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(出版者 / Publisher)
Institute of Comparative Economic Studies, Hosei University / 法政大学比較経済研究所

(雑誌名 / Journal or Publication Title)
Journal of International Economic Studies

(巻 / Volume)
9

(開始ページ / Start Page)
79

(終了ページ / End Page)
105

(発行年 / Year)
1995-03

(URL)
https://doi.org/10.15002/00002126

Journal of International Economic Studies (1995), No. 9, 79-106

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Introduction

Presently, developing countries are facing many problems in the course of industrialization. Many studies have already identified the problems. They can be summarized as follows. (1) How developing countries can accumulate technical and financial resources in a short period of time? It has been understood that the industrialization is a continuous process starting from agriculture through light industry and heavy/chemical industry to high-tech industry. For, this process is necessary to build the infrastructure which promotes general industrialization, while expanding the roundabout production. Today, however, developing countries have to compete with developed countries in the world market, immediately they take off. Now, it is a very important problem for developing countries how they can catch up with developed countries in a short run. (2) But, A. Gerschenkron claimed the advantage of developing countries. He says that developing countries can adopt advanced technology already established by developed countries. Thus, since they don't have to spend a long time for technical development, they can catch up with developed countries in a comparatively short period of time. (3) On the other hand, after making research of Mexican industries, T. Nakaoka[1] pointed out that assembly plants introduced into developing countries could make them more dependent on the import of components because their domestic component industry had not been fully developed yet. As a result, the export-import imbalance is far more extended, causing a shortage of foreign money, which impairs the development of the industry itself. (4) Therefore, in order to assimilate the imported technology, it is important to improve sociological and technical capacity to accept various factors necessary for the establishment of industry, and to secure the market over a period long enough to master the techniques. (5)But the real problem is how they can establish a system to produce goods at a low cost and compete with the businesses of highly industrialized countries in the world market. It is essential for them to master the production technology, adopt production control techniques and develop related industries in order to produce goods at a low cost.

This paper intends to clarify, by cost analysis, under what conditions mass-production technology can be transplanted, what kind of problems there are to hinder it, and how the industry or enterprises in the developing countries can be more competitive in the world market.

The above questions will be elucidated by analyzing (1)the kind of introduced techniques, (2) transition from the import to the domestic production of components, (3) the production cost, (4) the capital accumulation structure of enterprises, and (5) the economic performance of imported technology.

As a model, this study deals with the Chinese color TV industry which employs one of the most typical massproduction system and has rapidly grown. Since the national "reform and open door" policy in 1978, the Chinese color TV industry has made an amazing growth. The mass production of color TV sets in China began in 1981 when the color TV manufacturing plants imported from Japan started operation. In 1988, the production reached 10 million sets a year, and the large-scale mass production system was established. Clearly, it serves as an ideal example to consider the questions mentioned above.

Chapter I describes the structure of the Chinese color TV industry in terms of the import of technology, the increase in the domestic production of components and its industrial structure. Chapter II analyzes the production cost, based on various management indexes. The accounting system of Chinese enterprises, the cost structure, factors determining the cost, and economies of scale will be elucidated. Chapter III discusses the gross added value based on the management indexes and the cost structure of the TV enterprises, and clarifies their tax burden ratio, labor's relative share, and accumulation of retained profits.

As a result of the study, the following conclusions were reached. (1) The economic performance of technology import, estimated from the gross added value ratio, proved to be highly efficient. The gross added value, generated between 1986 and 1990, was 5 to 10 times as much as the introduction cost. (2) The increased autonomy of regions created independent regional economy, which contributed to the increase in the components' domestic production and the establishment of the mass production system. However, it also accelerated the establishment of an excessive number of small-scale color TV enterprises, hindering the optimum distribution of resources. (3) The working rates of assembly lines are low because of shortage of components and foreign currency. Large-scale enterprises are especially suffering from low labor productivities. (4) Expenses for components and materials account for more than 90% of the sales cost. It is crucial to reduce the component/material expenses in order to reduce the sales cost. The reason of high component/material expenses is that the prices of domestic products are higher than the international prices. The purchasing prices of imported products are also high, as compared to the international prices, even if the import duties are taken into consideration. (5) The Chinese enterprises have the comparative advantage of low labor cost. That means, if they succeed in reducing the component/material cost, they can be highly competitive in the world market. In order to reduce the component/material cost, it is necessary to improve the labor productivity by integrating small-scale component manufacturers into larger enterprises, allocate profits to assembly manufacturers and component manufacturers more appropriately by authorizing them to negotiate prices, and thereby to help component manufacturers reduce the cost. (6) The amount of large enterprises' retained profit is generally small. For, the average tax burden ratio for the Chinese enterprises is as high as 50 to 60% and the ratio is even higher for larger enterprises. It is necessary for China to review its policy and tax system, and take a new direction towards increasing the retained profit in large-

scale enterprises and restructuring the industry so that it can improve economies of scale.

I. The Structure of Color TV Industry in China

To begin with, let's take an overview of the history of the development of the television manufacturing industry in China and its structural characteristics.

Figure 1 shows the changes in the numbers of manufactured and exported television sets in China.

In 1978, the Chinese government took a "reform and open door" policy, which paved the way for introduction of foreign techniques. This policy led to the establishment of mass-production system in Chinese color TV industry. In 1978 and 1979, the first color TV mass-production line in China was built, and started operating in 1981. Between 1983 and 1985, a large number of color TV production lines were imported, and production increased dramatically: 1,340,000 sets were produced in 1984 and 4,350,000 in 1985. In 1988, only 7 years after the start of operation, production reached 10,370,000 sets, and the mass-production system with a capacity of more than ten million units was established. With this, the number of exported color TVs also increased from 1,500,000 in 1987 to 2,300,000 in 1988 and 3,620,000 in 1990. By then, China had become one of the most important color TV production bases in the world.

(A) The import of technology

The development of Chinese TV industry can be divided into four periods based on the extent of the import of technology. The first period, from 1978 to 1979, is the basic construction period funded by the national government. This period has the following characteristics: (1) Production bases were selected by the national government. (2) National fund was invested. (3) Techniques were carefully

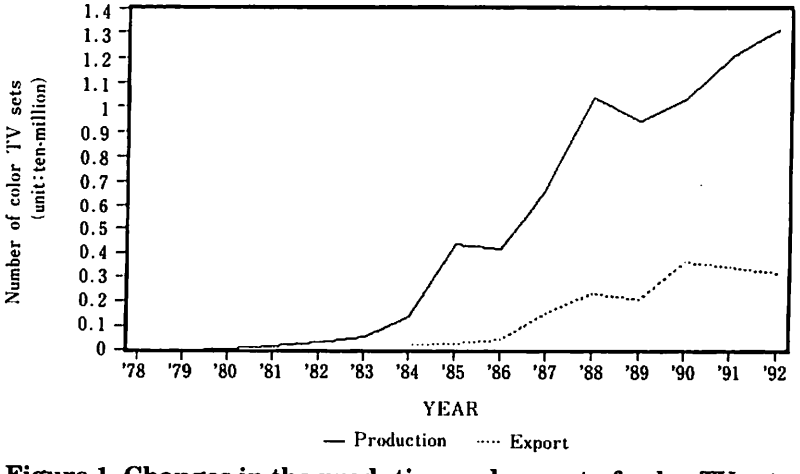


Figure 1 Changes in the prodution and export of color TV sets

introduced based on the plans in order to achieve well-balanced production from manufacturing of key components to assembly. During this period, mainly three color TV asssembly lines (with a production capacity of 500,000 sets a year) and a color CRT (cathode-ray tube) production line (with a capacity of 1,000,000 units a year) were imported from Japan.

The second period, from 1980 to 1982, was the coordination period. It is characterized with the following events: (1) Because a number of large-scale projects including iron and steel plants and petroleum plants were built intensively during the first period, a serious shortage of foreign money occurred. Introduction of techniques was suspended, and some plant construction contracts were cancelled. (2) At the same time, the form of technical introduction changed. In the first period, foreign-made manufacturing plants were introduced as they were, but now, only the techniques which were not known to the Chinese people were selected and imported. Otherwise, as many existing resources as possible were used. (3) The fact that the Provinces of Guangdong and Fujian were designated as "special economic districts" shows, the autonomy of regional governments were quickly extended.

The third period, from 1983 to 1985, is the period when regional governments and enterprises rushed to import plants. In this period: (1) At least one color TV enterprise was established in each province, and totally 118 color TV assembly lines were imported throughout the country[2]. (2) Most of them were imported from Japanese TV manufacturers, but some were from Philips in Holland, Hong Kong and South Korea. (3) Conveyor lines necessary for assembly, measuring devices and product design diagrams were also supplied. (4) It is estimated that the annual cost-effective production per line is 150,000 sets. Multiplying 150,000 sets by the number of imported assembly lines, which is 118, brings the national productivity to 17.7 million color TVs. (5) The cost of introducing one production line was about 0.5 to 1 billion yen (2.12 to 4.24 million U.S. dollars as of 1985), and totally, about 59 to 118 billion yen (250 to 500 million dollars) were invested in the introduction of assembly lines[3]. (6) All these costs were paid by "non-budgetary fund" which was not a national budget but a fund raised by regional governments and enterprises.

During the forth period, from 1986 to 1990, the goal of total home production of color TVs was set in the 7th Five Year Plan. This period is characterized by the following aspects: (1) In the third period, when not all color TV components could be made in the country, many assembly lines were imported. This required the import of a large number of components and caused a shortage of foreign currency. How they could earn foreign money and procure more components from abroad became a serious problem. (2) Meanwhile, the newly achieved enormous productivity created a threat of excess-production. In 1985, the Chinese government banned the import of color TV assembly lines. (3) The goverment also decided to distribute foreign money to the plants where 70% of the components they used were homemade. (4) In this way, the introduction of assembly plants came to a turning point, and the domestic production of components became the most urgent task.

