

NANKAI UNIVERSITY COMMITTEE ON  
SOCIAL AND ECONOMIC RESEARCH

Nankai University, Tientsin, China

Industry series

Bulletin No. 2

RAYON AND COTTON WEAVING  
IN TIENTSIN

By

H. D. Fong, Ph. D.

(方顯廷)



November 1930

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TIENTSIN, CHINA

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## PREFACE

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As an approach to the better understanding of China's industrialization in recent years, the Nankai University Committee on Social and Economic Research has deemed it advisable to undertake a sample survey of the major industries in Tientsin, the largest industrial and commercial centre in North China. This survey, in respect of the intensive treatment for each industry, may be considered the first of its kind in China. It covers five industries in Tientsin, namely, cotton spinning, flour milling, carpet weaving, rayon and cotton weaving and hosiery knitting. Except carpet weaving, the results of which have been summed up in my previous report on the "Tientsin Carpet Industry", the field investigation on other industries was commenced in June, 1929, and has now been largely completed. The present report on the "Rayon and Cotton Weaving in Tientsin" will soon be followed by another one on the "Hosiery Knitting in Tientsin", which is already in press. The results on the other two industries, namely, cotton spinning and flour milling, are being analyzed, but will not be published until the coming year.

I wish to take this opportunity of acknowledging the financial assistance to this survey rendered by the Institute of Pacific Relations. Dr. Franklin L. Ho, Director of the Committee, has taken a large part in promoting as well as in planning for the survey, and has given valuable suggestions in almost every phase of it. For the present report, the field investigation was undertaken by Mr. Y.Y. Chuan, and the statistical computation by Messrs. T.Y. Lee and C. T. Lin.

H. D. Fong

Nankai University Committee on Social and Economic Research  
November, 1930.

## Chapter I. History and localization

The process of weaving consists in interlacing, at right angles, two or more series of flexible materials, of which the longitudinal are called warp and the transverse weft. Weaving, therefore, embraces only one section of the textile industry, for felted, plaited, netted, hosiery and lace fabrics lie outside this definition. On the other hand, it has been applied to different kinds of raw materials, either separately or conjointly, in order to satisfy the growing demand for variety. From the animal kingdom, wool, hair, fur, feathers, silk and the pinna fibre have long been procured. From the vegetable kingdom, cotton, flax, hemp, jute, ramie and a host of other less known materials are derived. Amongst minerals there are gold, silver, copper, brass, iron, glass and asbestos. In addition, strips of paper, or skin, in the plain, gilt, silvered and painted conditions are available. Finally, artificial fibres are used, especially artificial silk, which has come into very extended use in recent years.<sup>1</sup> In China, silk has long been the celebrated fibre for weaving, but is now threatened by the three-fold competition of cotton, rayon, and silk produced abroad. The decline in the quality of Chinese silk, the substitution of silk by rayon, and the cheapness of cotton, all these combine to overthrow the silk industry in China, and give great prominence to the cotton and rayon industry.

### Cotton and rayon weaving in China

In China weaving is generally of the handloom type, no mechanical power being applied except in cotton. The handloom employed, meantime, is of several varieties, whether plain or figured, wooden or iron, old-fashioned or improved. The old-fashioned wooden loom, which one finds only in museums in America or Europe, is still the commonest type in China, especially in rural districts. In urban communities, the improved handloom made of iron, or of iron and wood, was first introduced from Japan, and has now found favor with many establishments. The old figured loom of Chinese origin is being replaced by the Jacquard loom, the famous French invention. Here and there in port cities, one meets with machine shops producing these different types of looms. But they must be semi-modern in the eyes of western observers, as no attempt to apply power to these looms has yet been made.

In the old classics we find cotton mentioned as having been used in the manufacture of cloth and given as tribute to the Middle Kingdom as early as between 2197 and 2205 B. C. It has been manufactured into cloth ever since that time and has always been widely used in the fifth century.<sup>2</sup> The spinning wheel supplied the yarn for the loom, and cotton fabrics were produced by the farmers' families after harvest seasons.

1. *Encyclopædia Britannica*, 14th edition, 1929, Vol. 23, p. 455 et seq.

2. Fung, D. K.: Cotton Culture, in *Chinese Social and Political Science Review*, pp. 97-8, October, 1916.

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Whatever cotton fabrics woven, however, satisfied only the requirements of the household, for without regular supply of yarn from the market, the space of the spinning wheel measured the output of the loom. However, the opening up of China to foreign commerce, after the first Opium War in 1840, introduced the machine spun yarn in large quantities from England and other European nations, which, aside from replacing the hand spun yarn, must have given a considerable impetus to the cotton weaving industry throughout China. This growth is told, partly if not wholly, in the history of China's import of cotton yarn and thread, from 1867 to 1928, covering a period of over sixty years.

**Table 1. Net import of cotton yarn and thread<sup>3</sup> into China, 1867-1928**

Year	Piculs	Hk. Tls.	Year	Piculs	Hk. Tls.
1867	33,507	1,615,766	1898	1,962,537	39,294,900
1868	54,212	1,780,277	1899	2,748,644	54,940,581
1869	131,525	1,766,195	1900	1,490,732	30,187,372
1870	52,083	2,144,740	1901	2,271,101	49,012,005
1871	69,815	2,091,139	1902	2,543,128	54,826,880
1872	49,809	1,528,032	1903	2,744,401	67,425,650
1873	67,833	3,486,959	1904	2,294,078	59,665,003
1874	68,819	1,969,344	1905	2,570,012	67,396,896
1875	91,403	2,746,605	1906	2,551,137	65,140,767
1876	112,908	2,838,833	1907	2,281,705	57,514,731
1877	116,169	2,841,216	1908	1,831,636	46,173,328
1878	108,360	2,520,514	1909	2,419,415	62,464,160
1879	137,889	3,190,517	1910	2,298,018	62,830,514
1880	151,519	3,648,112	1911	1,877,961	51,071,798
1881	172,482	4,227,685	1912	2,312,604	62,663,699
1882	184,940	4,050,391	1913	2,702,876	72,636,779
1883	228,006	5,241,994	1914	2,729,892	71,866,517
1884	261,458	5,584,138	1915	2,700,595	68,415,105
1885	387,820	7,871,212	1916	2,491,616	63,975,840
1886	384,581	7,868,560	1917	2,102,345	65,501,139
1887	593,728	12,590,580	1918	1,152,886	55,572,759
1888	684,959	13,495,732	1919	1,432,560	77,400,850
1889	679,727	13,019,376	1920	1,344,995	80,924,654
1890	1,083,405	19,391,696	1921	1,296,645	70,396,622
1891	1,212,922	20,983,539	1922	1,242,040	69,796,071
1892	1,305,572	22,152,654	1923	787,678	43,553,743
1893	983,399	17,862,552	1924	587,050	36,261,388
1894	1,161,694	21,397,293	1925	647,123	36,198,613
1895	1,134,110	21,208,775	1926	449,282	28,249,920
1896	1,624,806	32,010,094	1927	295,338	17,734,218
1897	1,573,116	34,430,117	1928	284,945	16,670,616

3. The quantity for "cotton thread on spools" during the period 1902 to 1924 is given in gross, not in picul. In order to reduce the gross to the picul, the following method is adopted. "Cotton thread in balls", the quantity of which is given in picul, is assumed to be of the same value as "cotton thread on spools". Divide the value of "cotton thread in balls" by its quantity, and get its price per picul. This price is then used as the denominator for the value of "cotton thread on spools", in order to get its quantity in picul.

## CHAPTER I. HISTORY AND LOCALIZATION

In Table 1<sup>4</sup> it may be seen that the quantity of cotton yarn and thread imported into China increased from the small figure of 33,507 piculs in 1867 to the huge total of 2,748,644 piculs in 1899, an increase of eighty-two times in the course of thirty-three years. This total, meantime, is the highest ever attained throughout the whole period, for after 1899 the amount of cotton yarn and thread imported remained stationary, and since 1914 has shown a considerable decline. In 1914 the amount imported reached 2,729,892 piculs, but in 1928 it fell to the small total of 284,945 piculs, approximately one tenth of the total for 1914. The decline in the quantity of cotton yarn and thread imported, however, does not indicate a similar decline in their consumption, but helps to explain the rapid growth in China's cotton spinning industry. About ten years before China reached the highest total in her import of cotton yarn and thread, that is, in 1890, the new industry of cotton spinning by power machinery was introduced. In that year, Viceroy Li Hung-chang first established a cotton mill in Shanghai, with 65,000 spindles and 600 looms. Since then, the cotton spinning industry has grown rapidly, especially after the outbreak of the World War which made it impossible to meet the Chinese demand for cotton yarn by means of foreign supply. The stoppage of foreign supply, and consequently of foreign competition in Chinese cotton industry, opened up a lucrative field for profit-making to Chinese spinners. A new era of unparalleled development was quickly ushered in, in China as well as in other Oriental countries, and cotton mills were no sooner promoted than invested in order to beat the race for satisfying an urgent need. This period of rapid growth in cotton industry extended over ten years, from 1915 to 1924, and witnessed the establishment of eighty-one of one hundred and twenty mills existing in 1928, with a total spindleage of 3,850,016 distributed throughout the twelve provinces of China as follows.<sup>5</sup>

**Table 2. Provincial distribution of spindles in Chinese cotton industry, 1928**

Name of Province	No. Mills	Spindles	
		No.	%
Kiangsu	78	2,540,176	66.0
Shantung	10	323,780	8.0
Hupeh	6	290,152	7.5
Chihli (Now Hopei)	9	289,756	7.5
Fengtien (Now Liaoning)	4	125,544	3.0
Honan	4	107,280	3.0
Other (Chekiang, Hunan, Kiangsi, Shansi, Anhwei, Shenxi)	9	173,328	5.0
<b>Total</b>	<b>120</b>	<b>3,850,016</b>	<b>100.0</b>

4. The statistics for the period 1867 to 1901 are taken from Part I of the *Returns of Trade*, namely, *Report on the Trade of China*, and *Abstract of Statistics*; those for the period 1902 to 1917 are taken from Part III, Vol. I of the *Returns*, namely, *Analysis of Foreign Trade: Imports*; and those for the period 1918 to 1928 are taken from Part II, Vol. I of *Foreign Trade of China*, namely, *Analysis: Imports*.
5. Ho and Fong, *Extent and Effects of Industrialization in China*, Tientsin, 1929, pp. 13-4.

## RAYON AND COTTON WEAVING IN TIENTSIN

In the same year 1928 China produced a total of 2,202,966 bales of yarn of 300 piculs each, amounting to 6,608,898 piculs. Deducting from this total the amount exported to foreign countries, namely, 349,780 piculs, there is still a balance of 6,259,118 piculs available for home consumption, chiefly for weaving. It is, therefore, not to be surprised that in that year, China's import of cotton yarn and thread should have been reduced to the small total of 284,945 piculs, as compared with the huge one of 2,702,876 piculs in 1913, the last pre-war year, or with that of 2,748,644 piculs in 1899, the year of greatest import. This rapid increase in the consumption of machine spun yarn, whether imported or home produced, from 33,507 piculs in 1867 to 1,083,405 piculs in 1890, the year during which the first cotton spinning mill was established, and from this total of 1,083,405 piculs in 1890 to one of 6,544,063 piculs in 1928 (6,259,118 piculs produced at home plus 284,945 piculs imported), cannot be explained by the substitution of hand spun by machine spun yarn alone, but more so by the expansion in China's cotton weaving industry.

Next to the consumption of machine spun yarn, whether imported or home produced, the import of cotton piece goods furnishes another index for the growth of China's cotton weaving industry. As shown in Table 3\*, the quantity of cotton piece goods imported increased from 4,250,324 pieces in 1867 to the highest total of 35,320,762 pieces in 1905, an increase of 8.3 times. Since then, however, the quantity of cotton piece goods imported has become more or less stationary, interrupted by occasional decreases or increases. In 1928 the quantity of cotton piece goods imported amounted to 27,048,569 pieces, which was equivalent to eight tenths of that in 1905. This discrepancy in the rate of increase during these two periods, 8.3 times between 1867 and 1905, and 0.8 between 1905 and 1928, can only be explained by the growth of cotton weaving industry in China, on the assumption that the demand for cotton piece goods should have grown according to a normal trend.

A third index of the growth in China's cotton weaving industry is the export of Chinese cotton piece goods to foreign countries, especially shirtings and sheetings, nankeens, drills and jeans. The statistics on such export were first recorded by the Customs for the year 1912, and since then have been published annually in its reports. According to the latter, the total value of cotton piece goods exported from China amounted to 2,826,229 Haikwan taels in 1912, but increased to Hk. Tls. 14,706,261

\* The statistics are taken from Part I of the *Returns of Trade and Trade Reports* (1867-1919) and of *Foreign Trade of China* (1919-1928).



**CHAPTER I. HISTORY AND LOCALIZATION**

**Table 3. Net import of cotton piece goods into China, 1867-1928**

Year	Pieces <sup>7</sup>	Hk. Tls.	Year	Pieces <sup>7</sup>	Hk. Tls.
1867	4,250,324	12,152,701	1898	15,523,890	37,627,533
1868	2,339,403	19,689,635	1899	19,418,560	47,345,107
1869	10,323,300	23,185,623	1900	15,963,638	43,773,721
1870	9,799,105	19,743,256	1901	16,708,700	49,062,268
1871	13,978,599	27,481,379	1902	22,957,552	70,411,619
1872	11,855,974	23,515,738	1903	18,999,870	59,552,658
1873	8,603,581	17,672,395	1904	18,874,439	62,926,054
1874	9,520,277	16,102,735	1905	35,320,762	112,065,711
1875	10,460,093	17,065,494	1906	29,157,582	85,295,176
1876	11,583,622	17,105,343	1907	15,917,243	58,392,433
1877	10,495,059	15,740,034	1908	16,932,858	63,435,809
1878	8,859,421	13,183,070	1909	21,375,456	67,651,108
1879	12,255,480	19,016,508	1910	17,146,744	63,865,382
1880	12,986,776	19,228,100	1911	23,123,564	87,913,404
1881	14,137,619	20,997,048	1912	21,128,103	75,577,648
1882	11,938,066	17,657,881	1913	28,445,700	101,732,770
1883	11,290,577	16,210,674	1914	28,442,315	106,732,428
1884	10,840,022	15,321,489	1915	22,313,453	79,161,630
1885	15,047,938	21,815,055	1916	19,919,007	69,615,132
1886	13,719,467	20,709,167	1917	24,437,401	90,400,704
1887	15,024,675	23,943,294	1918	19,348,824	92,900,737
1888	18,379,848	30,192,652	1919	25,947,572	131,100,455
1889	14,277,654	22,381,317	1920	25,911,216	161,504,578
1890	16,561,460	24,888,347	1921	19,434,669	134,780,553
1891	17,601,242	31,477,483	1922	23,923,059	145,015,533
1892	16,358,790	29,507,801	1923	20,037,470	125,212,779
1893	12,498,431	25,494,251	1924	21,558,410	147,372,751
1894	13,795,884	30,063,211	1925	23,531,959	149,501,679
1895	13,469,205	31,211,264	1926	26,944,314	167,589,667
1896	18,919,377	45,714,292	1927	21,636,451	128,512,233
1897	16,913,887	43,039,140	1928	27,048,569	163,329,509

in 1928, an increase of 5.2 times in the course of seventeen years. Its quantity, meantime, rose from 609,896 *pi* to 2,749,698 *pi* during the

**Table 4. Export of Cotton Piece Goods from China to Foreign Countries, 1912-1928**

Year	Pieces <sup>8</sup>	Hk. Tls.	Year	Pieces <sup>8</sup>	Hk. Tls.
1912	609,896	2,826,229	1921	1,092,372	5,872,617
1913	578,675	2,577,579	1922	1,072,279	5,756,869
1914	434,352	1,965,149	1923	1,597,870	9,156,556
1915	761,744	2,956,043	1924	2,041,542	12,081,198
1916	795,287	3,657,528	1925	1,805,476	10,984,951
1917	1,086,734	4,465,946	1926	1,992,056	12,062,894
1918	1,040,936	4,384,942	1927	3,085,098	16,094,858
1919	1,010,985	4,962,446	1928	2,749,698	14,706,261
1920	857,648	4,949,734			

7. Although most of the cotton piece goods are reported in pieces, yet a few of them also appear in piculs or yards. For the sake of uniformity, each picul is converted into 10 pieces, and each yard into 1/30 piece.
8. Nankeen is given in picul. For the sake of uniformity, one picul is converted into 10 pieces.

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same period, an increase of 4.5 times. This increase in the value and quantity of cotton piece goods exported from China to foreign countries, as shown in Table 4, coincides closely with the period of unparalleled development in China's cotton spinning and weaving industry which took place after the War. In cotton weaving, such development was accompanied by the introduction of power looms, which in 1928 extended to nine provinces, namely; Kiangsu, Shantung, Hupei, Hopei, Liaoning, Chekiang, Honan, Kiangsi and Hunan. In these nine provinces, there were altogether 29,579 power looms in 1928, of which 25,818 looms were operating during that year, producing a total of 15,254,153 *pi* of cotton piece goods. In Table 5, the provincial distribution of these looms and their output is shown.<sup>9</sup>

**Table 5. Statistics on Cotton Power Loom Weaving in  
China, 1928**

Province	No. mills	No. Looms		Total	Amount of cloth produced (in <i>pi</i> )		
		Operating	Newly installed		Reported	Estimated	Total
Kiangsu	32	18,291	2,785	21,076	9,957,303	1,264,740	11,222,043
Shantung	2	1,710	26	1,736	1,356,000		1,356,000
Hupei	6	3,178		3,178	1,156,200	147,750	1,303,950
Hopei	4	1,610	250	1,860	964,304		964,304
Liaoning	2	704		704	303,121		303,121
Chekiang	1	125	100	225		73,875	73,875
Honan	1	200		200	30,860		30,860
Kiangsi	1		300*	300			
Hunan	1		300	300			
Total	50	25,818	3,761	29,579	13,767,788	1,486,365	15,254,153

\*Not operating.

The provincial distribution of power looms and their output corresponds closely with the port distribution of cotton piece goods originally exported. In Table 6 it may be seen that in order of importance Shanghai occupies the first place, followed by Kiaochow, Hankow and Tientsin. In other words, the province that has the greatest number of power looms or greatest output of cotton piece goods possesses the port that has the greatest amount of cotton piece goods originally exported, namely, Shanghai in the province of Kiangsu. Similarly, Shantung possesses Kiaochow, Hupei Hankow, and Hopei Tientsin. It also indicates that the cotton piece goods exported originally from these ports are produced chiefly by power looms, whereas those produced by handlooms are also exported, only to the slightest extent. In 1928 only one sixth, or Hk. Tls. 11,895,656, of the cotton piece goods originally exported from Chinese ports include what may be considered the output of handlooms, namely,

9. Nankai Weekly Statistical Service, Vol. III, No. 27, July 7, 1930.

Table 6. Original Export of Cotton Piece Goods from  
Chinese Ports, 1914-1928

(in Hk. Tls.)

Year	Tientsin	Kiachow	Hankow	Shanghai	Swatow	Canton	Kowloon	Samshui	Other	All ports
1912	5,953		297,483	7,055,313	1,018,834	274,013	119,273	656,283		9,843,611
1913	235,360	1,156	641,382	7,230,702	137,031	276,792	152,954	646,656		9,722,609
1914	285,840	667	486,838	7,751,446	169,501	193,626	83,784	835,513	306,711	10,113,926
1915	801,685		452,396	9,882,095	143,379	339,722	155,100	693,077	262,613	12,730,067
1916	1,029,632	422	486,118	11,396,133	551,287	957,971	126,243	830,633	270,239	15,648,678
1917	909,109	10,977	403,038	13,622,993	665,095	590,914	418,988	772,008	770,783	18,163,905
1918	604,183	5,403	518,182	16,791,222	163,437	340,708	570,470	566,844	1,255,488	20,815,937
1919	354,993	6,295	891,186	19,890,899	121,606	370,807	510,515	559,433	1,997,908	24,703,582
1920	207,460	9,979	1,373,626	22,286,296	491,888	875,515	757,653	619,875	786,476	27,408,768
1921	241,526	28,430	1,444,229	24,565,742	358,798	758,932	654,091	568,265	1,634,204	30,254,217
1922	113,363	71,700	1,895,950	25,092,294	462,510	811,705	678,084	876,512	2,018,427	32,020,545
1923	125,349	50,083	2,704,474	32,981,367	1,085,897	2,244,635	347,460	299,851	1,741,555	41,580,671
1924	161,816	500,941	2,645,516	36,663,374	1,154,417	1,377,336	402,199	291,768	1,210,260	44,407,627
1925	229,588	2,436,992	5,424,475	40,038,521	935,066	1,069,078	399,416	136,039	1,026,464	51,695,589
1926	814,340	2,674,557	5,046,749	44,556,468	1,396,999	1,693,598	96,814	83,305	1,254,072	57,616,902
1927	425,387	3,599,473	4,611,739	45,436,372	723,024	647,467	184,834	67,683	784,937	56,480,916
1928	1,113,295	4,278,575	2,893,050	52,530,567	272,768	1,182,691	336,321	25,096	906,220	63,532,883

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Nankeens (Hk. Tls. 10,652,742), yarn-dyed native cloth (Hk. Tls. 1,002,203), native cloth dyed in the piece (Hk. Tls. 206,605), and fancy native cloth (Hk. Tls. 34,106). The chief ports of original export for handloom output, as shown in Table 7, are, in order of importance, Shanghai (Hk. Tls. 8,003,446); Hankow, Yochow, Shasi and Ichang (Hk. Tls. 1,802,098); Canton, Kowloon and Samshui (Hk. Tls. 1,500,850); Swatow (Hk. Tls. 233,837); Tientsin (Hk. Tls. 233,675); and Kiaochow (Hk. Tls. 31,528).

Table 7. Original export of native cotton piece goods  
from Chinese ports, 1928  
(in Hk. Tls.)

Port	Nankeens	Cloth, Na- tive, Yarn- dyed	Cloth, Na- tive, Dyed in the piece	Cloth, Na- tive, Fancy	Total
Tientsin	26,650	1,654	205,371		233,675
Kiaochow	30,540		988		31,528
Ichang	230,683				230,683
Shasi	445,168				445,168
Yochow	48,608				48,608
Hankow	1,060,998	16,551	95		1,077,639
Shanghai	7,029,341	941,193		32,912	8,003,446
Swatow	199,573	33,890		374	233,837
Canton	1,145,969	130			1,146,099
Kowloon	330,621				330,621
Samshui	24,130				24,130
Other	80,466	8,785	151	820	90,222
All ports	10,652,742	1,002,203	206,605	34,106	11,895,656

So much about the cotton weaving industry in China. Turning now to the silk weaving industry, the most striking feature is of course its early origin in Chinese history. The old tradition assigns the origin of silk weaving to the Age of Huang-ti, 2697-2596 B.C., but silk weaving actually began with the Chow dynasty, 1122-220 B.C., when the first type of silk fabric, called Chuan (絹), was made. Chinese silk, it may be recalled, contributed as one of the chief factors to the discovery of America, as the desire for its direct import led to the search for a new route to the East. However, the export of Chinese silk goods on a large scale did not commence until the coming of the nineteenth century, when China was opened up to foreign commerce by treaty after treaty. Thus, according to the Customs returns, the quantity of silk piece goods exported from China increased rapidly from 4,008 piculs in 1867 to 20,401 piculs in 1897, an increase of five times in the course of thirty years. After 1897, however, the export remained rather stationary, interrupted by abrupt increases only from 1909 to 1915. As shown in Table 8<sup>10</sup>, the quantity of silk piece goods exported remained almost un-  
changed from 1897 to 1908, namely, 20,401 piculs in the former

10. The statistics here are taken from Part I of the *Returns of Trade*, (1867-1919) and of the *Foreign Trade of China*, (1920-1928).

