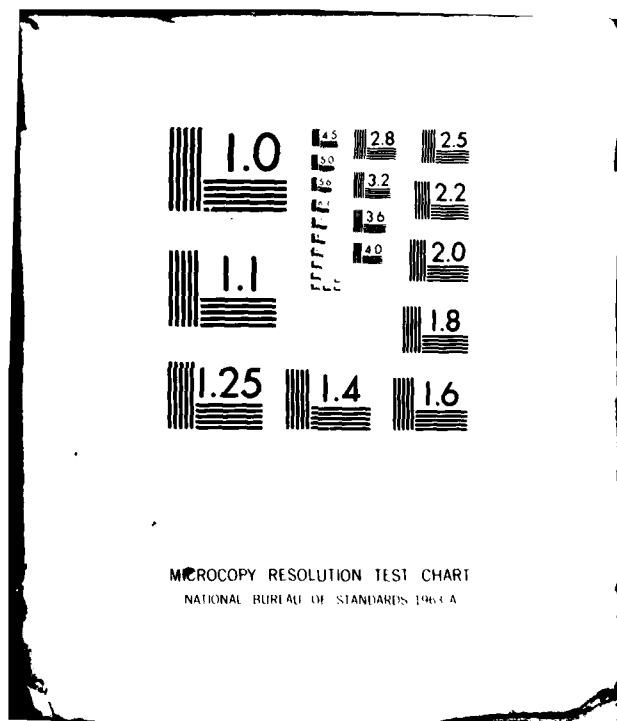
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530 items from the four digit classification of SITC (standard International Trading Classification) treated between China and developed countries (Japan, Europe, USA) in 1977. Of these, 298 are items for which China was in absolutely or relatively advantageous position, taking up 56% of total. This is due to the fact that relatively high proportions are taken up by foodstuff, animals, non-food raw material, manufactured goods classified by raw material, and miscellaneous goods. In terms of raw materials, however, greater proportions are taken up by leather, wood, and fiber goods as well as nonmetallic mineral products. Iron, steel, and non-iron metals are seen in connection with items in the relatively or absolutely inferior positions.

In addition to iron, steel, and non-iron metals, items that make up the relatively and absolutely inferior categories include chemical engineering products, machinery and transportation equipments, and optic, medical, and precision photography equipments. However, each of these types of items include items for which China is becoming competitive or is in relatively or absolutely advantageous positions, demonstrating the increasing capability of China..

(2) Foodstuff and animals.

According to the breakdown of items as shown in table I-2-2, animals (alive) (00) imported include improved breeds of cattle, poultry, horses and other edible livestocks from Japan and Europe, which probably exemplify the improved breeding of livestock and poultry, an item emphasized by the government for research and development. Edible stocks are already being exported to Japan.

Meat and meat products (01) include a large number of items

for which China is in relatively or absolutely advantageous position. Beef, which is not being exported to Japan, is being sent to Europe, demonstrating the adequate processing technology possessed by China.

In the dairy products and avian eggs (02) category, milk, cream and butter are being imported from Europe, probably for research. Cheese, curd, and eggs are already in advantageous position in comparison to Europe.

II. Trend of needs for technology induction in China.

II-1 Potential market for technology export.

We have thus far analyzed the industrial technological standards of China in terms of the technological gap between China and developed countries (Japan, Europe, USA). China is attempting to lessen this gap by "working out its salvation by its own efforts." However, as has been pointed out recently, since the modernization of a underdeveloped country starts with the recognition of technological disparity, and it goes through a large number of events and changes leading to the economic independence, following political independence, note 1). The impact of technological disparity should be extremely great.

Note 1, text p. 43): Morishima, M. "England and Japan; Volume 2," 1978.

In the past, we set up the pattern of independence in industrialization for 5 southeast Asian nations as shown in figure II-1-1, in connection with a research project, "Development of Asia in the 1970's and role of Japan." This pattern is applicable also to China, and its new cycle could be recognized as starting again after purging of the four men group in 1976. The needs for China

for technological induction is thought to be newly generated from each step of this cycle.

(1) Needs for technology induction in industrial independence.

First, we will determine needs for technological induction at each step of industrial independence qualitatively.

Step 1: Elevation of educational standards and increase in sociological mobility--These phenomena serve as the motivational force for the immense potential human resource that is being wasted in various forms to become an efficient force, thus producing the energy for independence. The first thing implemented in China after the second revival of Ding Chao Ping (July, 1977) was the resumption of the system of entrance examination (October, 1977). During the cultural revolution, entrance examinations were discontinued in September, 1966, so that this revival after 11 years of college entrance examination was an epoch-making change, symbolizing the trend away from Maoism and from cultural revolution note2).

note 2, text p. 43): Shibata, M., "Din Chiao Ping, the man who leads the modernization of China," 1978.

This indeed is the beginning of a new cycle. Technological needs to upgrade educational standards include language education system, experimental setup, television education, educational instruments, etc., and it is likely that induction will start with items suitable with the current status of China.

Step 2: Formation of developmental entity and promotion of developmental plans--These are the processes exemplifying the

returning of major activities of development to technocrats such as the functionaries after the failure of efforts to promote self-reliant economic activities through popular movements by the initiative from Mao Tse Tung such as the great leaping forward and cultural revolution, for China which is an underdeveloped country where the enterprising spirit has been inhibited and the management of national economy has been relegated to foreign nations. The developmental plan started in 1975 was formulated by the functionary of the Department of Interior, led by Din Chiao Ping whose honor has been restored. The needs for technological induction for this step include technology of economic planning and administrative management, and these needs are expressed as the desire to learn from the high rate of growth of Japan. However, during the stage in which the principles of marketing economy are not well developed, it is not likely that these types of technology would work effectively. It is equivalent to the fact that the efforts to promote self-reliant economic activity by the populace is not likely to succeed without the utilization of the price mechanism.

Step 3: Accumulation of domestic capital and utilization of foreign capital --The accumulation of capital in an underdeveloped country is achieved by the fostering of indigenous capital and induction of foreign capital, with greater roles played by the latter. Thus this process is prone to lose balance and become out of control. In China, the accumulation of capital for industrialization has been achieved mainly by that of domestic capital, but at the present stage, the utilization of foreign capital has been seriously considered. For the utilization of foreign capital, appropriate knowhow in management became necessary.

Step 4: Securing domestic market and necessity of developing foreign market--This means that the so-called securing of domestic market by import substitution, that is substituting imported capital assets and intermediate assets by domestic production, and the promotion of export by on-site manufacturing and processing of primary products and intermediate assets otherwise would be exported on such so as to achieve greater profits, to become objectives for underdeveloped countries. In China, items which could substitute for import or promote export by technology induction are those in the absolutely or relatively inferior technological standards. Raw materials classified as on relatively or absolutely advantageous levels could be processed on site, but manufactured goods so processed at this time are included in the relatively or absolutely inferior groups. Concrete analyses of this point would be presented later.

Step 5: Progress of farmland reformation and development of agricultural production--It is realized that the 5 southeast Asian nations have not satisfactorily achieved farmland reformation, their agricultural technology is backward, they cannot even produce enough foods for themselves, and export crops to earn foreign funds are not very actively cultivated. In China, "the basic theory of agriculture" has been adhered to by the government because actual needs for agricultural crops would steadily increase when industrialization that forces the resumption of urban shifting of population starts. The Chinese government recognizes that the increase of food stuff production in China during the past 20 years corresponds only to the increased demands by population increase and industrialization. note).

Thus, needs for technology induction for agricultural production is quite great.