(B) Shift to Home Production

In the end, the goal for total home production of all components of color TVs were achieved by more than 500 components production lines imported by regional

governments and enterprises, and by planned import of the production plants of color CRTs. The cost of color CRTs is reported to account for 50% of the total color TV production cost. The shift to total home production of components was realized by the following factors. (1) Aiming to establish regional economic autonomy, local governments built component manufacturing enterprises near their color TV assembly factories to create a self-supporting system within a region. This accelerated the shift to total home production of components. (2) The national government planned to increase production of color CRTs from 1.2 million units in 1985 to 7 million in 1990. With this, it decided to expand the capacity of existing factories (to produce 1.6 million units annually) and construct new factories in Beijing (1.6 million units), Nanjing (1.5 million units), and Shanghai (1.0 million units). The necessary investment was estimated to be more than 100 billion yen, and China tried to establish joint enterprises as a means of both raising fund and introducing the latest equipment. Thus, a joint enterprise between the Beijing government and Matsushita Electric Group was established in Beijing, and one between the government and Philips in Nanjing[4]. (3) By 1989, 90 to 95% of all components, excluding color CRTs, were made in China[5]. (4) However, the home production rates of the key components excluding tuners are still low[6]: in 1990, 34.2% of color CRTs, 40% of deflection yokes, 64.2% of flyback transformers, and 96.9% of tuners were homemade. The home production rate of color CRTs has been sharply increasing, since new factories started operation in 1990. But the other key components are still being made using the production equipment and designs introduced in mid-80's. For this reason, they have a difficulty in coping with the world's trends for increasingly large color TVs with more functions and higher performance. As a result, their home production rates are declining. Particularly, the reduction in size of color TV components and their integration into microchips are advancing in the world, and so they will have to introduce new production lines which can cope with the latest technological innovation including the surface mounting technique[7]. (5) Although Chinese exports have been increasing, most of them are processed and assembled products using imported components: in 1989, normal trade of color TVs was 4.6% (2.1% in 1990), while the processing deal and buy-back trade (a type of trade in which one party imports manufacturing techniques and components, and pays the charge by final products) accounted for 95.3% (96.4% in 1990)[8]. In order to realize the total home production of components and compete in the world market, China needs to establish a system to produce state-of-the-art components appropriate for the most advanced color TVs, and to improve the quality of the products.

(C) Industrial Structure

The Chinese color TV industry was established through the import of techniques. This establishment process significantly distorted the structure of the industry. The Chinese color TV industry is characterized primarily by the presence of too many small-scale assembly enterprises. This threatens their survivability and degrades economies of scale. Table 1 shows the distribution of enterprises by production scale. There are 9 large-scale enterprises with annual production of over 300,000 sets. They account for 16% of all color TV enterprises in China. These top 9 enterprises produced

Table 1 Distribution of production scales of color TV enterprises

Scale of production*	Number of Enterprises	Percentage
Over 3	9 (including 5 joint ventures)	15.79
2~3	5 (including one joint venture)	8.77
1~2	15	26.32
0.5~1	15	26.32
Under 0.5	13	22.81
Total	57	100.00

Source: The Chinese Electronic Industry Yearbook 1991, p.V-9.
Note: *Number of products a year (unit: hundred-thousand sets)

38% of the total production (9.4 million sets) in 1989[9]. The remaining 84% are enterprises with annual production less than 300,000 sets. The average annual production of the top 9 enterprises is 400,000 sets each, while that of medium- and small-scale enterprises is 120,000 sets, which is under the cost-effective production of one line. Secondly, there is a problem of the working rate of production lines. The working rate of a production line is obtained by dividing the actual number of products by the capacity. The average working rate of assembly lines in China is estimated to be only 55%. Thirdly, most component manufacturers are specialized in only one type of resistors or capacitors, and the production scale is very small, and yet they employ too many workers. This decreases the labor productivity. Moreover, they don't have enough investment to improve the production of components.

II. The Analysis of the Production Cost[10]

Why can these small-scale enterprises coexist with larger-scale enterprises?

The first reason lies in the process in which planned prices are determined. The second reason is the establishment of regional self-supporting economy by local governments. They are preventing the emergence of nation-wide market conditions, and therefore, the generation of economies of scale and the optimum distribution of resources.

Then, how are Chinese color TV enterprises managed, and what is the cost structure like? This chapter discusses the determination process of planned prices, managerial situations of Chinese color TV enterprises, their accounting system and the cost structure.

(A) Planned Prices

In China, planned prices of color TVs are determined in the following way[11].

130 "national-budget-controlled enterprises (budgetary enterprises)" report to the national government's Mechanical and Electronic Industry Department about production costs, financial situations, productivities, and technical standards. The information is processed and sent to the Department of Market and Price, and then

Table 2 Examples of the retail prices of color TV sets in 1986

Unit: Yuan

Size	Name of Enterprise	Retail price
14"	Beijing Dongfeng TV Factory	1,038
	Shaghai No.1 TV Factory	1,020
	Tianjin Communication & Broadcasting Co.	998
	Shijiazhuang TV Factory	998
	Inner Mongolia TV Factory	1,100
18"	Tianjin Communication & Broadcasting Co.	1,330
	Chongqing No.3 Radio Factory	1,420
	Inner Mongolia TV Factory	1,350
	Shanxi Broadcasting Equipment & TV Factory	1,395
	Shijiazhuang TV Factory	1,340
	Wuxi TV Factory	1,350
	Changhong Machinery Factory	1,390

Source: The Chinese Electronic Industry Yearbook 1987, p.IV-45.

to the State Planning Commission, where planned prices are finally determined.

Generally, a planned price is based on the production cost. An ex-factory price is determined by adding an average profit to the production cost. The ex-factory price plus a distribution margin determines a retail price. Specifically in the case of color TVs, however, planned prices are based on the highest production cost so that every enterprise can make a profit. In this way, the government has been promoting color TV industry strongly. (Usually, planned prices are determined based on the median production cost.) This is one of the main reasons why small-scale enterprises can coexist with larg-scale enterprises.

The retail prices of color TVs are actually determined in the following way. The average profit ratio is the capital profit ratio obtained by dividing the profit by current assets plus fixed assets. In 1985, the government determined the average profit ratio to be 15%, and the distribution margin 9 to 16%. Multiplying the ex-factory price by the average profit ratio gives the profit. Thus, the relation between the production cost and the retail price of a color TV can be represented in the following formulas: retail price = (1 + distribution margin) x ex-factory price = [(1 + distribution margin) / (1 - average profit ratio)] x production cost. As a result, retail price = (1.28～1.36) x production cost.

Table 2 shows the retail prices of new products in 1986 as determined by the Electronic Industry Department. This suggests that retail prices are not determined uniformly according to the size of a TV, but determined individually by manufacturer or products' features and quality. In January 1984, the Chinese government decided to include varied prices due to quality in controlled prices, aiming to give enterprises an incentive for improving management and products' quality [12]. This decision is reflected in the variation of the retail prices shown in Table 2. The variation is roughly between 5 and 6.5%.

In the 80's, the planned price system was strictly carried out, but in the current trend towards market economy, control of prices has been gradually loosened. The color TV industry has already been authorized to set retail prices with variation within 10% of controlled prices. This has been accelerating competition among

enterprises in price and quality, and making a clearer contrast between successful businesses and unprofitable ones.

(B) Managerial Situation of Chinese Color TV Enterprises

This section discusses the changes occuring in the managerial situation of the Chinese color TV industry, based on the data from 1986 to 1990. Though detailed managerial data of Chinese enterprizes are not available, their rankings by various management indexes, such as sales, profit & taxation, profit & taxation per employee, and labor productivity, are issued by the Electronic Industry Department and local governments. As the color TV industry is one of the most promoted electronic industries in China, they are always on higher ranks. Data on fixed assets, numbers of employees and production are known from leaflets and advertisements of enterprises. From these materials, the following information was collected.

Tables 3 and 4 show the managment indexes of 41 color TV manufacturers in 1990 and 1986, respectively. Because of the limited space, the data of 1988 are not shown here, but they are also included in the analysis of managerial situations.

In these tables, the fixed assets mean the purchase price before depreciation, the capital labor ratio represents the fixed assets per employee, and the labor productivity represents the production per employee. The numbers in the left-end column show the ranking of sales of 41 color TV enterprises in 1986 and 1990.

From these tables, the following observations can be obtained. (1) As the names of the enterprises suggest, color TV assembly businesses are scattering throughout the country; there is at least one enterprise in every region. This is preventing the generation of economies of scale. (2) When the sales are divided by 1,843 yuan[13], the average unit price of a TV in 1990, the number of TVs sold in a year can be known. As a result, large-scale enterprises sold about 630,000 sets, and small-scale enterprises sold about 58,000 sets in a year, making a great difference between them. Hereafter, the scale of enterprises will be discussed based on the amount of sales[14]. (3) Table 4 shows that there are significant changes in the rankings of sales between 1986 and 1990. As mentioned before, the data of management indexes were collected from various ranking lists. There are many empty boxes under the titles of the profit & taxation, and the labor productivity in 1990. This shows that the profit & taxation or labor productivity declined greatly in many enterprises and they weren't listed on higher rankings. Figure 2 shows the correlation between the sales and the sales growth rate. Figure 2-1 shows the sales in 1986 vs. the sales growth rates from 1986 to 1988, and Figure 2-2 shows the sales in 1988 vs. the sales growth rates from 1988 to 1990. They show that between 1986 and 1988 most enterprises increased sales by several times. Especially, the enterprises with smaller sales showed higher growth rates (with a correlation coefficient: $r = -0.498$). Encouraged by the great increase in demand, even small-scale enterprises could grow rapidly in this period. On the contrary, between 1988 and 1990, though the general sales still doubled, larger enterprises achieved slightly higher growth rates ($r = 0.063$). This is because demand decreased greatly after strong inflation occurred in 1988 and the government tightened its control. Competition in the market got severe, and the scale of business began to affect the growth of enterprises. This condition has been continuing since then, and urging restructuring of enterprises. (4) Between 1988 and 1990, the growth

Table 3 Business Indexes of Chinese color TV Enterprises (1990)

(Unit: Ten-thousand yuan, employee)

