

Technology Change and Female Labour in Japan

Edited by
Masanori Nakamura



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The United Nations University project on Technology Transfer, Transformation, and Development: The Japanese Experience was carried out from 1978 to 1982. Its objective was to contribute to an understanding of the process of technological development in Japan as a case-study. The project enquired into the infrastructure of technology, human resources development, and social and economic conditions and analysed the problems of technology transfer, transformation, and development from the time of the Meiji Restoration to the present. The research was undertaken by more than 120 Japanese specialists and covered a wide range of subjects, including iron and steel, transportation, textiles, mining, financial institutions, rural and urban society, small industry, the female labour force, education, and technology policy.

This volume examines the link between technological innovation and female labour from the standpoint of the relationship between modes of production and forms of labour.

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Foreword

This book represents part of the results of research carried out by the Institute of Developing Economies at the request of the United Nations University for the Project on Technology Transfer, Transformation and Development: The Japanese Experience.

Anyone with an interest in development issues, and anyone who has ever been to a developing country, is aware of the importance of human resources, and development experts have been talking about the issue for many years. The aim of this project is to examine, from the general viewpoint of development, Japan's experience in undergoing an industrial revolution with the help of technology transferred from the advanced countries. It was natural that the focus should be on the labour force. However, we had a specific reason for addressing the subject of female labour rather than limiting the scope of our study to the general discussion of labour-force creation and skill development. In the words of Shōji Okumura, a historian of technology, it is historically undeniable that the dynamism of the present-day Japanese economy began with the energy of the nimble fingers of its young women in the latter decades of the nineteenth century.

Further, although new technology did in some cases occasion loss of work opportunities for women, technological innovation and the female employment rate generally move along parallel lines. In fact, when advanced technology is adopted, women often become the core labour force. Re-entry into the labour force after taking time out for marriage and child-rearing has become an established social phenomenon over the past 30 years or so. It should be noted here that Japanese statistics treat the concept of "unemployment" differently from other countries: people seeking employment for the first time are not counted among the unemployed, and this shrinks the overall figures for the unemployed. The increase in the number of female job-seekers reflects changes in their life cycle and lifestyles. There are now (in 1990) more than 15 million working housewives, a number far exceeding

that of housewives occupied exclusively at home, and the unmarried female workforce is a minority in the labour market.

The culture of some countries rejects female employment, particularly as paid labour. This pattern was found in Japan as well before the Second World War, but the need to support a rapidly growing population made it imperative to adopt more advanced technology, and changes in technology promoted the employment of women. This inevitably produced shifts in the basic social structure of traditional culture, and such changes will undoubtedly continue. Japan was unable to maintain its indigenous culture untouched while pursuing industrial development and technological innovation. Other nations' cultures may be able to do so, but the prospect is not optimistic. The modernization of technology does not have to mean the complete reorganization of traditional culture. It can promote the partial advancement and more widespread transmission of culture in some respects, in some cases reinvigorating it in a more sophisticated form.

The Japanese did not cling to old ways. The national consensus welcoming the transfer of modern technology was in place more than a hundred years ago, although this was undoubtedly because people were already relatively poor and subject to population pressures, and because they recognized that this was the only alternative to ensure survival in the then international setting. Some scholars say that an "industrious revolution" took place prior to the industrial revolution, and that women, and even children, were the indispensable core of labour. This state of affairs continued in the course of the industrial revolution, as the earnings of the household head were not enough to support the family, and women and children also had to work. Some maintain that this "employment of entire families" was in complete opposition to the concept of full employment, but it was a common pattern before the war in small and medium-size factories, and in those smaller workplaces where Japan's industrial technology (and skills) developed.

The situation today has changed completely. Women are no longer engaged in hard labour, and office automation and micro-electronics are promoting a rapid influx of women into clerical or service sectors. But the foundations for these trends were laid by the increase in the nuclear family, rapid urbanization, and higher education, and further facilitated by the greatly reduced need for household labour as a result of the developments in the food and apparel industries. On the other hand, there is also a marked trend towards the part-time or indirect employment of women, and they are playing the role of buffer during economic fluctuations. This will surely necessitate a revision of non-Japanese ideas about "Japanese-style management," in particular, the system of lifetime employment. With the exception of professional and career workers, women are usually not employed for life.