Note), text p. 45): Hu Chiao Mu, "Let's speed up the realization of the four modernization by carrying out things based on rules of economics."
October 1978

Step 6: Development of underground resources and development of heavy chemical industry--Underdeveloped countries rely greatly on exportation of underground resources while the backwardness of heavy chemical industry is preventing the utilization of the developed resources. The task in attaining independence is how to eliminate this gap. For China, development of petroleum resources is the key to the independence. It has been pointed out that for China to develop its economy, to govern its populace effectively, and to maintain its national defense, it is necessary to have a huge amount of capital and a wide range of imported knowhow, from modern methods of administration to operation of factories, and China has no other source of funds to pay for such imports except for income from its petroleum resources note).

Note, text p. 46): Mano, S., "China, petroleum, and Japan."
August, 1978

During the reign of the 4 men group in the first half of the 1970's development of the energy resource in China was exceedingly slow, with virtual absence of progress. However, this is not only a fault of the four men group, but also due to the backwardness of heavy

chemical industry. The "four items of modernization" were proposed to overcome this delay, and the 10 year plan amended and augmented by Ding Chiao Ping after the revival of his honors, attempted to increase industrial production by over two parts, centering around heavy chemical industry. However, its overly hasty attempts to achieve its goals has forced some revision already at this time. It is necessary to know the trend of needs for practical technology induction.

Step 7. Necessity for the increase in employment opportunity and the increase in skilled labor force--This step focuses on the contradiction that the modern technological innovations gradually increase the rate of capital outlay per individual employee, so as to slow the expansion of markets for the labor force, while underdeveloped countries have to increase skilled labor force rapidly, thus strengthening the capability to be internationally competitive by utilizing potential human resources in order for such nations to become self reliant. If the immense amount of capital invested for heavy chemical industrialization is not going to absorb labor, the double structured economy would progress further, leading to sociological contradictions. This is the main problem for China at this time, causing it to have to place emphasis on light industry with employment promoting effects while having a strong desire to attain heavy chemical industrialization. Thus, the needs for technological induction in connection with light industry is likely to continue in the future.

In the foregoing sections, we made a simple survey of the pattern for China to attain its self reliance and industrialization, and discovered that every step of the newly begun cycle has

important needs for technological induction. Only after understanding such needs of China, we could identify the policy of China on future induction of foreign technology. The future policy, according to Kang Shi Si, the chairman of the National Committee of Economics, centers around the following 3 points (news report, April 4, 1979):

- ① Foreign technology induction will be accomplished gradually, in accordance with conditions in China.
- ② Avoid simultaneous construction of a large number of major projects with cooperation of foreign nations.
- ③ Cooperation of foreign nations will be sought actively for small size projects such as light industry, textile industry, and export products.

We consider that basic work in evaluating current conditions of China to have a renewed importance.

- (2) Evaluation of needs for technology induction of import substitution, export promotion, and developmentally directed types.

Now, concrete evaluation of items that could be considered for technological induction to achieve securing of domestic market and developing of foreign market, as noted in Step 4, will be attempted.

In addition to the import substitution and export promotion types, types of needs for technological induction should include the development-directed type, such as resource development, construction of industrial bases, agricultural development, and technological development of systems of transportation.

In evaluating needs for technological induction of import-substitution type, growth rates of import by China from Japan, Europe and USA are computed by items in accordance with the 4 digit classification of SITC code, ranking from the top, classifying to

the following 5 steps. The period for which the growth rate was computed is the 3 years between 1977, and the time for which the latest OECD trade data are available, and 1974, the year prior to the inception of the "modernization in four areas."

1. Items newly started are assumed to be imported.
2. Items with growth rate of import from 1st to 100th in ranking.
3. Items with growth rate of import from 101st to 200th in ranking.
4. Items with growth rate of import from 201st to 300th in ranking.
5. Items with growth rate of import from 301st to 428th in ranking.

However, of these items, those for which technological standards of China are considered to be in relatively or absolutely advantageous positions, as noted in the previous chapter, are regarded as items with low needs of technological induction, and are excluded.

Next, for needs for technological induction of the export promotion type, growth rates of export from China to Japan, Europe, and USA, are computed by items in accordance with the SITC code 4 digit classification, ranking is made from the top, and classified into the following 5 steps. The rate was computed also for the 3 year period, from 1974-1977.

1. Items newly started or assumed to be exported.
2. Items with growth rate of export from 1st to 100th in ranking.
3. Items with growth rate of export from 101st to 200 th in ranking.
4. Items with growth rate of export from 201st to 300th in ranking.
5. Items with growth rate of export from 301st to 459th in

ranking.

Here, too, the items for which technological standards of China are considered to be in relatively or absolutely advantageous positions, as noted in the previous chapter, are regarded as items with low needs of technological induction, and are excluded.

The needs for technological induction of development directed type appear in connection with items with low growth rate of export. Of the items imported, special attention is paid to those considered to be in absolutely inferior position of technological standards, as having especially strong needs. These are items imported from but not exported to developed countries. Evaluation could be made through classification into the 5 steps, in the same manner as for items of import substitution type..

In order to graphically illustrate the foregoing, the items of import substitution, export promotion, and development directed types, a matrix is constructed with the 5 steps of import substitution and development directed items on the abscissa, with the 5 steps of export promotion types on the ordinate, along with a column for the development directed type. Graphical positioning could be readily understood when the fact that even for goods in the same item, large sized, high quality ones are imported, and smaller, low quality ones are exported, is taken into consideration. Usually, technological induction is carried out in order to achieve improved quality, large size and mass production. If technology induction carried out with such objectives could contribute simultaneously to import substitution as well as export promotion, then it is most desirable for attainment of self reliance and industrialization.

Table II-1-1 summarizes the number of items on the matrix for needs of technological induction. The 4 types of needs for technological induction are typically shown. The results of actual classification work are shown in table II-1-2.

Based on the classified table, the following observations are made on each step of technological needs of import substitution and development directed types.

First, items newly started or assumed to be imported, which are areas where new needs for technological induction are occurring, include farm products such as soybean oil, rapeseed oil, and mustard-seed oil, for which a decrease in export has been noted. Possibly technological assistance for producing these items may be necessary. From the science and technology plan of China, it is clear that the horse, mule, and hinny are development directed items because of needs for improvements in breeding. In connection with light industry, topping of sheep and other animal wool and hair, as well as roving are noted as items with technological needs of export promotion type. Exports of lumber, boards and unit boards for plywood are decreasing. Logs and raw wood for milling of lumber and manufacturing of plywood have needs of development directed type for domestic construction, so that it is probable that needs exist for technology in forestry. In connection with heavy chemical industry, technological needs of development directed type are clearly shown for steel building material for railway construction, other railway rolling stock, and cement.

Second, items with higher growth rates of import, from 1st to 100th on ranking, for which needs for technology induction of import

substitution and development directed types are considered to be great at this time, among farm products, include oil and fat of animal and plant origins, which are seen as items with needs of export promotion type for attaining mass production capability. Butter is another item which could be exported, in addition to substituting for import, if appropriate technology induction could be carried out. Poultry products are shown as items with breeding improvement needs of development directed type. In connection with mineral industry, natural, unpolished industrial diamonds have needs of import substitution as well as export promotion type, with the possibilities of induction of mining and polishing technology. Aluminum and its alloys are shown as items with technological needs of import substitution type, and ferromanganese as items with needs of development directed type. Induction of metallurgic technology is being considered, as could be seen clearly from the items of emphasis in research and development in China. In connection with light industry, textile products with elastic components, trimmings, buttons, zippers, combs and toiletry goods are seen as items with quality improvement needs of import substitution and export promotion types. All of these, as noted in the previous chapter, are in the competitive stage for the current levels of Chinese technology.