Ranking in '90	Name of Enterprises	Sales	Profit & Taxtation	Amount of production	No. of Employees	Gross of wages**	Fixed assets	Labor productivity	Capital labor ratio
1	Shanghai No.1 TV Factory	116,136	12,300	109,117	3,726	846	10,614 #	292,853	28,487
2	Changhong Machinery Factory	115,089	20,931	138,004	4,720 *	1,071	13,664 #	292,376	28,948
3	Nanjing Radio Factory	95,234	9,265	126,500	7,200	1,634	17,000	157,698	23,611
4	Tianjin Communication & Broadcasting Co.	93,594	10,834	98,000	6,000	1,362	10,974	163,333	18,290
5	Shenzhen Huaqiang Electronics Industry Co.	81,828	5,737	68,000	3,300	749	10,000	223,107	30,303
6	Xiamen Overseas Chinese Electronic Co.,Ltd.	78,723	8,735	130,372	4,288	973		428,292	
7	Huang He Machinery Factory	75,733	6,800	78,000	3,936	893	19,832 #	108,300	50,386
8	Shanghai No.4 Radio Factory	74,118		75,275	4,180 *	949		180,084	
9	Shanghai No.18 Radio Factory	72,892	5,368 *1	75,309	4,284	972	7,030	176,038	16,410
10	Beijing TV Factory	65,748	5,183	83,300	2,967	674	8,047	296,661	27,122
11	Suzhou TV Factory	64,886	1,079	76,041	2,100	477	5,370	321,044	25,571
12	Fujian Hitachi TV Co., Ltd.	51,391	3,155 *2	86,335	1,470 *	334	2,108 #	587,312	14,341
13	Tianjin Great Wall Electronics Co.	51,318	3,896	52,648	3,381	767		155,717	
14	Tianjin TV Factory	51,318					4,675 #		
15	Wuxi TV Factory	50,276		61,067	2,200 *	499	5,008 #	277,578	22,762
16	Hangzhou TV Factory	44,331			4,392 *	997	11,369 #		25,886
17	Quig Dao TV Factory	42,622	8,115	54,979	2,527	574	4,773 #	362,659	18,888
18	Hua Fa Electronics Co.	34,416	3,652	37,500	1,370	311	5,000	273,290	36,496
19	Inner Mongolia TV Factory	30,053	2,631	38,800	1,507	342	4,072 #	275,814	27,021
20	Liaoning No.8 Radio Factory	29,991	3,036	65,624	2,494 *	566		263,129	
21	Changfeng Machinery Factory	29,016	3,527	42,700	4,494	1,020	12,600	95,016	28,037
22	Beijing Dongfeng TV Factory	24,397	1,525		2,748 *	624	7,945 #		28,912
23	Hefer No.2 Radio Factory	24,366	1,488 *3	28,278	2,222	504	3,909 #	127,264	17,591
24	Chengdu No.1 Radio Factory	23,370	4,634	26,000	2,658	603	6,298 #	97,823	23,696
25	Shanxi Broadcasting Equipment & TV Factory	22,706			4,480 *	1,017	9,179 #		20,489
26	Dalian TV Factory	20,780	1,355		1,958 *	444	7,504 #		38,325
27	Guangzhou Broadcasting Equipment Factory	20,037			2,725	619	5,091 #		18,681
28	Changchun No.1 Radio Factory	18,790	597 *4	18,366	1,936	439	5,371	94,866	27,743
29	Hunan TV Factory	18,736	527	23,943	1,511	343	3,981 #	158,458	26,348
30	Shanghai Broadcasting Equipment Factory	17,375			3,797	862	5,162		13,595
31	Foshan No.5 Radio Factory	15,510		18,179	880 *	200	3,680 #	206,575	41,817
32	Yunnan TV Factory	14,501	1,400	17,186	1,074 *	244	18,435 #	160,022	171,645
33	Shijiazhuang TV Factory	14,397			2,596 *	589	5,360 #		20,647
34	Shandong TV Factory	14,013	465	20,470	1,200	272		170,582	
35	Chongqing Radio Factory	13,119	3,696 *5	17,070	3,448	783		49,500	
36	Ganxin TV Ltd.	12,435	1,906	15,363	440	100		358,949	
37	Guizhou TV Factory	12,338	1,467	24,062	1,789 *	406	4,122 #	134,500	23,040
38	Wuhan TV Factory	11,663			1,650 *	375	2,238 #		13,561
39	Chongqing No.3 Radio Factory	11,000			1,440	327	3,590		24,931
40	Gansu TV Factory	10,986	891 *6	15,503	1,665 *	378	3,153 #		18,936
41	Xinjiang No.1 Radio Factory	10,636	1,055	13,800	900	204	2,447	161,747	27,189

Source: The Chinese Electronic Industry Yearbook 1991, etc.

Notes: *1: Pre-tax profit is 18.146 million yuan.
*2: Profit & taxtation is 21,465 yuan per employee.
*3: Pre-tax profit is 5.692 million yuan and the Product tax is 9.189 million yuan.
*4: Profit paid to Government is 6.03 million yuan, special consumption tax is 17.96 million yuan and amount loss is 18.015 million yuan.
*5: Special consumption tax is 16.05 million yuan and profit & taxtation is 2.73 million yuan.
*6: Pre-tax profit is 3.52 million yuan.
* : Calculated by multiplying the number of employees in 88 by 1.1, the average growth rate of other enterprises from 1988 to 90.
**: Calculated by multiplying the number of employees times 2,270 yuan,wage per employee calculated from total of employees and wages in electronic industry (Reference: The Chinese Electronic Industry Yearbook 1991, p.II-36).
: Calculated by multiplying the fixed assets in 1988 by 1.34, the average growth rate of other enterprises from 1988 to 90.

Table 4 Business Indexes of Chinese color TV Enterprises (1986)

(Unit: Ten-thousand yuan, employee)

Ranking in '90	Ranking in '86	Name of Enterprises	Sales	Profit & Taxtation	Amount of production	No. of Employees	Gross of wages**	Fixed assets	Labor productivity	Capital labor ratio
1	1	Shanghai No.1 TV Factory	57,594	7,637	52,589	3,036	577	5,740	240,876	18,906
2	9	Changhong Machinery Factory	27,500	1,479	41,836	2,000	302 *	7,389 #	112,342	36,946
3	4	Nanjing Radio Factory	40,388	4,278	34,637	6,467	1,150	11,104	58,057	17,170
5	23	Shenzhen Huaqiang Electronics Industry Co.	11,825	432	3,828	770	116 *		49,712	
6	15	Xiamen Overseas Chinese Electronic Co.,Ltd.	18,356	2,875	16,609	1,631	246 *		101,833	
7	11	Huang He Machinery Factory	23,298	2,233	22,231	6,704	1,060	10,591	42,366	15,798
8	2	Shanghai No.4 Radio Factory	45,458	4,436	40,843	2,800	423 *		107,822	
9	3	Shanghai No.18 Radio Factory	44,928	6,942	36,671	3,735	655	4,689	114,591	12,554
10	5	Beijing TV Factory	37,273	1,468	33,778	2,272	339	6,805	215,066	29,952
11	12	Suzhou TV Factory	23,257	1,768	27,131	1,874	312	2,933	152,156	15,651
12	18	Fujian Hitachi TV Co. Ltd	14,550	-2,563	12,615	1,028	2,111	1,140	164,157	11,089
14	14	Tianjin TV Factory	19,713	1,226	21,987	3,239	430	2,528	81,084	7,805
15	10	Wuxi TV Factory	25,365	2,120	29,033	1,998	279	2,708	150,871	13,554
16	8	Hangzhou TV Factory	27,653	3,562	30,752	3,072	587	6,148	90,192	20,013
17	17	Quig Dao TV Factory	15,447	1,613	15,407	1,340	171	2,564	171,946	19,134
19	21	Inner Mongolia TV Factory	12,608	1,347	12,331	1,215	173	2,202	142,842	18,123
20	32	Liaoning No.8 Radio Factory	8,000		11,082	1,267	191 *		87,466	
21	27	Changfeng Machinery Factory	9,002	1,417	9,297	4,036	716	7,792	25,056	19,306
22	16	Beijing Dongfeng TV Factory	16,209	1,187	17,717	2,494	324	4,519	87,735	18,119
23	31	Hefer No.2 Radio Factory	8,037	168	6,023	1,519	196	2,114	44,450	13,917
24	20	Chengdu No.1 Radio Factory	12,956	698	11,925	1,962	296 *	3,406 #	60,780	17,359
25	29	Shanxi Broadcasting Equipment & TV Factory	8,451	134	7,671	3,133	445	4,964	24,485	15,844
26	33	Dalian TV Factory	7,551	690	7,199	1,451	208	4,537	54,425	31,268
27	19	Guangzhou Broadcasting Equipment Factory	14,295	189	12,803	2,059	314	2,753	86,785	13,371
28	35	Changchun No.1 Radio Factory	7,040		6,355	1,301	197 *	2,520 #	48,847	19,366
29	24	Hunan TV Factory	11,198	1,036	11,472	1,291	176	2,153	109,829	16,677
30	7	Shanghai Broadcasting Equipment Factory	28,624	2,914		2,700	408 *			
31	22	Foshan No.5 Radio Factory	12,422	745	11,872	552	108	1,990	215,072	36,051
32	28	Yunnan TV Factory	8,609	3,391	8,903	751	510	9,969	83,924	132,743
33	26	Shijiazhuang TV Factory	9,124	200	10,703	1,451	152	3,354	99,593	23,115
35	34	Chongqing Radio Factory	7,176	408	8,313	1,500	227 *		26,003	
37	25	Guizhou TV Factory	10,107	190	9,330	1,251	149	2,229	109,864	17,818
38	37	Wuhan TV Factory	5,677	337	6,904	1,026	119	1,210	72,109	11,793
39	36	Chongqing No.3 Radio Factory	6,972	249	6,650	1,192	180 *		55,785	
40	40	Gansu TV Factory	3,498	231	4,262	1,612	201	1,705	32,884	10,577
41	39	Xinjiang No.1 Radio Factory	4,264	79	4,306	790	116	1,007	71,013	12,747

Source: "The Chinese Electronic Industry Yearbook 1987", "Statistical Year Book of China 1987", etc.

* : Calculated by multiplying the number of employees by 1511 yuan, the wages per employee obtained from total wages and the number of employees of other enterprises.

\# : Calculated backwards from the fixed assets in 1988, using the average growth rate of other enterprise' fixed assets from 1986 to 88.