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and 22,824 piculs in the latter year. But in 1909 the quantity exported rose to 28,406 piculs, from whence it increased to 34,500 piculs in 1913, and to 41,158 piculs in 1915. Since 1915 the quantity exported has shown

Table 8. Export of silk piece goods\*\* from China, 1867-1928

Year	Piculs	Hk. Tls.	Year	Piculs	Hk. Tls.
1867	4,008	2,172,370	1898	19,319	10,044,578
1868	3,568	1,947,258	1899	18,088	9,892,525
1869	3,383	1,695,259	1900	18,297	9,028,051
1870	3,791	1,896,294	1901	20,695	10,226,778
1871	4,490	2,352,781	1902	20,628	9,651,708
1872	5,302	2,607,052	1903	20,207	13,784,910
1873	5,149	2,203,342	1904	21,567	11,763,368
1874	5,778	2,374,854	1905	15,727	9,938,750
1875	6,468	4,022,538	1906	15,497	9,753,854
1876	5,889	3,986,038	1907	20,496	12,926,152
1877	6,460	4,432,121	1908	22,824	13,727,341
1878	7,440	4,507,047	1909	28,406	17,891,709
1879	6,920	4,498,992	1910	29,996	17,998,679
1880	8,390	5,421,721	1911	28,078	17,050,871
1881	7,188	4,612,273	1912	28,539	16,103,787
1882	6,598	3,396,374	1913	34,500	20,873,778
1883	7,731	4,022,749	1914	26,721	15,562,386
1884	8,808	4,426,973	1915	41,158	21,558,073
1885	10,279	4,556,470	1916	39,121	20,019,966
1886	12,495	6,754,708	1917	30,209	17,229,766
1887	14,184	6,723,149	1918	34,559	18,911,247
1888	16,036	7,893,987	1919	39,464	23,260,228
1889	14,682	7,175,038	1920	37,453	24,317,477
1890	11,140	5,320,810	1921	42,824	30,274,652
1891	13,166	6,464,689	1922	30,946	23,631,234
1892	15,868	7,371,850	1923	28,495	24,548,608
1893	17,135	8,253,087	1924	27,322	22,300,873
1894	19,081	8,415,549	1925	31,295	23,202,322
1895	23,122	11,330,697	1926	38,711	30,857,682
1896	20,850	9,723,313	1927	32,821	25,170,934
1897	20,401	10,094,747	1928	33,125	23,903,778

\*\* Including pongees (1886-1928)

a decline, interrupted by occasional increases. In 1928, the last year for which customs statistics are yet available, the quantity of silk piece goods exported decreased from 41,158 piculs in 1915 to 33,125 piculs.

The decline in the export of Chinese silk piece goods since 1897, as has been said above, is due to three factors, namely, the competition of foreign silk, the cheapness of cotton fabrics and the rise of rayon industry. Of these three factors, the last is probably the most important, for the simple reason that rayon is not only as cheap as cotton, but also possesses the artistic beauty of natural silk. In this connection, it is particularly interesting to note that the decline in the export of Chinese

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silk piece goods began almost at the same period as the development of rayon industry, which started in 1895 in France, and thence spread to other countries in Europe, America and Asia. In 1896, as shown in Table 9<sup>11</sup>, the world output of rayon amounted only

**Table 9. World output of artificial silk**  
(in million kilos.)

1896	.....	0.6	1913	.....	11.0
1900	.....	1.0	1914	.....	12.0
1901	.....	1.5	1915	.....	13.5
1902	.....	2.5	1916	.....	15.0
1903	.....	3.0	1917	.....	15.5
1904	.....	4.0	1918	.....	16.0
1905	.....	5.0	1919	.....	20.0
1906	.....	6.0	1920	.....	25.0
1907	.....	6.5	1921	.....	30.0
1908	.....	7.0	1922	.....	36.0
1909	.....	7.5	1923	.....	47.5
1910	.....	8.0	1924	.....	64.0
1911	.....	8.5	1925	.....	84.5
1912	.....	9.0			

to 600,000 kilos, but during the last pre-war year it had already risen to the huge figure of 11,000,000 kilos. Since the outbreak of the war, the development has proceeded by leaps and bounds, increasing from 11,000,000 kilos in 1913 to 84,500,000 kilos in 1925. This striking development may be attributed not only to its artistic quality and cheapness, as mentioned above, but also to the relative stability of its price and the improvement in its quality. Indeed, as a recent report of the League of Nations remarks, "even when the abnormal circumstances which were the outcome of the war became less marked, when the transient conditions favorable to the development of the industry disappeared, the use of artificial silk, far from diminishing, as might at first have been expected, continued to increase more and more rapidly".<sup>12</sup>

The rayon industry, which was partly responsible for the decline in China's silk weaving industry, did not spread to China until its rapid development after the war. In 1914 the Customs returns for the first time recorded the quantity and value of artificial silk piece goods imported into China, which amounted to 747,558 yards and 283,805 Haikwan taels. Since then there had been no appreciable increase until 1923, although fluctuations around the 1914 returns, whether upward or downward, were not uncommon. In 1923 not only artificial silk piece goods, but also artificial silk mixtures (cotton or wool), were recorded. Consequently, the quantity rose from 747,558 yards in 1914 to 1,767,976 yards in 1923, and

11. League of Nations, Economic and Financial Section, *The Artificial Silk Industry*, Geneva, 1927, p. 12.

12. *Ibid.*, p. 11.

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the value rose from 283,805 Haikwan taels to 814,594 Haikwan taels during the same period. In Table 10 the import of artificial silk yarn and piece goods into China, from 1914 to 1928, is shown.

Table 10. Net import of artificial silk yarn and piece goods from foreign countries into China, 1914-1928

	Piece goods		Yarn		Total
	Yds.	Hk. Tls.	Piculs	Hk. Tls.	Hk. Tls.
1914	747,558	283,805			283,805
1915	553,484	210,731			210,731
1916	520,130	175,772			175,772
1917	870,270	335,367			335,367
1918	1,251,468	485,921			485,921
1919	298,909	183,409			183,409
1920	415,564	193,729			193,729
1921	237,684	202,401			202,401
1922	639,489	337,371			337,371
1923	1,767,976	814,594	8,327	2,337,151	3,151,745
1924	2,883,203	1,598,102	13,059	2,604,402	4,202,504
1925	3,488,761	1,890,337	27,233	4,875,697	6,766,034
1926	5,183,783	3,466,329	42,781	5,338,560	8,804,889
1927	6,220,789	3,617,278	83,547	11,246,671	14,863,949
1928	7,701,534	5,663,322	127,150	16,723,753	22,387,075

Beginning with 1923, the quantity and value of artificial silk floss and yarn imported was also recorded for the first time, which since 1926 had been merged into one category with that of artificial woolen yarn, entitled "Artificial silk floss and yarn and artificial woolen yarn". Since the quantity of artificial woolen yarn consumed is rather small, we may employ the term "artificial silk floss and yarn" to cover the two kinds of products. Thus, in 1923 the import of artificial silk floss and yarn amounted only to 8,327 piculs or 2,337,151 Haikwan taels, but in 1928 it increased to 127,150 piculs or 16,723,753 Haikwan taels,—an increase of fifteen times in term of quantity or of eight times in term of value. This rapid increase in the import of artificial silk floss and yarn from 1923 to 1928, as compared with the slower increase in the import of artificial silk piece goods during the same period, is an evidence of China's attempt to manufacture rather than to import artificial silk piece goods, and explains the rise of China's rayon weaving industry.

An analysis of the net import of artificial silk floss and yarn by ports furnishes us with a reliable index of the distribution of rayon weaving industry in China, with the qualification that whatever amount of such material imported into each port is not necessarily consumed by that port alone, but also by its vicinity. Thus, in Tientsin, the artificial silk floss and yarn imported supplies the rayon weaving industry in Tientsin as well as that in Kiaoyang, a famous weaving district about

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one hundred miles southwest of Tientsin. In Tables 11a and 11b the import of artificial silk floss and yarn is distributed according to the port of import.

**Table 11a. Net import of artificial silk floss and yarn into Chinese ports, 1923-1928**

(in piculs)

	1923	1924	1925	1926	1927	1928
Canton	218	1,506	1,801	4,348	2,201	2,635
Shanghai	6,329	8,559	19,844	22,764	49,525	60,075
Soochow	691	1,060	957	3,020	1,905	4,520
Hankow	102	203	982	778	405	1,618
Tientsin			4,445	7,282	19,318	34,253
Kiaochow	56	258	638	1,674	2,830	11,971
Other		62	1,160	2,985	2,773	8,688
All ports	7,396	11,648	29,827	42,851	78,957	123,760

**Table 11b. Net import of artificial silk floss and yarn into Chinese ports, 1923-1928**

(in Hk. Tls.)

	1923	1924	1925	1926	1927	1928
Canton	43,505	301,430	325,816	606,450	262,558	311,157
Shanghai	1,787,075	1,698,659	3,545,402	2,767,597	6,653,200	7,875,440
Soochow	191,279	207,279	169,296	414,951	233,496	605,560
Hankow	30,793	50,604	186,756	118,013	52,741	207,652
Tientsin			576,560	938,432	2,467,553	4,661,480
Kiaochow	18,185	57,244	117,852	201,148	346,198	1,575,058
Other		10,330	224,802	419,926	361,135	1,166,257
All ports	2,070,837	2,325,546	5,146,484	5,466,427	10,376,876	16,402,604

From the above table, it may be seen that in 1928 Shanghai was the most important port of import for artificial silk floss and yarn (60,075 piculs valued at Hk. Tls. 7,875,440), Tientsin second (34,253 piculs valued at Hk. Tls. 4,661,480), and Kiaochow third (11,971 piculs valued at Hk. Tls. 1,575,058). In term of the quantity imported, 49 percent went to Shanghai, 28 percent to Tientsin, 10 percent to Kiaochow, and 13 percent to other ports including Soochow, Canton, Hankow etc; in term of the value imported, 48 percent went to Shanghai, 28 percent to Tientsin, 10 percent to Kiaochow, and 14 percent to other ports. From this review it may be inferred that Shanghai had the largest rayon weaving industry, as it imported the greatest amount of artificial silk yarn. If we are to trust the statement made by the China Journal in May, 1928, a journal of recognized standing in China, such was actually the case. "In Shanghai," says the Journal, "perhaps unknown to the general public, a very big industry in artificial silk and artificial woolen goods has arisen. In fact, fabrics of this nature is actually being manufactured in Shanghai on a large scale and shipped to Europe or America, some of the stuff being of such quality and beautiful design as to compare more than



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favorably with that of European manufacture".<sup>13</sup> In Kiaochow, we have no data available with regard to the existence of a rayon weaving industry, but that some development of this nature must have taken place is quite possible. In Tientsin, rayon weaving is the largest handicraft industry second only to carpet weaving, upon which the present report is chiefly written.

### Rayon and cotton weaving in Tientsin

The weaving industry in Tientsin employs both rayon and cotton as raw materials. The application of rayon, however, did not begin on a large scale until 1925, before which only cotton and silk were employed. The type of loom used may be plain or figured, but figured loom is invariably operated by hand power, and is called handloom. Plain weaving, on the other hand, may be operated by hand or by power. It employs cotton as raw material when operated by power, but cotton and rayon, either separately or conjointly, when operated by hand. In figured weaving, cotton is seldom employed alone, but mixed with rayon, while rayon may be employed alone or mixed with cotton.

In this report no treatment will be given to power weaving. Power weaving, it may be remarked in passing, is now carried on by two cotton mills in Tientsin, namely, Yu Yuan (裕元) and Heng Yuan (恆源). The latter started out as a cotton weaving mill by power in 1916, with 200 looms; but in 1920 it also took over the spinning branch. The former, established in 1915 as a cotton spinning mill, added the weaving branch by power in 1922, with 500 looms. In the following year, another 500 looms were installed, because of a slack in the yarn market. In 1928, the two mills produced altogether 870,000 *pi* of cotton cloth, of which 770,000 *pi*, or 89 percent, were contributed by Yu Yuan.

Plain weaving by hand, which for centuries has been a household industry all over China, must have developed in Tientsin quite early. Figured weaving, on the other hand, is a recent development. In Tientsin, figured weaving was first taught by a Japanese as a branch of the textile department in the Industrial Training Institute (實習工場), organized by Governor Yuan Shih-Kai in 1906. At the close-down of the Institute three years afterwards, hundreds of pupils trained in the craft of figured weaving joined hands in organizing small weaving establishments, of which Fu Chang (輔章) was the best noted. Gassed yarns were used as raw materials; the fabrics woven were of the striped type, for which reason the establishments were generally known as stripe weaving societies (紋織社), such as Mei Su (美術), Ch'en Tung (振東), Yah Yah (亞亞), etc. Other establishments, including Hua Shih (華實)

13. *China Journal*, VIII: No. 5 p. 224, May, 1928. It is, however, strange to note that in a recent work on *Shanghai Industries* published after an extensive field investigation of the subject by the Social Affairs Bureau of the Greater City of Shanghai, no mention was made of the rayon weaving industry.

and Hua Chang (華彰), were started later. Three years afterwards, the industry went through another expansion, when Hua Chang was enlarged into a limited company called Chang Chi Weaving and Dyeing Company (彰記織染有限公司), and undertook to produce fabrics woven of mixed cotton and silk, at the price of \$1.70 or \$1.80 per ch'ih, (0.32 meter). That the industry prospered greatly was partly reflected in the high wages of thirty to forty dollars per month paid to the weavers. This prosperity continued a little before the end of the Great War, when the industry suffered a reverse on account of growing competition among small manufacturers as well as of deterioration in the quality of fabrics woven. Many of the unemployed weavers had to emigrate from Tientsin to Choutsun (周村), a silk weaving centre in the province of Shantung, for a living. Meantime, enterprising manufacturers devised new patterns in order to revive the business. The industry thus lingered on for many years, but showed no sign of a return to prosperity until the large scale introduction<sup>14</sup> of rayon as raw material by Yao Shih-chung (姚樹春) in 1925. In May of that year, Mr. Yao established a weaving factory by the name of Hua Ch'ang (華昌), producing many kinds of new fabrics woven of rayon or of mixed rayon and wool. A year after Yao's introduction of rayon as raw material for figured weaving, Chen Ching-tang, proprietor of Ming Sheng (明生) factory, followed Yao's lead in devising a new fabric woven of rayon, namely, Ming Hua Ké (明華葛). This fabric was sold by Ch'ing Hua (慶華) factory, and took its name from the names of the two factories, Ming from Ming Sheng and Hua from Ch'ing Hua. It was sold at twenty-six dollars per *pi* during that year, returning a handsome profit to the inventor. The new fabric, however, was not patented, and in the course of no more than a year it had been so widely copied by other manufacturers, whether new or old, that its output increased greatly and its selling price was considerably reduced, from twenty-six dollars per *pi* to ten dollars per *pi* at the end of 1927. Mr. Chen, therefore, had to invent a new fabric called Mei Sheng Chi (美生綺) in order to save his business. In this connection, the development of rayon weaving in Tientsin may be read in the light of rayon import. In 1925 when rayon was first introduced by Yao as the raw material for weaving, its import into Tientsin amounted to Hk. Tls. 576,560, but increased to Hk. Tls. 938,342 in the following year. This increase, however, was most rapid in 1927, during which year the import of rayon amounted to Hk. Tls. 2,467,553, an increase of two and half times over that for 1926. Indirectly, it confirmed the growth in rayon weaving

14. Somewhere in 1917 Ch'ing Ho Kung (慶和公), a native firm, undertook to sell rayon yarn to weaving establishments at very high price, \$240 per 20 lbs., for the weaving of a rayon fabric called 鳳眼縐. This firm had the yarn imported by the manager of Teh Lung Hong (德隆洋行), at \$1,200 per box of 100 lbs. each. A little later, however, the price was reduced to \$800 per box. The new fabric, 鳳眼縐, was at first woven by two establishments, namely, Yu Hua (裕華) and Ch'ang Chi (彰記).

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industry in Tientsin, one year after Chen's invention and two years after Yao's. In 1928, the last year for which customs statistics are yet available, the import of rayon into Tientsin amounted to Hk. Tls. 4,661,480. Since 1928, the industry has suffered a decline, partly due to the loss of market in Manchuria, an outcome of the Sino-Russian dispute over Chinese Eastern Railway, and partly due to the price increase in rayon, a result of the depreciation in silver exchange.

According to an investigation into the rayon and cotton weaving industry in Tientsin by this Committee, conducted from June, 1929 to February of this year, there were 328 establishments in the industry in 1929, employing altogether 4,805 looms. Of these establishments 207, employing 2,603 looms, were organized during the last five years, from 1925 to 1929. This rapid increase in the number of establishments as well as of looms, as shown in Table 12, coincides closely with the growth of the industry caused by the use and import of rayon as raw material. In this table it may also be observed that although the number of establishments has increased from 40 in 1927 to 57 in 1928 or 58 in 1929, yet its average size, as measured by the number of looms per establishment, has decreased from 17.1 in 1927 to 11.9 in 1928, or 9.7 in 1929.

**Table 12. Tientsin weaving establishments in 1929  
classified by year of establishment**

Year of establish- ment	No. establish- ments	No. Looms			Looms per establish- ment
		Figured	Plain	Total	
Before 1912	11	68	95	163	14.8
1912	6	74	51	125	20.8
1913	8	98	74	172	21.5
1914	7	94	30	124	17.7
1915	2	18	16	34	17.0
1916	6	94	58	152	25.3
1917	8	124	135	259	32.4
1918	8	48	57	105	13.1
1919	9	84	14	98	11.0
1920	4	48	75	123	30.8
1921	12	83	216	299	25.0
1922	9	124	43	167	18.6
1923	13	81	54	135	10.4
1924	18	153	93	246	13.7
1925	18	248	40	288	16.0
1926	34	329	62	391	11.5
1927	40	501	174	683	17.1
1928	57	483	195	678	11.9
1929	58	388	175	563	9.7
<b>Total</b>	<b>328</b>	<b>3,148</b>	<b>1,657</b>	<b>4,805</b>	<b>14.6</b>

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In Tientsin the weaving establishments may employ rayon or cotton, or both, as raw material. Among these establishments, 328 in number, 163 (or 50 percent) employ rayon, 91 (or 27.7 percent) employ rayon and cotton, and 74 (or 22.3 percent) employ cotton as raw material. In term of value, 3,515,210 dollars' worth of rayon yarn (or 68.5 percent), 1,253,211 dollars' worth of cotton yarn (or 24.4 percent) and 359,804 dollars' worth of cotton thread (or 7.1 percent) were consumed by these establishments in 1929. Again, the weaving establishments may employ plain or figured looms, or both. Of these, 159 employ figured looms (2,011), 91 employ plain looms (980), and 78 employ both plain and figured looms (1,814).

## Chapter II. Industrial Organization

Before the coming of industrial revolution in western countries, especially England, handloom weaving used to be carried on under two industrial systems, namely, master craftsman system and merchant employer system. In England, these two systems persisted long after the industrial revolution, and did not lose its predominant position until about 1840<sup>15</sup>. The reasons for such persistence are plain enough, and account also for the prevalence of these two systems in Tientsin weaving industry. In the first place, handloom weaving, unlike power loom weaving, requires but little fixed capital. The loom can be cheaply bought on the market, and requires no installation of power facilities. Any workman can become a small master if he is able to manage several hundred dollars to purchase a few looms and collect them together in a workshop, whereas a medium-sized capitalist may become a manufacturer as well as a merchant employer by letting out his orders to small weavers. Secondly, the flexibility of these two systems is in itself an asset under changing economic circumstances. In China the recurrence of war, and the instability in market conditions that it creates, set a check to the pursuit of industry under factory system. Under this system, the heavy investment in fixed capital can be profitable only by means of an assured market. But once war becomes a recurrent phenomenon, it interrupts the means of communication and thereby closes up the interior market. The industry, consequently, has to contract its scale of operation, or to suspend it entirely.

Thus, because of the small amount of capital required, as well as of the adaptation to economic conditions arising from political changes, the two systems of industrial organization, namely, master craftsman system and merchant employer system, prevail in the weaving industry in Tientsin. Factory system, however, also exists, especially in the plain weaving of cotton fabrics; so also the transition forms between all these systems. In Tientsin industries, not only in weaving, but also in carpet making and hosiery knitting<sup>16</sup>, the overlapping of industrial systems constitutes a notable feature of the transitional stage of economic development. In the following paragraphs, this general analysis of the industrial systems in Tientsin weaving industry is substantiated by factual statements with regard to capital, rent, loom, labor, raw materials and output.

### Capital, rent and loom

According to the amount of capital invested, Tientsin weaving establishments may be divided into three classes, namely, small, medium and large. The small establishments employ a capital of 1,000 dollars

15. Fong, H. D.: *Triumph of Factory System in England*, Tientsin, 1930, Ch. I.

16. Fong H. D.: *Tientsin Carpet Industry*, Tientsin, 1929, Ch. II.

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or less each, the medium sized employ a capital of 5,000 dollars or less each, and the large ones employ a capital of 5,001 to 100,000 dollars. Under this more or less arbitrary classification, 218 out of a total of 322 establishments that give returns on the amount of capital invested belong to the small class, employing 107,980 dollars out of a total capital of 685,980 dollars. In other words, 67.7 percent of the weaving establishments employ only 15.8 percent of the total capital invested. Meantime, 88 medium establishments, or 27.3 percent, employ a capital of 221,000 dollars, or 32.1 percent; while 16 large establishments, or 5 percent, employ a capital of 357,000 dollars, or 52.1 percent. In the following table, the detailed distribution of 322 weaving establishments in Tientsin by the amount of capital invested is given.