Stoves, ranges cooking heaters, hearths, gas burners, and other similar items are things for which China is becoming competitive technologically, and could advance to have needs for technical induction of export promotion type from import substitution type. It has been known that at this time needs for technological

induction of import substitution type for television receivers, phonorecords and masters for their manufacturing, and recording tapes and sheets. In the heavy chemical industry, in connection with iron and steel, items with technological needs of import substitution type include wirecloth, wiregrill, rope and other related items, inner plate of ferroalloy steel, cast iron pipes, oil drums, etc. Development directed type of items include formed steel (over 80mm), steel sheet piles, steel anchors and anchor parts. In connection with chemical products, high temperature coal tar distillates and related substances, with technological needs of import substitution type, have just started to be exported. Man made plastic, chemical industrial products, chemicals and flash materials for photography could be tied to the direction of export. Rubber tires, tubes, rubber belts and belting could be classified as items with technological needs of purely import substitution type. Petroleum and gas are classified as development directed type, but self reliance is likely by induction of drilling and utilization technology.

Thirdly, we will look at items with growth rate of import at 101st-200th on ranking, which are considered to have technology induction needs of import substitution and development directed types in the near future.

Among farm products, fresh and condensed milk and cream are classified as development directed type. For this purpose, middle (sic) of improved breeds are already being imported, showing the emphasis placed on dairy farming as a direction in modernized agriculture. Butter has already been exported. In connection with light industry, textile products are noted in relation with export promotion type. In addition, technological needs of import sub-

stitution type are seen with synthetic fiber textile, linen textile ramie textile, and hemp textile as well as knitwork. Technological needs of export promotion type are seen with consumable precision electronic and electric instruments such as lenses, prisms, reflective mirrors and other optic instruments, communication instruments, broadcasting and receiving instruments for radio and television, and other applied radio instruments. Monoculars, binoculars, microscopes, and other optical instruments, watches, watch movements and watch cases could be connected with exporting in the near future. Phonographs, tape recorders and other types of recorders and voice-sound reproducing instruments are regarded as items with technology induction needs of purely import substitution type, but through Japanese-Chinese joint enterprises, these are now beginning to be exported..

In connection with steel of heavy chemical industry, thin plates are already connected with technological needs of export promotion type. Thick plates are also beginning to be exported. In the future, wire rods and jointless steel pipes could be connected with exporting. At the present time, high pressure water conduction steel pipes for hydroelectric power plants, formed steel (80mm or less), steel belts, and steel pipes (excluding cast iron pipes) are items with technological needs of development directed type. Items related with steel are seen within the group with import growth rate from 1st to 100th on ranking, related with import substitution and export promotion as well as development directed type, thus induction of steel plants could be seen as technology induction, that "kills three birds with one stone." In connection with petrochemicals, technological needs of purely import substitution type are seen with ether, epoxides and acetal, organic synthetic dyes,

short synthetic fibers, phenol, resins, and amino resins. Needs of import substitution type are continuing to be present with phosphate and nitrogen fertilizers. In addition to items related to steel, strong needs for manufacturing technology for buses and special use automobiles such as fire engines, sprinkler trucks, and repair cars.

In the foregoing, items with strong needs for technological induction of import substitution and development directed types are surveyed. Next, we will look at items with strong needs for technological induction of export promotion type.

Items newly started or assumed to be exported are likely to have new needs for technological induction of export promotion type. Some items are exported as samples. Automatic data processors and their component instruments, which have high growth rates of import, have been exported from North America to China as samples. Although growth rates of import are high, metal processing instruments and machinery are also beginning to be exported. Items with low growth rates of import and newly begun to be exported which show needs for technological induction of export promotion type include, in addition to those related to steel, trailers and other vehicles and their parts, and leather tanning and processing machinery.

Items with growth rates of export from 1st to 100th places on ranking are with greatest potential for export promotion type of needs. Those with import substitution needs as well have already been noted. Items of purely export promotion type include machinery such as loading machinery, food processing machinery, etc. Induction of mass production technology for these items is a possibility.

The next group, those items on 101st to 200th on ranking also have potential technological needs of export promotion type. Of these,

items with import substitution type of needs have already been noted. For items with purely export promoting needs, mass production technology for printing and book-binding machinery, tractors, etc., are noted.

In the foregoing, the trends from 1974 to 1977 are seen in terms of the five classifications of import substitution, export promotion, and development directed types of technological induction. Now we will see how the trends noted are shown in inquiries for plant and machinery importation based on the 10 year plan which was re-started in the beginning of 1978.

(3) Technology induction needs as seen in inquiries for plant and large scale machinery importation.

Studying transfer of technology accompanying a plant based on table II-1-3, it could be seen that the imports related to the Pao San Iron Work, Shanghai, in general, are aimed at "killing three birds with one stone," with import substitution, export promotion, and development directed types. However, these are divided into those with needs of development directed type such as technological training, those with needs of both import substitution and export promotion types such as hot rolling plants, those mainly with needs of import substitution type such as seamless pipe manufacturing plants and firebrick plants, and those with needs of development directed type such as thermoelectric power plants. Other steel-related plants include development directed type with objectives mainly of renewal of obsolete facility, and import substitution and export promotion types that center around expansion and new construction.

Plants related with petroleum development have needs of development and export promotion simultaneously. Oil refineries

for domestic consumption and needs for technology in utilizing natural gas as city gas are noted.

As has been seen previously, needs of import substitution type are major ones for plants related to petrochemicals. The ethylene plant with the capacity of annual production of 300,000 tons, which will become the center of a petrochemical complex also has needs of development directed type for the construction of an industrial center. Marmade leather plants are related with export promotion of general goods. The reclamation of used sulfuric acid could be regarded as import substitution, but basically it represents needs for environmental protection in connection with development.

Plants related with electric power are classified as needs for domestic construction.

As has been seen previously, electronic and precision instrument plants at this time are basically noted as needs of import substitution type. Of these, manufacturing plants for radio and television speakers, and production of digital clocks are related with export promotion. At this time, utilization of computers centers around scientific and technological computations for technological development..

Plants related to non-iron ores are aiming at domestic resource development and import substitution. In case of cooperative prospecting, portions of these plants are considered for exporting.

Plants related to transportation are for expediting the organization of domestic transport systems. Internal combustion engines of piston type are noted with both import substitution and export promotion needs, and as such, they are exceptions. There are

some possibilities that manufacturing of trucks could be processed on commission, and a portion of products could be exported.

Plants related to ships constitute a portion of the transport system. Needs for modernization of shipyards mainly through new equipments are classified as development directed type. However, since ore and other carriers of 100,000 ton capacity have high growth rate of export, work on expansion of shipyard for capability of building these large vessels is considered to have needs of export promotion type as well.

Plants related to building materials, for needs of import substitution and export promotion types, are concentrating on high quality products.

Other plants, such as modernization of fishing equipments, modernization of food distribution, facilities for drainage, etc., are centered around needs related with necessities of life.

Transfer of technology accompanying import of large machinery is said to represent needs of development directed type, as import of this type is carried out largely in order to speed up the availability of items which could not be manufactured or produced domestically. Technology transferred is mainly that of operation, and through service and maintenance, technology of manufacturing also could be transferred. Machinery for metal work and turbo-compressors, which are imported to promote domestic production to contribute to export promotion, could be classified as having needs of import substitution as well. Items related to prospecting, drilling, and transportation of coal and petroleum could be classified as having needs of export promotion type as well.