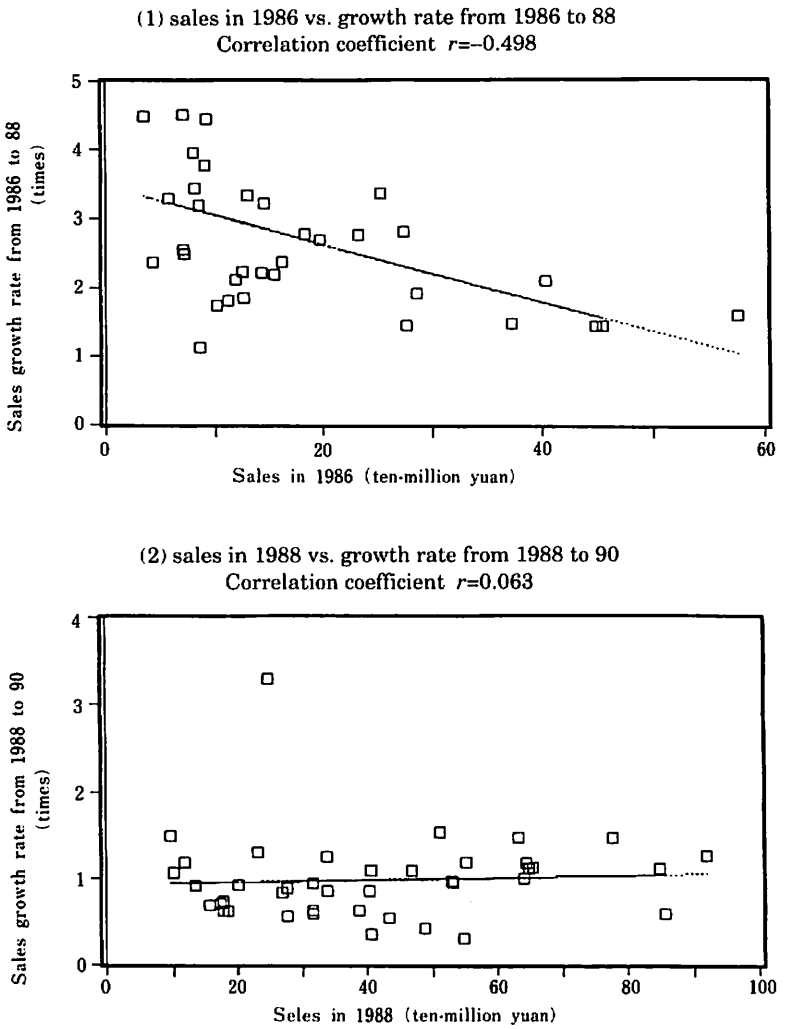
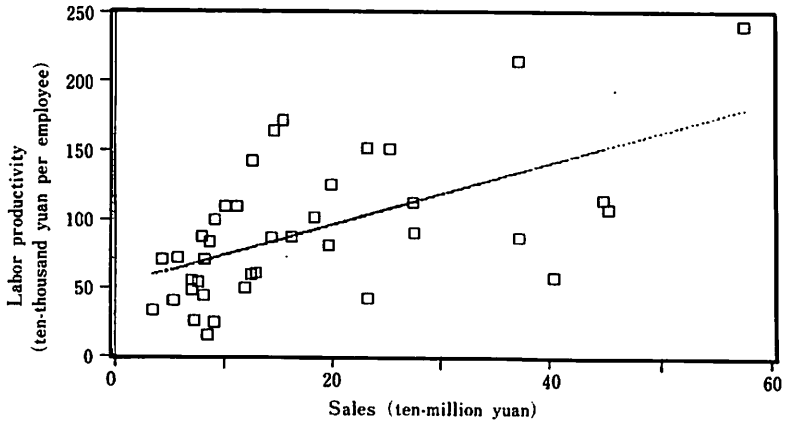


Figure 2 Relationship between the sales and the sales growth rate

of labor productivity stagnated. The average labor productivity sharply increased by 220% from 96,961 yuan/employee in 1986 to 214,639 yuan/employee in 1988, but it decreased to 206,079 yuan/employee in 1990, 96% of that of 1988. In addition, between 1988 and 1990, the difference in the labor productivity due to the scale of business became smaller. Figure 3 shows the result of analysis of correlations between the labor productivity and the sales in 1986 and 1990. In 1986 (Figure 3-1), there was a close relation between the scale of business and the labor productivity (r = 0.581), and the larger the enterprise was, the greater its labor productivity was. However, the correlation coefficient declined to 0.258 in 1988, and 0.369 in 1990 (see Figure 3-2), which shows that differences in the labor productivity due to the scale of business were reduced. That means, even large-scale enterprises have problems in the labor productivity. (5) The correlation between the labor productivity and the

(1) 1986: Correlation coefficient r=0.581



(2) 1990: Correlation coefficient r=0.292

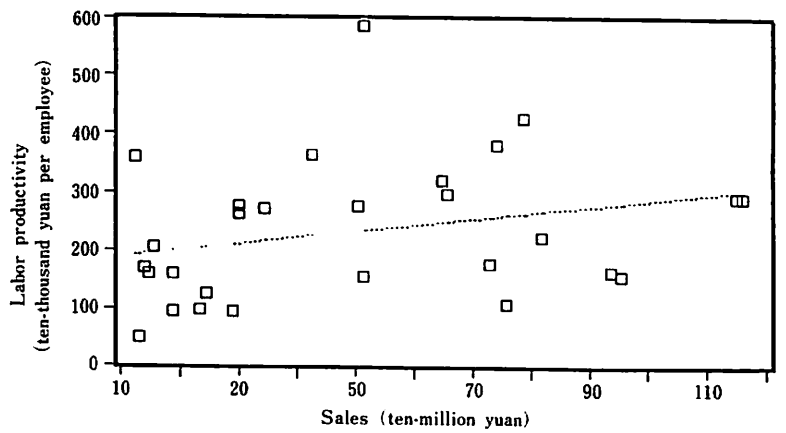
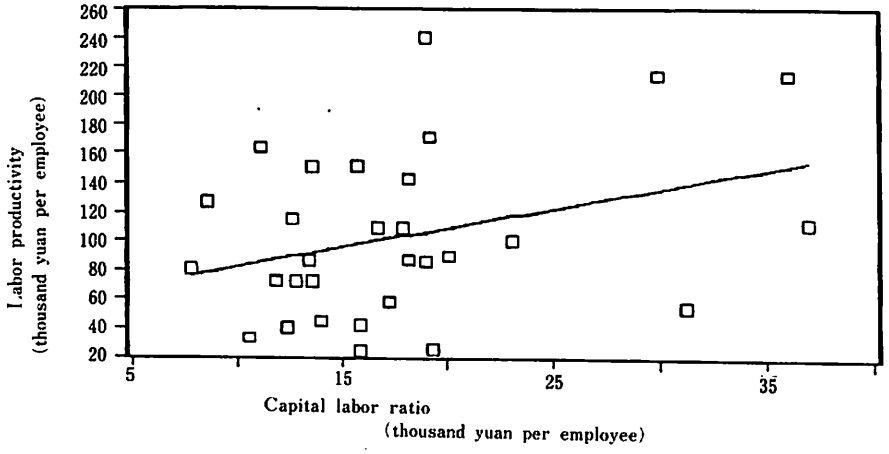


Figure 3 Relationship between the sales and the labor productivity

capital labor ratio may be the clue to the problem. Figure 4 shows the result of its analysis. Figure 4-1 is the result of 1986, where the correlation coefficient is 0.339, showing that the higher the capital labor ratio is , the greater the labor productivity is. But, it dropped down to -0.005 in 1990 (see Figure 4-2), which suggests that the capital labor ratio no longer affected the labor productivity. In general, if enterprises sell more products, they gain more profits and they can invest the profits in plant and equipment and improve their labor productivity even further. But here, the average capital labor ratio increased by only 120% from 1986 to 1990: from 21,214 yuan/employee in 1986 and 19,317 yuan/employee in 1988 to 25,721 yuan/employee in 1990. Moreover, the correlation coefficient of the capital labor ratio vs. the sales stayed almost the same: 0.137 in 1986, 0.198 in 1988, and 0.100 in 1990.

The above trends can be attributed to the low working rate of color TV assembly lines. The primary cause of the problem is the excessive introduction of assembly

(1) 1986: Correlation coefficient r=0.339



(2) 1990: Correlation coefficient r=–0.005

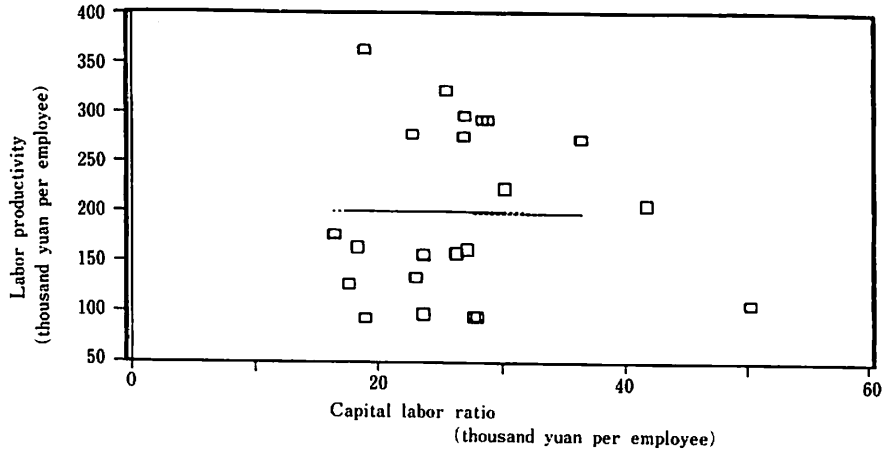


Figure 4 Relationship between the capital labor ratio and the labor productivity

lines between 1983 and 1985, as described in Chapter I. A huge number of new assembly lines certainly enabled the rapid expansion of production, but they were in excess. Generally speaking, equipment investment should be timely done, considering market conditions and technical standards. Nevertheless, China invested in over-capacity equipment and fell short of investment. This resulted in the low capital labor ratio and the low dependency of the capital labor ratio on the sales in late 1980s. This also prevented it from coping with the later technical innovation. Another cause of the problem is especially the low working rates in large-scale enterprises. Between 1983 and 1985, large enterprises introduced several to ten assembly lines, while most small enterprises installed one line. When there were not enough components, large enterprises with greater capacity had more difficulty in procuring them. It is

reflected in the reduced difference in the labor productivity between large enterprises and small ones, and in the poor coorelation between the labor productivity and the capital labor ratio. The most needed component was color CRTs. The current home production rate of color CRTs is 85%, but it was as low as 13.9% in 1988 and 18.2% in 1989, being far from catching up with the rapidly increasing production of color TVs. Apparently, the working rate of assembly lines depended on the ability to procure color CRTs [15].

Thirdly, there is a problem of components' quality. Though it has been much improved, there was a considerable problem in the 1980s. For example, the products whose quality was approved by the Electronic Industry Department were only 47.2% of all TVs manufactured in 1989, and even less in 1990; 37.65% [16]. The poor quality of components is a serious problem especially for large-scale enterprises. As China's central export industry, they had been stressing their quality policy and endeavoring to improve quality-control standards and quality-evaluation systems. And now, they just couldn't degrade their quality standards, even if it was very difficult to procure homemade components meeting the standards, and they couldn't help depending increasingly on imported components.

Fourthly, there is a problem of the shortage of foreign currency to buy components from abroad. In late 1980s, the amount of foreign currency allocated by the government considerably decreased, and the enterprises were forced to earn foreign money by themselves. Naturally, large enterprises faced greater difficulty in earning foreign money, because they needed more money to maintain their large-scale business than small-scale enterprises did. On the contrary, small-scale enterprises had an advantage over large enterprises in procuring foreign currency and homemade components. As small-scale enterprises are a center of the local economy in each comparatively small region, the local government strongly supported them. This is a major reason for survival of small-scale enterprises. It has created the "evil equality" and obstructed the optimum distribution of desperately needed homemade components and foreign currency.