**Table 13. Tientsin weaving establishments classified  
by amount of capital invested, 1929  
(in dollars)**

Capital per establishment	Establishments		Capital	
	No.	%	Amount	%
1- 100	24	7.5	2,080	0.3
101- 200	31	9.6	5,950	0.9
201- 300	30	9.3	8,800	1.3
301- 400	11	3.4	4,400	0.6
401- 500	65	20.2	32,450	4.8
501- 600	3	0.9	1,800	0.3
601- 700				
701- 800	7	2.2	5,600	0.8
801- 900	1	0.3	900	0.1
901- 1,000	46	14.3	46,000	6.7
1,001- 1,500	24	7.5	36,000	5.2
1,501- 2,000	31	9.6	62,000	9.0
2,001- 3,000	19	5.9	56,000	8.2
3,001- 4,000	3	0.9	12,000	1.7
4,001- 5,000	11	3.4	55,000	8.0
5,001-10,000	11	3.4	92,000	13.4
Above 10,000	5	1.6	265,000	38.7
Total	322	100.0	685,980	100.0

That 67.7 percent of the small establishments employ only 15.8 percent of the total capital and that 5 percent of the large establishments employ 52.1 percent of the total capital require a word of explanation. It must be noted that among the large establishments the amount of capital invested by each establishment varies a great deal, from the lowest of 6,000 dollars to the highest of 100,000 dollars. Among the 16 large establishments 11 employ a capital of 6,000 dollars to 10,000 dollars each, the total being 92,000 dollars; while the other five establishments employ 15,000 dollars, 50,000 dollars, 50,000 dollars, 50,000 dollars, and 100,000 dollars respectively, the total being 265,000 dollars. With the exception

of one canvas weaving establishment the other ten among the former class are engaged in plain or (and) figured weaving of rayon or (and) cotton fabrics. Among the latter class four establishments are engaged in canvas weaving, and one establishment, employing \$15,000, in flour bag weaving. As canvas or flour bag weaving, because of technical simplicity, can be profitably operated on a large scale, it is plain enough that the largest establishments in Tientsin weaving industry should be engaged in this process, and operated under the factory system.

The prevalence of small establishments, employing a capital of 1,000 dollars or less each, can be explained by the industrial systems, namely, master craftsman system and merchant employer system. In this class of establishments, the master craftsman is the leading figure. He requires little capital for his business, whether fixed or circulating. His workshop can be rented; his looms, varying from a few to about a dozen, cost him but a few hundred dollars to install. The raw materials, whether rayon or cotton yarn, he can secure from the stores with a month's credit, while selling his fabrics for ready cash. It is true that he must provide room and board for his workers, as in China dormitory system has become an established rule in small industries, and occasionally in large ones. Such provision, however, is not costly, considering the fact that workshop is invariably converted into dormitory during night time, and that meals constitute the barest elements of food. Moreover, he can easily reduce his working force during slack period, and enlarge it when prosperity returns. His family, including wife and children, assists him in the preparatory processes of weaving, such as winding, spooling, reeling, etc. Its members live with him, and thus help to reduce his personal expenses and to eke out a living with his petty earnings. This, in brief, is a picture of a great number of owners of small establishments, of those whom we designate as master craftsmen. Other owners, however, are only middlemen under the merchant employer system. They may provide the workshop and looms, and organize a small working force for weaving; but their raw materials, whether cotton or rayon yarn, are supplied by other establishments larger than their own. In other words, they do not weave on own account, but on that of other establishments. Such middleman may undertake weaving under three arrangements common to the industry. Under the first arrangement, the middleman buys the raw materials from his merchant employer, that is, the medium or large establishment, at the market price, but does not pay for them until they are converted into finished fabrics. The latter he is bound by contract to sell to his merchant employer, also at market price, but actually at a price much lower than the market price. Under the second arrangement, the merchant employer gives out a certain quantity of raw material to the middleman, say 200 pounds of rayon yarn, on condition that the latter return to the former forty pi of rayon fabrics, for the weaving of

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which only 150 pounds of rayon yarn are actually needed. The other 50 pounds of rayon yarn thus constitute the wage for the middleman. Under the third arrangement, the merchant employer gives out the raw material to the middleman, for the weaving of certain fabrics at a fixed wage. At present when the price for rayon fabrics has been considerably depressed by unfavorable market conditions, the first arrangement is preferred, while the other two are resorted to only when such fabrics command a remunerative price. The middleman, under whatever arrangement, must secure a third person to guarantee his credit in undertaking orders for the merchant employer. Otherwise, the former may run away with the raw materials given him by the latter, and with whatever amount of credit that the latter may extend to the former in case of need, purely as a matter of accommodation. Despite the above distinction between a master craftsman and a middleman, it must not be assumed that a master craftsman cannot be a middleman at the same time, or vice versa. Among 218 small establishments mentioned above, 52, employing a total capital of \$15,500, are owned by middlemen; while 35, employing a total capital of the same amount, are owned by middlemen who are master craftsmen at the same time.

The capital investment of these three classes of establishments, whether small, medium or large, may be further classified according to the type of business organization, whether individual proprietorship, partnership or limited corporation. Among 218 small establishments there are 200 individual proprietorships and 18 partnerships. Among 88 medium establishments there are 60 individual proprietorships, 25 partnerships and 3 limited corporations. Among 16 large establishments there are 8 individual proprietorships, 4 partnerships and 4 limited corporations. In other words, there are altogether 268 individual proprietorships, 47 partnerships and 7 limited corporations. The prevalent form of business organization, therefore, is the individual proprietorship.

Among the fixed charges in a weaving establishment rent constitutes the most important item. Indeed, it exceeds the amount of capital invested for some of the small establishments. Thus, for thirty-eight of them, the amount of annual rent paid in 1929 reaches \$12,298, whereas the total capital invested amounts only to \$9,480. The rent, in other words, exceeds the capital by \$2,818 for 38 small establishments, or by an average of 74 dollars each. In Table 14 the weaving establishments in Tientsin are classified according to the amount of rent paid in 1929. From this table it may be seen that of the 303 establishments, 209, or 68.9 percent, pay an annual rent of \$400 or less each. The total amount paid by these establishments reaches \$47,162, or 41.7 percent of the total which is \$113,260. Meantime, 77 establishments, or 25.5 percent, pay an annual rent of \$900 or less each and a total rent of \$43,028, which is 37.9 percent of all the rents paid; while 17 establishments, or 5.6 percent,



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**Table 14. Tientsin weaving establishments classified by amount of rent paid, 1929 (in dollars)**

Rent per establishment	Establishments		Rent	
	No.	%	Amount	%
100 or below	18	5.9	1,438	1.3
101 - 200	79	26.1	12,722	11.2
201 - 300	71	23.4	18,224	16.1
301 - 400	41	13.5	14,778	13.1
401 - 500	36	11.9	16,321	14.4
501 - 600	20	6.6	11,243	9.9
601 - 700	9	3.0	6,124	5.4
701 - 800	10	3.3	7,620	6.7
801 - 900	2	0.7	1,720	1.5
901 -1000	9	3.0	8,870	7.9
Above 1000	8	2.6	14,200	12.5
<b>Total</b>	<b>303<sup>17</sup></b>	<b>100.0</b>	<b>113,260</b>	<b>100.0</b>

pay an annual rent of \$901 or more and a total rent of \$23,070, which is 20.4 percent of all the rents paid. In other words,

209 establishments (68.9%)	pay a total rent of \$47,162 (41.7%)
77 " (25.5%)	" " " \$43,028 (37.9%)
17 " (5.6%)	" " " \$23,070 (20.4%)

The number of looms employed by weaving establishments varies with the type of fabrics woven. As shown in Table 15, 159 figured weaving establishments employ 2,011 looms, or 12.7 looms each; 91 plain weaving establishments employ 980 looms, or 10.8 looms each; 78 plain and figured weaving establishments employ 1,814 looms, or 23.3 looms each. Thus plain and figured weaving establishment is the largest in size, figured weaving establishment the second, and plain weaving establishment the smallest.

**Table 15. Tientsin weaving establishments classified by type of fabrics woven, 1929 (in term of looms)**

No. looms per establishment	Plain		Figured		Plain & Figured	
	No. estab'ts	No. looms	No. estab'ts	No. looms	No. estab'ts	No. looms
1-5	28	112	20	78	2	8
6-10	42	329	58	477	14	118
11-15	9	115	36	470	19	256
16-20	4	73	29	528	18	323
21-25	3	70	6	137	5	110
26-30	1	30	8	225	6	170
31-35	1	31			2	67
36-40			1	36	3	113
41-45					1	44
46-50	2	100			2	100
Above 50	1	120	1	60	6	505
<b>Total</b>	<b>91</b>	<b>980</b>	<b>159</b>	<b>2,011</b>	<b>78</b>	<b>1,814</b>

17. The rent for 15 establishments is not given, so also that for 10 establishments with own premises.

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According to the above table, the weaving establishments in Tientsin, 328 in number, employ a total of 4,805 looms, of which 1,665 are plain and 3,140 figured. In other words, the figured looms occupy about 65 percent of the total. Figured looms, it may be noted, are far more costly than plain looms. According to the Committee's investigation, the cost of 3,140 figured looms reaches 251,281 dollars, which gives an average of eighty dollars per loom, while the cost of 1,665 plain looms amounts only to 42,113 dollars, which gives an average of 25.6 dollars per loom. Indeed, the looms in a weaving establishment constitute the major portion of the capital.

In the following table the weaving establishments in Tientsin are further classified by the number of looms employed. From this table it may be seen that the commonest number of looms employed per establishment varies from six to ten. 115 establishments, or 35.1 percent of the total, belong to this class, employing 924 looms, or 19.2 percent of the total. Next to this size is eleven to fifteen looms per establishment. 63 establishments, or 19.2 percent, belong to this class, employing 841 looms, or 17.5 percent.

**Table 16. Tientsin weaving establishments classified by number of looms employed, 1929**

No. looms per establish- ment	Establishments		Looms	
	No.	%	No.	%
1-5	50	15.2	198	4.1
6-10	115	35.1	924	19.2
11-15	63	19.2	841	17.5
16-20	51	15.6	924	19.2
21-25	14	4.3	317	6.6
26-30	15	4.6	425	8.8
31-35	3	0.9	98	2.1
36-40	4	1.2	149	3.1
41-45	1	0.3	44	0.9
46-50	4	1.2	200	4.2
Above 50	8	2.4	685	14.3
Total	328	100.0	4,805	100.0

### Labor, raw materials and output

As shown in Table 17, the number of workers per weaving establishment is generally small. The two classes of establishments employing the fewest workers, namely 1-10 and 11-20, is the largest in number, 191. The class of establishments employing twenty-one to thirty workers each is the next largest in number, 53. In other words, 244 establishments, or 74.7 percent, do not employ more than thirty workers each, employing altogether 3,540 workers, or 44.9 percent. The other 83 establishments, or 25.3 percent, employ more than thirty workers each, having altogether 4,333 workers, or 55.1 percent.

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Table 17. Tientsin weaving establishments classified  
by number of workers, 1929

Workers per establish- ment	Establishments		Workers	
	No.	%	No.	%
1 - 10	82	25.1	552	7.0
11 - 20	109	33.4	1,638	20.8
21 - 30	53	16.2	1,350	17.1
31 - 40	44	13.5	1,523	19.3
41 - 50	17	5.2	792	10.1
51 - 60	6	1.8	344	4.4
61 - 70	7	2.1	466	5.9
71 - 80	—	—	—	—
81 - 90	1	0.3	90	1.2
91 -100	1	0.3	100	1.3
Above 100	7	2.1	1,018	12.9
Total	327	100.0	7,873	100.0

The workers employed by weaving establishments are composed chiefly of apprentices, but partly of adult workers. Of the total number of workers, 7,873, about two thirds, namely, 5,117, are apprentices, only the other 2,756 being adult workers. This resort to apprentice labor, which is also true with other Tientsin industries including carpet weaving and hosiery knitting, is commoner with smaller than with larger establishments. As shown in another table below, the apprentice labor occupies as high as 75.4 percent of the total working force in establishments with ten or fewer workers each. As the size of establishments increases, the

Table 18. Percentage distribution of adult workers and apprentices  
in different classes of Tientsin weaving  
establishments, 1929

Workers per establish- ment	Adult workers		Apprentices		Total workers	
	No.	%	No.	%	No.	%
1 - 10	136	24.6	416	75.4	552	100
11 - 20	431	26.3	1,207	73.7	1,638	100
21 - 30	463	34.3	887	65.7	1,350	100
31 - 40	539	35.4	984	64.6	1,523	100
41 - 50	343	43.3	449	56.7	792	100
51 - 60	142	41.3	202	58.7	344	100
61 - 70	165	35.4	301	64.6	466	100
71 - 80	—	—	—	—	—	—
81 - 90	40	44.4	50	55.6	90	100
91 -100	50	50.0	50	50.0	100	100
Above 100	447	43.9	571	56.1	1,018	100
Total	2,756	35.0	5,117	65.0	7,873	100

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percentage of apprentice labor also decreases: 73.7 percent in establishments with 11 to 20 workers, 65.7 percent in establishments with 21 to 30 workers, 64.6 percent in establishments with 31 to 40 workers, and 56.7 percent in establishments with 41 to 50 workers. In some of the establishments, indeed, the apprentice labor occupies fully one hundred percent, including 29 establishments employing ten or fewer workers each, 20 establishments employing eleven to twenty workers each, 2 establishments employing twenty-one to thirty workers each, and 4 establishments employing more than thirty workers each. These 55 establishments, or 17 percent, employ altogether 717 apprentices, or 9 percent.

When both workers and apprentices are employed, the workers in large or medium establishments are chiefly weavers, but sometimes foremen or instructors to the apprentices. In some establishments where the processes of perforating cards, sizing yarns, dyeing or calendering fabrics are also performed along with weaving, the workers are assigned to each of these processes, with the assistance of apprentices. On the other hand, the apprentices in large or medium establishments, especially the novices, perform the preliminary processes of weaving, such as winding, spooling, reeling, warping, and drawing-in, and have to run errands besides. Among these different processes winding is occasionally done by adult females on the premise, or at home. In small establishments little attempt at specialization is possible, and workers are employed only to instruct or to supervise the apprentices. The latter are trained to weave as well as to engage in other processes preliminary to weaving. The perforation of cards, the sizing of yarns, and the dyeing or calendering of fabrics, all these are delegated to independent establishments engaged in these processes.

The raw materials consumed by the weaving establishments in Tientsin are composed of three kinds, namely, rayon yarn, cotton yarn and cotton thread. Rayon yarn is chiefly imported from Italy, France, Germany, Great Britain, Netherlands, etc., and is of no. 120 and no. 150 type. The importer, generally a foreign firm, sells it to the native firm which again deals it out in small or large lots to the weaving establishments. Rayon yarn is packed in boxes of two hundred pounds each, the price being quoted at about \$1.50 per pound. The term of sale may be credit or cash, the credit price being higher than the cash price in order to make allowance for interest charges. The cotton yarn used is generally of 16 counts, although for canvas or flour bag weaving lower counts, such as 10, may be used. The cotton thread used is of 32, 42, or 60

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counts. Of these two types of raw materials, most of the former and a part of the latter are produced by the six cotton mills in Tientsin; the rest have to be imported from abroad, chiefly from Japan. Cotton yarn or thread, whether imported or home produced, is sold to the weaving establishments through native firms, but imported yarn or thread must go through the hands of importers first. It is quoted by pound, by small parcel, or by large bale. One large bale, whether of yarn or of thread, is composed of forty small parcels, one small parcel containing a quantity of ten pounds.

In Tientsin the weaving establishment may employ rayon yarn alone to produce rayon fabrics; or else, it may employ both rayon yarn and cotton thread to produce rayon mixtures. In both types of establishments, cotton yarn may be added for the weaving of cotton fabrics. On the other hand, cotton yarn and cotton thread may be employed together or independently of each other, for the production of cotton fabrics of various grades. In the following table the weaving establishments in Tientsin are classified according to the kind of raw materials used.

**Table 19. Tientsin weaving establishments classified by kind of raw materials used, 1929**

Rayon yarn	163	Cotton yarn	62
Rayon yarn +cotton thread	60	Cotton thread	10
Rayon yarn +cotton yarn	26	Cotton thread +cotton yarn	2
Rayon yarn +cotton yarn +cotton thread	5	Total	328

According to the above table, there are 254 weaving establishments employing rayon yarn as raw material, 95 weaving establishments employing cotton yarn, and 77 weaving establishments employing cotton thread. These establishments consumed altogether 2,241,902 pounds of rayon yarn valued at \$3,515,210; 5,006 bales of cotton yarn valued at \$1,253,211; and 945 bales of cotton thread valued at \$359,804. In the following three tables, the weaving establishments in Tientsin are classified according to the quantity of rayon yarn, cotton yarn or cotton thread consumed in 1929.

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**Table 20. Tientsin weaving establishments classified by amount of rayon yarn consumed, 1929 (in pounds)**

Rayon yarn consumed per establishment	Establishments		Total rayon yarn consumed	
	No.	%	Amount	%
1,000 or below	18	7.1	9,360	0.4
1,001 - 2,000	20	7.9	28,820	1.3
2,001 - 3,000	18	7.1	48,880	2.2
3,001 - 4,000	24	9.5	88,200	3.9
4,001 - 5,000	30	11.8	136,920	6.1
5,001 - 6,000	15	5.9	85,300	3.8
6,001 - 7,000	13	5.1	88,240	3.9
7,001 - 8,000	20	7.9	152,780	6.8
8,001 - 9,000	8	3.2	68,050	3.1
9,001 -10,000	21	8.3	204,440	9.1
10,001 -15,000	37	14.6	448,362	20.0
15,001 -20,000	15	5.9	267,900	12.0
20,001 -30,000	8	3.2	210,200	9.4
30,001 -40,000	2	0.8	72,500	3.2
40,001 -50,000	2	0.8	92,000	4.1
Above 50,000	3	0.9	240,000	10.7
<b>Total</b>	<b>254</b>	<b>100.0</b>	<b>2,241,902</b>	<b>100.0</b>

**Table 21. Tientsin weaving establishments classified by amount of cotton yarn consumed, 1929 (in bales)**

Cotton yarn consumed per establishment	Establishments		Total cotton yarn consumed	
	No.	%	Amount	%
1 - 10	24	25.3	141.60	2.8
11 - 20	33	34.7	519.90	10.4
21 - 30	9	9.5	233.50	4.7
31 - 40	8	8.4	292.00	5.8
41 - 50	5	5.3	229.00	4.6
51 - 60	2	2.1	110.00	2.2
61 - 70	—	—	—	—
71 - 80	2	2.1	160.00	3.2
81 - 90	—	—	—	—
91 -100	2	2.1	189.00	3.8
Above 100	10	10.5	3,131.00	62.5
<b>Total</b>	<b>95</b>	<b>100.0</b>	<b>5,008.00</b>	<b>100.0</b>

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Table 22. Tientsin weaving establishments classified by amount of cotton thread consumed, 1929 (in bales)

Cotton thread consumed per establishment	Establishments		Total cotton thread consumed	
	No.	%	Amount	%
Below 1	10	13.0	6.12	0.6
1 - 5	31	40.2	78.25	8.3
6 -10	12	15.6	97.95	10.4
11 -20	10	13.0	163.00	17.3
21 -30	6	7.8	158.00	16.7
31 -40	2	2.6	71.00	7.5
Above 40	6	7.8	370.53	39.2
Total	77	100.0	945.00	100.0

For the 328 weaving establishments referred to in the above tables, the value of raw materials consumed including rayon yarn, cotton yarn and cotton thread amounts to \$5,128,225, or an average \$15,635 per establishment. In the following table these establishments are classified according to the value of raw materials consumed.

Table 23. Tientsin weaving establishments classified by value of raw materials consumed, 1929 (in dollars)

Raw materials consumed per establishment	Establishments		Total raw materials consumed	
	No.	%	Value	%
1,000 & below	17	5.2	9,613	0.2
1,001 - 2,000	8	2.4	12,960	0.3
2,001 - 3,000	12	3.7	29,986	0.6
3,001 - 4,000	20	6.1	70,254	1.4
4,001 - 5,000	18	5.5	80,856	1.6
5,001 - 6,000	22	6.7	122,506	2.4
6,001 - 7,000	17	5.2	110,149	2.1
7,001 - 8,000	24	7.3	180,939	3.5
8,001 - 9,000	18	5.5	156,860	3.1
9,001 -10,000	6	1.8	57,144	1.1
10,001 -11,000	18	5.5	190,474	3.7
11,001 -12,000	16	4.9	186,426	3.6
12,001 -13,000	13	4.0	163,294	3.2
13,001 -14,000	6	1.8	80,840	1.6
14,001 -15,000	14	4.3	206,362	4.0
15,001 -16,000	10	3.0	157,420	3.1
16,001 -17,000	5	1.5	83,097	1.6
17,001 -18,000	13	4.0	227,688	4.4
18,001 -19,000	7	2.1	130,017	2.5
19,001 -20,000	3	0.9	57,950	1.1
20,001 -30,000	29	8.8	427,699	8.2
30,001 -40,000	11	3.4	384,029	7.5
40,001 -50,000	7	2.1	317,397	6.2
Above 50,000	14	4.3	1,384,265	27.0
Total	328	100.0	5,128,225	100.0

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An examination of the above table shows that less than one tenth of the total number of establishments, or 9.8 percent, consumed more than four tenths of raw materials, or 40.7 percent. On the other hand, more than two thirds of the establishments, or 69.9 percent, consumed less than one third of the raw materials, or 32.4 percent. The unequal consumption of raw materials is another index of the variation in the sizes of weaving establishments. This inequality, however, is not so great as that shown in the distribution of the amount of capital invested. In capital distribution, less than one tenth of the establishments, or 9.3 percent, employed more than six tenths of the total capital, or 61.8 percent. On the other hand, more than two thirds of the establishments, or 67.7 percent, employed less than one sixth of the total capital, or 15.8 percent. A comparison of capital investment and raw material consumption, therefore, reveals the paradox that the smaller the establishments in capital investment, the greater the amount of raw materials consumed per unit of capital invested. For the smallest establishment in respect of capital investment, that employing one hundred or fewer dollars, the raw materials consumed for every dollar of capital invested amounts to \$54.10. The ratio decreases in favor of capital investment as the size of establishments, in term of capital investment, increases: 29.64 for \$101-\$200 establishment, 12.32 for \$901-\$1,000 establishment, 6.45

**Table 24. A comparison of capital investment and raw material consumption in Tientsin weaving establishments, 1929 (in dollars)**

Capital per establishment	Establishments		Total capital		Total raw materials consumed		Ratio of raw materials to capital
	No.	%	Amount	%	Amount	%	
1 - 100	24	7.5	2,080	0.3	112,532	2.2	54.10
101 - 200	31	9.6	5,950	0.9	176,371	3.5	29.64
201 - 300	30	9.3	8,800	1.3	258,737	5.2	29.40
301 - 400	11	3.4	4,400	0.6	92,186	1.9	20.95
401 - 500	65	20.2	32,450	4.8	681,053	13.7	20.99
501 - 600	3	0.9	1,800	0.3	43,737	0.9	24.30
601 - 700	-	-	-	-	-	-	-
701 - 800	7	2.2	5,600	0.8	72,470	1.4	12.94
801 - 900	1	0.3	900	0.1	13,020	0.3	14.47
901 - 1,000	46	14.3	46,000	6.7	566,892	11.4	12.32
1,001 - 1,500	24	7.5	36,000	5.2	321,909	6.5	8.94
1,501 - 2,000	31	9.6	62,000	9.0	862,411	17.3	13.91
2,001 - 3,000	19	5.9	56,000	8.2	395,782	7.9	7.07
3,001 - 4,000	3	0.9	12,000	1.7	105,227	2.1	8.77
4,001 - 5,000	11	3.4	55,000	8.0	354,940	7.1	6.45
5,001 -10,000	11	3.4	92,000	13.4	428,788	8.6	4.66
Above 10,000	5	1.6	265,000	38.7	496,280	10.0	1.87
<b>Total</b>	<b>322</b>	<b>100.0</b>	<b>685,980</b>	<b>100.0</b>	<b>4,982,335<sup>18</sup></b>	<b>100.0</b>	<b>7.26</b>

18. Six establishments that gave no returns on capital consumed \$145,890 worth of raw materials.



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for \$4,001-\$5,000 establishment, 4.66 for \$5,001-\$10,000 establishment, and finally, only 1.87 for establishments above \$10,000. This paradox, which is shown in detail in Table 24, can be explained by several reasons. In the first place, most of the small establishments are simply middlemen for the larger establishments, and needs provide only workshops and looms, and a staff of working force, in order to work up the raw materials given them by the larger establishments. The provision for raw material, which ordinarily consumes the largest portion of the capital, is therefore not a factor in capital investment for small establishments. Secondly, the larger establishment has to provide not only raw material for its own workmen on the premise, but also for those in smaller establishments. Besides, such establishment is engaged in purchasing fabrics in addition to producing them. It buys fabrics from the small establishments that weave on own account. Such purchase, at times, may

Table 25. Tientsin weaving establishments classified, by value of output, 1929 (in dollars)

Value of output per establishment	Establishments		Total value of output	
	No.	%	Amount	%
1,000 & below	4	1.2	2,664	0.1
1,001 - 2,000	6	1.8	9,722	0.1
2,001 - 3,000	9	2.8	22,502	0.3
3,001 - 4,000	11	3.4	38,892	0.6
4,001 - 5,000	21	6.4	96,574	1.4
5,001 - 6,000	12	3.6	67,450	1.0
6,001 - 7,000	15	4.6	100,186	1.4
7,001 - 8,000	16	4.9	118,229	1.7
8,001 - 9,000	19	5.8	162,376	2.3
9,001 - 10,000	14	4.3	134,248	1.9
10,001 - 11,000	12	3.7	126,072	1.8
11,001 - 12,000	14	4.3	163,270	2.3
12,001 - 13,000	14	4.3	172,954	2.5
13,001 - 14,000	8	2.4	110,056	1.6
14,001 - 15,000	20	6.1	290,173	4.1
15,001 - 16,000	6	1.8	93,022	1.3
16,001 - 17,000	9	2.8	149,158	2.1
17,001 - 18,000	11	3.4	194,825	2.8
18,001 - 19,000	6	1.8	111,508	1.6
19,001 - 20,000	6	1.8	117,138	1.7
20,001 - 25,000	23	7.0	505,877	7.2
25,001 - 30,000	18	5.5	506,890	7.3
30,001 - 40,000	20	6.1	677,306	9.7
40,001 - 50,000	7	2.1	300,296	4.3
50,001 - 60,000	7	2.1	382,115	5.5
60,001 - 70,000	4	1.2	262,530	3.8
70,001 - 80,000	3	0.9	226,190	3.2
80,001 - 90,000	2	0.6	167,000	2.4
90,001 - 100,000	1	0.3	98,780	1.3
Above 100,000	10	3.0	1,588,100	22.7
Total	338	100.0	\$6,991,103	100.0

## RAYON AND COTTON WEAVING IN TIENTSIN

even exceed its own output, and the establishment becomes more a wholesaler than a manufacturer. For these two reasons, therefore, the ratio of raw material consumption to capital investment is more favorable to small than to large establishments.