The development of mechanization does not lead automatically to the lightening of the burden of female labour. In Japan, the mechanization of farming is encouraging men to take jobs outside agriculture and making it a

predominantly female occupation. In fishing villages, the motorization of fishing boats has led to wives taking their place as indispensable working partners of their husbands. Among the trade-offs are new health problems among women young and old in farming and fishing villages. In the past, young women endured long workdays (the 12-hour day was standard) in silk-reeling or textile plants, ruining their health for the sake of meagre earnings and poor nutrition which helped to secure the survival of their parents and siblings in poor fishing or farming villages. Today, although the nature and status of problems have changed, they remain in a sophisticated modern form at a higher level and are perpetuated.

Some of the young women who, by virtue of their robust health, survived the hardships of the silk-reeling industry around the turn of the century were still alive when our project was initiated. Among their recollections is *Aa, nomugi tōge* [Remember the Nomugi Pass] (1977) by Shigemi Yamamoto, considered the finest example of documentary literature. This record of the not-too-distant past moved many after it had been made into a film and shown in other countries.

This book also touches on the same period, and other groups in this research project are dealing with it. For example, Takeo Izumi's excellent work on (female) labour in the textile industry has been translated (*The Developing Economies*, IDE, Tokyo, 1979) and I recommend that it be read along with this book. This project series also includes a volume dealing with the issue of educational systems and human resources.

As Professor Masanori Nakamura, the editor of *Technology Change and Female Labour in Japan*, points out, this book's approach is unique for Japan, and few other books have covered the subject from the start of industrialization to the present day. I am grateful for the pioneering spirit of the editor and of the authors of each chapter. I also sincerely hope that research on the issues raised will be undertaken more extensively and in further depth and detail.

This book would not have been possible without the dedicated efforts of my colleagues, in particular Akiko Akemine, who bore the brunt of the actual editing work. I would also like to thank Takeo Uchida and Shigeo Minowa of the United Nations University for their support and cooperation.

Takeshi Hayashi

Preface

Female labour has become an indispensable element of today's industrial society. During the 1960s, as Japan's rapid economic growth rose to its peak, the entry of women into the workforce in large numbers brought about major changes in the country's employment structure. The high tempo of innovation in science and technology, needless to say, formed the backdrop for this trend; the spread of office automation and use of electronic equipment expanded employment opportunities for women and accelerated changes in the woman's life cycle. Technological development transformed the production process in factories and labour-employer relations; it led even to transformations in human relations in society and in the household environment. The Japanese have never before experienced a technological and social revolution of this degree, occurring this rapidly. In this context, it was only natural that "Technology Change and Female Labour in Japan" should be added to the list of topics to be studied in the United Nations University Project on Technology Transfer, Transformation, and Development: The Japanese Experience" in cooperation with the Institute for Developing Economies.

IDE's project coordinator, Professor Takeshi Hayashi, approached me in the spring of 1981 to request me to undertake a collaborative study on technological change and female labour. I was finally convinced to undertake the project because of the topicality as well as the great importance of the subject, and work began in March that year. I and the members of our group (the other scholars collaborating on the study) held regular seminars every two or three months to exchange ideas. It seemed to us that studies showing how technology had changed in each period and in specific industries, and how those changes had affected the nature of female labour in Japan, would offer a useful guide to those considering the problems of female labour in developing countries currently in the throes of rapid technological change. We discussed this challenge many times in the room set aside for our meetings at the Institute. About one year after these meetings

began, we decided on our respective topics for writing. The draft manuscripts were prepared by the end of 1983 and, after being read by the editors, were returned to the authors for checking and revision.