(C) Accounting System

This section describes the cost structure of the Chinese color TV industry. Before that, it is necessary to know how the Chinese enterprises calculate earnings and expenses.

In the 80s, the accounting system of Chinese enterprises was drastically changed by the government's decision in 1985 that enterprises should pay the profit tax instead of paying the profit to the government. Figure 5 shows the structure of color TV enterprises' accounting system after this change. Non-operating revenues and expenditures are not included in the figure in order to simplify it.

Deducting the cost of sales and the selling cost from the sales leaves the profit & taxation, which is regarded in China as a principal index of a business's revenue. Deducting distribution taxes, such as the product tax and the special consumption tax, from the profit & taxation leaves the gross profit (pretax profit). Deducting the corporation profit tax, the adjustment tax and other taxes from the gross profit leaves the after-tax profit. Deducting the profit paid to the government from the after-tax profit leaves the retained profit. This is the current net profit of the business. In the

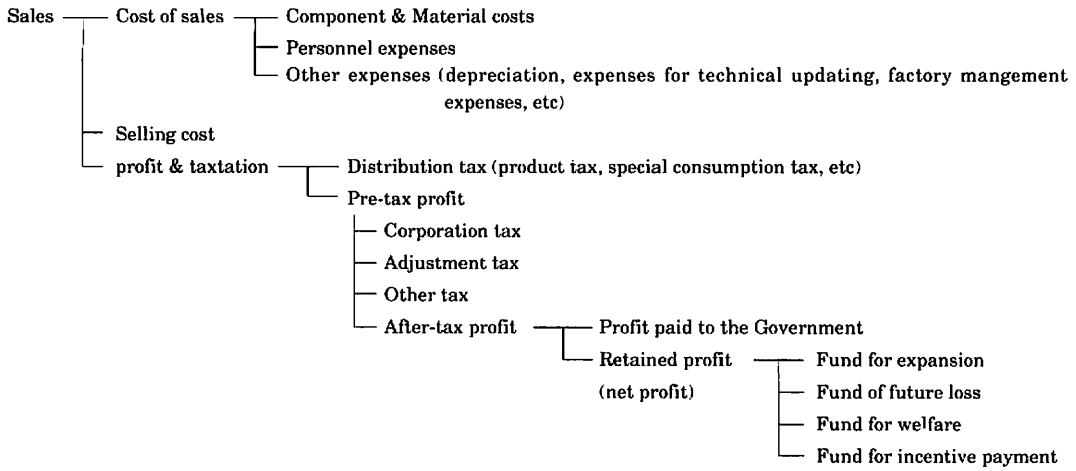


Figure 5 Accounting System of Chinese Color TV Enterprise

figure, the items under the retained profit are the destinations of the retained profit.

(D) The Cost Structure

Let's examine the cost structure by using the profit and loss accounting system described in (C).

Table 5 shows the accounting result on the cost structure of color TV enterprises in 1990, based on management indexes shown in Table 3. Because of the limit in space, the results of 1986 and 1988 are not shown, but they are included in the analysis below.

The cost of sales is obtained by subtracting the profit & taxation from the sales. Though the selling cost is included in the cost of sales, the amount is ignored here because it does not affect the follwing discussion. The sales cost ratio is the proportion of the cost of sales to the sales. The result of analysis of the correlation between the sales cost ratio and the sales is shown in Figure 6.

This result is suggesting very interesting facts: (1) The correlation coefficient in 1986 (see Figure 6-1) is -0.184, meaning that the larger the amount of sales, that is, the scale of business is, the lower the sales cost ratio is. This shows that the economies of scale were generated. However, the correlation coefficient in 1988 and 1990 (see Figure 6-2) are 0.252 and 0.154, respectively, meaning that the larger the sales or the scale of business is, the higher the sales cost ratio is. This shows that the economies of scale were degraded. (2) The average sales cost ratios in 1986, 1988 and 1990 were 92.4%, 82.7% and 90.4%, respectively. Though it is gradually lowering, the especially low ratio in 1988 was the result of the sudden rise of prices due to inflation.

Now, how were the elements of the sales cost structure changed? The cost of sales consists of expenses for components, materials, labor and others, as shown in Figure 5. Other expenses include depreciation, expenses for technical updating and the operation cost.

Depreciation expenses can be obtained by multiplying the industrial depreciation rates shown in the "Chinese Statistical Yearbook 1993" (5.1% in 1986, 5.3% in 1988

Table 5 Cost Analysis of Chinese color TV enterprises in 1990

Unit: Ten-thousand yuan

Ranking in '90	Name of Enterprise	Sales cost	Sales cost ratio(%)	Depre-ciation +updating	Manage-ment expenses	Total of other expenses	ratio (%)	personal expenses	ratio (%)	Material costs *9	ratio (%)
1	Shanghai No.1 TV Factory	103,836	89.4	860	5,192	6,052	5.2	964	0.9	96,820	93.2
2	Changhong Machinery Factory	109,182	94.9	1,107	5,459	6,566	5.0	1,221	1.1	101,395	92.9
3	Nanjing Radio Factory	85,969	90.3	1,377	4,298	5,675	6.6	1,863	2.2	78,430	91.2
4	Tianjin Communication & Broadcasting Co.	82,760	88.4	889	4,138	5,027	6.1	1,553	1.9	76,180	92.0
5	Shenzhen Huaqiang Electronics Industry Co.	76,091	93.0	810	3,805	4,615	6.1	854	1.1	70,622	92.8
6	Xiamen Overseas Chinese Electronic Co., Ltd.	69,988	88.9		3,499	3,499	5.0	1,110	1.6	65,379	93.4
7	Huang He Machinery Factory	68,933	91.0	1,606	3,447	5,053	7.3	1,019	1.5	62,861	91.2
9	Shanghai No.18 Radio Factory	67,524	92.6		3,376	3,376	5.0	1,109	1.6	63,039	93.4
10	Beijing TV Factory	60,565	92.1	652	3,028	3,680	6.1	768	1.3	56,117	92.7
11	Suzhou TV Factory	63,807	98.3	435	3,190	3,625	5.7	543	0.9	59,638	93.5
12	Fujian Hitachi TV Co., Ltd.	44,699	87.0	171	2,235	2,406	5.4	380	0.9	41,913	93.8
13	Tianjin Great Wall Electronics Co.	47,422	92.4		2,371	2,371	5.0	875	1.8	44,176	93.2
17	Quig Dao TV Factory	34,507	81.0	387	1,725	2,112	6.1	654	1.9	31,741	92.0
18	Hua Fa Electronics Co.	30,764	89.4	405	1,538	1,943	6.3	355	1.2	28,466	92.5
19	Inner Mongolia TV Factory	27,422	91.2	330	1,371	1,701	6.2	390	1.4	25,331	92.4
20	Liaoning No.8 Radio Factory	26,955	89.9		1,348	1,348	5.0	645	2.4	24,962	92.6
21	Changfeng Machinery Factory	25,489	87.8	1,021	1,274	2,295	9.0	1,163	4.6	22,031	86.4
22	Beijing Dongfeng TV Factory	22,872	93.7	644	1,144	1,787	7.8	711	3.1	20,374	89.1
23	Hefer No.2 Radio Factory	22,878	93.9	317	1,144	1,461	6.4	575	2.5	20,842	91.1
24	Chengdu No.1 Radio Factory	18,736	80.2	510	937	1,447	7.7	688	3.7	16,601	88.6
26	Dalian TV Factory	19,425	93.5	608	971	1,579	8.1	507	2.6	17,339	89.3
28	Changchun No.1 Radio Factory	18,194	96.8	435	910	1,345	7.4	501	2.8	16,348	89.9
29	Hunan TV Factory	18,209	97.2	322	910	1,233	6.8	391	2.1	16,585	91.1
32	Yunnan TV Factory	9,803	67.6	1,493	490	1,983	20.2	933	9.5	6,887	70.3
34	Shandong TV Factory	13,548	96.7		677	677	5.0	311	2.3	12,560	92.7
35	Chongqing Radio Factory	9,423	71.8		471	471	5.0	892	9.5	8,059	85.5
36	Ganxin TV Ltd.	10,529	84.7		526	526	5.0	114	1.1	9,889	93.9
37	Guizhou TV Factory	10,871	88.1	334	544	877	8.1	463	4.3	9,531	87.7
40	Gansu TV Factory	10,095	91.9	255	505	760	7.5	431	4.3	8,904	88.2
41	Xinjiang No.1 Radio Factory	9,581	90.1	198	479	677	7.1	233	2.4	8,671	90.5

Source: Table 3

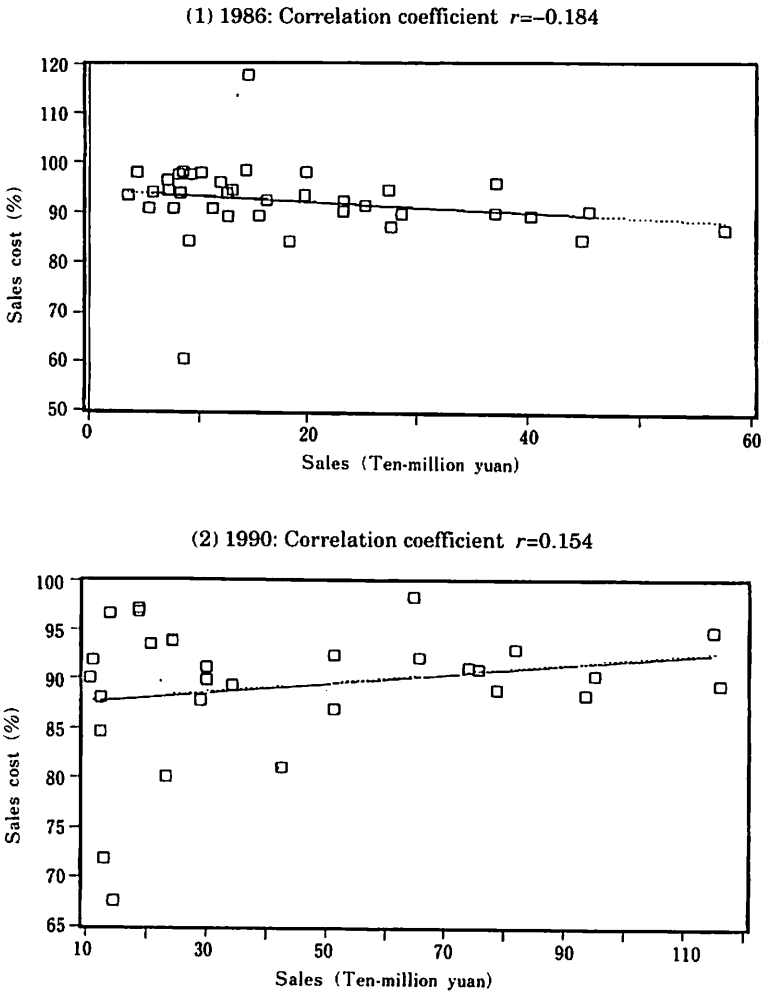


Figure 6 Relationship between the sales cost and the sales

and 5.1% in 1990) by the amount of fixed assets of each color TV enterprises. Expenses for technical updating is obtained by multiplying the fixed assets by 3%, and the operation cost is obtained by multiplying the cost of sales by 5%[17]. As a result, the average other expenses, consisting of these expenditures, are 7.3% of the sales cost in 1986, 6.4% in 1988 and 6.7% in 1990, showing a lowering tendency.