As is commonly expected, the distribution of weaving establishments in Tientsin by the value of raw materials consumed coincides closely with that by the value of output. As is shown in the above table, 10.2 percent of large establishments produced 43.2 percent of the total output in 1929, while 67.6 percent of small establishments produced 29.3 percent. This distribution of output coincides with the distribution of raw materials, and may be clearly shown as follows:

For large establishments:

9.8 percent of establishments consumed 40.7 percent of raw materials, 10.2 percent of establishments produced 43.2 percent of output.

For small establishments:

69.9 percent of establishments consumed 32.4 percent of raw materials, 67.6 percent of establishments produced 29.3 percent of output.

### Weavers' and Dyers' Association

The Weavers' and Dyers' Association, organized in 1914, was not approved and registered with the former Ministry of Agriculture and Commerce until 1918. Its members were chiefly employers in plain and figured weaving as well as in dyeing. With the advance of the Nationalist army towards the North, in the fall of 1928, this Association ceased to function, and many of the member establishments were closed down because of failure in business. In the following year, the employers in the industry, confronted with the loss of market in Manchuria and the union's attempt to prevent them from reducing the labor force, realized again the common need for united action, and organized the Native Cloth Manufacturers' Association. The latter, unfortunately, was soon dissolved by the the Social Affairs Bureau, because of the alleged conspiracy against the workers, at the request of the General Labor Union of Tientsin. At this juncture, the Commercial Association Code was promulgated by the Nationalist Government. The weavers and dyers, like other manufacturers, were urged by the Social Affairs Bureau to re-organize under the new code. Twenty-eight employers, including leading elements in the industry, pulled together to resuscitate the dying organization, and elected eight of them as members of the Re-organization Committee. In February of the following year a new constitution was drafted and approved by the municipal government. An election meeting was accordingly called on the 31st of March, and 15 members were elected, who again elected among themselves 5 members as the permanent officers. Before this re-organization the Association claimed a total of 148 member establishments, but 44 of them had closed down and another 22 had suspended operation in the course of the re-organization, leaving only a total of 82 in the end.

## CHAPTER II. INDUSTRIAL ORGANIZATION

The new Association, therefore, had to take steps to recruit new members, towards which end five recruiting groups were organized, with the result that 67 new establishments joined the Association before the end of August, 1930.

The constitution of the Association, as referred to above, is composed of ten articles, of which the more important are as follows. The objects of the Association shall be to promote the industry by co-operative study and free exchange of information, as well as by joint reform of business abuses. Any manufacturer in the weaving or dyeing industry in Tientsin may join the Association, provided he pay, for each of the two seasons, his membership due according to the amount of capital invested: \$4 for special class, \$2 for first class, \$1 for second class and fifty cents for third class. The members shall have the right to elect 15 members of the Executive Committee, who shall elect among themselves five permanent officers, with one of them as the chairman. The meetings for the members shall be of two kinds, namely, semi-annual and special. Semi-annual meetings shall be held in June and December, with 15 days' notice by the executive committee, while special meetings may be sanctioned by the executive committee if it deems necessary, or at the request of one tenth of the members. The executive committee meets twice per month, the meeting to be called by the permanent officers. The permanent officers meet once per week, the meeting to be called by the chairman. If any member shall violate the constitution of the Association or the eighth article of the Commercial and Industrial Association Code, he shall, at the decision of the executive committee, be dismissed from the Association.

## Chapter III. Weaving and marketing

Strictly speaking, weaving consists in interlacing, at right angles, two or more series of flexible materials, of which the longitudinal are called warp and the transverse weft. In a broad sense, weaving includes not only the preparatory processes that precede it, but also the finishing processes that follow it. Of these the former, including winding, spooling, reeling, sizing, warping and drawing-in, are generally performed in the weaving establishment itself, while the latter, including dyeing and calendering, are delegated to the independent establishment. Except sizing the preparatory processes will be described in connection with weaving, as they are carried on under the same roof, while the finishing processes and sizing will be given a separate treatment, under subsidiary processes. The latter, it may be noted, include not only sizing, dyeing and calendering, but also card perforating and loom making.

### Weaving

The chief problem that precedes weaving is the preparation of warp and weft, the warp being stronger in tensile strength than the weft, in order to stand the strain of weaving. The yarn, as it comes directly from the spinning mill or the yarn merchant, is wound in small bundles. First of all, it must be re-wound on an old-fashioned spinning wheel, from which, with the aid of another worker, the yarn is formed into spools. A square frame, with an area of about five feet square, is filled with rows of nails, like in an abacus, upon each of which the spools, 160 in number, are fixed. The frame is then placed in an inclined position, while the warps from the spools are led through the lease rods and wound upon a large spinning wheel in the form of a bundle. Ten or more bundles of this kind may then be wound on the take-up roller, the number of bundles being dependent upon the number of warps in the fabric. The warps on the take-up roller are then sized by means of glue and other chemicals, so as to give them the tensile strength necessary for weaving. After sizing the warps are drawn into the healds, and ready to be put on the loom for use. The wefts, meantime, are reeled by another worker, to be fit into the shuttle. With the warps and wefts all prepared, the process of weaving commences.

Generally speaking, a loom for weaving warps and wefts into fabric must provide for the following: (1) Shedding, i.e., raising and lowering the warp threads in a pre-determined sequence so as to form two lines between which the weft may be passed. (2) Picking, or placing lines of weft between the divided warp. (3) Beating-up, or striking each weft thread into its appointed position in the fabric. (4) Letting-off, or holding the warp tense and delivering it as weaving proceeds. (5) Taking-up, or drawing away the cloth as manufactured. (6) Temples, for stretching the fabric widthwise in order to prevent the edge threads of a warp from injuring the reed, and from breaking. Fig. 1 illustrates these operations.

### CHAPTER III. WEAVING AND MARKETING

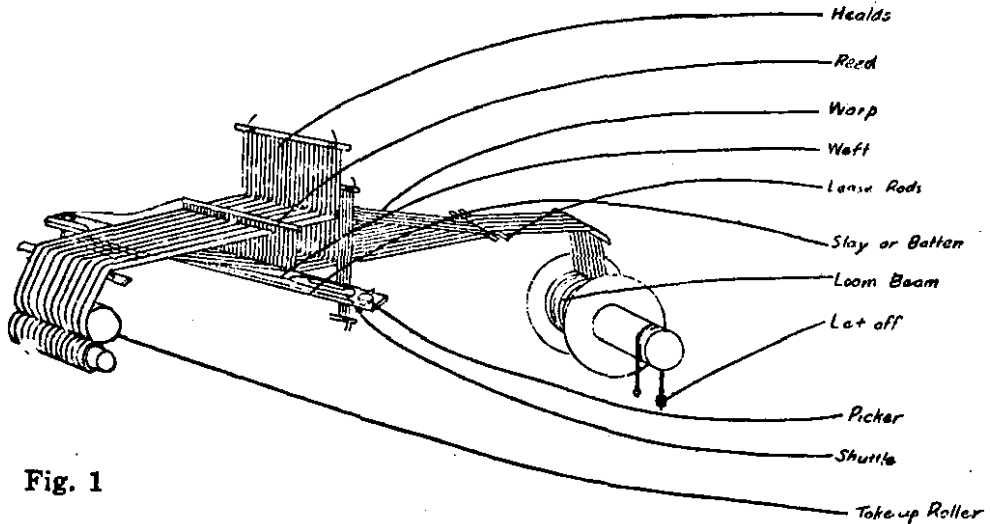


Fig. 1

Shedding is generally done by controlling the warp threads by eyed healds, which are lifted or lowered to form the shed. The weft is inserted by the shuttle after the shed has been formed, and beating-up is done by the reed which is moved forward by the slay or batten. Intermittently driven rollers take up the cloth, and a frictional drag, applied to the warp beam by a weighted rope or chain, regulates the let-off and warp tension.<sup>19</sup> In Tientsin weaving industry, no power has yet been applied to weaving, and consequently, human power is applied to the treadles in order to raise or lower the shedding, to pick the weft by means of the shuttle, and to beat it up into its appointed position in the fabric. For figured weaving, however, picking is performed by means of a right hand, in pulling the string attached to the shuttle but hung upon a pulley in front of the weaver.

The difference between plain and figured weaving lies chiefly in the employment of a Jacquard for the latter, the loom being essentially similar in principle as well as in structure. Jacquard machine, indeed, is one of the most important inventions in the world of weaving. It is, however, not the work of one man, but represents the efforts of several inventors whose labor extended over three-quarters of a century. This apparatus has taken the places of the simple, the loops, the pulleys and the draw-boy of the older shedding motion, but other parts of the harness remain unchanged. In 1725 Basile Bouchon substituted for the bunches of looped string an endless band of perforated paper by which the simples for any shed could be selected. In 1728 M. Falcon constructed the machine since known as the Jacquard and operated it through the medium of

19. *Encyclopaedia Britannica*, 14th ed., 1929, Vol. 23, p. 459.

# RAYON AND COTTON WEAVING IN TIENTSIN

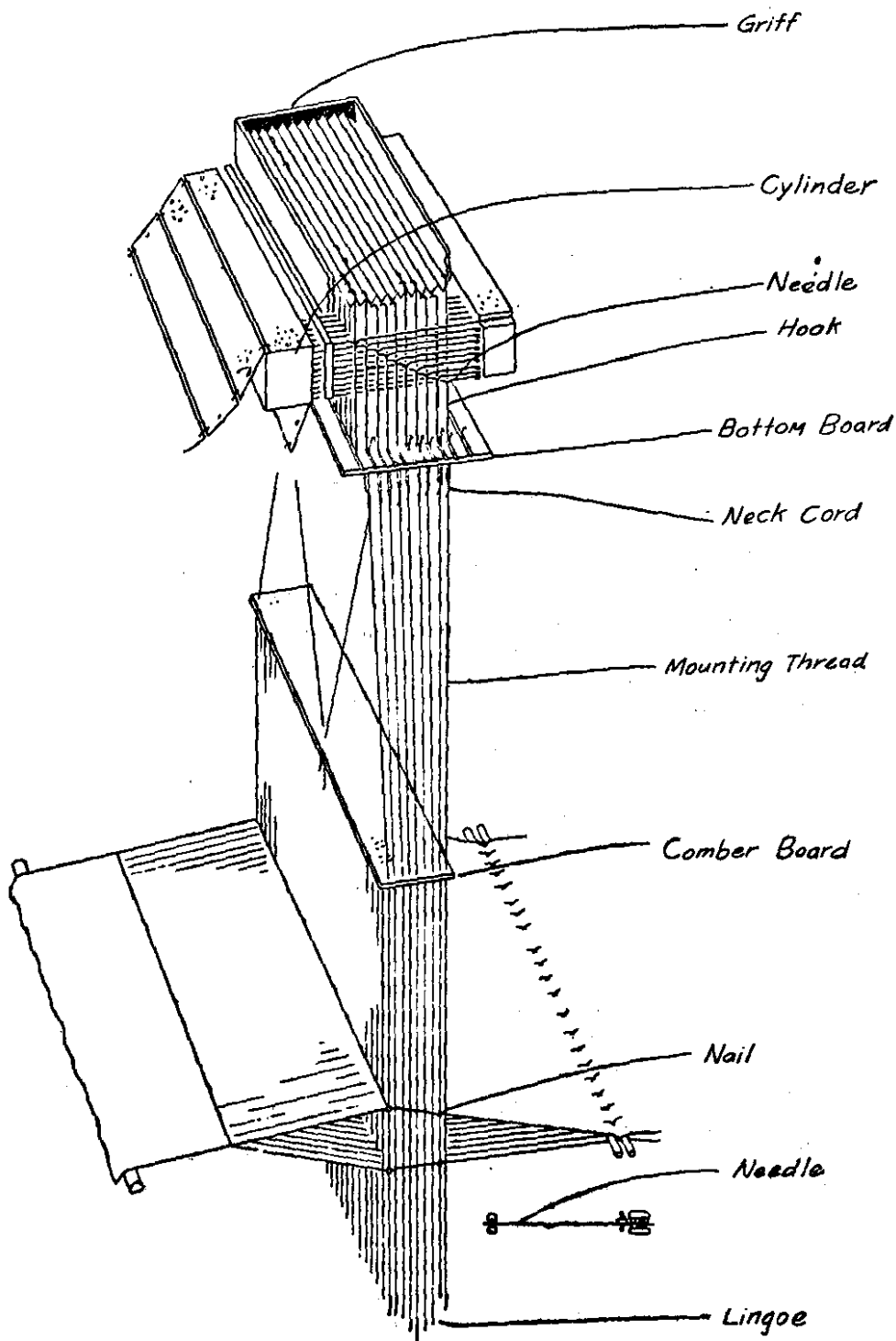


Fig. 2

### CHAPTER III. WEAVING AND MARKETING

perforated cards, but it was attached to the simple cords and required a draw-boy to manipulate it. In 1745 Jacques de Vaucanson united in one machine Bouchon's band of paper and the mechanism of Falcon. He placed this machine where the pulley box previously stood and invented mechanism for operating it from one centre. But it was not until the end of 18th century that another inventor, Joseph Marie Jacquard (1752-1834), carried the contrivance to such perfection that, although many slight improvements have since been made to it, it remains to-day practically the same as when it was introduced in 1801, and this notwithstanding the astonishing development of textile machinery during the 19th century and the universal adoption of the machine both for hand and power loom weaving.

The essential feature of a Jacquard machine is the combination of perforated paper or card with needles or pegs in such a way that the blank (or, it may be, the perforation) in the card causes the harness carrying a certain thread, or set of threads, to rise as required. In short, the process can be briefly described as follows. In a Jacquard machine, as shown in Fig. 2, the warp threads are raised by rows of upright wires called hooks. These are bent at both extremities and are normally supported upon a bottom board which is perforated to permit the neck cords from the harness beneath to be attached to the hooks. Each of a series of horizontal needles—one of which is shown enlarged and detached at the foot of Fig. 2—is provided with a loom and a crank; the former to permit of a to-and-fro movement, the latter to receive a hook. The straight ends of the needles protrude about one-quarter of an inch through a perforated needle board, but the looped ends rest upon bars placed in tiers. A wire passed through all the loops of the needles which form one vertical line limits the extent of their lateral movement, and small helical springs impinge upon the loops of the needles with sufficient force to press them and their hooks forward. A frame called a griff, is made to rise and fall vertically by a treadle which the weaver actuates with one foot. This frame contains a blade for each line of hooks, and when the blades are in their lowest position the hooks are free and vertical with their heads immediately over the blades, hence an upward movement given to the griff would lift all the hooks and thereby all the warp threads. Only certain hooks, however, must be lifted with the griff, and the selection is made by a quadrangular block of wood, called a cylinder, and cards which are placed upon it. Each face of the cylinder has a perforation opposite each needle, so that if the cylinder be pressed close to the needle board the needle points will enter the holes in the cylinder and remain undisturbed. But if a card, which is not perforated in every possible place, is interposed between the cylinder and the needles, the unperforated parts of the card close up some of the holes in the cylinder and prevent corresponding needles from entering them. Each needle so arrested is

## RAYON AND COTTON WEAVING IN TIENTSIN

thrust back by the advancing card; its spiral spring is contracted and its hook is tilted. If at this instant the griff ascends, its blades will engage the heads of all vertical hooks and lift them, but those that are tilted will remain unlifted. So soon as the pressing force of a card is removed from the needles the springs restore both needles and hooks to their normal positions. Cards are perforated by special machinery from a painted design, after which they are laced into a chain and passed over conical pegs upon the cylinder; the number required to weave any pattern equals the number of weft threads in that pattern. The cylinder is generally drawn out and turned by each upward movement, so that each face in succession is presented to the needles, and each rotatory movement brings forward a fresh card. As the griff rises with vertical hooks a shed is formed, and a thread of weft is passed across the warp. The griff then descends and the operation is repeated but with a new combination of lifted threads for each card. A Jacquard may contain from 100 to 1,200 hooks and needles, and two or more machines may be mounted upon the same loom. In Tientsin, only one Jacquard is mounted upon each loom, with 400 to 1,300 hooks and needles.

### Subsidiary processes

The processes that are subsidiary to weaving include loom making, card perforating, sizing, dyeing, and calendering. In Tientsin, there are altogether 86 establishments engaged in these processes, employing 971 workers (including 214 staff members, 323 workers and 434 apprentices) and a total capital of \$118,950. In Tables 26 and 27, these 86 establishments are classified by the amount of capital invested as well as by the number of workers employed.

Loom making. In loom making there were fifteen establishments in Tientsin in 1929. With the exception of one establishment the other fourteen were formed after 1913: 1 in 1901, 1914, 1926 respectively, and 2 in 1919, 1921, 1922, 1925, 1927 and 1928 respectively. Of these 15 establishments seven employ a total capital of \$54,000, or 96 percent: 2 with \$1,000, 1 with \$2,000, 2 with \$5,000, and 1 with \$10,000 and \$30,000 respectively. The other eight establishments employ only \$2,050: 1 with \$50, 2 with \$100, 1 with \$200, 2 with \$300, and 2 with \$500. Two establishments, employing a capital of \$300 and \$5,000 respectively, are organized as partnership, while thirteen others are owned by individual proprietors. The fixed capital is composed of lathes and drills. The former, owned only by large establishments, are imported from Japan or Europe, or produced at home. European lathes are most expensive, costing about one thousand dollars each, while Japanese and Chinese ones can be purchased for several hundred dollars a piece. The drills of European make cost about one hundred dollars each, and those of Chinese make, about twenty to thirty dollars. In eight of these



Table 26. Establishments in subsidiary industries of weaving  
in Tientsin classified by amount of capital  
invested, 1929 (in dollars)

Capital per establishment	Loom making		Card perforating		Sizing		Dyeing		Calendering		Total	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
100 or. below	3	250	4	350	3	250	2	200	6	430	18	1,480
101 — 200	1	200	1	120	5	950	5	950	2	350	14	2,570
201 — 300	2	600			5	1,500	2	600	2	600	11	3,300
301 — 400					1	400	2	500			3	1,200
401 — 500	2	1,000	1	500	1	500	7	3,500			11	5,500
501 — 1,000	2	2,000			1	600	7	6,800			10	9,400
Above 1,000	5	52,000					14	43,500			19	95,500
Total	15	56,050	6	970	16	4,200	39	56,350	10	1,380	86	118,950

Table 27. Establishments in subsidiary industries of weaving  
in Tientsin classified by number of workers, 1929

Workers per establishment	Loom making		Card perforating		Sizing		Dyeing		Calendering		Total	
	Estab'ts	Workers	Estab'ts	Workers	Estab'ts	Workers	Estab'ts	Workers	Estab'ts	Workers	Estab'ts	Workers
1 — 5	3	10	5	10	7	25	9	35	3	13	27	93
6 — 10	5	37	1	8	5	40	9	73	5	38	25	196
11 — 15	1	14			4	45	9	119	2	26	16	204
16 — 20	2	39					6	106			8	145
21 — 25	1	21					5	112			6	133
26 — 30	2	54									2	54
Above 30	1	110					1	36			2	146
Total	15	285	6	18	16	110	39	481	10	77	86	971

## RAYON AND COTTON WEAVING IN TIENTSIN

establishments electric power is employed, varying from 3 to 8 horse power. The workshops are rented from outside proprietors, and are located in one of the following three sections: Hsien To (西頭), San Tao Shih Ta Chieh (三條石大街), vicinity of the city. These sections, it may be noted, are centres for weaving and machine making industries. In these 15 establishments there are altogether 285 workers, including 21 staff members, 35 workers and 229 apprentices. Chou Hsin (久興), the largest establishment, employs 110 workers, including 4 staff members, 26 workers and 80 apprentices. For the other 14 establishments the size distribution is as follows: 8 with 10 or fewer persons, 3 with 11-20 persons and 3 with 21-30 persons.