The study had to proceed in accordance with four important considerations: (1) our small study group had to cover the period from the beginning of Japan's modernization (Meiji, 1868–1912) to the rapid economic growth period (1955–1973); (2) there was surprisingly little previous research on the topic; (3) reliable documents and statistics that could be used in the study were quite limited; and (4) the resulting research should be presented in such a way as to be useful to developing countries. With these concerns in mind, we determined to define the focus of the study very specifically; for the pre-war period, we selected the three topics of silk-reeling labour, women workers in the coal industry, and female workers of the urban lower class. For the post-war period, we decided to deal with women working in family-based industries, as exemplified by agriculture and fisheries, and with female employed labour during the rapid economic growth period. This book is made up of five chapters, each covering one of these topics, along with an introductory chapter providing an overview of female labour in the pre-second World War period, and a concluding chapter. The following is a brief outline of the book's content.

The introductory chapter deals with female labour in the industrial revolution period from the two perspectives of production type and source of labour supply, divided into six categories, and the changes for each during the First World War period, the inter-war period, and the wartime (China War and Pacific War) period. Chapter 1 focuses on the conditions of workers in the silk-reeling industry, reflecting developments in production technology from the end of the transition period to the modern Meiji period government in around 1900, mainly as observed in the Suwa region of Nagano Prefecture. Chapter 2 describes female workers in the coal-mining industry, explaining how technological innovation prescribed labour management in the coal-mining industry from 1900 to the 1930s and analysing the impact of those changes on female labour. Chapter 3 looks at female labour among the lower classes in the large cities from the 1870s to the 1920s, examining how industrialization and the progress of urbanization altered the framework of daily life and the structure of employment for these women. The next two chapters cover the post-war period. Chapter 4 deals with family-based enterprises in agriculture and fisheries, portraying the impact of technological innovation during the rapid economic growth period on employment patterns among women of agricultural, and especially fisheries, households. Chapter 5 discusses the sharp rise in female employment during the rapid economic growth period and the changes in Japanese lifestyles and living patterns brought about by the automation of labour processes and technological innovation.

The concluding chapter summarizes the findings of each of the studies and places them in the context of historical research, and examines their

significance and usefulness from the point of view of the problems of female labour in other Asian countries.

As reflected in the above remarks, female labour encompasses both employed and family-based workers, but, with the exception of chapter 4, which examines women working in agriculture and fisheries in the post-war period, the main thrust of analysis is on employed workers. This book was originally compiled for an overseas readership, mainly for the reference of third-world countries, and plans did not include the publication of Japanese or English editions. As a result, the authors were required to include references and information which are often common knowledge to Japanese specialists. They therefore made full use of existing studies, including quotations and citations from these works.

The fact that the study of how technology transfer, transformation, and development changed the nature of female labour was a completely new field left us relatively unconstrained by previous research and gave us a free hand in our endeavours. We will be satisfied if this work provides a useful landmark in further efforts to open up this field of research.

Masanori Nakamura

Contents

Foreword vii

Preface xi

Introduction: Types of Female Labour and Changes in the
Workforce, 1890–1945

 Yutaka Nishinarita 1

Chapter 1. Silk-reeling Technology and Female Labour

 Masanori Nakamura and Corrado Molteni 25

Chapter 2. The Coal-mining Industry

 Yutaka Nishinarita 59

Chapter 3. Female Workers of the Urban Lower Class

 Akimasa Miyake 97

Chapter 4. Family-run Enterprises: An Overview of Agriculture and
Fisheries

 Kazutoshi Kase 132

Chapter 5. Innovation and Change in the Rapid Economic Growth
Period

 Sakiko Shioda 161

Chapter 6. Conclusion

 Masanori Nakamura 193

Contributors 213

Index 215

Introduction: Types of Female Labour and Changes in the Workforce, 1890–1945

Yutaka Nishinarita

This book covers two periods of modern Japanese history: from the Meiji Restoration of 1868 to the end of the Second World War, and from 1945 to 1985. For women workers after 1945, the studies (chapters 1–3) present a relatively clear picture of the overall situation. For the pre-war period, however, the essays (chapters 4 and 5) focus on female workers in specific industries—silk-reeling and coal-mining—and on the occupations of the urban lower class, and do not attempt a comprehensive treatment.