The personnel expenses consist of the total wages for employees and welfare expenses. The government had set the welfare expenses to be 14% of the total wages[18]. The average percentage of the personnel expenses was 3.3% of the sales cost in 1986, 2.0% in 1988 and 2.5% in 1990, with a decreasing tendency.

When subtracting personnel expenses and other expenses from the sales cost, expenses for components and materials can be obtained. Their average ratio to the sales cost tended to increase: 89.4% in 1986, 91.6% in 1988 and 91.8% in 1990. The average component/material ratio of the top 5 enterprises (Shanghai No.1 TV

Factory, Changhong Machinery Factory, Nanjing Radio Factory, Shanghai No.18 Radio Factory, and Beijing TV Factory) is even higher than that: 91.8% in 1986, 92.6% in 1988, and 92.7% in 1990.

From these results, the following conclusions can be drawn. (1) The sales cost is as high as over 90%, which hinders the increase in the profit rate. (2) Expenses for components and materials account for 90% of the sales cost, and the reduction in these expenses is crucial to lower the sales cost. (3) In large-scale enterprises, the ratio of the expenses for components and materials is especially high, and it is essential for them to reduce these expenses in order to improve the profit rate. (4) The proportion of personnel expenses to the sales cost is as low as 2 to 3%. The Chinese color TV industry holds a comparatively advantageous position in this aspect.

The Chinese color TV industry must reduce the component/material cost, if they are to be highly competitive in the international market. In other words, if they can reduce the component/material cost to the level of the developed countries, they will gain an advantage over them in price, because they have the comparative advantage of the low labor cost.

Then, why are their component and material costs so high? In 1988, the World Bank made a research on the costs of three color TV enterprises in China: Shanghai TV Factory (the same one as Shanghai No.1 Factory above; SHANGHAI), Changhong TV Factory (Changhong Machinery Factory above; CHANGHONG), and Beijin TV Factory (BEIJING), and compared them with those of an international TV company[19]. Though the analysis was made on the production cost of one 14-inch color TV as of 1985, the data are still effective and the following discussion is based on them.

The ex-factory cost of a 14-inch color TV was $260.28 in SHANGHAI, $237.96 in CHANGHONG, $250.27 in BEIJING, and $142.00 in the international TV company. The Chinese color TV industry's cost is higher than the cost of the international color TV company by 168 to 183%. The proportions of material expenses, indirect expenses and personnel expenses to the sales cost is 91.4%, 6.1% and 0.8%, respectively in SHANGHAI; 96.2%, 3.8% and 1.6% in CHANGHONG; 92.5%, 2.9%, and 0.9% in BEIJING; and 73.2%, 14.1% and 15.7% in the international TV company. The proportion of material expenses is extremely high in the Chinese enterprises, and the percentages of indirect and personnel expenses are significantly low, compared to the international TV company[20].

Table 6 shows the comparative analysis of the material cost of each enterprise. From this table, the following facts are revealed. (1) Among the components used, the ratio of domestic products is high in Braun tubes, deflection yokes and electron guns. This may be because priority was given to these key factories. But the prices of the domestic products are about the same as the imported products or even higher, and twice or more as high as the international prices. Not only that, foreign products are purchased at higher prices than the international prices, even after the import duty is deducted. (2) The home production rate of tuners has been increasing, but their price is also higher than the international price by almost 200%. This is because the key elements of a tuner, such as coils and variable capacitors, have to be imported[21]. (3) The price of a homemade transformer is almost twice as high as an imported product whose price is 1.6 times as high as the international price. (4) As for printed

Table 6 Comparative analysis of the material cost per 14" color TV

	Shanghai TV Factory			Changhong TV Factory			Beijing TV Factory			International Color TV Co.
	producing area	material cost($)	cost ratio of China to US	producing area	material cost($)	cost ratio of China to US	producing area	material cost($)	cost ratio of China to US	material cost($)
Braun tube, deflection yoke, electron gun	(I)*(D)	83.11	2.14	(I) (D)*	84.75	2.18	(D)	82.73	2.13	38.81
tuner	(D)	21.30	1.99	(D)	18.44	1.72	(D)	20.48	1.91	10.70
transformer	(I)*(D)	7.23	1.62	(D)	13.13	2.95	(D)	13.24	2.98	4.45
printed circuit board	(D)	5.09	1.44	(I)*(D)	10.46	2.96	(D)	3.96	1.12	3.65
integrated circuit	(I)	4.97	0.97	(D)	9.06	1.76	(D)	9.57	1.86	5.14
cabinet	(F)	6.94	0.58	(F)	5.48	0.46	(D)	13.26	1.11	11.94
other components	(I)*(D)	109.33	3.76	(I)*(D)	87.67	3.01	(I)*(D)	88.35	3.04	29.10
gross material cost		237.95	2.30		228.98	2.21		231.59	2.23	103.67
import duty & related expenses	—	36.91	—	—	54.84	—	—	26.25	—	—
ratio of import duty & related expenses to material cost (%)	—	16	—	—	24	—	—	11	—	—
raio of imported components (%), not including a Braun tube	—	24	—	—	33	—	—	26	—	—
raio of imported components (%), including a Braun tube	—	44	—	—	54	—	—	34	—	—

Source: "RESEARCH ON THE DEVELOPING STRATEGY OF ELECTRONICS INDUSTRY" (BEIJING: Electronic Industry Publishing Co., 1991) p.582.
Note: (I), (D), (F) represent imported products, domestic products, self-made products, respectively.
The mark "*" shows that the item in front of the mark is majority.

circuit boards, a high percentage of homemade products are being used. Their price is half the price of an imported one. SHANGHAI can get a good supply of the products from the China's largest printed circuit board manufacturer located in the same area. BEIJING has been producing printed circuit boards in its own plant imported from Terefunken of Germany since the beginning of 1980. These conditions have been contributing to the reduction of costs[22]. (5) An integrated circuit is a typical example where the price of domestic products are extremely high, compared to that of imported ones. In the case of integrated circuits, mass production is the most cost-effective method. Chinese integrated circuits are expensive because they are produced in a small scale. (6) Meanwhile, cabinets are a typical example where assembly enterprises succeeded in reducing the cost by producing them in their own factory. Their price is less than half of the domestic products supplied from other manufacturers.

To conclude, the prices of components are generally high in China. There seem to be four reasons for it. First, most component manufacturers in China are small in scale with a low labor productivity. This raises the cost of domestic components. Large-scale assembly enterprises can manufacture components in their own factory at a much lower cost. Secondly, China has to depend on the import of integrated circuits and special materials necessary for making components. For, the Japanese and other companies who sold the component manufacturing plants to China require the use of specified parts so that they can guarantee the quality of Chinese products. This "import with strings attached" prevents Chinese manufacturers from using low-priced key components and materials. Thirdly, imported components are very expensive. Not only the import duty is high, but also the great demand for imported components are continuously raising their prices, because every factory desperately needs a large number of components in order to keep the assembly lines operating. This gives Chinese enterprises a disadvantage, because they have to buy the parts at higher prices than international TV companies do. Finally, the government had set high planned prices for TV components, aiming to promote the domestic component manufacturing industry. For this reason, the profit rates in the assembly enterprises are reported to remain lower than those in the component manufacturers[23].

All these factors taken into consideration, it would be necessary for Chinese assembly enterprises, to increase the production of components within their own factory and reduce the material cost. It is already intended in the move toward conglomeration, with an assembly enterprise in the core and some component manufacturers around it, which began in the latter half of 1980's. However, as there is a limit in the expansion of component production within an assembly enterprise, it will be necessary in the long run to integrate small component manufacturers into larger-scale enterprises. It is also essential to authorize the enterprises to set independent prices, in order to realize the optimum distribution of profits among assembly enterprises and component manufacturers. Forcing component manufacturers to reduce costs in this way will be important for the Chinese color TV industry in order to become more competitive in the world market.

III. The Structure of Capital Accumulation

Finally, the structure of capital accumulation in the Chinese color TV industry is

analyzed in this Chapter. The analysis is based on the profit ratio, the labor's relative share, the tax burden ratio and the gross added value ratio, and their dependence on the scale of business. The profit ratio is the proportion of a net profit, which is an enterprise's retained profit, to a gross added value; the labor's relative share is the ratio of a personnel cost to a gross added value; the tax burden ratio is the ratio of taxes to a gross added value; the gross added value ratio is the ratio of a gross added value to sales.

Table 7 shows the changes in the ratios of profits and taxes in the electronic/communication systems manufacturers, the TV manufacturers and the color TV manufacturers. The ratio of the distribution tax to the profit & taxation tends to increase, but it is especially high in the color TV industry. This shows that the government is controlling the rise in prices due to inflation and the resultant maldistribution of profits by raising the distribution tax. On the other hand, the ratio of a corporation profit tax and a profit paid to the government to a pre-tax profit are decreasing, reflecting the government's intention to give enterprises stronger incentives for managerial improvement. However, some insist that these taxes are still high[24].

Table 8 shows the amounts of the gross added value and other items (net profits, depreciation and personnel expenses) in 1990 with their proportions. Because of the limit of space, the data in 1986 and 1988 are not shown, but they are included in the analysis of the changes in the capital accumulation structure between 1986 and 1990.