The loom making establishments used to manufacture looms alone, whether plain or figured or both. But with the decline in weaving industry, especially after the Dragon festival in 1929, there was a slack in the market for looms. Consequently, some of these establishments began to produce other articles in order to dovetail the business. In 1929 these establishments produced varying quantity of Jacquard looms, plain looms, perforators, perforating frames, and miscellaneous articles including gins, printing press, noodle cutters, safes, as shown in Table 28. According to the type of output, these establishments may be divided

**Table 28. Output of loom making establishments in Tientsin, 1929**

Name of output	Output		Sale		On stock (quantity)
	Quan- tity	Cost per unit (in dollars)	Quan- tity	Price per unit (in dollars)	
Jacquard, 400 needles	1,936	22-27	1,379	26-40	557
"    600    "	641	26-40	404	35-46	237
"    900    "	306	37-50	201	42-65	105
"    1,200  "	212	44-60	180	50-75	32
"    1,300  "	105	55-70	83	65-85	22
Jacquard loom	225	20-30	225	20-35	-
Plain loom	262	24-28	260	29-35	2
Plain loom, iron at- tachment	135	12-16	80	18	55
Perforator	1,030	24	1,030	25-26	-
Perforating frame	57	40-65	49	47-75	8
Gin	86	60-70	86	65-80	-
Printing press	3	30	3	36	-
Noodle cutter	100	32	85	35	15
Safe	285	10-13	285	12-14	-
<b>Total</b>	<b>5,383</b>		<b>4,350</b>		<b>1,033</b>

into four classes, namely, Jacquard loom, plain loom, Jacquard and plain loom, plain loom and miscellaneous. The Jacquard loom establishment produces not only Jacquard and loom, but also perforator and perforating frame. Among the 15 establishments in Tientsin, there are 9 in the first class, 2 in the second, 1 in the third and 3 in the fourth.

### CHAPTER III. WEAVING AND MARKETING

When weaving industry was at the peak of its development, during 1927 and 1928, the loom making establishment simply received orders from its clients, and had very little on stock for ready sale. In 1929, however, when the industry showed a considerable decline, the loom making establishment, because of accumulation in stock, had to send its own runners to weaving establishments for sale. Even so, the local market was quite unfavorable, and many of the establishments had to look for customers elsewhere, especially in Kacyang, Choutsun, Lungshan and Peiping. Of these four places, Kaoyang, for long time the weaving center of Hopei province, consumed the largest number of looms. In marketing the looms there, the Tientsin establishment may follow one of the three methods. According to the first method, it may sell the looms through its own branch office, or through some agency on commission basis. According to the second, the looms are sold through correspondence, especially to customers who have already had sufficient dealings with the establishment. The last method is for the customer to come to Tientsin for the purchase of looms, and to have them transported to its own district by some express company. Under all these methods, the transaction may be carried out in term of cash or of credit. For small loom making establishments cash sale is preferred because of lack of circulating capital; so also for any establishment, whether large or small, in dealing with new customers. When the transaction is carried out in term of credit, the account is settled on the first or fifteenth of the month, or during one of the three festivals. Under this arrangement, the customer must pay a deposit for his order and another sum when the loom is received, only the rest being charged to the credit account. The loom, if bought by customers from districts beyond Tientsin, is packed with a wooden box, and entrusted to an express company for transport, for which the rate charged varies according to distance: \$1.50 per picul from Tientsin to Tsinan, \$5 per picul to Changchiakow, \$7 per picul to Harbin, Shansi or Honan. These companies also take care of tax payment on behalf of the customers.

**Card perforating.** For every Jacquard a set of about one thousand cards are needed each time a new pattern is put on the cylinder, to produce one *pi* of rayon fabrics or mixtures with a length of 52 *ch'ih*. The facility to change cards, which has made Jacquard one of the greatest inventions to mankind, necessarily entails heavy outlay to the weaving establishment. A set of one thousand cards, which may cost from five to fifteen dollars, can last for one year or so if continuously used and repaired. The pattern which it produces, however, is dependent upon the fancy of the consuming public, and oftentimes has a shorter life of existence than the cards themselves. Sometimes the change of pattern takes place so frequently that there arises a demand for independent establishments to make cards. It is true that in some weaving establish-

## RAYON AND COTTON WEAVING IN TIENTSIN

ments, especially in large ones, cards are made on the premise, in charge of an independent department. In other establishments they are purchased from workshops whose chief business is to produce cards with own patterns or with those given by the customers.

In Tientsin, there were altogether six card perforating shops in 1929, of which four were formed in that year, one in 1925 and one in 1928. These shops are owned by individual proprietors, and operated on a very small scale. The total capital invested amounts to \$970, of which one shop alone claims \$500, the other \$470 being distributed among five shops as follows: one with \$50 and \$120 respectively, and three with \$100 each. In each shop the proprietor is himself the artist designer and manager, formerly under the employ of some weaving establishment. He draws up the design, but delegates the perforation process to his workers. In these shops there are altogether 18 workers including 9 apprentices. The largest employs eight workers, while the other five employ ten workers: three shops with two workers each, one shop with one worker, and another one with three workers. The fixed capital is composed of one or two perforators and frames, and a set of ink and paint brush, while the cards are generally supplied by the weaving establishment—the employer. The pattern is often prepared by him also, but may be furnished by the shop at a small cost. Very seldom is the pattern colored with originality, but in nine out of ten cases it is copied from others frequently found in the silk satins produced in Soochow or Hangchow, the two centres long noted for silk weaving. The graph or ruled paper, upon which the pattern is draughted, used to be imported from Japan, at 25 sheets per dollar; but recently Chinese imitations can also be found on the market, at 40 sheets per dollar. The cards perforated by these shops in 1929 amounted to 557,400 sheets: one shop perforated 160,000; one shop, 140,000; one shop, 96,000; one shop, 92,400; one shop, 48,000; and one shop, 21,000. The price for these cards varies according to the number of needles: the greater the number of needles, the higher the price.

**Sizing the yarn.** In order to strengthen the warp for weaving purpose, it must be sized; in order to produce a fabric of mixed color, the warp must be dyed before it is sized. The warp, whether rayon or cotton, must go through these processes, but cotton warp, generally cotton thread of 42 or 60 counts, requires a further process, namely, mercerizing, to give it the desired lustre. Any one or more of these processes may be performed by the weaving establishment itself, or by the sizing establishment. In Tientsin, only large weaving establishments execute these processes on own premise, while smaller ones, which constitute the majority, delegate them to sizing establishments.

In 1929 there were altogether sixteen sizing establishments in Tientsin, mostly organized in recent years: one in 1909, 1916, 1922, and

### CHAPTER III: WEAVING AND MARKETING

1924 respectively; two in 1926; three in 1927; one in 1928 and six in 1929. Like the card perforators, these establishments are chiefly owned by individual proprietors, only four being organized as partnership. The total capital invested reaches \$4,200, of which but three establishments have a capital investment of \$400, \$500 and \$600 respectively. The fixed capital in these establishments is composed of boilers and dyeing tanks, which can be bought at small cost. On the average, the price for the boiler is ten dollars each, and that for the tank, four to five dollars each. For every establishment the installation of one boiler requires from three to four tanks. The sixteen establishments employ altogether 110 workers, including 14 staff members, 62 workers and 34 apprentices. With the exception of three establishments employing eleven workers and one establishment employing 12 workers the other 12 do not have more than ten workers each. The raw materials consumed in 1929 included 5,720 cattiees of dyes at \$2.00 or \$2.50 per catty, or \$12,870; 13,740 cattiees of glues at \$0.42 per catty, or \$5,770.80; and \$572.04 worth of other materials including wax, soda, sulphuric acid, fish oil, flour etc. The amount of yarn sized, dyed or mercerized included the following: sizing and dyeing 32,700 parcels (of ten pounds) of rayon yarn at one dollar per parcel, or \$32,700; sizing and dyeing 48,740 parcels of cotton thread, at fifty cents per parcel, or \$24,370; sizing 3,200 parcels of rayon yarn, at forty-five cents per parcel, or \$1,440; and mercerizing 200 parcels of cotton thread, at \$1.20 per parcel, or \$240. The gross income from sizing, therefore, amounts to a total of \$58,750, which is about three times the cost of raw materials consumed, namely, \$19,212.84.

**Dyeing the fabric.** As many kinds of rayon and cotton fabrics are woven in the grey state, they have to be dyed afterwards. Dyeing, indeed, is the largest subsidiary industry, next to which is loom making. Of the total amount of capital employed in the subsidiary industries in 1929, namely, \$118,950, about one half, or \$56,350, belonged to the dyeing industry.

According to the nature of work performed, dyeworks may be divided into three classes. The first class of dyeworks dye figured fabrics of cotton or rayon make, as well as silk fabrics sold by piece goods stores. To them the dyeing of plain fabrics as well as the dyeing and sizing of rayon or cotton yarn constitutes only a by-employment. The second class of dyeworks, which is the most numerous, dye imported as well as native fabrics of plain design, chiefly of cotton make. The dyeing of imported fabrics, however, forms their principal business, while very little of native fabrics is being dyed. The third class of dyeworks are operated on a much smaller scale, and specialize in the dyeing of clothings and miscellaneous fabrics. In front of these dyeworks are also attached their offices, so as to deal directly with the clients. Of these three classes of dyeworks, the Committee has investigated only those that dye rayon or cotton fabrics

## RAYON AND COTTON WEAVING IN TIEN-TSIN

of Tientsin make, 39 in all. Among these thirty-nine, 23 are exclusively engaged in the dyeing of cotton or rayon fabrics, while the other 16 dye fabrics as well as other articles. The value distribution of the business of these thirty-nine dyeworks, in term of percentages, may be expressed as follows: dyeing fabrics, 72.3 percent; dyeing cotton thread, 8.3 percent; weaving fabrics, 6.5 percent; dyeing clothing and miscellaneous fabrics, 6.5 percent; other, 6.4 percent.

Of these 39 dyeworks, 20, or one half, were established during the last five years: 1 in 1925, 4 in 1926, 7 in 1927, 3 in 1928 and 5 in 1929. The other 19 were established in the following years: one in 1895, 1899, 1913, 1919, 1920 and 1924 respectively; two in 1916, 1918, 1921 and 1922 respectively; and five in 1923. These dyeworks employ a total capital of \$56,350, of which \$49,500, or 88 percent, are contributed by 20 dyeworks whose capital investment varies from the smallest of one thousand to the largest of six thousand dollars. Twenty-eight of the dyeworks are organized as individual proprietorship, ten as partnership, and one, employing a capital of \$3,000, as limited corporation. In respect of the fixed capital employed, these dyeworks may again be divided into two classes, namely, modern and primitive. The modern dyeworks, 22 in number, employ respectively a steam boiler and a calenderer, operated by electric power. The cost for the calenderer varies from 800 to 1,000 dollars, while that for the steam boiler from 300 to 400 dollars. 18 of these 20 modern dyeworks employ a capital of one thousand dollars or more, only four having a capital below that amount. On the other hand, the native dyeworks, 17 in number, employ boilers, dyeing tanks, and calendering stones as fixed capital. Some of them have no stone at all, as they are engaged purely in dyeing. The proportion of boilers to tanks is generally one to three or four, but exceptions are not infrequent. In modern dyeworks the number of workers per dyework is also greater than that in primitive ones. In 22 of the former 310 workers are employed, or 14 per dyework; while in 17 of the latter only 171 are employed, or 10 per dyework. In both classes of dyeworks the total number of workers employed reaches 481, including 176 staff members, 188 workers and 117 apprentices.

The raw materials consumed by the dyeworks included dyes of different colors and others. The quantity of different dyes consumed, in term of catties, is as follows: black, 18,070; blue, 11,830; indigo, 5,898; grey, 4,193; red, 1,210; green, 1,171; yellow, 315; and violet, 50. The last two colors cater chiefly to the Mongolians and Tibetans for religious costumes. In 1929, the amount of rayon and cotton fabrics dyed included the following: Ming Hua Ké, 195,200 *pi*; Shang Shih Ké, 55,200 *pi*; Hsien Chun, 280 *pi*; plain cottons, 73,000 *pi*. Besides, these dyeworks dyed 75,500 *pi* of silk satins and pongees, 28,100 parcels of cotton thread, and 900 parcels of rayon yarn; sized 770 parcels of rayon

yarn; mercerized 300 parcels of cotton thread; and calendered by hand process 2,500 *pi* of fabrics.

**Calendering by hand process.** After the fabric is woven, it has to be calendered for the necessary lustre. At present calendering is all performed either by hand or by machine. Machine calendering, applied chiefly to figured fabrics, is carried on in modern dyeworks, whereas hand calendering, applied chiefly to plain fabrics, is carried on as a by-employment in primitive dyeworks, or as an independent business for what is called calendering shops (磨房). In 1929 there were altogether ten calendering shops employing a total capital of \$1,380, of which the two largest shops employed three hundred dollars each. The calendering stone (元寶石), of the sycee shape, is the only fixed capital used, which costs from ten to twenty dollars a piece. In 1929 there were 49 stones in the whole industry, nine of which belonged to the largest shop and three to the smallest. The number of workers per shop did not exceed 14, the smallest having only four workers. The total number of workers employed reached 77, including 3 staff members, 29 workers and 45 apprentices. The kind of fabrics calendered can be divided into two classes, namely, imported and native fabrics. Native fabrics may be either figured or plain, but the latter occupies by far the largest quantity. Hand calendering applies only to those figured fabrics woven of dyed warp, such as Paris Satin, Mei Sung Chi, Tientsin Hsien Chun, etc. It is applied to all kinds of plain fabrics except checks and stripes that require machine calendering in order to give them greater lustre. Among the imported fabrics only sheetings and Mexicans are calendered by hand process. In 1929 the amount of fabrics so calendered included the following: 134,800 *pi* of plain fabrics, of which 123,800 *pi* were cotton and 11,000 *pi* rayon; 500 *pi* of figured fabrics; and 60,000 *pi* of imported fabrics. The price for calendering different fabrics varies; so also the unit of currency with which it is quoted. For the firms dealing in imported fabrics, the price is quoted in term of taels: Tls. 0.07 per *pi* for Mexicans, and Tls. 0.14 per *pi* for sheetings. For the dyeworks, the price is quoted in term of cash: 60 cash per *pi* for Mexicans, 120 cash per *pi* for sheetings. For the weaving establishments, the price is quoted in term of dollar cents. For Mexicans the price for indigo color is five cents per *pi*, that for blue, grey, or light red is ten cents per *pi*; for stripes or checks the price is five cents per *pi* if the length is 52 *ch'ih*, but eight cents per *pi* if the length is 78 *ch'ih*; for figured fabrics such as Mei Sun Ch'i and Paris satin the price is ten cents per *pi*. Cash or tael, however, is convertible into dollar cent at a fixed rate of exchange, every dollar being equivalent to 0.69 taels or 3,200 cash.

**Classification of output.**

The output of weaving establishments in Tientsin may be classified according to the raw materials used or the design em-

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ployed. The fabrics may be woven of rayon, cotton or both, but may be plain or figured for any kind of raw materials used. In early years when cotton alone was employed, both plain and figured fabrics were woven of it. Recently, however, with the introduction of rayon, figured fabrics are seldom woven of cotton, but of rayon or of rayon and cotton together. The cotton fabrics are chiefly plain, but may be figured if desired. In 1929 the total output for 328 weaving establishments amounted to \$6,991,103, or \$21,314 per establishment. Of this total \$4,831,775, or more than two thirds (69.1 percent), were fabrics woven of rayon or of rayon and cotton together. Of the cotton fabrics amounting to a total of \$2,159,328, canvas cloth occupied 42.1 percent (\$909,630) and flour bag cloth occupied 8.9 percent (\$192,088),—a total of 51 percent (\$1,101,718). The other 49 percent of cotton fabrics were composed of plain cottons including sheetings, Mexicans and patriots, figured cottons, checks, stripes, crapes, serges, etc. In the following table the detailed distribution of these fabrics is shown.

**Table 29. Output of cotton fabrics by Tientsin  
weaving establishments, 1929**

Name of fabric	Value (in dollars)	Percent	Name of fabric	Value (in dollars)	Percent
Canvas	909,630	42.1	Stripes	321,143	14.9
Flour bag	192,088	8.9	Checks	86,624	4.0
Plain			Crapes	66,364	3.1
Mexicans	193,498	9.0	Serges	64,060	3.0
Patriots	83,080	3.8	Other	32,720	1.5
Sheetings	66,521	3.1			
Figured	143,600	6.6	Total	2,159,328	100.0

Of the rayon fabrics or mixtures amounting to a total of \$4,831,775, about one fifth are mixtures, the rest being fabrics woven of rayon only. These fabrics are chiefly figured, but may also be plain, striped or checked. Generally speaking, they can be classified into three categories, namely, pongees, satins and ké. Of these the last group occupies the largest portion, or ninety percent, while the first and second occupy eight and two percent respectively. Ké, of which the most noted variety goes under the popular name Ming Hua Ké, is chiefly woven of rayon, but occasionally of rayon and cotton together such as Shang Shih Ké. Pongees are woven of rayon only, while satins, such as Paris Satin, are often rayon and cotton mixtures. Again, ké and satins are frequently figured, while pongees are plain, checked, striped, or printed. In respect of thickness, ké is most varied of all, and can be divided into three classes, namely, thin, medium and thick. Thin ké may be thinner than pongees, designed for summer wear; while thick ké may be thicker than satins, designed for winter wear, such as Shang Shih Ké.



### CHAPTER III. WEAVING AND MARKETING

Among the different kinds of ké, Ming Hua Ké, next to Phoenix-eyed Satin (鳳眼緞), is the first rayon fabric ever produced in Tientsin, and for that reason enjoys also the widest market, occupying about eighty percent of the total output of ké. The length per *pi* is invariably 52 *ch'ih*, while the width may vary from 2, 2.1 to 2.2 *ch'ih*, 2.1 *ch'ih* being the commonest. The weight fluctuates from 2 5/8 catties, 2 3/4 catties, 2 7/8 catties to three catties, of which the commonest is 2 3/4 catties per *pi*; while the number of warps is always 3,200. As dyeing is delayed until after weaving, Ming Hua Ké is often sold in the grey state, leaving the selection of colors to the large factories or piece goods merchants. The standard colors employed are white, violet, red, orange, yellow, grey, blue, indigo, green and black, of which red, indigo, blue, grey and black are most preferred in winter and white in summer. Shades of these colors are also used, rather infrequently. The price reached twenty-six dollars per *pi* when Ming Hua Ké was first invented and put on the market, but within a year's time it was reduced considerably to ten dollars per *pi*, chiefly due to the redundancy in output brought about by the absence of patent protection to the inventor. At present, even when the price is further reduced to six or seven dollars per *pi*, the market for Ming Hua Ké still shows little sign of improvement.

Mei Sun Chi, another well-known variety of ké, was designed by the same inventor as that of Ming Hua Ké, Mr. Chen Ching-tang. The latter claimed to have produced this new fabric for a revival of the trade after the redundant output of Ming Hua Ké. The chief difference between the new fabric and the old lies in the use of dyed instead of undyed yarn for weaving, as well as in the employment of finer design. The color for the warp, furthermore, is different from that of the weft, so that on every piece of Mei Sun Chi, unlike on that of Ming Hua Ké, two colors may appear at the same time. This adds new charm to the fabric, and gives it a higher market value. The work, however, is more complicated; the cost becomes greater. The price per *pi* reaches nine or ten dollars, and may run well above the last figure for unique design or color scheme. Paris satin, an imitation of Mei Sun Chi, is sold at about the same price. Both Mei Sun Chi and Paris satin, however, are not produced on a large scale, for they cater neither to the rich nor to the poor. For the former it is not fine enough, for the latter it is a little too expensive.

#### Marketing methods.

The methods of marketing rayon and cotton fabrics varies with the extent of market covered, whether local or otherwise. Generally speaking, these fabrics depend more upon other provinces or districts rather than Tientsin for consumption. These provinces may be classified into two groups, namely, eastern and western. The eastern provinces include Manchuria; the western provinces include Shansi, Shensi and Kansu. In marketing Tientsin fabrics in these provinces, two methods

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are adopted. According to the first method, the piece goods merchants (外客) from these provinces, who are known as eastern (東客) or western (西客) merchants according to their geographical origin, may come to Tientsin and establish their temporary headquarters in native hotels for the purchase of these fabrics. The practice is generally for the weaving establishments to dispatch their own runners with samples of different fabrics, to these merchants at their respective hotels, for selection and purchase. The transaction is carried on in term of credit, rarely in cash, to be settled at the middle or the end of the month, or during one of the three festivals, namely, the Dragon Festival, the Moon Festival and the Year-end. According to the second method, the weaving establishment may start a sales office in some of these provinces, in order to market the fabrics at the place of consumption, such as Taiyuan or Harbin. In these places the office deals with the local piece goods merchants at wholesale. But this method is not resorted to recently because of adverse market conditions for the fabrics. When the fabrics are not marketed in other provinces, but in Tientsin itself, two methods are also employed. According to the first, the weaving establishment may send its own runner with samples of different fabrics, to piece goods firms, department stores or bazaars, for selection and purchase. The client may give an order for a certain quantity of certain kind of fabric, say 20 *pi* of Ming Hua Ké, but it is not obliged to purchase all of them unless actually sold. Here the transaction is also carried on in term of credit, but occasionally in cash, the credit sales to be settled in the same way as that for eastern or western merchants. A second method, resorted to by the small establishments, is for the peddlers (小行販), whether rural or urban, to purchase the fabrics directly at these establishments, on cash terms. Credit, however, may be granted, provided that the peddler secure some reputable person to serve as his guarantor. In such case the peddler must clear his account each time he makes a new purchase. These peddlers deal in cotton and rayon fabrics, as well as in cotton piece goods imported from abroad, whether white or printed. In busy seasons the rural peddlers have to come to and fro several times per month between Tientsin and their own territory, and establish temporary offices in small native hotels.

### Taxation.

Generally speaking, any native product designed for consumption elsewhere than the place of production has to pay one or all of the three taxes, namely, export duty, coast trade duty and likin which goes under various names such as Tung-shui (統稅) or Lo-ti-shui (落地稅). For instance, if a native factory is established in Szechuen or Hunan, and its product, say grasscloth, is to be consumed elsewhere. According to the customary practice, at the starting point of transportation the factory must pay likin or Tung-shui once, say at five percent *ad valorem*. When the product

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reaches Hankow to be shipped by river steamer for Shanghai, the full export duty, which is five percent *ad valorem* under the Anglo-Chinese Treaty of 1842, plus a coast trade duty which is one half of the export duty, or two and half percent *ad valorem*, must be paid. On the other hand, when the product reaches Hankow to be transported to the interior of Hupei, whether by boat or by cart, it has to pay another likin or Lo-ti-shui, in reaching the destination. However, with the rise of native industry around the nineties, there arose a demand for the abolition of these taxes in order to reduce its burden. Accordingly, any native product, if it be an imitation of foreign machine-made goods (機製洋貨), i. e. 'privileged factory product', pays only an export duty of five percent *ad valorem* when exported from one port to another port, to the Maritime Customs. If exported to foreign countries, it is even exempted from this export duty. This exemption, however, is a recent development after the World War, when Chinese government realizes the growing volume of native factory products exported abroad, chiefly for the consumption of Chinese emigrants.