Before 1945, the majority of women worked in the agricultural and extractive industries (fig. 1). The number of women in the primary sector dropped from 7 million (more than 70 per cent of all women workers) before the First World War to 6 million during the war years. After 1923, when it was at its lowest, however, their number increased steadily, reaching about 60 per cent of all women workers in the 1930s. Female labour in the tertiary (service) sector, especially sales, shows a steady increase, expanding from 8–9 per cent of the total female workforce before the First World War to 14–15 per cent after the war. Immediately after the financial crisis of 1927, the tertiary sector employed 18 per cent of all women workers, and in 1928 the figure exceeded that in manufacturing.

The number of women working in the industrial sector grew during the First World War and in the late 1930s, but declined or levelled off during the intervening period, remaining at around 15 per cent. If we define female labour broadly to include women working in family enterprises, before 1945 the vast majority were engaged in family enterprises, including farming and small business, in the primary and tertiary sectors. Only a very small number worked as hired labour in the manufacturing sector.

In the pre-war period, female hired labour bore the brunt of technological change. Only after 1945 were women in traditional family enterprises affected by technological innovation (see chapter 4). Here, the discussion will be limited primarily to female wage-labour. Three general methodological observations may be made.

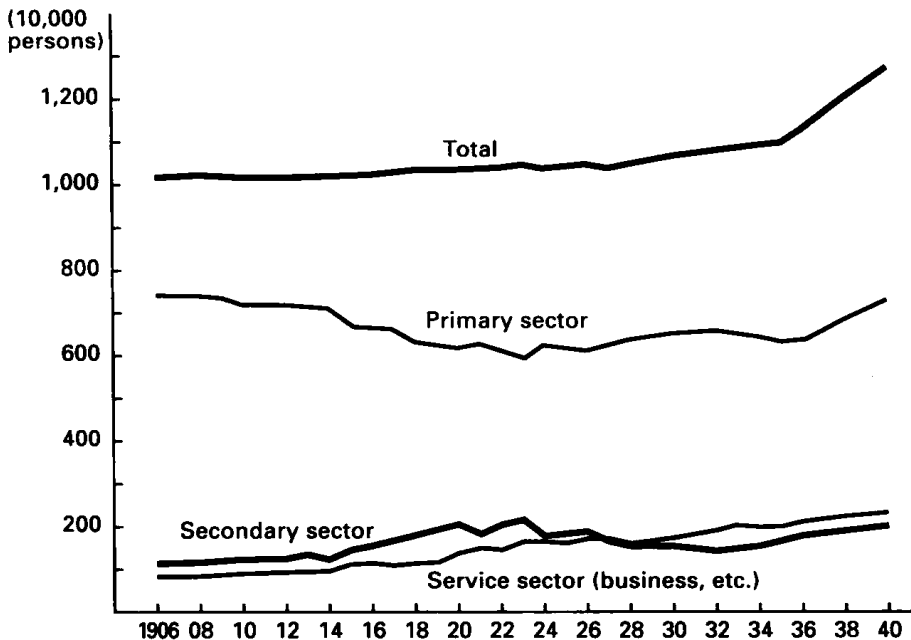


Fig. 1. Number of Women Workers by Industrial Sector, 1906–1940

Notes: Figures are estimations.

Source: Compiled from tables provided in Umemura Mataji, "Sangyōbetsu koyō no hendō: 1880–1940 nen" [Trends in Industrial Sector Employment: 1880 to 1940], *Keizai kenkyū*, vol. 24, no. 2 (1973).

First, female workers may be categorized in a number of ways, depending on one's theoretical and methodological assumptions. Here, I will classify women workers according to the form of production (labour and technology) and social supply of labour (labour market).