Inquiries on importation of plants and large machinery based on the 10 year plan restarted in the beginning of last year, clearly show the strong needs of Chinese leaders, aiming at resource development and development of heavy chemical industry. However, developmental needs of various parts of China surfaced, and needs for technology induction exceeded the national budgetary limits.. These resulted in the postponement of contract occurred in February of this year. In China, at this time the system of wholesale prices as related to consumer prices is not well established, and it appears that needs precede without determination of costs at each factory. It is clear that China has an immense potential as a market for exporting technology, but the only way to materialize such a potential is conquering each step of industrial self reliance in a steady, patient manner. It is healthy that China shifted its emphasis onto basic agricultural theory and small projects centering around light industry. Also it is normal to return the emphasis to coal development from petroleum development with greater risk.

At this time it seems as though we need to define and evaluate technology exportation for Japan to China with wakeful eyes. (All right, now I'm awake).

		1977年度7	対 G N P 比 %
1	中 国	1.00 兆円	1.0 %
2	日 本	3.89 8	2.1 %
3	西 独	3.16	2.6 %
4	フ ラ ン ス	2.04	2.0 %
5	イ ン グ リ ス	1.51	2.3 %
6	米 国	10.95	2.4 %

10 資料：科学技術白書1978年版およびInternational
Financial Statistics Nov. 1978より試算
11 注：中国はGNP比1%として試算、日欧米は政府、民間
両方含む

Table I-1-1, Comparison of levels of investment for research
and development.

1-China 2-Japan 3-West Germany 4-France

5-England 6-USA 7-Fiscal 1977 8- $\times 10^{12}$ yen

9-ratio to GNP 10-background material: estimated
computations from science and technology report, 1978

edition, and International Financial Statistics, Nov. 1978.

11-Note: Estimate computation for China as GNP ratio at 1%.

Figures for Japan, Europe and USA include both governmental
and private sectors.

	7 人 員		8 支 出	
	1000人 ^{7a}	%	10億元 ⁹	%
1 基礎研究	21.3	1.8	0.11	2.4
2 農業およびエネルギー 以外の資源	418.1	35.1	0.81	18.0
3 医学・衛生	128.1	10.8	0.52	11.0
4 国 防	193.6	16.2	1.00	22.0
5 製造・エネルギー運輸	429.6	36.1	2.15	47.0
6 合 計	1190.7	100	4.59	100

10 資料: Billgren, Boel and Sigurdson, Jon "an Estimate of Research and Development Expenditures in the People's Republic of China in 1973" OECD, Jul. 1977.

Table I-1-2. Expenditure and number of personnel for research and development in China (1973)

1-basic research

2-agriculture and resources other than energy

3-medicine, hygiene, 4-defense

5-manufacturing, energy, transportation

6-total 7-personnel 7a-persons 8-expenditure

9-10 x 10⁹ yuan 10-background information

		7 研究者数	8 人口1万人当りの研究者数
		千人	人 ¹⁰
1	中国 (1973)	1,191 ⁹	13
2	日本 (1975)	255	23
	(1977)	272	24
3	西独 (1975)	94	15
4	フランス (1975)	62	12
5	イギリス (1972)	77	14
6	米 国 (1975)	533	25

資料：科学技術白書 1978年版 11

注：中国については、表I-1-2より推計。¹²

Table I-1-3. Comparison of research personnel

1-China 2-Japan 3-West Germany 4-France 5-England

6-USA 7-Number of researchers

8-number of researchers per 10,000 population

9-x10³ persons 10-persons

11-background informatipn: white paper on science and
technology, 1978 edition

12-Note: For China, estimated from table I-1-2,

TABLE I-1-4. Items of importance in research and development in China

		CHINA, Outline of plans for nationwide science & technology, 1978-1985 (draft) written Jan. 78	JAPAN, 10-year basic plan for science & technology, presented May 77.
Agricultural Science & Technology	1	Research of systems & techniques of cultivation suitable for mechanization	
	2	Development of various high quality and high capability farm machinery & implements	
	3	Technique of formation of high yield farmland by soil improvement & water melting (sic)	Elucidation of factors in changing fertility of soil
	4	Improvement of low yield soil that takes up 1/3 of total	Technology of formation, maintenance & servicing of agricultural land
	5	Facility to transport water from south to north	Technology of constructing sea-area reservoir
	6	New complex fertilizers	
	7	Biological nitrogen fixation	Elucidation of biological nitrogen fixation mechanism
	8	Scientific fertilizing	
	9	Technology of irrigation and drainage	Prevention of meteorological damages, utilization of energy from sources such as geothermal and waste heat, wind power, etc.
	10	Breeding of new varieties, new technology in breeding	New methods of breeding, breeding of better varieties
	11	Improvement of yield, quality & resistance of new breeds	Improvement of photosynthetic efficiency
	12	New pesticides which are effective & non-polluting	
	13	Comprehensive prevention technology of agricultural pests	Technology in preventing damages by agricultural pests
	14	New fast growing, high yield breeds of trees, new technology	Forestry technology in tropical area, & utilization of species of trees that utilize tropical area (sic)
	15	Comprehensive utilization of forest resources, forest fire prevention, technology of fire-fighting	Technology in forestry management
	16	Development of grasslands	Technology of feed production
	17	Improved breeding of domestic livestock & poultry	Breeding and propagation technology
	18	Mechanized breeding	Breeding management technology

Energy science & Technology	29	Improvement of fishery production, culturing	Technology of coastal and shallow sea fishery development
	20	Ocean fishing & processing	Fishery technique with culturing of resources
	21	Modern scientific experimental stations for agriculture, forestry, animal husbandry & fishery	Technology of utilizing new protein resources, technology of utilizing unused or little used, protein resources from water
	22	Agricultural biology, agricultural engineering, application of new technology for agriculture	Technology of utilizing radiation
	23	Development of petrogeographical theory & starting of oil & gas prospect-on	Technology of development & obtaining of oil & natural gas
	24	Research on new processes, technology & equipment for various prospecton and development	Storage technology of petroleum & natural gas
	25	Improvement of well-drilling standards & rates of yields of petroleum & gas	
	26	Development of processing technology of crude oil	
	27	Mechanization of important coal mines & from comprehensive mechanization to automation for some	
	28	Improvement of mechanization standard for medium & small sized coal mines as well	
	29	Research on basic theory, mining technique, equipment & safety technology for coal mining	Research & development of coal utilization technology
	30	Vaporization, liquification & comprehensive utilization of coal	Technology of low calony vaporization, high calony vaporization & liquification
	31	Development of coal, new methods of transport & utilization	Technology of colloid fuel, fluid layer fuel technology
	32	Large scale hydroelectric power plants	
	33	Electric power plants at mining sites	
	34	Large scale electric network	
	35	Construction of ultrahigh voltage transmission lines	New technology in electricity transmission (research on super ultra high voltage & large capacity transmission, ultra conductive transmission, etc.)