In Tientsin, cotton fabrics produced by the weaving establishments did not obtain the privilege of paying only one tax, namely, the export duty of five percent *ad valorem*, until granted by the former Ministry of Agriculture and Commerce on Dec. 18, 1915, at the request of one leading manufacturer by the name of Sung Tsai-chou (宋則久). The rayon fabrics, or rayon and cotton mixtures, however, were not given this privilege, as they did not come into existence until many years after the grant. As a result, rayon fabrics today have to pay not only an export duty of five percent *ad valorem*, but also an export surtax of two and half percent since the first of February, 1929, as a result of the increase in the import tariff. In addition, they have to pay a coast trade duty of two and half percent when imported into another port such as Hankow or Shanghai, as well as a coast trade surtax of 1.25 percent. In other words, rayon fabric has to pay a tax of 7.5 percent when exported abroad, but one of 11.25 percent when exported to another port. But if it is exported to the interior, it has to pay either a native customs duty or a parcel post duty in Tientsin, depending upon whether the fabric is sent through the Chinese postal service or through the native customs by means of rail, boat or cart. The rate of duty, whether for the native customs or for the postal service, is fixed at twenty cents per *pi*, or \$1.20 per parcel of 6 *pi*, for rayon fabric, but for rayon and cotton mixture, it is raised to thirty cents per *pi* or \$1.80 per parcel. Calculating on the average of six dollars per *pi* for the rayon fabric, a tax of twenty cents per *pi* means 3.7 percent *ad valorem*. When sent by the parcel post, the fabric is subject to likin if it passes through an octroi after having been delivered to its destination. Similarly, when sent by rail, boat or cart through the native customs, it

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is subject to likin for each octroi that it passes through. To send by means of parcel post, therefore, exempts the fabric from likin at any octroi covered by the postal route. It is only under exceptional circumstances when postal service is not yet installed, such as in certain parts of Kansu and Shensi, that the fabric has to be sent by means of boat or cart, and be subject to the payment of likin at each octroi. A parcel, however, must not exceed  $16\frac{1}{2}$  catties in weight, or 22 pounds, before it can be accepted by the postal service for mailing.

That the burden of taxation is unusually high for rayon fabric may be seen from the above review of different taxes. It becomes extortionate when we examine the situation a little further. At the maritime customs, the rayon fabric is valued, for the assessment of export duty, at Hk. Tls. 230 per picul, while the rayon mixture is similarly valued at Hk. Tls. 140 per picul. Generally speaking, every picul is equivalent to thirty-three *pi* of rayon fabric. At first when rayon fabric was sold at twenty dollars per *pi*, every picul of rayon fabric would be worth 660 dollars. Consequently, the official valuation did not amount to more than one half of the market value of the fabric, and the rate of duty levied was lowered to the same extent. At present the situation is reversed. As the rayon fabric is sold at six dollars per *pi*, every picul of it is worth only 198 dollars, which does not reach even two thirds of the official value. In other words, the export duty is automatically raised to one third of the official rate, and the weaving establishment has to bear a heavier rate of taxation at a time when its product is only worth one third of the original value! The weaving establishments, therefore, have recently united in presenting a petition to the Commissioner of Customs in Tientsin, requesting him to order a new assesment of the value of rayon fabrics. Such request, however, has not yet been granted up to the present. It bases its claim not only on the reduced value for rayon fabrics, but also on the reduced assessment of rayon yarn by the Customs. The rayon yarn, which was formerly assessed at 230 to 240 Haikwan taels per box of one hundred pounds, has now been reduced to about one hundred taels.

## Chapter IV. Workers and apprentices

Next to carpet weaving, rayon and cotton weaving employed the largest number of workers among the handicraft industries in Tientsin in 1929. Whereas there were 303 establishments employing 11,568 workers in the former, the latter employed 7,873 workers in 327 establishments.<sup>20</sup> This number of workers in rayon and cotton weaving industry in 1929, however, showed a decline from that of the preceding year, 1928. In 1928, according to the investigation of the Social Affairs Bureau of the Special Municipality of Tientsin,<sup>21</sup> there were in that industry 404 establishments employing a total of 8,575 workers. This decline, caused chiefly by the fluctuating state of market conditions for the industry, affected largely the workers in smaller establishments. As shown in the following table, the percentage distribution of establishments employing ten or fewer workers decreased from 34.1 percent in 1928 to 25.1 percent in 1929; similarly, that of establishments employing twenty or fewer workers decreased from 34.9 percent in 1929 to 33.3 percent in 1928. For the establishments employing more than twenty workers each, however, the percentage distribution showed an increase: those with 21-30 workers increased from 14.6 to 16.2 percent, those with 31-40 workers from 9.0 to 13.5 percent, those with 41-50 workers from 3.9 to 5.2 percent, those with 51-100 workers from 2.7 to 4.6 percent, and those with more than one hundred workers from 0.8 to 2.1 percent.

Table 30. Tientsin weaving establishments classified by the number of workers employed, 1928-29

Workers per establishment	Establishments			
	1928		1929	
	No.	%	No.	%
1 - 10	138	34.1	82	25.1
11 - 20	141	34.9	109	33.3
21 - 30	59	14.6	53	16.2
31 - 40	36	9.0	44	13.5
41 - 50	16	3.9	17	5.2
51 - 100	11	2.7	15	4.6
Above 100	3	0.8	7	2.1
Total	404	100.0	327	100.0
No. workers	8,575		7,873	

20. The number of establishments should be 328, but one establishment had suspended operation, employing no worker at the time of the Committee's investigation.

21. *Annual Report* (August, 1928 to July, 1929), Social Affairs Bureau of the Special Municipality of Tientsin, 1929.

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### The workers.

Of the total working force in the Tientsin weaving industry, 35 percent, or 2,756, are workers, not apprentices. The Committee has not attempted to make a complete investigation of these workers. Instead, it has resorted to the process of sampling for an economical and practical analysis. Generally speaking, its criterion is to select one out of every nine workers for actual field investigation. Thus, it has selected 317 out of 2,756 workers and 550 out of 5,117 apprentices—a total of 867 out of 7,873 workers for investigation. First of all, the workers may be analyzed according to their place of birth, age, length of residence in Tientsin, marital status, size and composition of family. Of the 317 workers investigated by the Committee, only 12 are natives of Tientsin. Among the other 305, 244 are born in Hopei province, 55 in Shantung, and 6 in Liaoning and Shansi. Of those born in Hopei (256), three fifths, or 151 workers, belong to 17 Hsien, while the other two fifths, or 105 workers, belong to 48 hsien. Of those born in Shantung (55) two hsien alone claim one half, or 27 workers; namely, 15 from Chang Chiu and 12 from Ch'ang Shan. In Table 31 the detailed distribution of workers according to place of birth is given. It may be noted that those who are not natives of Tientsin, 305 in number, have resided in Tientsin for various years: 136, or 44.6 percent, from one to five years; 127, or 41.6 percent, from six to ten years; 42, or 13.8 percent, from eleven to twenty years.

**Table 31. Workers in Tientsin weaving industry  
classified by place of birth, 1929**

Place of birth	No. workers	Place of birth	No. workers
Hopei	256	Nankung	8
Wu Ch'ing	16	An Tz'e	7
Yenshan	12	Hsien	6
Tientsin	12	Shu Lu	6
Chi	11	Ts'ang	6
Tsing Hai	10	Other 48	105
Ching	9	Shantung	55
Tsao Chiang	8	Chang Chiu	15
Shen	8	Ch'ang Shan	12
Ning Tsin	8	Other 18	28
Ch'ing Wan	8	Shansi	5
Ho Chien	8	Liaoning	1
Jao Yang	8	Total	317

The age of 317 workers varies from the lowest of 15 to the highest of 44. 282, or ninety percent of the workers, falls within the age group

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of 18-31. 189, or sixty percent, falls within the age group of 18-25. With regard to marital status, it may be noted that taking 20 as the marriable age for workers, only 163 out of 265 marriable workers, or 61 percent, have married, the rest 102 workers being single. Of those who are married, 88 have as yet no children, 43 have one child each, 22 have two children each, 7 have three children each, one has four children, and two have five children each. In Table 32 the detailed distribution of workers with regard to age and marital status is shown. Of these 317 workers;

Table 32. Workers in Tientsin weaving industry classified by age and marital status, 1929

Age	Married	Single	Total	Age	Married	Single	Total
15		1	1	26	8	3	11
16		3	3	27	11	7	18
17		6	6	28	12	7	19
18	8	15	18	29	9	4	13
19	7	17	24	30	10	4	14
20	6	17	23	31	12	6	18
21	8	20	28	32	5	-	5
22	15	14	29	33	1	-	1
23	9	13	22	34	5	2	7
24	15	8	23	35-44	12	-	12
25	15	7	22	Total	163	154	317

183, or 57.7 percent, first entered into gainful employment at 16 years of age or below: 3 at 10, 6 at 11, 19 at 12, 32 at 13, 29 at 14, 44 at 15 and 50 at 16. The other 134 workers entered into gainful employment chiefly below twenty years of age: 41 at 17, 25 at 18, 35 at 19, 8 at 20, 7 at 21, 3 at 22, 7 at 23 and 8 at 24.

The size of workers' families varies from the smallest of one person to the largest of fourteen persons, the average being 5.9 persons. The size for 230 of them, 72.6 percent, varies from three to seven persons. Here it may be noted that the word 'family' is employed in an economic sense, in the sense that the members of the same family live under one household economy. A classification of the members of these 317 families, 1,560 in number, according to their status in the family, shows that there are 8 grandfathers, 17 grandmothers, 217 fathers, 250 mothers, 7 uncles, 3 aunts, 163 wives, 79 sons, 43 daughters, 504 brothers, 13 sisters-in-laws, 248 sisters, 2 nephews, 3 nieces, 1 grandnephew and 2 grandnieces. In other words, most of the workers, about two thirds, have parents, while only one half have wives. Besides, a great number of them, have brothers and sisters.

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**Table 33. Workers in Tientsin weaving industry  
classified by size of family, 1929**

No. persons per family	Families		No. persons
	No.	%	
1	6	1.9	6
2	12	3.8	24
3	29	9.1	87
4	43	13.5	172
5	47	14.9	235
6	60	19.0	360
7	51	16.1	357
8	26	8.2	208
9	20	6.3	180
10	14	4.4	140
11	4	1.3	44
12	2	0.6	24
13	2	0.6	26
14	1	0.3	14
Total	317	100.0	1,877

In two thirds of the workers' families, namely, 215, other member or members of the family, besides the worker himself, are also gainfully employed. In 113 families there is one other member gainfully employed; in the remainder 102, the distribution of other members gainfully employed runs as follows: 2 in 59 families, 3 in 30 families, 4 in 12 families, and 5 in 1 family. Altogether there are 374 other members of the families gainfully employed, including 147 fathers, 216 brothers, 5 uncles, 3 wives, and 3 sons. Of these 374 members 230 are farmers, 81 workers, 44 traders, and 19 public servants. Their age distribution is as follows: 27 in 15-20 group, 120 in 21-30 group, 62 in 31-40 group, 69 in 41-50 group, 80 in 51-60 group, and 16 in above 60 group.

**Terms of employment.**

Among the terms of employment for workers may be mentioned the system of employment, system of wage payment, working hours and working conditions. The system of employment in Tientsin weaving industry is in no case uniform, but an introduction from some one, related to the employer one way or the other, is often required. Thus, of the 317 workers investigated by the Committee, only 28 present themselves for job without any introduction, while the other 289 are introduced by various persons: 178 by friends, 58 by fellow natives, 28 by relatives, 16 by co-apprentices, 7 by family members, and 2 by neighbors. These persons who introduce the applicants to the employers are themselves



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employed in various occupations, chiefly in weaving (250), but also in other branches of industry (10), trade (35), agriculture (10) and public service (12). The applicants, meantime, are also employed in various occupations before their admission into weaving establishments, of which weaving claims the largest number, namely, 190. Of the remaining 127, 29 are employed in industry, 39 in agriculture, 3 in trade. 56 applicants, including 20 pupils, are not gainfully employed. Those who were previously employed in weaving require no further training after admission, while those who were not so employed have to do so. Some of the latter class, however, are not employed as weavers, but as preparers including winders, reelers, spoolers, warpers, etc. These occupations, it may be noted, can be more easily learnt than weaving itself.

With regard to the length of service, 233 out of 317 workers, or 74 percent, have been with the employer for three years or less: 100 for half a year, 53 for one year, 23 for one year and half, 22 for two years, and 35 for three years. The length of service for the other 84 workers is as follows: 21 for four years, 16 for five years, 39 for 6-10 years, and 8 for above ten years. That 74 percent of the workers investigated have been with their employers for three years or less indicates the fluctuating state of employment in the industry. The workers do not stay long with the same employer, but work for new employers quite frequently. The responsibility for this state of affair—high labor mobility—lies more with the employer than with the workers. The employer, because of the fluctuating state of market conditions for the industry, can seldom keep the new worker over a long period of time. Unemployment, therefore, becomes a recurrent experience with the worker, which took place quite seriously during 1929. In that year, the outbreak of Sino-Russian controversy over the Chinese Eastern Railway created a great deal of disturbance in Manchuria, and thereby affected considerably the market for rayon and cotton fabrics in that region. Before the coming of the Moon Festival (September 17), many weaving establishments had already contracted their scale of operation or suspended it entirely. After the Moon festival, the situation became more serious. The Committee, in filing out the blank form for the number of workers employed by the weaving establishment, had to ask for two returns, namely, that employed before the Moon festival and that employed after it. Thus, the Committee found to its surprise that of the 153 establishments investigated after the Moon Festival, 67 had reduced their working force, while another 6 had dispensed with it entirely. Consequently, whereas before the festival these 73 establishments employed a total of 2,348 workers including 913 apprentices, the latter had been reduced to one of 907 (including 743 apprentices) after it. In other words, in these 73 establishments, 82 percent of the workers and 48 percent of the apprentices were dismissed. The percentage of the workers dismissed is higher than that of the apprentices

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for the simple reason that the apprentices are paid no wages and must remain for work until the term of apprenticeship is completed.

The reduction of the working force of 73 establishments from 2,348 before the festival to 907 after it, a reduction of 1,441 workers including 170 apprentices, is indeed a serious problem for the workers. But it must be remembered that this reduction did not take place simultaneously, but extended over almost half a year. This is true because of the fact that the Committee's investigation of these 73 establishments did not take place at one time, but extended from September 28, 1929

(11 days after the Moon festival) to February 14, 1930, a period of about five months: 2 establishments investigated in September fired 14 workers, 21 in October fired 309 workers, 30 in November fired 541 workers, 15 in December fired 348 workers and 5 in February fired 229 workers.

The Committee, as indicated in the above paragraph, required only 153 but not all of the 328 weaving establishments to make two returns, namely, the number of workers employed before the festival and that after it. The number of workers dismissed, therefore, would have been greater if complete statistics could have been secured from 328 instead of 153 establishments. To repeat the same process of investigation from one establishment to the other, however, is too costly, and one has to satisfy himself by inference. That is to say, if 153 establishments reduced their working force by 1,441 workers after the festival, 328 establishments would have reduced their working force by 3,089 workers. Taking a conservative estimate of 50 percent of these fired workers to be re-employed in the same or other industry, the other fifty percent, or 1,545 workers, must have been unemployed. 1,545 workers, it may be reiterated, constitutes about one fifth of the total number of workers in the Tientsin weaving industry, 7,873.

In this connection, it may be pointed out that Chinese mentality, especially that of the small manufacturers in Tientsin weaving industry, is never exact. The term 'before the festival' as employed above, often-time denotes 'one month before the festival' or 'one half month before the festival'. That such is the case may be confirmed by the number of workers already dismissed before the festival. On the first of September the four branches of the Weaver's Union reported a total of 261 members to be unemployed: 94 for Branch No. 1, 82 for Branch No. 2, 22 for Branch No. 3, and 63 for Branch No. 4. During the four days from September 10 to 13, when the Social Affairs Bureau of the Special Municipality of Tientsin called a Conciliation Conference between the Employers and the Workers in the Tientsin weaving industry, it was again reported that 37 establishments had dismissed a total of 347 workers, of whom only 54 were restored to work, while the rest 293 were sent back home with different amount of travelling allowances: for 70 workers dismissed

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with good reason: one dollar each for Tientsin resident, six dollars each for non-resident; for 223 workers dismissed because of the close-down of the employer's establishment, fifteen dollars each for natives of Shansi, Honan and Liaoning, twelve dollars each for natives of Hopei and Shantung.<sup>22</sup> Two weeks before this Conference, however, the extent of dismissal had already been great enough as to demand relief for the dismissed. Of the total amount of relief fund expended during the fifteen days from August 28 to September 11, namely, 447 dollars, 350 dollars were contributed by the municipal government, and the rest by the Match Workers Union (\$40), Tramway Operators' Union (\$37) and Telegraph Operators' Union (\$20). This relief fund was distributed to about two hundred dismissed workers per day, at fifteen cents each. The actual number of dismissed workers receiving relief during each of these fifteen days is as follows: 174, 220, 213, 217, 217, 218, 220, 207, 196, 201, 190, 187, 168, 192, 160.<sup>23</sup>

In the same month of September, the Central Labor Union of Tientsin organized a relief show in behalf of the unemployed workers in the weaving industry for three days, from September 27 to 29. 12,430 dollars' worth of tickets were distributed among various individuals and institutions, but only one third, or 4,366.2 dollars, were sold. The gross receipt was even less, totalling \$3,483, from which were deducted \$639 and \$130 for the renting of showground and costumes respectively,, \$233.3 and \$785 as remunerations to actors and amateurs respectively, and \$417.73 for miscellaneous expenses. The net receipt from the show, therefore, amounted only to \$1,277.97.<sup>24</sup> Unfortunately, this sum of relief fund raised from the show was poorly spent in organizing a weaving establishment on the 28th of December. The latter employed twenty workers for a short while, but failing an attempt to raise more fund for circulating capital on February 16, it closed down on the sixth of March.<sup>25</sup> The proposal of organizing a weaving establishment for the relief of the unemployed, however, had its origin in the unsuccessful attempt of the workers to form a Society for the Study of Figured Weaving, in the month of September. This Society, as proposed, was a profit-making organization, to be composed of share-holders who were also weavers above sixteen years of age. There were to be two thousand shares of one dollar each, for which no share-holder could hold more than twenty shares. The latter could have only one vote irrespective of the number of shares and must pay for his purchase from the Society on cash basis. The Society was to be managed by a Board of Five Managers, and supervised by a Board of Three Inspectors, both of which were to be elected by the share-holders at their annual meeting, for a term of two years. There were

22. *Ta Kung Pao*, Tientsin, Oct. 13, 1929.

23. *Social Welfare*, Tientsin, Sept. 12, 1929.

24. *Ta Kung Pao*, Dec. 27, 1929.

25. *Ibid*, Nov. 16, Dec. 5, 24, 29, 1929; March 7, 1930; *Social Welfare*, Oct. 29, 31, 1929; Feb. 8, 17, 1930.

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to be five sections including business, organization, marketing, research, and editing, for which the Board of Managers was to be responsible. The Society, if necessary, might also organize a school, a library, or a gymnasium, for the welfare of the weavers. This Society, in short, possessed most of the features of a producers' co-operative, namely, the democratic principle of one man one vote, the limitation placed upon share-holding, the humanitarian objects, and the principle of cash sale to members.

The system of wage payment is based on time or piece, or both. Time wage is paid to the heads of different departments, or to janitors, cooks, and workers on odd jobs; while piece rate is paid to weavers and others. The latter, however, may be paid on the basis of time and piece. A worker may receive a fixed rate of wage for the month, which is subject to addition or deduction according to the amount of work performed. Thus, in one of the weaving establishments, one kung or one day's work is composed of weaving 1,  $5/6$ ,  $3/4$ ,  $5/7$ , or  $2/3$  *pi* of different kind of fabrics, dependent upon the raw materials used, the number of Jacquard needles, the length per *pi*, whether 52 *ch'ih* or 76 *ch'ih*, and the kind of design, whether plain or figured. One kung is also equivalent to the execution of any one of the following operations: winding three pounds of No. 150 rayon yarn, or 2.5 pounds of No. 150 rayon floss; reeling nine pounds of No. 150 rayon floss or yarn, or 120 small bundles of 32's or 42's cotton thread; warping 40 pound of No. 150 rayon yarn, 30 pound of No. 150 rayon floss, 30 pounds of No. 100 or No. 120 rayon yarn, or 23 pounds of No. 100 or No. 120 rayon floss; drawing-in 2,500 healds for figured weaving or 3,000 healds for plain weaving; perforating 180,000 holes on the cards; tracing 600 pairs of flowers on the ruled graph. Under the system of time or of time and piece payment, the employer provides for free room and board. On the other hand, under the piece system, the employer charges nothing for the room, but deducts a certain amount for the cost of board from the workers' monthly wage. As the piece rate for weaving varies with different factors, such as the raw materials used, the number of Jacquard needles, the length per *pi* and the kind of design employed, the piece rates in Table 34 gives but an approximate picture.

Of the 317 workers investigated by the Committee, only 16, including janitors, cooks and workers on odd jobs, are paid a time wage, with free provision of room and board. For these workers the wages per month are as follows: one with \$3 per month, one with \$4 per month, three with \$5 per month, ten with \$6 per month and one with \$7 per month. The other 301 workers are mostly paid on piece rate basis, although a small number are paid under the mixed system of time and piece rates. For all of them the cost for board is deducted from the monthly wages. In Tables 35a and 35b the monthly wages of these

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Table 34. Wage rates for rayon or cotton weaving in Tientsin, 1929  
(dollars per *pi*)

Rayon fabrics or mixtures	Wage rates	Cotton fabrics	Wage rates
Ke		Sheetings	0.35
Ming Hua Ke	1.00	Mexicans	0.35
Mei Sun Chi	1.25	Checks	0.45
Shang Shih Ke	1.50	Stripes	0.40
Pongees		Patriots	0.40
Chun Ch'iu	1.00	Figured	0.80
Fang Ch'iu	0.75	Canvas	0.75
Satins		Flour bag	0.35
Paris Satin	1.20	Serges	0.55
Other			
Hsien Chun	1.10		
Checks	0.55		
Stripes	0.50		

301 workers are shown, with or without deduction of the cost for board. From these tables it may be noted that the commonest wages per month including board are fifteen dollars, applicable to 50 workers; twenty dollars, applicable to 30 workers; and twelve dollars, applicable to 29 workers. 184 workers, a little less than two thirds, receive a monthly wage between twelve and twenty dollars. The total monthly wages for 301 workers amounts to \$4,906, which gives an average of \$15.3 per worker.

Table 35a. Monthly wages of workers in Tientsin  
weaving industry, 1929

Wage per month	No. workers	Total monthly wages	Wage per month	No. workers	Total monthly wages
8	10	80	21	6	126
9	20	180	22	17	374
10	14	140	23	5	115
11	12	132	24	9	216
12	29	348	25	6	150
13	10	130	26	1	26
14	27	378	27	1	27
15	50	750	28	2	56
16	15	240	29	1	29
17	6	102	30	10	300
18	15	270	32	2	64
19	2	38	35	1	35
20	30	600	Total	301	4,906

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**Table 35b. Monthly wages of workers in Tientsin weaving industry, 1929 (excluding board)**

Wage per month	No. workers	Total monthly wages	Wage per month	No. workers	Total monthly wages
4	13	52	16	8	128
5	27	135	17	10	170
6	26	156	18	13	234
7	15	105	19	6	114
8	38	304	20	2	40
9	40	360	21	1	21
10	25	250	22	1	22
11	12	132	23	1	23
12	12	144	24	7	168
13	6	78	25	3	75
14	25	350	26	1	26
15	9	135	Total	301	3,222

For the 301 workers the cost for board varies from the smallest of four dollars to the highest of seven dollars and half, but the commonest, applicable to 150 workers, is six dollars. For the other 151 workers the cost for board is distributed as follows: 21 workers, \$4 per month; 51 workers, \$4.5 per month; 42 workers, \$5 per month; 34 workers, \$7 per month; and 3 workers, \$7.5 per month. The total monthly cost of board for 301 workers amounts to \$1,684, which gives an average of \$5.6 per month per worker.