Second, I will look at the transformation, and in some cases dissolution, of each category of women workers in the course of the evolution of Japanese capitalism, attempting to identify the structural dynamics involved. To clarify this process, I divide the development of the female labour force into four periods: the industrial revolution (1880s–1907), the First World War (1914–1918), the inter-war period (1920–1936), and the Second Sino-Japanese and Pacific War period (1937–1945).

Finally, looking at female labour after 1945 we can obtain a comprehensive grasp of the continuities and discontinuities between the pre-war and post-war periods. As this paper focuses on the pre-war situation, the subject of continuity-discontinuity will be briefly touched on in the conclusion of this introductory chapter, providing a link to chapter 5.

I. The Industrial Revolution

Japan's industrial revolution took place in the 20 years before about 1907. The revolution was led by the cotton and silk industries. Cotton-spinning relied on imported cotton and spinning machines, and from the start production was large-scale and mechanized. The industry grew rapidly, displacing both hand-spun and imported cotton yarn. In 1897, yarn exports exceeded imports for the first time, indicating that capitalist production had transformed cotton-spinning into an export industry.

Silk-reeling, too, was mechanized but developed from a combination of Western and indigenous technology. Selling primarily to the North American market, silk yarn became Japan's main earner of foreign reserve revenue. Between 1906 and 1910, Japanese silk exports overtook even those of China, until then the world's largest silk-yarn exporter.

In contrast to cotton-spinning and silk-reeling, civilian machinery and equipment manufacturing remained in an incipient stage of development during the years of early industrialization. Machinery manufacturing acquired an abnormal structure heavily skewed by a surge forward in military-related development. Military procurement for the army and navy during the Russo-Japanese War (1904–1905), however, proved an important stimulus to civilian machine manufacture, and shipbuilding in particular advanced rapidly. By 1907, with the completion of the *Ten'yō maru*, Japan's first modern domestic-built steam vessel, the industry had risen to contemporary world standards. As Japan's capacity for self-sufficiency in shipbuilding increased, a number of large machine manufacturers emerged, and Japanese craftsmen began producing American-style machine lathes on their own.

By around 1907, the way seemed clear for the establishment of the machine and equipment industry, and the foundations for development of an independent national economy, based on the internal linkage between the consumer goods and industrial goods industries, took shape. In fact, however, this linkage remained extremely weak, and in the cotton and silk industry, for example, machine manufacturers could not satisfy domestic demand for spinning and reeling equipment until the 1930s. Industrial capitalism depended on imports for many heavy industrial goods, and these were paid for largely out of the earnings from raw-silk thread exports. The reeling industry, then, financed the machine imports essential for the development and expansion of industrial production in Japan.

These features of incipient Japanese capitalism are illustrated in the industrial structure. By 1909, the end of the industrial revolution, the spinning and weaving industry, including both cotton-spinning and silk-reeling, accounted for 51 per cent of the value of total industrial production and employed 64 per cent of the workforce (table 1). The metalworking and machine industries produced only 10 per cent of that value and hired a mere 8 per cent of the labour force. The industrial structure was lopsided, skewed heavily toward spinning and weaving.