	36	Technology of large scale dam construction	Technology of dam design & management
	37	Large scale power generator units, large scale hydroelectric generators	
	38	Earthquakes induced by dams, technological protection	
	39	Construction of nuclear power plants	Light water reactors, nuclear fuel cycle, new types of reactors
	40	Research on energy sources such as solar, geothermal, wind, tidal power, etc.	Development of natural energy
	41	Research of controlled thermonuclear fusion	Nuclear fusion
	42	Low colony fuels such as stone coal, arsenics, oil shale, etc.	Utilization technique of oil shale & tar sand
	43	Utilization of methane gas resources in farming areas	
	44	Technology of better utilization & conservation of energy, utilization of remaining heat	Development of effective utilization of energy
	45	Decrease in coke ratio in iron manufacture	
	46	Decrease in coal consumption in electricity generation	
	47	Decrease in energy consumption in chemical & metallurgical industry	
Material science & Technology	48	New technology in intensifying mining yield	Utilization of low quality and non-utilized resources, in-place leaching technique
	49	Technology in ore dressing of hematite	
	50	Research on ores that contain multiple metals	
	51	Increased production of titanium & vanadium	
	52	Refining technology for copper, aluminum, nickel, cobalt & rare earths	
	53	Research on prospecting & rules of formation of iron-rich ores	
	54	Establishment of system for iron-steel & non-iron metal materials	
	55	Cement & other building materials which are light strong & versatile	

	56	Research on mining, ore dressing & processing of non-iron metals	
	57	Technology of synthesizing organic material using petroleum, natural gas & coal	
	58	Intensification of research on catalysts & development of technology for direct synthesis	
	59	Innovation in production technology of plastic, synthetic rubber & synthetic fibers	
	60	Improvement of standards of automation & equipment of petroleum industry	
	61	Various special materials required by defense industry & new technology	Materials to endure high heat & cold temperature, special performance materials
	62	Research on structural & complex materials	High performance structural material
	63	Basic research in materials science	New processing technology
	64	New experimental technology & development of measurement & testing methods	
Computer science Technology	65	Basic research in computer science & related fields	Measurement, transmission & processing technology of information
	66	Industrial production of LSI	Materials for electronic technology, element technology (increasing speed of semiconductor elements, practical use of super LSI)
	67	Research & production of large size computers	
	68	Formation of mass production capability of computer systems	
	69	Research on computer accessories, software & applied mathematics	
	70	Development of modern computer industry	
	71	Popularization of microcomputers	
	72	Use of super high speed large size computers	
	73	Several computer networks and data bank	Supporting technology for information & communication systems
	74	Computer control of major production process & management for some important enterprises	

Laser science & Technology	75	Laser physics, laser spectrophotometry, research on nonlinear optics	Scientific technology of opto-electronics laser
	76	Construction of experimental lines of photo-communication	Practical use of materials & elements for optic fiber cables & light source for photocommunication
	77	Improvement of standards of laser equipment in general use & research on detectors	
	78	Development of new model laser equipment	Increasing power output & efficiency of laser
	79	Development of new wave lengths of laser	Development of new laser
	80	Research in new mechanisms of laser generation	
	81	Research on structures of substances using laser	
	82	Isotope separation by laser	Isotope separation utilizing unique & advantageous properties of laser
	83	Laser nuclear fusion	Laser nuclear fusion
	84	Promotion of application of laser in various areas of economic and defense activities	
Space science & technology	85	Automation of weather observation, resource survey, environmental monitoring & cartography	Establishment of analytical & processing technology of observed data
	86	Innovations in technological system of communication & radio-TV broadcasting	Information & communication systems (new systems of broadcasting such as satellite broadcasting, SHF band broadcasting, etc.)
	87	Technology of remote sensing	Technology of remote sensing
	88	Formation of satellite utilization system & space research center	
	89	Speeding up of transportation system	Development of large size rockets
	90	Research, construction & launching of scientific & applied satellites	Satellite system including scientific & applied satellites
	91	Launching of skylab & space explorer	Development of instruments on ground & abroad satellites
	92	Applied research of basic theory of space science & space technology	

High energy physics	93	Theoretical research of high energy physics	Utilisation technology of ultra high temperature plasma
	94	Establishment of high energy physics research center in 10 years	
	95	Proton accelerator of about $300-500 \times 10^9$ volts of the first 5 years	
	96	Construction of higher performance, larger size proton accelerator in the second 5 years	
	97	Preparation for high energy physics experiments, especially research & construction of detectors	
	98	Research on high energy physics theory & cosmic rays	
	99	Mutual exchange of information between high energy physics & related fields	
	100	Research of application of accelerator technology on engineering, agriculture & medicine	
Gene engineering	101	Establishment of laboratories & organizations on genetic engineering	Research on life science
	102	Basic research in genetic engineering	Gene engineering includes research on DNA alteration
	103	Combination of molecular biology, molecular genetics & cellular biology	Elucidation of life phenomenon & various biological functions (basic research centering on the molecular level)
	104	Utilization of new technology of genetic engineering in medical & pharmaceutical industry	Technology of industrial application of living organisms & their function
	105	Prevention & treatment of certain difficult or uncommon diseases	Conquering of viral infectious & hereditary diseases
	106	Creation of new high yielding breeds of farm crops that fix nitrogen by themselves	Basic research of photosynthesis & its application on food & energy production

Comprehensive utilization	107	Comprehensive utilization of resources	Utilization of general wastes or resources
	108	Utilization of three industrial wastes (waste gas, waste water & solid wastes)	Technology of utilizing industrial wastes as resources

名 ^A 称 (略 称)	製 作 機 関 名 ^B	収められている情報 ^C	
		D 内 容	年間収録数 ^E
Automatic Subject Citation Alert (ASCA N)	Institute for Scientific Information (ISI)	4900雑誌から98%, その他から2%及び410 万件の引用文献 1	400,000
U. S. Government Reports Announcements (USGRA)	National Technical Information Service (NTIS)	国防総省 (DOD), 航空 宇宙局 (NASA), エネル ギー開発庁 (ERDA) など 米國政府機関レポート 2	58,000
International Information Service in Physics, Electrotechnology, Computters and Control. (INSPEC)	Institution of Electrical Engineers (IEE)	(A) 420 誌 38ヶ国 3 (B) 2000 誌及び米英特 許 80% 会議資料 10% 学位論文 10% (C) 同 上	(A) 68,000 (B) 32,000 (C) 20,000
CA-Condensates (CAC)	Chemical Abstracts Service (CAS)	12,000 誌, 100カ国 雑誌 Chemical Abstracts に収められた 全論文の書誌事項および 検索語	393,000
Metals Abstracts Index Data Base (METADEX)	American Society for Metals (ASM)	100雑誌の全論文と 5 900雑誌の重要論文で, 95%, モノグラフ, 会 議録, 学位論文で5%	26,000
Computerized Engineering Index (COMPENDEX)	Engineering Index Inc. (EI)	3,500の雑誌, 学会の出 版物, 会議論文, 書籍 6	82,000

Table I-1-5 List of major data basis.

A Name (abbreviation)

B Name of agency that compiled the data banks.

C Information contained

D Contents E Number of annual listings

Remainder key next page

Table I-1-5 key(cont.)

- 1 98% from 4,900 journals, 2% from other sources,
420 references cited.
- 2 Reports of U.S. governmental agencies such as Department
of Defense, National Air & Space Administration, Energy
Research and Development Agency, etc.
- 3 (A) 420 journals from 38 nations.
(B) 2,000 journals and U.S & U.K. patents, 80%.
Convention proceedings 10%
Thesis for advanced degrees 10%
(C) Same as above.
- 4 12,000 journals from 100 nations.
Summary and indices of all papers included in the journal,
Chemical Abstracts (sic)
- 5 Entire texts of papers in 100 journals and excerpts of
900 journals make up 95%, the remaining 5% by monographs,
proceedings, and thesis for advanced degrees.
- 6 3,500 journals, proceedings, books.

A' 分析度	A 分野	B 農・農薬	C 生物・生化	D 医・薬	E 化学・化工	F 物理	G 電気・電子	H 金属	I 工学
					ASCA				
					USGRA				
			CAC				META	COMP	
						INSPEC			
I 深(詳)									

Figure I-1-1. Fields covered by data base.