Figure 7 shows the result of analysis of the relations between the sales and the profit ratio, the labor's relative share, the tax burden ratio and the gross added value ratio. The result suggests the following facts. (1) The graph of the profit ratio vs. the sales shows that the larger the sales is, the higher the retained profit is. However, the correlation coefficient is 0.540 in 1986, 0.174 in 1988, and 0.366 in 1990, showing a decrease in the profit ratio's dependency on the sales. The average profit ratio was 11.9% in 1986, 16.9% in 1988 and 12.8% in 1990. The sharp increase in the ratio in

Table 7 Changes in the ratio of taxes to profits

Unit: %

	'86	'87	'88	'89	'90
Ratio of the distribution tax to the "profit & taxtation"					
The Electronic & Communication Equipment Manufacturers*1	—	31.9	32.0	35.4	49.3
The TV Manufacturers*2	—	29.5	33.9	42.4	54.4
The Color TV Manufacturers*3	40.3	—	41.1	—	63.2
The ratio of Corporation profit tax and profit paid to the Government, etc to pretax profit					
Electronic & Communication Equipment Manufacturers*4	—	67.1	66.4	59.3	51.4

Source: "Statistical Year Book of China 1988-1991", "Chinese Electronic Industry Yearbook 1988-1991"

Note: *1: Calculated from gross "profit & taxtation" and gross pretax profit of 1,300 enterprises. (Source: "Statistical Year Book of China 1988-1991")

*2: Calculated from gross tax and gross profit of 172 or 173 enterprises
The data of '87 is that of 497 broadcasting and TV manufacturing enterprises. (Source: "Chinese Electronics Industry Yearbook 1988-1991")

*3: Calculated from pretax profit and "profit & taxtation" of several color TV manufacturers (source: ibid).

*4: Calculated from gross retained profit and gross pretax profit of 1,300 enterprises. (Source: "Statistical Year Book of China 1988-1991")

Table 8 Analysis of rough value add of the color TV enterprises at 1990

Unit: Ten-thousand yuan

Rankig in '90	Name of Enterprise	Sales	Gross added value*1						Profit ratio (%)	Laber's relative share (%)	Tax burden ratio (%)	Gross added value ratio (%)
			Sum Total	Personal expenses	Rough profit							
					Total	Net profit *2	Depre-ciation +updating	Taxes *3				
1	Shanghai No.1 TV Factory	116,136	14,124	964	13,160	2,200	860	10,100	15.6	6.8	71.5	12.2
2	Changhong Machinery Factory	115,089	8,235	1,221	7,014	1,056	1,107	4,851	12.8	14.8	58.9	7.2
3	Nanjing Radio Factory	95,234	12,505	1,863	10,642	1,657	1,377	7,608	13.3	14.9	60.8	13.1
4	Tianjin Communication & Broadcasting Co.	93,594	13,276	1,553	11,723	1,938	889	8,896	14.6	11.7	67.0	14.2
5	Shenzhen Huaqiang Electronics Industry Co.	81,828	7,401	854	6,547	1,026	810	4,711	13.9	11.5	63.7	9.0
6	Xiamen Overseas Chinese Electronic Co.,Ltd.	78,723	9,845	1,110	8,735	1,562		7,173	15.9	11.3	72.9	12.5
7	Huang He Machinery Factory	75,733	9,425	1,019	8,406	1,216	1,606	5,584	12.9	10.8	59.2	12.4
9	Shanghai No.18 Radio Factory	72,892	7,046	1,109	5,937	960	569	4,408	13.6	15.7	62.6	9.7
10	Beijing TV Factory	65,748	6,603	768	5,835	927	652	4,256	14.0	11.6	64.5	10.0
11	Suzhou TV Factory	64,886	2,057	543	1,514	193	435	886	9.4	26.4	43.1	3.2
12	Fujian Hitachi TV Co., Ltd.	51,391	7,243	380	6,863	1,197	171	5,495	16.5	5.2	75.9	14.1
13	Tianjin Great Wall Electronics Co.	51,318	4,771	875	3,896	697		3,199	14.6	18.3	67.1	9.3
17	Quig Dao TV Factory	42,622	9,156	654	8,502	1,451	387	6,664	15.9	7.1	72.8	21.5
18	Hua Fa Electronics Co.	34,416	4,412	355	4,057	653	405	2,999	14.8	8.0	68.0	12.8
19	Inner Mongolia TV Factory	30,053	3,351	390	2,961	471	330	2,160	14.0	11.6	64.5	11.2
20	Liaoning No.8 Radio Factory	29,991	3,681	645	3,036	543		2,493	14.8	17.5	67.7	12.3
21	Changfeng Machinery Factory	29,016	5,711	1,163	4,548	631	1,021	2,896	11.0	20.4	50.7	19.7
22	Beijing Dongfeng TV Factory	24,397	2,880	711	2,169	273	644	1,252	9.5	24.7	43.5	11.8
23	Hefer No.2 Radio Factory	24,366	2,380	575	1,805	266	317	1,222	11.2	24.2	51.3	9.8
24	Chengdu No.1 Radio Factory	23,370	5,832	688	5,144	829	510	3,805	14.2	11.8	65.2	25.0
26	Dalian TV Factory	20,780	2,470	507	1,963	242	608	1,113	9.8	20.5	45.0	11.9
28	Changchun No.1 Radio Factory	18,790	1,533	501	1,032	107	435	490	7.0	32.7	32.0	8.2
29	Hunan TV Factory	18,736	1,240	391	849	94	322	433	7.6	31.5	34.9	6.6
32	Yunnan TV Factory	14,501	7,124	933	6,191	840	1,493	3,858	11.8	13.1	54.2	49.1
34	Shandong TV Factory	14,013	776	311	465	83		382	10.7	40.1	49.2	5.5
35	Chongqing Radio Factory	13,119	4,588	892	3,696	661		3,035	14.4	19.4	66.2	35.0
36	Ganxin TV Ltd.	12,435	2,020	114	1,906	341		1,565	16.9	5.6	77.5	16.2
37	Guizhou TV Factory	12,338	2,264	463	1,801	262	334	1,205	11.6	20.5	53.2	18.3
40	Gansu TV Factory	10,986	1,577	431	1,146	159	255	732	10.1	27.3	46.4	14.4
41	Xinjiang No.1 Radio Factory	10,636	1,486	233	1,253	189	198	866	12.7	15.7	58.3	14.0

Source: Table 3, Table 5

Notes: *1) The gross added value is the sum of the personnel expenses, the profit and taxtation, the depreciation and the updating expenses.

*2) The net profit, which is an enterprise's retained profit, can be obtained by subtracting the taxes from the profit & taxtation.

*3) Taxes are, as shown in Figure 5, the sum of the distribution tax, the corporation profit tax, the adjustment tax, other taxes and the profit paid to the government. The ratio of the distribution tax to the profit & taxtation is the value of the color TV manufacturers shown in Table 7, and the ratio of the corporation profit tax, the adjustment tax, other taxes and the profit paid to the government to the pretax profit are the values of the electronic/communication systems manufacturers shown in Table 7. Some vales in 1986 are not known, but there was not a significant variation in this period shown in Table 7, and so the values of 1987 were used instead.

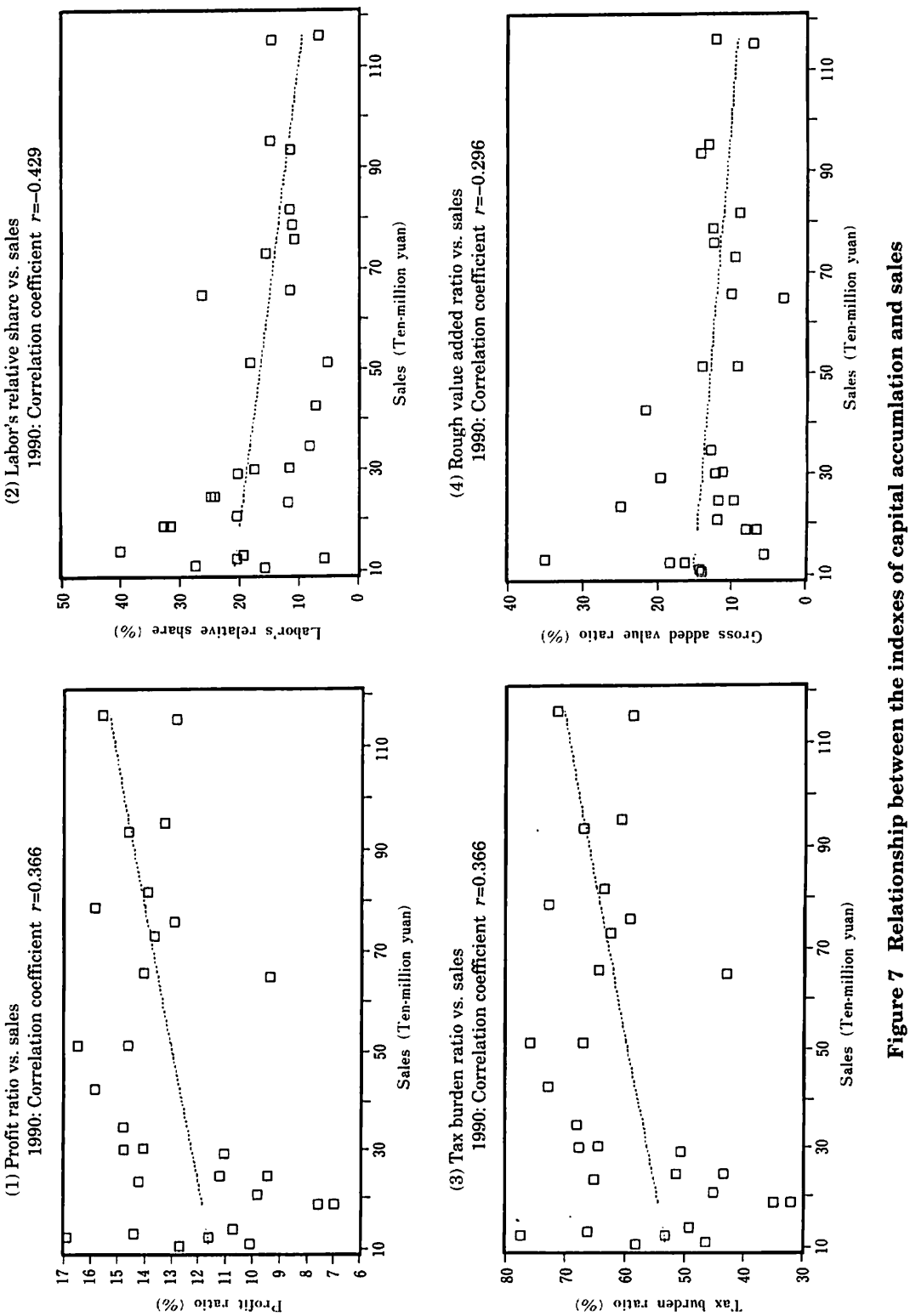


Figure 7 Relationship between the indexes of capital accumulation and sales

1988 reflects the rise of the prices due to inflation. (2) The graph of the labor's relative share vs. the sales shows that smaller enterprises had higher labor's relative shares. As Tables 3 and 4 clearly show, even the enterprises with small sales employ more than 1,000 workers, resulting in high labor's relative shares. The correlation coefficient was -0.515 in 1986, -0.142 in 1988 and -0.429 in 1990. The labor's relative share's dependency on the sales was low in 1988 as the amount of gross added value increased, but smaller enterprises basically have higher labor's relative shares. The average labor's relative share was 23.6% in 1986, 8.7% in 1988 and 17% in 1990, showing a lowering tendency. (3) The graph of the tax burden ratio vs. the sales shows that larger enterprises have greater tax burden ratios. This is because the government has been taking a policy that more profitable enterprises should pay more in taxes. The average tax burden ratio was 48.9% in 1986, 68.9% in 1988 and 58.9% in 1990, tending to increase. (4) The graph of the gross added value ratio vs. the sales shows that larger enterprises have lower gross added value ratios. This reflects the fact that larger enterprises have higher materials costs. This tendency has been increasingly intensified, as shown in the correlation coefficients: -0.008 in 1986, -0.296 in 1988 and -0.326 in 1990. The average gross added value ratios are generally low, excluding 1988: 13.0% in 1986, 20.1% in 1988 and 14.3% in 1990.