The hours of work in the weaving industry are unusually long from modern viewpoint. From dawn to dark the workers are engaged, however leisurely or inefficiently, in winding, reeling, spooling, warping, drawing-in, weaving and many other processes. The customary practice is to start early in Summer and Autumn, about 6 or 7 A.M., and late in Winter and Spring, about 7 or 8 A.M. They proceed with their work until 7 or 8 P.M. in Summer and Autumn, and 8 or 9 P.M. in Winter and Spring.<sup>26</sup> During this long interval about two hours are spent for meals, but no other period of rest is provided. The commonest working hours, therefore, run from ten to thirteen per day. In Tientsin weaving industry, 284 establishments (86.9 percent) employing 6,568 workers (83.6 percent) fall within this class. Only seven establishments (2.1 percent) employing 231 workers (2.9 percent) work eight hours per day, and measure up to the modern standard. On the other hand, ten establishments (3.1 percent)

26. Branch Union No. 1 has proposed to reduce the working hours to 12, with the following arrangement for different seasons:

Spring	7:30 A.M. to 8:30 P.M.
Summer	5:30 A.M. to 6:30 P.M.
Autumn	6:30 A.M. to 7:30 P.M.
Winter	8 A.M. to 9 P.M.

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employing 230 workers (2.9 percent) work more than thirteen hours per day. In Table 36 the detailed distribution of working hours in Tientsin weaving industry is shown.

**Table 36. Hours of work in Tientsin  
weaving industry, 1929**

Hours per day	Establishments		Workers	
	No.	%	No.	%
8.0	7	2.1	231	2.9
8.5	1	0.3	70	0.8
9.0	18	5.5	375	4.7
9.5	7	2.1	399	5.1
10.0	69	21.1	1,650	21.0
10.5	13	4.0	380	4.8
11.0	85	26.0	1,919	24.4
11.5	16	4.9	366	4.7
12.0	47	14.4	953	12.1
12.5	29	8.9	681	8.7
13.0	25	7.6	619	7.9
13.5	4	1.2	53	0.6
14.0	6	1.9	177	2.3
Total	327	100.0	7,873	100.0

The holidays for the workers in rayon and cotton weaving are the same as those for other handicraft industry. For the New Year the holiday is the longest, lasting from three, ten or fifteen days, but the commonest is ten days. For the Moon and Dragon festivals, there is a holiday of one to three days, but one day is the commonest. For the Lantern Festival, there may be no holiday or one day's holiday. These four festivals are the traditional holidays, but on other occasions such as the Double Tenth (i.e. National Independence day), the Labor day, and any other day sanctioned by the authorities, there is generally one day's holiday. The system of Sunday rest is yet too early for the Chinese industries, but some beginning towards that direction has been made. On the first and the fifteenth of the month according to lunar calendar, the workers are free from work after supper, about 6 P.M., so as to have enough time for bathing, hair cutting and running personal errands. During all these holidays, the employer as a rule provides for better meals. On New Year's holiday, lasting from 26th of December to the 5th of January according to lunar calendar, many of the workers return

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home to celebrate the festival. It is also during this time that their contract of employment is cancelled or renewed.

The working conditions in weaving establishments are generally unsatisfactory; in some cases they are miserable beyond description. The workroom is not only small, but also filled with damp and dirt. In small establishments the ground floor is also used as sleeping space for workers; in large ones, another compartment may be built above the looms by means of a few wooden boards, for similar purposes. Neither sunlight nor air enters into the room sufficiently to satisfy the normal need of a worker, while wind or water visits him with cold or wet at different seasons of the year. As the floor is covered with mud, the summer flood sometimes even destroys the fabric itself. The cotton or rayon dust, meantime, saturates the air, and one can hardly breathe without being suffocated. The worker, under such circumstances, has to operate the treadle by his right foot, and move the shuttle by his right hand for figured weaving. For plain weaving, he has to apply both feet to the treadles. His eyes are constantly fixed upon the loom and the fabric, for fear that the warp may break, or that the needle may get out of order. Indeed, in visiting one of these workrooms, one can only marvel at the power of resistance of a Chinese weaver, and refresh his mind once more with the wretched conditions of English handloom weavers in bygone days.

### Workers' Union

In cotton and rayon weaving there is as yet no central union, although four branches of it were organized in the month of July, 1928. In April of the following year these four branches had respectively 89, 114, 152 and 190 members, but in September practically all workers in the industry were enlisted in the membership. At that time, the four branches had respectively 874, 1,055, 272 and 614 members, or a total of 2,815. This rapid increase in membership was chiefly due to the growing extent of unemployment, for the protest against which unions became the only effective agent. Of these 2,815 workers, 2,543, or ninety percent, were to be found in 126 establishments of the following sizes: 55 establishments with ten or fewer workers, 45 establishments with 11-20 workers, 13 establishments with 21-30 workers, and 13 establishments with more than thirty workers. These branches were all registered with the Municipality, the Social Affairs Bureau, the local Kuomintang, and the General Labor Union. In respect of objects, activities and organization they are largely similar. The objects of each branch union include the improvement of the worker's economic conditions, the elevation of his social status,



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and the settlement of labor disputes. The membership is open to any worker in the industry above 16 years of age, provided that he be not an exploiter of his fellow workmen or a reactionary against the present régime. The age requirement, however, is not often complied with, for among the 2,815 members in the four branches, 349, or 12.4 percent, are 16 years of age or below. After having been introduced by 2 members and signed the letter of allegiance, every worker has to pay an admission fee of fifty cents and a membership fee of twenty cents per month. These two fees, the admission fee and the membership fee, constitute the only source of the union's income, which, because of its limited amount, restricts its activity for the improvement of the economic status of its members. The union's work, thus far, has been confined chiefly to propaganda and protest. The part that it took in voicing the sufferings of unemployment has been described in a previous paragraph. Besides, the union settles labor disputes with the joint assistance of the Social Affairs Bureau and the General Labor Union, and participates in mass meetings against imperialist encroachments upon China, by Japan, Russia, and other nations, or in memorial gatherings for Sun Yat-sen and the seventy-two patriots. Sometimes, it also prints circulars of an educational nature for distribution among members.

The monthly meeting of the members or their delegates is given full authority over the union's policies and activities, while the executive committee, composed of a secretary and four sections including business, organization, training and propaganda, carries out such policies and activities during the interval the monthly meeting is not in session. The members of the executive committee are paid by the union, and their term of office is limited to six months.

#### The apprentices

The apprentice labor, which constitutes sixty-five percent of the total workers, is the mainstay of the rayon and cotton weaving industry in Tientsin. As is the case with workers, the Committee has selected 550 apprentices, out of a total of 5,117, for investigation. Of these 27 were born in Tientsin, 442 in other hsien of Hopei, 78 in Shantung, and 3 in Honan, Shansi and Anhwei. Of those born in the province of Hopei (469), about one half (237) came from ten hsien including Tientsin, and the other half (232) from sixty-four hsien. Of those born in Shantung (78), 12 came from Chang Chiu, 9 from Hui Ming, and 57 from other 23 hsien. In Table 37 the detailed distribution of apprentices according to

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**Table 37. Apprentices in Tientsin weaving industry  
classified by place of birth, 1929**

Place of birth	No. workers	Place of birth	No. workers
Hopei	469	Shen	10
Wu Ch'ing	31	Nan Pi	9
Wu Yih	30	Hsien	8
Ching	28	Ku Cheng	8
Tientsin	27	Ho Chien	7
Chi	25	An Ping	6
Ning Tsin	24	Wen An	6
Tsao Chiang	21	Pa	6
Jao Yang	18	Pao Ti	6
Yenshan	17	Other 50	102
Heng Shui	16	Shantung	78
Ts'ang	15	Chang Chiu	12
Tsing Hai	13	Hui Ming	9
Ching	13	Other 23	57
Ta Cheng	13	Other	3
Nan Kung	10	Total	550

the place of birth is given. A comparison of this table with Table 31 shows that the apprentices came from about the same districts as the workers. A little more than one half of the workers and apprentices, 453 out of 867, came from sixteen hsien,—fifteen in the province of Hopei and one in the province of Shantung. Each of these 16 hsien contributed eighteen or more persons: 47 from Wu Ch'ing, 39 from Tientsin, 37 from Ching, 36 from Chi, 35 from Wu Yih, 32 from Ning Tsin, 29 from Tsao Chiang and Yenshan respectively, 27 from Chang Chiu, 26 from Jao Yang, 23 from Tsing Hai, 21 from Ts'ang, 18 from Heng Shui, Ta Cheng, Nan Kung and Shen respectively. In Table 38 the detailed distribution of the workers and apprentices according to the place of birth is given. From an examination of this table it may be concluded that Tientsin natives constitute but 4.5 percent of the total workers in weaving industry, the other 95.5 percent being supplied by other hsien in Hopei and other provinces, especially Shantung. Although a small portion of the latter have been in Tientsin for varying number of years and have found their homes there, yet the majority came to that place chiefly for making a living. That this is the case may be shown by the fact that the family members of the workers and apprentices are chiefly engaged in farming. The employer, for the same reason, has to provide room and board for the worker, under what is generally known as the 'dormitory system'.

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Table 38. Workers and apprentices in Tientsin weaving industry classified by place of birth, 1929

Place of birth	Apprentices	Workers	Total
Hopei	469	256	725
Wu Ch'ing	31	16	47
Tientsin	27	12	39
Ching	28	9	37
Chi	25	11	36
Wu Yih	30	5	35
Ning Tsin	24	8	32
Tsao Chiang	21	8	29
Yenshan	17	12	29
Jao Yang	18	8	26
Tsing Hai	13	10	23
Ts'ang	15	6	21
Heng Shui	16	2	18
Ta Cheng	13	5	18
Nan Kung	10	8	18
Shen	10	8	18
Ch'ing	13	2	15
Ho Chien	7	8	15
Hsien	8	6	14
Ku Cheng	8	5	13
Ch'ing Wan	5	8	13
An Tze	5	7	12
Nan Pi	9	1	10
Hsin Cheng	5	5	10
Other	111	86	197
Shantung	78	55	133
Chang Chiu	12	15	27
Ch'ang Shan	2	12	14
Hui Ming	9	2	11
Other	55	26	81
Other	3	6	9
Total	550	317	867

Before the apprentices entered into the weaving industry, a little more than one half, or 277, were school boys. Of the other half (49.7%), 144 (26.2%) were engaged in farming, 37 (6.7%) in weaving, knitting and dyeing as apprentices. The remaining 92 (16.8%) were idle, being neither schooled nor employed. Most of these apprentices, 448 (80%), fall within the age group of 14-18: 70 apprentices are 14 years of age; 102, 15; 125, 16; 98, 17; 53, 18. The age distribution for the other 102 apprentices is as follows: 1, 11 years of age; 12, 12 years of age; 21, 13

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years of age; 35, 19 years of age; 15, 20 years of age; 18, above 20 years of age.

The size of apprentices' families varies from the smallest of one person to the largest of fifteen persons, the average being 5.9 persons. The size for 418 of them, or 75.9 percent, varies from four to eight persons. A classification of the members of these 550 families, 3,271 in number, according to their status in the family, shows that there are 53 grandfathers, 86 grandmothers, 462 fathers, 475 mothers, 63 uncles, 45 aunts, 835 brothers, 203 sisters-in-laws, 497 sisters and 2 wives. 314 apprentices have both parents, 49 have fathers only, 62 have mothers only, while 26 have neither parent, being orphans.

**Table 39. Apprentices in Tientsin weaving industry  
classified by size of family, 1929**

No. persons per family	Families		No. persons
	No.	%	
1	2	0.4	2
2	17	3.1	34
3	52	9.4	156
4	79	14.4	316
5	92	16.7	460
6	107	19.4	642
7	81	14.7	567
8	59	10.7	472
9	25	4.6	225
10	19	3.4	190
11	4	0.8	44
12	9	1.6	108
13	2	0.4	26
14	1	0.2	14
15	1	0.2	15
Total	550	100.0	3,271

In ninety percent of the apprentices' families, namely, 504, other member or members of the family, besides the apprentice himself, are also gainfully employed. In 309 families there is one other member gainfully employed; in the remainder 195 families the distribution of other members gainfully employed runs as follows: 2 in 135 families, 3 in 53 families and 4 in 7 families. Altogether there are 766 other members of the families gainfully employed, including 419 fathers, 299 brothers, 38 uncles, 8 grandfathers and 2 mothers. Among these 766 members there are 494 farmers, 120 workers, 110 traders and 42 others. Their age distribution is as follows: 101 in 12-20 group, 213 in 21-30 group, 180 in 31-40 group, 189 in 41-50 group, 64 in 51-60 group, 15 in 61-70 group, and 4 in 71-80 group.

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### Terms of apprenticeship

The terms of apprenticeship in Tientsin weaving industry are similar to those in other handicraft industries, especially in carpet making;<sup>27</sup> they are officially approved by the employers' association in the industry, namely, Weavers' and Dyers' Association. Under these terms any applicant for apprenticeship must be introduced by somebody, and guaranteed by another one for the faithful fulfillment of apprenticeship. He is given a trial period of five to fifteen days, during which period he may either resign on his own account, or be dismissed by his master for failure to meet the requirements. The term of apprenticeship lasts over three years, or three years and four months (that is, three years and one festival as commonly called), during which period the apprentice is given an opportunity to learn the craft of weaving, and is obliged to stay with his master until the completion of his term. The living expenses of the apprentice, including room, board and other miscellaneous items, are paid for by the master, provided that the apprentice complete his term of apprenticeship; otherwise, the apprentice, or the person who guaranteed him, is held responsible for refunding the master with the cost for board, at \$6.00 per month. This provision also applies to an apprentice who is dismissed because of disobedience or poor conduct. The apprentice receives the customary vacation of one day each for the Dragon Festival and the Moon Festival, and five to ten days for the New Year. At other times he must not ask for leave of absence except in case of marriage or death in the apprentice's family, which period of leave must be made up before completing the term of apprenticeship. Finally, on the completion of the term of apprenticeship, the master may request the Weavers' and Dyers' Association to issue a certificate of journeymanship to the apprentice, and may then employ him at his establishment as a full-fledged worker.

Such, then, are the official terms of apprenticeship. Their practical application may be next examined. The persons who recommend the apprentices to the employers may be fellow natives, friends, relatives, family members, etc. Of the 550 apprentices investigated by the Committee, 176 are recommended by friends, 170 by fellow natives, 133 by relatives, 42 by family members, 29 by others. Those persons who recommend the apprentices are mostly engaged in weaving themselves, totalling 308. Of the other 242, 123 are engaged in trade, 58 in industry, 37 in agriculture, 24 in professions and public service.

The term of apprenticeship, according to the official regulations given above, may be three years or three years and one festival. Of the 550 apprentices investigated, 390 are subject to three years, and 151 to three years and one festival. The remaining 9 are subject to four years. At the time of the Committee's investigation, the 550 apprentices

27. Fong, *Tientsin Carpet Industry*, Tientsin, 1929, Ch. V.

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have already completed a part or all of their term of apprenticeship: 170 apprentices have been with their employers from one month to half a year, 117 from seven months to one year, 90 from thirteen months to one year and half, 47 from nineteen months to two years, 85 from twenty-five months to two years and half, 33 from thirty-one months to three years, and 8 from three to four years.

Generally speaking, the apprentice is given to learn the preparatory processes of weaving during the first half year or first year. During the rest of the term he is taught to weave, with different arrangements for wage payment. The commonest arrangement, of course, is not to pay him any wage, but to take care of his room, board and miscellaneous expenses, with the gift of some pocket money during one of the Chinese festivals. But as a means of promoting his efficiency, the apprentice may be given a wage rate one half or one third of the worker's. Again, he may be required to perform a certain quantity of work per day, in excess of which he is given full wage like the worker. Under still another arrangement, he is paid the same wage as the worker, but may have to pay more for the cost of his board, which is sometimes twice as much as the worker's.

In large establishments the apprentice is taught the craft of weaving by the instructor, oftentimes a skilled weaver who has stayed long enough with the employer so as to enjoy his confidence. In small ones, however, the arrangement is not so systematic. The apprentice is asked to run errands; it is only at slack times that he gets an opportunity to learn from the employer, worker, or elder apprentice. His work is principally one of dovetailing, not of performing any particular process.

On the whole, the system of apprenticeship is far from being satisfactory. Having been deprived of its educational character, it now becomes an instrument of exploitation which should be more serious in consequence than child labor under the worst modern conditions. The apprentice labor, which is so extensively found in handicraft industries, is not regulated by the Factory Law like the child labor in modern factories. The Factory Law, however ineffective be its enforcement, applies only to power driven mills employing thirty or more persons. The apprentice, working as he does under the wretched physical conditions described in a previous paragraph, has no chance for bodily development. Mentally speaking, he has practically nothing to nourish his mind except the vulgar influences of his fellow workers and apprentices. Most of the apprentices are illiterate; those who have learnt to read are very seldom able to write. Taking for granted that the masters have been quite faithful in giving their apprentices an adequate training in the craft of weaving at the completion of the term, the former do not consider it profitable to keep the latter as workers at full wages. The apprentice, having learnt his craft after a period of three or four years,

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has no opportunity to exercise it in order to make a living. That this is the case has been shown by the employer's preference for the apprentice in a period of business depression. The apprentice, to the employer, is not so costly; he is more easily managed than the worker, who has recently become quite recalcitrant with his union's backing. The unemployed worker, meantime, has seen enough of this paradox, an application of which becomes his only solution. With the assistance of a small loan from his friend or relative, or of a small fund raised from the sale of his own personal effects, he soon sets himself up as an employer, resorting to apprentice labor for his working force. He offers to execute orders for larger employers as a middleman or contractor, and works for smaller wages as an inducement. The working conditions in his shop, therefore, must be worse than those of his employer in order to eke out a living for himself. His apprentices receive poorer treatment. Thus, the evil goes round and round the circle, and becomes more intensified each time. As a result, the industry is now flooded with apprentices on the one hand, and unemployed workers on the other. It has thus come to a standstill, and yet the employer, the worker and the apprentice are all helpless in improving their present position.

## Chapter V. Prospect and retrospect.

The industry of weaving, which has been greatly revolutionized by the inventions of Cartwright and others, is still carried on as a handicraft industry in China except for cotton. The power loom weaving of cotton, which is now carried on in nine provinces of China, chiefly in Kiangsu, Shantung, Hupei and Hopei, is not the subject for the present report, which is confined to the handloom weaving in Tientsin. In the latter place handloom weaving is applied to rayon as the chief textile fibre, although supplemented by cotton to some extent. The fabrics woven, furthermore, are figured rather than plain. According to the Committee's investigation, there were 328 weaving establishments in 1929, of which 163, or fifty percent, employed rayon; 91, or 27.7 percent, employed rayon and cotton; and 74, or 22.3 percent, employed cotton as the raw material. In term of value, these establishments consumed 3,515,210 dollars' worth of rayon yarn, or 68.5 percent; 1,253,211 dollars' worth of cotton yarn, or 24.4 percent; and 359,804 dollars' worth of cotton thread, or 7.1 percent. 159 of them employed 2,011 figured looms, 91 employed 980 plain looms, and 78 employed 1,814 plain and figured looms.

As the industry is carried on chiefly under the master craftsman and merchant employer systems, but partly under the factory system, it is operated on a small scale. In respect of the capital invested, the weaving establishments may be divided into three classes, namely, the small class employing a capital of 1,000 dollars or less, the medium class employing a capital of 5,000 dollars or less, and the large class employing a capital of 5,001 to 100,000 dollars. According to this classification, 67.7 percent of the establishments are small, employing 15.8 percent of the total capital invested; 27.3 percent of the establishments are medium, employing 32.1 percent of the total capital invested; and 5 percent of the establishments are large, employing 52.1 percent of the total capital invested. In respect of the number of looms employed, the plain and figured establishment is the largest in size, employing 23.3 looms; the figured weaving establishment is the second, employing 12.7 looms; and the plain weaving establishment is the smallest, employing 10.8 looms. Or, to express it in still another way, the largest number of establishments, 115, employ from six to ten looms each. The next largest number, 63, employ from eleven to fifteen looms each. The average number of looms per establishment, however, is 14.6 looms.

That the weaving establishments are generally small may be further confirmed by the prevalence of establishments employing thirty or fewer persons. 244 establishments, or 74.7 percent, belong to this class, employing altogether 44.9 percent of the workers, or 3,540. In these establishments the apprentice labor predominates, occupying as high as



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75.4 percent of the total working force in establishments with 10 or fewer workers, 73.7 percent in establishments with 11 to 20 workers, 65.7 percent in establishments with 21 to 30 workers. For the industry as a whole, apprentice labor occupies about two thirds, namely, 5,117 out of a total of 7,873 workers.

In respect of the raw materials consumed there is the paradox that the smaller the establishments in capital investment, the greater the amount of raw materials consumed per unit of capital invested. For the smallest establishment in respect of capital investment, that employing one hundred or fewer dollars, the raw materials consumed for every dollar of capital invested amounts to \$54.10. The ratio decreases in favor of capital investment as the size of establishments, in term of capital investment, increases: 29.64 for \$101-\$200 establishment, 12.32 for \$901-\$1,000 establishment, 6.54 for \$4,001-\$5,000 establishment, 4.66 for \$5,001-\$10,000 establishment, and finally, 1.87 for the establishment with a capital above \$10,000. This paradox may be explained by two factors. Most of the small establishments, in the first place, are simply middlemen executing orders for the large ones; and secondly, the large establishments not only have to provide raw materials for their middlemen establishments, but also to undertake marketing in addition to production.

As is commonly expected, the distribution of weaving establishments in Tientsin by the value of raw materials consumed coincides with that by the value of output. Thus, for large establishments, 9.8 percent of establishments consume 40.7 percent of raw materials, while 10.2 percent of establishments produce 43.2 percent of output. For small establishments, 69.9 percent of establishments consume 32.4 percent of raw materials, while 67.6 percent of establishments produce 29.3 percent of output. For the 328 establishments as a whole, the total value of raw materials consumed amounts to \$5,128,225, which is 73.3 percent of the total value of fabrics produced, namely, \$6,991,103.

Because of the prevalence of small establishments in Tientsin weaving industry, any attempt at organization for common ends is hardly feasible. The Weavers' and Dyers' Association, first formed in 1914, is an evidence of this difficulty. The Association has been very inactive ever since its establishment, and has almost gone out of existence but for the recent attempt at resuscitation.