Table 1. Amount of Production and Number of Workers by Industry, 1909-1940

	1909	1914	1919	1925	1929	1935	1940
<i>Amount of production (1,000 yen)</i>							
<i>Spinning and weaving industries</i>							
Silk-spinning	111,561 (14.0) ^b	166,438 (21.1)	846,527 (12.3)	937,139 (13.5)	864,353 (11.2)	484,587 (4.5)	956,383 (3.3)
Cotton-spinning	121,218 (15.2)	203,722 (14.8)	760,476 (11.0)	781,442 (11.3)	822,035 (10.6)	877,043 (8.1)	870,126 (3.0)
Silk textiles	46,234 (5.8)	55,151 (4.0)	453,122 (6.6)	275,324 (4.0)	248,503 (3.2)	237,513 (2.2)	606,062 (2.1)
Cotton textiles	61,975 (7.8)	117,485 (8.6)	795,350 (11.5)	709,211 (10.2)	485,393 (6.3)	641,148 (5.9)	388,214 (1.3)
Other textiles	403,452 (50.7)	660,175 (48.1)	3,514,386 (51.0)	3,479,416 (50.2)	3,323,137 (42.9)	3,497,652 (32.3)	4,976,151 (17.1)
<i>Metalworking and machines/appliances</i>							
Chemicals	76,249 (9.6)	184,681 (13.5)	1,274,069 (18.5)	934,994 (13.5)	1,450,231 (18.7)	3,350,433 (31.0)	14,343,557 (49.3)
Processed food	80,172 (10.1)	164,125 (12.0)	723,493 (10.5)	771,593 (11.1)	1,044,266 (13.5)	1,814,724 (16.8)	4,623,270 (15.9)
Misc. manufacturing ^c	147,240 (18.5)	221,246 (16.1)	742,997 (10.8)	1,102,313 (15.9)	1,163,314 (15.0)	1,168,479 (10.8)	2,465,196 (8.5)
Total	89,316 (11.2)	142,201 (10.4)	634,465 (9.2)	636,595 (9.2)	757,772 (9.8)	984,529 (9.1)	2,684,528 (9.2)
	796,429 (100.0)	1,372,429 (100.0)	6,889,410 (100.0)	6,924,911 (100.0)	7,738,720 (100.0)	10,815,817 (100.0)	29,092,702 (100.0)
<i>Number of workers</i>							
<i>Spinning and weaving industries</i>							
Silk-reeling	191,561 (24.5)	224,287 (23.8)	297,957 (18.6)	343,654 (19.1)	416,715 (22.9)	280,508 (11.9)	198,837 (5.2)
Cotton-spinning	89,781 (11.5)	112,858 (12.0)	187,707 (11.7)	210,997 (11.7)	179,558 (9.9)	168,800 (7.1)	138,203 (3.6)
Silk textiles	59,574 (7.6)	45,649 (4.8)	93,453 (5.8)	74,611 (4.1)	67,048 (3.7)	86,385 (3.7)	125,955 (3.3)
Cotton textiles	71,759 (9.2)	88,662 (9.4)	160,426 (10.0)	168,016 (9.3)	126,495 (7.0)	139,128 (5.9)	75,769 (2.0)
Other textiles	501,538 (64.3)	583,469 (62.0)	917,238 (57.1)	1,004,317 (55.7)	1,037,829 (57.1)	1,071,188 (45.4)	998,217 (26.1)
Machines and appliances	65,017 (8.3)	102,257 (10.9)	273,899 (17.1)	317,306 (17.6)	281,033 (15.5)	583,833 (24.7)	1,726,123 (45.1)
Chemicals	27,399 (3.3)	40,212 (4.3)	96,449 (6.1)	98,084 (5.4)	122,330 (6.7)	226,960 (9.6)	222,483 (5.8)
Processed food	71,313 (9.1)	76,856 (8.2)	104,772 (6.5)	170,648 (9.5)	142,998 (7.9)	158,125 (6.7)	497,751 (13.0)
Misc. manufacturing ^c	115,227 (14.8)	138,808 (14.7)	211,384 (13.2)	211,651 (11.7)	232,794 (12.8)	320,781 (13.6)	3,829,835 (100.0)
Total	780,494 (100.0)	941,602 (100.0)	1,605,742 (100.0)	1,802,006 (100.0)	1,816,984 (100.0)	2,360,887 (100.0)	

a. Based on companies with five or more workers.

b. Numbers in parentheses are percentages.

c. "Misc. manufacturing" includes lumber and wood-processing, printing and bookbinding, ceramics, quarrying, and others.

Source: Compiled on the basis of data contained in documents in *Kogyô tôkei go-jûnenshi, Shiryôhen I* [Fifty Years of Industrial Statistics, Documents, vol. 1].