From the above result, it is known that there are the following problems in the capital accumulation in the Chinese color TV industry. Firstly, as high materials costs lower gross added value ratios, capital accumulations are generally small. Secondly, as the standard of the tax burden ratio is high and continues rising, it is becoming increasingly difficult for the enterprises to expand the retained profit. Particularly, larger businesses show higher tax burden ratios, which is hindering their growth. Thirdly, the government is taking a policy to induce small-scale businesses to compensate their high labor's relative shares with their low tax burden ratios, thereby maintaining their profit ratios. It is obscuring the real managerial problems in the small-scale enterprises, and preventing the optimum distribution of resources. Fourthly, though labor's relative ratios tend to decrease, wages have been sharply rising, and the possible increase in labor's relative ratios could lower profit ratios. Finally, as shown in Figure 5, retained profits are allocated for funds for expansion of production, future losses, welfare, and incentive payment. The proportions have been specified by the government as 60%, 10%, 10% and 20%, respectively[25]. Not only the low depreciation rate of 5% but also the low proportion of the production expansion fund are obstructing new investment in plant and equipment.

After all, if China wants to be more competitive in the world market, they have to reinforce the retained profit in the large-scale enterprises. In order to cope with future technical innovations, it is important to develop large-scale enterprises which can afford a huge amount of investment in equipment and technical development. Nevertheless, the Chinese government has been continuing the policy to take more profit from larger enterprises. It needs to be definitely changed.

Conclusions

As a result of the analysis of the industrial structure, the production cost and the

capital accumulation structure as described above, the characteristics of the Chinese color TV industry can be summarized as follows.

Firstly, in spite of their many problems and shortcomings, the Chinese color TV industry is a successful example of the introduction and establishment of mass-production techniques. According to the 1986 research of 630 machinery enterprises which imported techniques [26], 32% completely failed to install and commission the technology and equipment, while 40% reached reasonable capacity levels. Moreover, 40% of the enterprises relied entirely on imported components. As compared to that, the color TV industry's rapid establishment of mass-production techniques and sharp increase in the use of domestic components are noteworthy.

Let's estimate the economic efficiency of technology import in the color TV industry. As mentioned before, the average gross added value ratio between 1986 and 1990 was 15.8%. Multiplying it by 16.6 billion dollars, the total sales of color TVs from 1986 to 1990 [27], gives 2.6 billion dollars, which is the gross added value generated during this period. On the other hand, as discussed in Chapter I(A), the total introduction cost of assembly lines was about 250 to 500 million dollars. That means, the output 5 to 10 times as much as the introduction cost was realized.

Secondly, the early implementation of mass production and the rapid increase in the supply of domestic components were brought mainly by the expansion of the regional economic autonomy. But at the same time, it caused the excessive establishment of small-scale color TV enterprises and prevented the generation of economies of scale. Moreover, planned prices were set high so that every enterprise could make a profit. Regional small-scale enterprises have been strongly supported by the local governments as the key businesses in the regional economy, and given priority in the procurement of components and foreign currency. It enabled co-existance of the small-scale enterprises with large enterprises, but it also hindered the optimum distribution of resources. Particularly now, when there is not enough supply of good-quality components nor enough foreign money to import components, the working rate of assembly lines is hindered and therefore, the labor productivity remain low in large-scale enterprises.

Thirdly, the proportion of the sales cost to the sales is as high as over 90%, which hinders the increase in the profit ratio. As the component/material cost accounts for 90% of the sales cost, its reduction is crucial for lowering the sales cost. The reasons for the high component/material cost are that most domestic component manufacturers are small in scale, with a low labor productivity and high costs; that the prices of imported components are higher than the international prices because of import duties and excessive demand; and that the planned prices of components have been set high to promote the domestic component manufacturing industry. Therefore, in order to reduce the component/material cost, it is necessary to improve the labor productivity by integrating small-scale component manufacturers into larger enterprises, allocate profits to assembly manufacturers and component manufacturers more appropriately by authorizing them to negotiate prices, and thereby to help component manufacturers reduce the cost. As they have the advantage of the low labor cost, they can be highly competitive in the world market if only they succeed in reducing the component/material cost.

Finally, the enterprises' retained profit is very small. Their average tax burden ratio is as high as 50 to 60% and the ratio is even higher for larger enterprises. It

hinders the growth of large-scale enterprises. If they are to be more competitive in the world market, they must have a huge amount of funds for equipment investment and technical development. China will have to review its policy and tax system, and take a new direction towards the reinforcement of the retained profit in large-scale enterprises and restructuring of the industry so that economies of scale can be improved.

Acknowledgements

Acknowledgements are due to Prof. T. Matsuzaki at Hosei Univerisity for his kind instruction, and Prof. K. Yamamoto at Shinshu Universityl and Professor Emeritus of Tokyo University, and the members of The Technology Transfer Project of the Institute of Comparative Economic Studies, Hosei University, for their valuable discussion and advices.

NOTES

1) NAKAOKA. T (ed.): "GIJUTSU KEISEI NO KOKUSAI HIKAKU" (TOKYO: CHIKUMA SYOBOU, 1990) p.7.
2) The "NIHON KEIZAI SINBUN" Feb. 28, 1986.
3) TAKAGI. N: "Nicchu Denshi Kougyo Gijutsu Itenshi" (TOKYO: THE INSTITUTE OF COMPARATIVE ECONOMIC STUDIES, HOSEI UNIVERSITY, Working Paper No.42, 1994) p.110. The datas are varied in different sources, for example 112 assembly lines with capacity of 15,730,000 sets/year (Marukawa N.: 'Kaden Sangyo no Sangyo Seisaku', "Chugoku no Sangyo Kouzo to Keizai Hatten Senryaku", TOKYO: NICCHU KEIZAI KYOKAI, 1990, p.19), or assembly 112 lines with a capacity of 15,700,000 sets/year, and foreign currency spent to purchase lines was $9 billion dollars ("Chugoku no Sangyo Seisaku to Gijutsu Dounyu", TOKYO: NICCHU KEIZAI KYOKAI, 1989, p.62), or 120 assembly lines with a capacity of 17,000,000 sets/year, ("BEIJING JOURNAL OF THE YOUTH" March 4, 1986).
4) Since then, techniques have been introduced by establishing joint enterprises, as seen in the example of a VTR cylinder head factory.
5) "Chinese Electronic Industry Yearbook 1990" p.V-15.
6) It is reported that domestic taping components are not used and ICs and transistors are imported in BEIJING TV FACTORY, and that chip components are imported in NANJING TUNER FACTORY ("91 Chugoku Denshi Kogyo Chousadan Hokokusyo" (TOKYO: EIAJ, 1991) p.68, p.69, p.74.
7) TAKAGI N.: "Nicchu Denshi Kougyo Gijutsu Itenshi" (TOKYO: THE INSTITUTE OF COMPARATIVE ECONOMIC STUDIES, HOSEI UNIVERSITY, Working Paper No.42, 1994) p.42.
8) "Chinese Electronic Industry Yearbook" (1990) p.III-27, (1991) p.III-26.
9) "91 Chugoku Denshi Kogyo Chousadan Hokokusyo" (TOKYO: EIAJ, 1991) p.35.
10) Much of the cost analysis of the Chinese color TV industry is owed to the book, "Nihon Tekko Sangyo Bunseki" (Tokyo: Nihon Hyoronsha, 1982) by T.

Matsuzaki.

11) The Description about planned prices are based on a hearing (THE INSTITUTE OF COMPARATIVE ECONOMIC STUDIES, HOSEI UNIVERSITY, Working Paper No.35, 1993).
12) The "NIHON KEIZAI SINBUN" Jan. 4, 1984.
13) The price was obtained by dividing the sales by the number of products of some color TV enterprises ("Chinese Electronic Industry Yearbook 1991").
14) The scale of enterprises, used in the business analysis by the scale of enterprise is generally represented by the amount of capital or the number of emproyees, in China it is represented by the amount of fixed assets or the profit & taxtation ("Satistical Year Book of China 1986" p.391). The dependency of cost on the amount of production is used in the discussion of economics of scale. Therefor, in this report, the scale of enterprise is represented by sales that is proportionate to the amount of production.
15) Based on the hearing from production manager of a color TV enterprise.
16) "Chinese Electronic Industry Yearbook 1991" p.III-24.
17) Based on the hearing from an accountant of a color TV enterprise.
18) ibid.
19) "RESEARCH ON THE DEVELOPING STRATEGY OF ELECTRONICS INDUSTRY" (BEIJING: Electronics Industry Publishing, 1991) pp.566-601.
20) ibid. p.581.
21) A Japanese tuner engineering designer said that Chinese tuner manufacturers imported kits of key components even after the plant had started operation because they had imported a manufacturing plant together with a product design drawing.
22) Based on the hearing from general manager of a color TV enterprise.
23) ibid.
24) According to general manager of a color TV enterprise, the ratio of the corporation tax, the adjustment tax, other taxes and the profit paid to the Government to the pre-tax profit are 55%, 2.6%, 4.75% and 9.4%, respectively. The total is 71.75% which is about 20% higher than the values in Table 7.
25) Kyushu University Chugoku Keizai Kenkyukai (ed.): "Chugoku no Keizai Seido to Tokei-Kaikei Seido" (1991) p.295.
26) CONRAY R. "TECHNOLOGICAL CHANGE IN CHINA" (OECD, 1992) p.213.
27) The gross added value should be multiplied by the sales, but the data of gross sales of the color TV industry is not available. So, the gross output was used instead of the gross sales in the calculation. As for the estimation of the gross output, see TAKAGI N. "Nicchu Denshi Kougyo Gijutsu Itenshi" (TOKYO: THE INSTITUTE OF COMPARATIVE ECONOMIC STUDIES, HOSEI UNIVERSITY, Working Paper No.42, 1994) p.87.