A Fields A' degree of analysis

1 Deep (detailed)

B Agriculture, pesticide

C Biology, biochemistry

D Medicine, pharmacology

E Chemistry, chemical engineering

F Physics

G Electricity, electronic

H Metals

I Engineering

A 技 術 分 野	B 論 文 数
① 農業科学技術	38
② エネルギー科学技術	15
③ 材料科学技術	109
④ コンピュータ科学技術	1
⑤ レーザー科学技術	10
⑥ 宇宙科学技術	2
⑦ 高エネルギー物理学	18
⑧ 遺伝子工学	13
⑨ 総合利用	4
⑩ その他	129
11 合 計	339

12 資料: CAC, COMPENDEX

注: 1978年末現在, 台湾, 香港を含まず。

Table I-1-6. Number of papers published in China during the past 2 years by fields of technology.

A Fields of technology

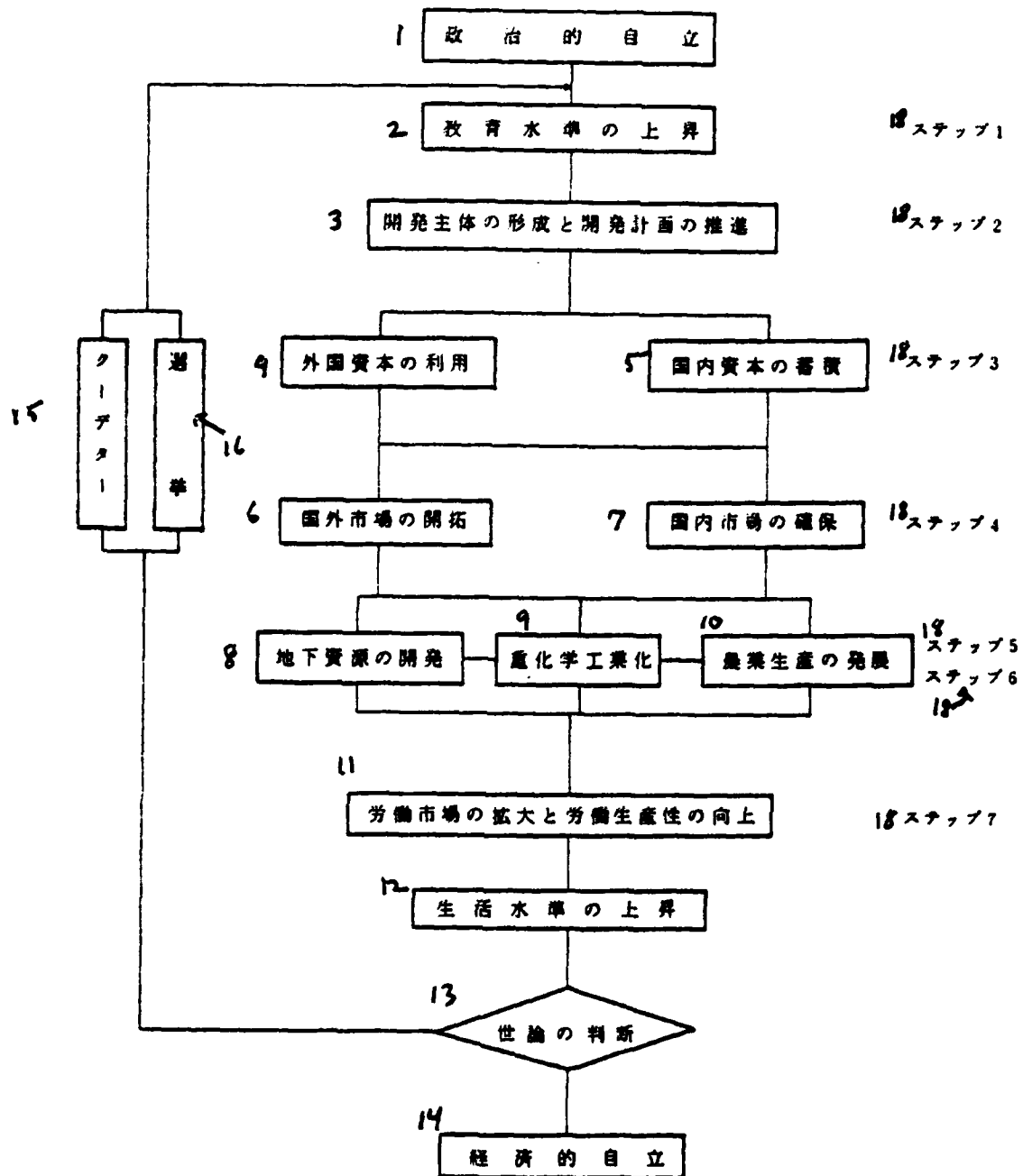
B Number of papers

- ① Agricultural science and technology
- ② Energy science and technology
- ③ Materials science and technology
- ④ Computer science and technology
- ⑤ Laser science and technology
- ⑥ Space Science and technology
- ⑦ High energy physics
- ⑧ Gene engineering
- ⑨ Comprehensive utilization
- ⑩ others

11 Total

12 Background material: CAC, COMPENDEX

Note: As of the end of 1978, inot including Taiwan and Hong Kong



出所：MRI「70年代アジアの発展と日本企業の役割」 1972年。

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Figure II-1-1. Pattern of industrial independence in Asia

Key: next page

Figure II-1-1 Key:

- 1 Political independence
- 2 Upgrading of educational standard
- 3 Formation of developmental entity and promotion of developmental plans.
- 4 Utilization of foreign capitals
- 5 Accumulation of domestic capitals
- 6 Development of foreign market
- 7 Securing of domestic market
- 8 Development of underground resources
- 9 Attainment of heavy chemical industrialization
- 10 Development of agricultural production
- 11 Expansion of labor market and improvement of labor producing
- 12 Upgrading of living standards
- 13 Determination of opinions
- 14 Economic independence
- 15 Coup d' etat
- 16 Election
- 17 Source: MRI "Development of Asia in the 1970's and role of Japanese enterprise" 1972.
- 18 Step

1 輸 入	2 輸 出	3	4	5	6	輸出伸び率	8 輸出されたこ とがないもの
		新しく輸出を 開始または再 開したもの	輸出伸び率 1~100位 61%以上	輸出伸び率 101~200位 60~15%	輸出伸び率 201~300位 14~0%	301~459位 △1~△100%	
9 新しく輸入を開始ま たは再開したもの		2				7 6	15
10 輸入伸び率1~100位 19%以上		2	4 14 輸入代替兼輸出振興型	6	13	15 25 純輸入代替型	16 10 開発指向型
11 輸入伸び率101~200 位 18 ~ △7 %		6	5	4	7	29	16
12 輸入伸び率201~300 位 △8 ~△34 %		7	4	12	6	15	11
13 輸入伸び率300位以 下~428位 △35~△100 %		4	純輸出振興型 5 17	3	6	6	27

Table II-1-1 Summary of needs for technological induction by items, as seen by export and import growth rates by item. (Average rates of growth, 1974-77).