Although weaving constitutes the principal occupation of any weaving establishment in Tientsin, yet the preparatory processes except spinning, and the finishing processes, are also carried on under the same roof. The preparatory processes include winding, spooling, reeling, warping, sizing, drawing-in and designing, while the finishing processes include dyeing and calendering. Dyeing, it may be noted, is considered as a preparatory process when the yarn is dyed before weaving, but a finishing process when the fabric is woven with undyed yarn and has

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to be dyed afterwards. Sometimes, winding is given out to home workers, while sizing, dyeing and calendering are delegated to independent establishments, especially by small weaving shops. All these processes, whether preparatory or finishing, are executed without the aid of machinery, but under the old native method, the only exception being made to the twin processes of dyeing and calendering in modern dye-works.

The process of weaving for plain or figured fabrics is essentially similar, except in the employment of a Jacquard for figured weaving. The loom employed, as well as the Jacquard, were at first imported from Japan; but gradually the Chinese manufacturers could also produce imitations at a price lower than that for the Japanese make. The Jacquard and the loom are produced by the same establishment, but the former is more expensive than the latter. According to the Committee's investigation, the cost for 3,140 figured looms, including Jacquard attachments, reaches 251,281 dollars, which gives an average of 80 dollars per loom; while the cost for 1,665 plain looms amounts only to 42,113 dollars, which gives an average of 25.6 dollars per loom. The cards required of a Jacquard may be perforated by the weaving establishment, under the charge of a skilled workman. But for the smaller ones, this process of card perforating is also delegated to independent shops.

As indicated above, the five processes in connection with weaving, namely, loom making, card perforating, sizing, dyeing and calendering, are often delegated to the independent establishments, and give rise to the subsidiary industries of weaving in each of these processes. In Tientsin, there are altogether 86 establishments engaged in these processes, employing 971 workers, and a total capital of \$118,950. Of these establishments, 15 are engaged in loom making, employing 285 workers and a capital of \$56,050; 6 in card perforating, employing 18 workers and a capital of \$970; 16 in sizing, employing 110 workers and a capital of \$4,200; 39 in dyeing, employing 481 workers and a capital of \$56,350; and 10 in calendering, employing 77 workers and a capital of \$1,380. In respect of the capital invested as well as of the workers employed, therefore, dyeing is the first in importance, loom making second, sizing third, calendering fourth, and card perforating, fifth.

The fabrics produced may be rayon, cotton, or mixed; they may be plain or figured. Generally speaking, the plain fabrics are chiefly cotton, and the figured fabrics chiefly rayon or mixed. In 1929 the total output for 328 weaving establishments amounts to \$6,991,103, which gives an average of \$21,314 per establishment. Of this total \$4,831,775, or more than two thirds, are fabrics woven of rayon or of rayon and cotton together. Of the cotton fabrics amounting to a total of \$2,159,323, canvas cloth occupies 42.1%; flour bag, 8.9%; plain fabrics, 15.9%; figured fabrics, 6.6%; stripes and checks, 18.9%; and other fabrics, 7.6%. Of the rayon fabrics or mixtures amounting to a total of \$4,831,775, about one fifth

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are mixtures, the rest being fabrics woven of rayon only. These fabrics are chiefly figured, but may also be plain, striped or checked. Generally speaking, they can be classified into three categories, namely, pongees, satins and ké. Of these the last group occupies the largest portion, or ninety percent, while the first and second occupy eight and two percent respectively. Among the different kinds of ké, Ming Hua Ké enjoys the widest market, occupying about eighty percent of the total output of ké. Mei Sung Chi and Paris satin are also well known, but being more expensive, they command a narrower market.

As the rayon and cotton fabrics depend more upon other localities than Tientsin for consumption, the marketing method is better developed in dealings with what is called eastern or western merchants, the former coming from Manchuria, and the latter from Shansi, Shensi, and Kansu. According to one method, these merchants come to Tientsin and establish their temporary offices in native hotels for the purchase of these fabrics, through the medium of runners dispatched by the weaving establishments, in term of credit rather than of cash. According to another method, the weaving establishment starts a sales office in some of these provinces, in order to market the fabrics at the place of consumption, such as Taiyuan or Harbin. In marketing the fabrics in Tientsin, runners are also employed to secure orders from piece goods firms, department stores or bazaars, but small peddlers have to come to the weaving establishments for purchase, mostly in term of cash.

The cotton fabrics produced by Tientsin weaving establishments did not obtain the privilege of paying only the export duty of five percent *ad valorem* until 1915. The rayon fabrics or mixtures, however, were not given this privilege, as they did not come into existence until many years after the grant. As a result, rayon fabrics today have to pay not only an export duty of five percent *ad valorem*, but also an export surtax of two and half percent since the first of February, 1929, as a result of the increase in the new import tariff. In addition, they have to pay a coast trade duty of two and half percent when imported into another port such as Hankow or Shanghai, as well as a coast trade surtax of 1.25 percent. But if it is exported to the interior, it has to pay either a native customs duty or a parcel post duty in Tientsin, at the rate of twenty cents per *pi* for rayon fabrics, or thirty cents per *pi* for rayon mixtures.

In Tientsin weaving industry there are altogether 7,873 workers including 5,117 apprentices, not counting 971 workers and apprentices in the subsidiary industries of loom making, card perforating, sizing, dyeing and calendering. Of these workers the Committee has made a sample investigation of 317 workers and 550 apprentices, a total of 867. Both apprentices and workers are natives of different hsien in the two provinces of Hopei and Shantung, only 39, or 4.5 percent, being natives of Tientsin. 453 out of 867 workers are natives from sixteen hsien, 15 in Hopei and

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1 in Shantung, each of which contributes from 18 to 47 persons. The age of the workers varies from the lowest of 15 to the highest of 44. 282, or ninety percent, falls within the age group of 18-31. The age of the apprentices varies from the lowest of 11 to the highest of 22. 448, or eighty percent, falls within the age group of 14-18. Both workers and apprentices come from large families, the average size of which being 5.9 persons. That their economic status is generally low may be indicated by the inability of marriable workers to marry and the early age at which the workers and apprentices entered into gainful employment. Thus, taking 20 as the marriable age for workers, only 163 out of 265 marriable workers, or 61 percent, have married. The age during which the apprentices and workers first entered into gainful employment is commonly 16 or below.

Among the terms of employment may be mentioned the system of employment, system of wage payment, hours of work and conditions of work. The hours of work are the same for workers and apprentices, of which the commonest run from ten to thirteen per day, applicable to 86.9 percent of the establishments employing 83.6 percent of workers and apprentices. Only 2.1 percent of the establishments employing 2.9 percent of the workers and apprentices work eight hours per day, while 3.1 percent of the establishments employing 2.9 percent of the workers and apprentices work more than thirteen hours per day.

For the workers the system of wage payment is based on time or piece, or both. Time rate is paid to the heads of different departments, or to janitors, cooks, and workers on odd jobs; while piece rate is paid to weavers and others. The latter, however, may be paid on the basis of time and piece, receiving a fixed rate of wage for the month which is subject to addition or deduction according to the amount of work performed. Of the 317 workers investigated by the Committee, the majority, 301, are paid under piece or time and piece basis, only 16 being paid under time basis. For the former the cost for board is deducted from the monthly wage, but the provision of room is free; while for the latter no charge is made even for board. For the former, the commonest wage per month including board is fifteen dollars, applicable to 50 workers; twenty dollars, applicable to 30 workers; and twelve dollars per month, applicable to 29 workers. 184 workers, a little less than two thirds, receive a monthly wage between 12 and 20 dollars. The total monthly wage for 301 workers amounts to \$4,906, which gives an average of \$15.3 per worker. For the apprentice, the commonest arrangement is not to pay him any wage, but to take care of his room, board, and miscellaneous expenses, with the gift of some pocket money during one of the Chinese festivals. But as a means of promoting his efficiency, he may be given the wage one half or one third of the worker's. He may be required to perform a certain quantity of work per day, in excess of which he is given full wage like

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the workers; or else, he may be paid the same wage as the worker, but may have to pay more for the cost of his board, which is sometimes twice as much as the worker's.

The system of employment in Tientsin weaving industry, whether for workers or for apprentices, is in no case uniform; but an introduction from some one, related to the employer one way or the other, is often required. Such persons, mostly employed in weaving, may be friends, fellow natives, relatives, family members, neighbours or co-workers. The worker, once hired by the employer, is given no contract of employment, although it is commonly understood that he shall not be fired except during one of the three festivals. The apprentice, on the other hand, is employed for the customary term of three years and one festival. For failure to complete this term of apprenticeship, the apprentice, or the person who introduced him to the employer, must be held responsible for refunding the latter with the cost for board, at \$6.00 per month. This provision also applies to an apprentice who is fired because of disobedience or poor conduct.

The working conditions in weaving establishments are generally unsatisfactory; in some cases they are miserable beyond description. The workroom is not only small, but also filled with damp and dirt. In small establishments the ground floor is also used as sleeping space for workers; in large ones, another compartment may be built above the looms by means of a few wooden boards, for similar purposes. Neither sunlight nor air enters into the room sufficiently to supply the normal need of a worker, while wind or water visits him with cold or wet at different seasons of the year. As the floor is covered with mud, the summer flood sometimes even destroys the fabric itself. The cotton or rayon dust, meantime, saturates the air, and one can hardly breathe without being suffocated. Under such working conditions, it is no surprise that both workers and apprentices suffer from tuberculosis to a quite large extent. The weavers, furthermore, have to operate the treadle by his right foot, and move the shuttle by his right hand for figured weaving. For plain weaving, they have to apply both feet to the treadles. Their eyes are constantly fixed upon the loom and the fabric, for fear that the warp may break, or that the needle may get out of order. Trachoma, therefore, is another common disease. Indeed, in visiting these workrooms one can only marvel at the power of resistance in a Chinese weaver, and refresh his mind once more with the wretched conditions of English handloom weavers in by-gone days.

The workers in the weaving industry were not organized into any union until the northward advance of the Nationalists in 1928. In that year four branches were organized, with no central headquarter however. The membership, meantime, was very small, for in April of the following year these four branches had but a total of 545 members. It did not

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include the majority of workers in the industry until the spread of unemployment before the Moon festival (Sep. 17) in 1929. At the beginning of the month, the membership had been swollen to the huge figure of 2,815. The union, therefore, became the active agent for protest against the wholesale dismissal of workers. It helped to settle the disputes that arose from such dismissal and organized means for relief. A public performance of Chinese drama was staged successfully for three days, from September 27 to 29, reaping a net sum of \$1,277.97. At the same time a fund of \$447 was raised from the municipal government and other unions to tide over the financial strain of the unemployed for a period of half month, from August 28 to September 11. In December a weaving establishment was organized with the aid of the fund raised from the show, employing twenty workers; but unfortunately, the amount was not sufficient for the successful operation of the enterprise. The establishment, therefore, had to close down on the sixth of March in 1930.

### Causes for decline

The weaving industry in Tientsin, which reached the peak of development from 1927 to 1928, was followed by rapid decline in 1929, especially in the figured weaving branch of rayon fabrics or mixtures. Ming Hua Ké, the most noted variety of rayon fabrics, was sold at twenty-six dollars per *pi* when first invented in 1926, but in the course of one year's time it was reduced to ten dollars per *pi* because of the redundancy in output. At the beginning of 1929, it could still command a market price of nine dollars per *pi*, but since then it had steadily declined, until it was lowered to seven dollars per *pi* in July and to six dollars per *pi* in September. The last price, which was the lowest ever reached in the history of rayon fabrics, not only brought no profit to the manufacturer, but inflicted upon him a loss of more than one dollar. This is due to the fact that for every *pi* of Ming Hua Ké woven, the cost for four pounds of rayon yarn, at \$1.40 per pound, reached \$5.60; that for sizing the warp, at six cents per pound for 2.5 pounds, reached 15 cents; that for winding, spooling, reeling, warping and drawing-in, at ten cents per pound, reached forty cents; that for weaving reached one dollar per *pi*; and that for fixed charges reached twenty cents. The total cost, in other words, reached \$7.35. Because of this loss, many of the small establishments went out of existence, while the medium and large ones alone had to continue their operation with a part of unpaid apprentices, hoping meantime for an improvement in market conditions. In both classes of establishments, therefore, there was a wholesale dismissal of paid workers and unpaid apprentices. Thus, in 73 establishments investigated by the Committee after the Moon Festival, 82 percent of the workers and 48 percent of the apprentices were dismissed.

This rapid decline in the industry, which resulted in the loss of market for rayon or cotton fabrics, is an outcome of many factors, of

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which some are more remote than the other. In the first place, the facility to become a small master, due chiefly to the absence of capital requirement and the system of unpaid apprenticeship, results in the prevalence of small establishments. The small masters, which are the least organized, are most prone to accepting orders at reduced price, and weaving fabrics of an inferior quality. Having neither skill nor capital to devise new fabrics or to build up the market, they are ready enough to imitate or reproduce the latest or most profitable output of large manufacturers. These imitations tend not only to flood the market with redundant output, but also to destroy whatever merits of the original fabric by inferior workmanship. In other words, the large manufacturers pay the cost of experimentation, while the small masters reap the profit. Nay, the latter may even bring discredit upon the former's success by unfaithful imitation. Such method of cut-throat competition, indeed, is suicidal to the industry, but so long as the facility to become small master exists, the industry is confronted with a powerful factor for its decline. Secondly, the competition of fabrics imported or produced elsewhere, especially in Kaoyang, is another factor for the decline. Thus far, we have no statistics regarding the output of Kaoyang fabrics, but statistics on imported fabrics are given in detail in the customs' returns. According to the latter, there were in 1928 a total gross import of artificial silk piece goods amounting to Hk. Tls. 5,693,059, of which 43.3% were contributed by Japan, 25.5% by Great Britain, 17.2% by France, and 14% by other countries including Italy. The net import of artificial silk piece goods in the same year, meantime, amounted to Hk. Tls. 5,534,331, of which Shanghai claimed 52.6%; Dairen, 20.1%; Amoy, 5%; Hankow, 3.4%; and other ports, 18.9%. These ports, especially Shanghai, Dairen and Hankow, are important markets for Tientsin fabrics of rayon make. As a result of the foreign fabrics there, Tientsin fabrics have to suffer not only from the competition in price as well as in quality, but also from the burden of taxation. Tientsin fabrics pay two taxes, namely, the export duty of 7.5% *ad valorem*, and the coast trade duty of 3.75% if sent through the maritime customs. This, nevertheless, is still a light burden for the manufacturers to bear, provided that the valuation of these fabrics for the purpose of such tax be not excessively high. But rayon fabric is valued at Hk. Tls. 230 per picul. As one picul is equivalent to 33 *pi*, which, if valued at the market price of six dollars per *pi*, is worth only 198 dollars, or two thirds of the value set by the taxing authority, the tax rate is automatically raised to one third of the official rate by means of an excessive valuation. The export duty is raised from 7.5% to 10%, and the coast trade duty from 3.75% to 5%.

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The last three factors for the decline in Tientsin weaving industry are more immediate than the first three, and strike a final death blow to the industry. The Sino-Russian dispute over the Chinese Eastern Railway, which lasted throughout the second half of 1929, resulted in open warfare between these two nations in Manchuria,—one of the principal markets for Tientsin fabrics. The renewal of civil war between the South and the North, and the recurrence of flood and famine in the Northwest, both of which took place seriously in the first part of 1930, and are still pending, not only closed up the channels of communication, but also taxed heavily the purchasing power of the consumers for Tientsin fabrics. Finally, the rapid increase in the exchange rate in favor of gold-using countries, which was due chiefly to the sale of demonetized silver by European or Asiatic countries that have either returned to the gold standard or have adopted it in preference to silver,<sup>28</sup> resulted in a drastic increase in the silver price for rayon yarn,—the chief raw material for the weaving industry in Tientsin. The increase in the exchange rate, as it first took place during the end of 1929, did not affect the weaving industry. The rayon merchants, not the importers, could still sell at the old price, with a slight increase, when the stock was not yet exhausted. But with the elapse of time, when new orders had to be placed with the importers for fresh supply of rayon yarn, it became impossible for the weaving establishments to keep up their operation, with little prospect for a drastic change in the price for rayon fabrics. The decline of weaving industry in Tientsin, therefore, is the most rapid at the present moment. As one of the leading manufacturers informed the present writer, in July of 1930, at least one half of the weaving industry in Tientsin had disappeared at that time, and Jacquard looms, which were sold at one hundred dollars a piece a year ago, could now be had for one fifth of their original value! He also remarked that the plain looms could be had for what they might sell as scraps!

### Suggestions for revival

The rapid decline of the weaving industry in Tientsin, which has been briefly sketched above, affects all parties concerned—the workers, the employers and the nation at large. The workers lose their job, the employers their capital, and the nation the income from one of its handicraft industries. Some attempt at a revival, therefore, should be made in order to relieve the industry from down-right disappearance. In view of the fact that handloom weaving constitutes the second largest handicraft industry in Tientsin, in respect of the capital invested or of the workers employed, such attempt is the more important.

28. Ho, Franklin L.: A century of silver, in *Oriental Fur Trade Review*, September, 1930.



## CHAPTER V. PROSPECT & RETROSPECT

The first condition for revival is of course a return to peace and order,—the minimum requirement for the continuous operation of any productive activity. At the moment of the present writing (August, 1930) the Sino-Russian dispute has long been brought to a close, while the civil war between the North and the South is promising an early end because of the exhaustion of men and resources on both sides. But to have peace and order restored in those regions that constitute the principal markets of the weaving industry in Tientsin is as yet a time-consuming process. The bandits that have flourished during this interval of the nation's unrest are hard to suppress at one moment, as their activities have nearly permeated every province, not excepting the richest lands of Kiangsu and Chekiang.

A second condition is a reduction in taxation. For the cotton fabrics woven in Tientsin there has all along been one tax, namely, the export duty of five percent, if such fabrics be destined for home consumption in other parts of the nation. For export abroad there is even an exemption of this tax. For rayon fabrics or mixtures, however, the same privilege is not granted, for the simple reason that the Chinese government has delayed the registration of these fabrics as a 'privileged factory product', so that the national revenue may not be diminished. At present, therefore, the rayon fabrics have to bear the burden of several taxes, including export duty, coast trade duty, parcel post tax, native customs duty and all kinds of *likin*. No one of these taxes, however, is justifiable from a modern point of view, but cripples the recovery of an already declining industry. At least the privilege that has been granted to the cotton fabrics should also be given to the rayon fabrics or mixtures. ~~In that case, not only is the burden of taxation for the industry reduced, but the unfair advantage of having to pay only the export duty and the coast trade duty, which the imported rayon fabrics or mixtures now enjoy, is also eliminated.~~

When these two fundamental conditions for the revival of the industry are fulfilled, a third step may be taken towards the re-organization of the industry itself. The small masters, first of all, must be eliminated from the industrial scene, in order to stop the cut-throat competition that they have so often practiced. This can be accomplished in various ways. The employment of apprentice labor, which is the mainstay of small masters, must be more strictly regulated by the government, whether national or local. Its terms should be so specified that on the one hand the apprentices might receive an adequate training in the craft, and that on the other hand the cost of adult labor should at least be made equivalent to that of apprentice labor. The small master, in other words, must not be left uncontrolled in his exploitation of apprentice labor. Secondly, the large manufacturers in the weaving industry should

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resuscitate their present organization, the Weavers' and Dyers' Association, on a new basis, whose chief object should be to combat against the small masters because of their cut-throat competition. Such organization may lay down certain rules for admission, the fulfillment of which should be rendered impossible for the small masters. By means of close co-operation and active control over the industry, in respect of the quality and price of the fabrics woven, it may eventually exercise a sane influence over the market, and weed out the small masters in their attempt to cut the price or to deteriorate the quality. The large manufacturers, meantime, should re-organize their business on a scientific basis. They should have sufficient capital to pay for the fixed and running costs; they should not have just enough to spend for fixed capital, resorting to loans for circulating capital. As the business of weaving is quite a complicated affair, involving a knowledge not only of weaving, but also of sizing, dyeing, pattern designing, etc., each department should be in charge of a skilled workman. The working hours, which run from ten to thirteen per day, should be reduced to nine or ten, while the wages, which amount to no more than fifteen dollars per month including board, should be raised so as to give the workers an incentive for greater efficiency. The working force, meantime, can be reduced if well organized, laying emphasis on quality rather than quantity. If resort be made to the apprentice labor, such labor should be more systematically trained than it has been until the present, with a view to keeping him eventually as the basic force in the establishment. The working conditions, finally, must be considerably improved, providing sufficient space for breathing while working, with sunlight and ventilation. The method of marketing may also be improved. Indeed, one of the foremost manufacturers, Mr. Chen Ching-tang, the inventor of Ming Hua Ké, has already proposed to organize a price-fixing association, with a view to stopping the inter-necine practice of price-cutting in the past.

Finally, some attempt should be made towards solving the problem of raw materials. The rayon yarn and floss, which constitutes the chief textile fibre for the weaving industry in Tientsin, has recently increased in price, because of silver depreciation. Meantime, the prospect for producing it at home is very dark in view of China's lack of wood pulp—the chief raw material for rayon yarn and floss. It is true that there are forests in Manchuria and Szechuen that can be used for the production of wood pulp, and of rayon yarn and floss consequently. But the initial capital, which runs over several millions of dollars, is hard to raise, especially in view of the unsettled political conditions today. The technical ability is also lacking. Some of the manufacturers in the industry, therefore, have suggested a return to the natural silk, in place of the artificial silk. This, however, is not likely, as natural silk is too

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expensive for the mass. Another way out, under present circumstances, is to utilize the woolen yarn for plain or figured weaving. As Tientsin is the collecting centre for China's wool export, the nearness to raw materials offers a distinct advantage. The problem, nevertheless, rests with the process of yarn spinning. It is quite questionable whether Chinese manufacturers at large, and Tientsin manufacturers in particular, are, technically if not otherwise, in a position to produce sufficient quantity of woolen yarn for this purpose. To the present writer, the most probable course of development lies in a return to cotton rather than rayon weaving. The cotton yarns used, chiefly of the higher counts, are partly imported, but partly produced at home in Tientsin cotton mills. The spinning of finer yarns should be encouraged once the civil war comes to an end. The planting of long staple cotton—the raw material for finer yarns, should also be promoted, especially in Hopei province where some success has been achieved towards that direction.

# Publications of the Nankai University Committee on Social and Economic Research

In order to meet the growing demand for the collection and analysis of social and economic facts in China in recent years, the Nankai University appointed a Committee on Social and Economic Research in the fall of 1927. The results of the Committee's investigation have hitherto appeared in the two weekly publications of the Committee, namely, "The Nankai Weekly Statistical Service" (English and Chinese) and "Economic Weekly" (Chinese), as well as in the leading economic and business journals in China. Arrangements, however, have been made by the Committee to issue special publications since 1929, some of which have already appeared in print in the following series:—

## I. Price series:—

Wholesale prices and price index numbers in North China, 1913-1928,  
Franklin L. Ho, 145pp. 4°

Index numbers of the quantities and prices of imports and exports and of trade in barter terms of trade in China, 1867-1928, by Franklin L. Ho, 24pp. 4°

## II. Industry series:—

Extent and effects of industrialization in China, by Franklin L. Ho and H. D. Fong, 34pp. 4° (out of print)

Tientsin carpet industry, by H. D. Fong, 77pp. 4°

Rayon and Cotton Weaving in Tientsin, by H. D. Fong, 79pp. 4°

## III. Economic history series:—

Triumph of factory system in England, by H. D. Fong, 310pp. 4°

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