Table 2. Composition of the Female Labour Force by Industry

	1902	1907	1914	1919	1925	1929	1935	1940
Spinning and weaving industries	61,980 (79.4) ^a	68,273 (79.3)	100,460 (80.6)	175,873 (77.4)	199,372 (78.5)	185,280 (77.5)	205,725 (85.7)	188,783 (85.2)
Cotton-spinning	120,980 (93.8)	148,588 (94.9)	209,703 (95.0)	278,249 (93.4)	315,870 (91.9)	385,167 (92.4)	255,066 (92.0)	174,441 (92.2)
Silk-reeling	51,187 (86.6)	93,749 (87.2)	119,850 (85.2)	237,986 (81.6)	236,315 (81.2)	203,613 (81.2)	291,614 (82.3)	271,870 (83.2)
Weaving (A) ^b	730,213 (94.5)	726,232 (95.7)	575,797 (94.3)	951,834 (90.8)	539,015 (86.5)	454,467 (85.1)	492,777 (83.9)	?
Weaving (B) ^b	2,310 (75.3)	3,204 (71.7)	34,835 (69.2)	41,205 (52.9)	40,042 (47.8)	40,441 (44.4)	60,432 (44.7)	139,642 (58.9)
Other	983 (2.9)	2,395 (3.9)	4,184 (4.8)	16,561 (6.4)	19,623 (6.2)	19,995 (7.1)	48,219 (8.2)	175,293 (10.2)
Metalworking/machines								
Chemicals	43,683 (53.1)	22,386 (34.2)	28,101 (33.4)	56,248 (29.7)	48,464 (28.6)	53,348 (27.7)	98,792 (30.7)	126,448 (31.7)
Processed food	13,316 (44.2)	19,643 (40.8)	10,882 (18.6)	19,726 (18.8)	47,190 (27.7)	21,317 (14.9)	31,671 (20.0)	69,267 (31.1)
Misc. manufacturing	11,579 (35.8)	20,342 (38.4)	27,023 (34.3)	43,743 (30.6)	48,872 (28.4)	60,590 (29.9)	90,143 (31.1)	152,242 (30.0)
Total (including misc.) (excludes weaving (B))	313,269 (62.8)	385,936 (60.0)	535,297 (62.7)	870,797 (54.0)	955,827 (52.9)	969,835 (53.1)	1,081,702 (45.7)	1,298,059 (33.8)
Mining								
Metals	?	?	67,291 (22.9)	111,849 (24.0)	72,321 (23.3)	55,104 (19.2)	25,389 (9.9)	55,240 (11.1)
Coal	?	?	14,893 (15.7)	15,167 (15.0)	5,895 (13.1)	5,077 (10.6)	6,433 (9.3)	18,358 (11.9)
			51,400 (27.5)	95,283 (27.4)	65,402 (25.9)	49,277 (21.5)	17,847 (10.2)	34,431 (10.6)

a. Figures in parentheses show percentage of women workers *vis-à-vis* the entire labour force for that industry.

b. "Weaving (A)" means factory workers; "Weaving (B)" non-factory workers.

Source: Compiled from *Nōshōmu toketihyō* [Statistics on Agriculture and Commerce Affairs], *Kōjō toketihyō* [Factory Statistics], *Shōkōshō toketihyō* [Ministry of Commerce and Industry Statistics], and *Honpō kōgyō sūsei* [Trends in Japan's Mining Industry].

The overwhelming majority of workers in the spinning and weaving industry were women, and most women in the labour force were employed in this sector. During the industrial revolution (surveyed in 1902 and 1907), female workers accounted for between 94 and 95 per cent of those employed in silk filatures, 79 per cent of the workers in cotton mills, and 87 per cent of factory weavers (table 2). A closer examination of the categories in table 2 shows the composition of the female working population to be more complex than it first appears. The extremely large number of women working in domestic manufactures ("Textiles (B)")—roughly 700,000—worked for putting-out operations controlled by *toiya* agents. The chemical industry hired between 20,000 and 40,000 women, and processed food and "miscellaneous manufacturing" each employed between 10,000 and 20,000. Women accounted for between 35 and 40 per cent of the workers in each of these industries.