1 Import 2 Export

3 Items newly started or resumed to be exported

4 Items with growth rates of export, 1st to 100th on ranking, over 61%.

5 Items with growth rates of export 101st to 200th

6 Items with growth rates of export, 201st to 300th

7 Items with growth rates of export, 301st to 459th.

8 Items which have never been exported

9 Items newly started or resumed to be imported

10 Items with growth rates of import, 1st to 100th on ranking, over 19%.

11 Items with growth rates of import, 101st to 200th on ranking

12 Items with growth rates of import, 201st to 300th on ranking

13 Items with growth rates of import, 300th to 429th on ranking

14 Import substitution and export promotion type

15 Purely import substitution type

16 Development directed type

17 Purely export promotion type

Table I-1-2 (sic) Needs for Technological Induction as seen by growth (Average rate of growth 1974-77)
rates of export and imports by items

export import	Items newly started or re- sumed to be ex- ported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101st-200th on ranking 60-15%	Export growth rate 201st-300th on ranking 14-0%	Export growth rate 301st or below in ranking 41-4100%	Items never exported
Items newly started or resumed to be imported	Topping & roving of sheep & other animal wool & hair Safety glass	Powdered cocoa (unsweetened)			Soybean oil Newsprints Rapeseed & mu- lard oil Bulbs, tubes, liv- ing trees, roots, cuttings & other plants Lumber, thin board, unit boards for ply- wood (thickness 5mm or less) Wooden boxes, crates, drums & other con- tainers Safes made of non- precious metals	Spigel Railway construction material of steel Other railway roll- ing stock Natural corn (unpro- cessed & scrap) (including chunks & boards of natural cork olive oil horse, donkey, mule & hinny explosives Halogenates & sulfides of non-metals Ignition apparatus such as fuses, detonators Sunflower seed oil Cast iron castings (unprocessed) Lead and its alloys (processed) Logs & raw lumber for further processing to lumber or ply- wood (conifers) Cement Crude potassium salts

Export Import	Items newly started or re- sumed to be ex- ported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101st-200th on ranking 60-13%	Export growth rate 201st-300th on ranking 14-0%	Export growth rate 301st or below in ranking 14-100%	Items never exported
Import growth rate 1st-100th on ranking, over 19%	Automatic data pro- cesses & component instruments, & data transcribing machinery, reading machine for data processor, both optical & electro- magnetic	Animal & plant oil (boiled, oxidized, dehydrated, sulfur- ated or poly- merized)	Mail, parcel post Buttons, zippers, combs, toiletry goods	Butter Spinning fiber pro- ducts for wadding & machinery Other printed materials Other ferroalloys	Cast iron pipes Oil drums, boxes & other similar containers (for transporting, shipping, packaging)	Sulfur (excluding sublimated, pre- cipitated & colloidal sulfur)
	High temperature coal tar distillates and related products	Wirecloth, wire grill, mats & other similar items made of wire (including endless type)	Other chemical engineering products Asbestos products, material for polishing	Home electric appliances Stoves, ranges, cooking heaters, hearth, gas burners & other similar items for home use	Television receivers (including those equipped with radio receiver, recorder, or ground repro- ducer)	Steel rail Radioactive elements, radioactive isotopes & their compounds & mixtures
	Textile & trimming using elastic yarns (excluding knitwork)	Industrial diamond (natural, unpol- ished)	Newspaper, mag- azine & other periodicals	Craft pulp & soda pulp (wood pulp) (excluding those for dissolving)	Calculators, cash registers & other similar instruments with calculating mechanisms	Ferromanganese Boilers (excluding boilers noted in No. 711-1) and radiators (for central heating), air heaters, heated air dividers & their parts (made of steel)
				Other machinery	Other elements	
				Chemicals & flash- ing materials for photography (blended or not separated in all- quot portions or packaged for retail)	Other office machines	
				Printing & writing paper, machine- manufactured (in rolls or sheets) (others)	Chunks of aluminum or its alloys	Poultry
					Lubricating oil & grease (including those for which lubricants of ani- mal or plant origin are added)	Formed steel (exclud- ing rail) (those over 50mm), steel sheet pile
					Functional nitrogen compounds	Petroleum gas
					Phonograph records, thin masters, & tapes & sheets for phone & video re- cording	Short fibers of man- made fibers (ex- cluding synthetic fibers)
						Steel anchors & their parts

Export Import	Items newly started or re- summed to be ex- ported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101st-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-40%	Export growth rate 301st or below in ranking, 41-100%	Items never exported
Import growth rate 1st-100th on ranking, over 19%				Other salts of inorganic acids & peroxy salts (I) Other medical instruments Medium thickness steel plate (thick- ness over 3mm & below 4.75mm) (excluding tin- plated ones)	Orthopedic surgical instruments, surgi- cal belts, hernia belts, splints for fracture treatment, prosthetic limbs, eyes, dentures & related items, hear- ing aids Ink for printing Other fertilizers Alcohol & phenols Functional aldehyde, ketone & quinine com- pounds Other inorganic bases and metallic oxides Strand wires, nets, braided rope & other similar items (exclud- ing those electrically insulated) Rubber tires & tubes (for vehicles & air- craft) Esters & salts of inorganic acids Electric insulation material Salts of other inorgan- ic acids & peroxy salts (II) Rubber belts & belting (for transmission, con- veyers or elevators)	

Export Import	Items newly started or re- sumed to be ex- ported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101st-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 11-100%	Items never exported
Import growth rate 1st- 100th on ranking, over 60%					Hydrocarbon & their halogenated deriva- tives, sulfonated derivatives, nitra- ted derivatives Other organic com- pounds Disinfectants, insecti- cides, germicides, herbicides, germina- tion inhibitors, rodenticides & other similar chemicals	
Import growth rate 101st-200th on ranking	Tungsten, molybdenum & tantalum Gas turbines (excluding those for aircraft) Thick steel plates (thickness exceeding 4.75mm) (excluding tin plated ones) & universal plate Cellulose ester, cellulose ester & other cellulose derivations, reclaimed, reclaimed cellulose & vulcanized fiber Nickel and its alloys (processed) Other metal processing machinery	Lens, prism, reflective mirror & other related optical instruments Thin plates of steel (thickness 3mm or less) (excluding clad, plated, printed & otherwise coated products) Special handling items Internal combustion engine (piston type) (excluding those for aircraft) Communication instruments, radio-television microphones & receivers, applied wireless instrument (other items)	Textile (painted or impregnated & their products) Aerostats, dirigibles, aircraft, parts for aerostats & dirigibles (excluding rubber tires, engines and electric parts) Measuring instruments (other things) & precision instruments Other electric instruments	Books (including maps & world globes) (printed ones) Steel wires (in rolls) Synthetic rubber Electric instruments for internal combustion engines, automobiles & bicycles Monoculars, binoculars, microscopes & other optic instruments Phosphate fertilizers (including superphosphate & Thomas phosphate fertilizers) Watches (with watch movements) watch movements & watch casings	Thermoelectronic tubes, cold cathode tubes photoelectric circuits, photocells, piezoelectricity crystal elements Seamless steel pipes (excluding cast iron pipes) Hose, belt & belting made of textile fibers Organic, inorganic compounds & complex ring compounds Ethers, epoxides & acetals Organic synthetic dye, natural indigo & lake pigments Short synthetic fibers	High pressure water conduction pipes for thermoelectric power plants Fire engines, sprinkler trucks, repair cars, X-ray vans & other special use automobiles (assembled or otherwise) Sulfite pulp (wood pulp) (excluding pulp for dissolving) Zinc & its alloys (processed) Formed steel (80 mm or less) Steel belts Oats (not pulverized)

Export Import	Items newly started or resumed to be exported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 0-100%	Items never exported
Import growth rate 101st-200th on ranking					Phenol resins, amino resins, alkyl resins, polyarilesters & other unsaturated polyesters, sili- cone & other con- densates & poly- merized condensates Hormones Films, plates & paper for photogr- aphy Phonographs, tape recorders & other recorders & sound reproducers Pigments (others) Nitrogen fertili- zers (excluding nat- ural sodium nitrate) Wheels & stones for polishing Yarn of manmade fibers (excluding synthetic fibers) Paint, enamel, lac- quer, varnish, water color paint dryer & fillers Acids, acid anhy- drates, acid halo- gen compounds, acid peroxidates & pero- xidate Steel bars & hollow mining drill steel	Milk & cream (including buttermilk, non- fat milk, sour milk, sour cream & whey (fresh) Paper for manu- factured cigar- ettes (excluding paper already cut for appro- priate widths of cigarettes) Steel ingot Linoleum Leather, composi- tion leather & parchment-finish- ed scrap leather (excluding items suitable for man- ufacturing of leather goods) & leather powder Nickel ore (in- cluding purified ore) & nickel mate Milk & cream (in- cluding butter- milk, nonfat milk & whey) condensed liquid or semi- solid) Buses (including trolley buses) (assembled or otherwise)

Export import	Items newly started or resumed to be exported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 0-100%	Items never exported
Import growth rate 101st-200th on ranking					Synthetic fiber textile (excluding narrow width tex- tile) Linen, ramine & hemp textile (ex- cluding narrow width textile) Firebricks & other fireproof building material Rubber processing materials (paste, board, bars, thread, pipes, etc.) Knitwork (excluding those using elastic yarns or processed with elastic) Manmade graphite, animal charcoal, & organic chemical products (other things) Other man-made plastic goods Medical electric instruments Oxides of metals (mainly used for paint) Organic surfactants, synthetic surfact- ants & synthetic inorganic deter- gents	Steel pipes (ex- cluding cast iron pipes) (those manufactured by welding & other methods)

Export Import	Items newly started or resumed to be exported	Export growth rate 1st-100th on ranking, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 11-100%	Items never exported
Import growth rate 101st-200th on ranking					Bricks, tiles, pipe & similar items Iron & copper wire (excluding wire rods) Aluminum & its alloys (processed)	
Import growth rate 201st-300th on ranking	Steel coil (for re-rolling) Containers for compressed or liquified gases Storage tanks & similar containers (those with capacity 3001 or more) (those for compressed or liquified gases & those with machinery parts or heating-cooling equipment are excluded) Hand-held tools (with self-contained electromotive apparatus) Steam engine Trailers & other vehicles (excluding self-propelled type) & their parts Steel powder & shots & sponge iron	Other photographic & cinemascopic instruments Craft paper & craft cardboard Machinery for construction & mines Ballbearing, roller bearing, needle bearing	Metal processing machinery (excluding those noted in No. 715-2) (II) Other rubber goods Synthetic fiber yarns Ships (excluding warships, tugboats, special use vessels, ships for scrap) Insulated electric wires & insulated cables Pumps & centrifuges Processing machinery for minerals, lumber, manmade hard plastics & other similar materials (including metal processing machinery & accessories Misc. manufactured goods of nonprecious metals	Electric measurement instruments Machinery parts (others) Gauging instruments (excluding electric gauges) Typewriters & checkwriters Spring made of steel or copper Passenger automobiles (excluding buses & special used cars) (assembled or otherwise)	Cameras & flash instruments for photography Other animals (mainly to be ingested) Polyethylene, polystyrene, polyvinyl derivatives, cumaroiden (phonetic) resins & other polymers & copolymers Chunks, bars & pipes of glass (including scrap glass) Animal fats & greases (excluding lard) Machine-manufactured paper & cardboard (rolls or sheets) (others) Bodies, chassis, frame & other parts & accessories, (excluding rubber tires, chassis with engines & electric parts) Salts of inorganic acids & peroxy salts	Steel plates (tin-plated) Oxygen, nitrogen, & rare gases Other ships & vessels Metals of the platinum group (nonprocessed or primary products) Silver (nonprocessed or primary products) Potassium fertilizers (excluding crude potassium salts noted in No. 271-4) Cattle (including buffalo) Hardened oil Farm machinery for cultivation & soil preparation Parts for railway rolling stock Malt & its powder

Export Import	Items newly started or resumed to be exported	Export growth rate 1st-100th on ranking, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 0-100%	Items never exported
Import growth rate 201st-300th on ranking			Aircraft engines (including jet engines) Other manufact- ured goods of nonprecious metals Electric generators, motors, converters, transformers & rectifiers Instruments for opening-closing, protection & connection of electric circuits, resistor, distrib- uting panel, control panel		Wheat (including spelt) Heating & cooling machinery X-ray & other radia- tion instruments Harvesters, press for hay & straw, threshing machine, grassmowers, clean- ing & sorting machine for farm crops Textile machinery Other farm implements Sewing machines	
Import growth rate below 300th on ranking	Leather tanning or processing machines Cotton (excluding cotton linters) Steel structures, their parts & building material made by process- ing for steel structures Accessories of boiler noted in No. 711-1 & conden- ser for steam engine	Other inorganic compounds Loading-unload- ing machinery Steel joints for plumbing Copper & its alloys (processed items) Food processing machinery (ex- cluding those for home use)	Other paper & cardboards (in rolls & sheets) Printing & book- binding machinery Tractors (excluding those designed for roads)	Machinery for sort- ing, separating & other processing of minerals & mach- inery for glass product manufact- uring Polishing roller, wrapping machine, scales & other instruments Chunks of copper or its alloy Thin steel plates (thickness below 3mm) (clad or other- wise plated or printed items (ex- cluding tin plated ones)	Special use automo- biles & trucks (assembled or other- wise) Chunk of lead or its alloys Pulp manufacturing machinery, paper making & process- ing machines Light oil Scrap steel Heavy oil Optic glass (not optically polished) & blank for correc- tive lenses)	Tractor for road use Airplanes, gliders, kites & rotascutes (phonetic) Milk & cream (including butter- milk, nonfat milk & whey) (dried, chunks or powder) Other mineral thermal insula- tors Scrap rubber (in- cluding scrap rubber goods for recycling) & its powder

Export import	Items newly started or resumed to be exported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 11-100%	Items never exported
	(excluding those carded, combed or otherwise treated for preparation of spinning)			Pig iron Natural phosphates (pulverized or otherwise) Polished plate glass (square or rectangular, not processed)	Boards for con- struction (manufac- tured from wood pulp & other plant fibers) Regular plate glass (made by drawing up or blowing up method) (Square or rectang- ular, not processed)	Synthetic organ- ic leather tann- ers, inorganic tanners, compos- itive tanners & enzymes for pre- tanning Steel broom, sheet bar & rough ly forged steel Machinery pulp (wood pulp) Other engines Steam generating boilers & super- heating water boilers Magnesium & berium Chunk of nichel or its alloy Pulp for dis- solving (wood pulp) Railway locomo- tives (others) Tin ores (includ- ing purified ores Railway electric locomotives (powered by stor- age batteries or external elec- tricity Forged steel (in- cluding drop forg- ed steel (not pro- cessed).

Import growth rate below 300th on ranking

Export Import	Items newly started or resumed to be exported	Export growth rate 1st-100th on rank- ing, over 60%	Export growth rate 101-200th on ranking, 60-15%	Export growth rate 201st-300th on ranking, 14-0%	Export growth rate 301st or below in ranking, 41-4100%	Items never exported
Export growth rate below 300th on ranking						Steel castings (not processed) Composition leather Ores of silver & metals of plati- num group (inclu- ding purified ores) Accelerators of electrons & protons Potatoes (fresh or frozen) Dairy farming machinery & cream separators Cigars (including shellout-phonetic Music (including handwritten, illustrated & bound ones) Stable isotopes & their compounds Asphalt, oil shale, asphaltic rock & tar sand (natural products)