In the chemical industry, women workers concentrated in the match factories. In the manufacture of food, beverages, and tobacco, most worked in tobacco factories, and in "miscellaneous manufacturing" they engaged mainly in straw-plaiting and the weaving of figured rush mats (*hanagoza*). According to a 1902 survey by the Ministry of Agriculture and Commerce (Nōshōmushō), women comprised 77 per cent of workers in the match industry and 86 per cent of those in the tobacco industry.¹ Although there are no confirming statistics, we may suppose that the coal industry, too, employed large numbers of women during the period of the industrial revolution.

Most of the women engaged in these activities (coal-mining was an exception) were under 20 years of age (table 3). With the exception of tobacco, all

Table 3. Age Composition of the Female Workforce, 1901 (percentages)

	Under 14	15-19	Over 20
Cotton-spinning ^a	11.4	41.6	47.0
Silk-reeling ^b	18.3	47.9	33.8
Textiles ^c	16.7	39.9	43.4
Matches ^d	18.6	40.3	41.1
Tobacco ^e	6.7	43.5	49.7

a. 19,344 workers in 16 factories in the Kansai area.

b. 12,519 workers in 205 factories in Nagano Prefecture.

c. 63,701 workers in weaving factories in Hachioji (Tokyo), Tango (Kyoto Prefecture), Sakai (*dantsū*) (Osaka), Ashikaga (Tochigi Prefecture), Nakajima (Aichi Prefecture), Fukui Prefecture (silk-weaving), and Fukuoka Prefecture (*kurume gasuri*).

d. 3,996 workers in 14 factories in Osaka.

e. 4,958 workers in 10 factories.

Source: Nōshōmushō Shōkō Kyoku Hen [Commerce and Industry Bureau, Ministry of Agriculture and Commerce], ed., *Shokkō jijō* [Conditions in the Textile Industry] (1903).

of the goods produced by these industries were for export.² Young female labour, concentrated in the leading export industries, formed a crucial link in the reproductive cycle of early industrial capitalism in Japan. Below, we shall summarize the main features of the female labour force in each sector, focusing on labour and technology (forms of production) and the social supply of labour (the labour market).

1. Cotton-spinning

The majority of female cotton-mill operatives were unmarried and less than 20 years old (table 3). In 1901, 59 per cent of the workers in England's spinning industry were women, and 60 per cent of these were over 20—and many of them were married.³ The unusually high proportion of unwed adolescent women in the workforce is one of the distinguishing features of Japan's early cotton industry. This branch was able to absorb so many young women because of the introduction and rapid spread in the late 1880s of ring spindles, which were easier to operate than the more exacting mule spindles. Japan's quick switch to the technically advanced ring spindle gave it a technological edge over England, which relied exclusively on the mule, and this difference probably explains the larger proportion of older women in English cotton mills.

In the early stages of the industrial revolution, impoverished urban families and poor peasant producers on the periphery of urban centres provided cotton mills with female labour. But as the demand for labour expanded, factories cast recruitment nets wider, and by the late 1890s most operators were the daughters of poor peasants and tenant farmers who came to the cities from the rural hinterlands to find seasonal work (*dekasegi*).⁴ The labour contracts these young women signed with the factories that hired them overwhelmingly favoured management. The "agreements" prohibited the worker from leaving before the specified period of employment was up and allowed the company to fine violators. Management, however, was free to dismiss workers as it pleased.⁵ Such arbitrariness was determined by the fact that recruits, who were poor, were advanced a sum to cover travel and outfit expenses at the time of employment. This money had to be repaid out of wages and effectively bound the worker to the factory. Women in the cotton industry were in effect bonded workers, and as a result they were not independent sellers in the labour market. Under this system of employment, female mill operatives were forced to work a double shift extending far into the night, and for lower wages than their counterparts in colonial India.⁶

2. Silk-reeling

The silk filature industry developed rapidly on a traditional foundation to which foreign technical implants were added. Silk-reeling machinery combined the best features of Western and indigenous technology. But reeling