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Labor Force and Development in Japan

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THE ASIAN POPULATION AND DEVELOPMENT ASSOCIATION, 1986

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Foreword

The labor force is a fundamental determinant of development and survival of a country or a society. Labor force size is in turn determined by the total population of a country, its age and sex compositions, and participation rates by age and sex in the labor force, which are determined by the economic and social conditions of a nation. Total population and its age and sex composition are affected by a country's birth and death rates. Finally, labor force of a regional district is not only affected by these factors of population dynamics but also by migration patterns.

The importance of labor force is not determined by quantity alone. Rather, the concepts of "human capital" and "human investment" have also been emphasized, and supported by theory and actual experiments. It is generally accepted that the higher the quality of labor force, the greater the contribution to economic development and growth. As for Japan's postwar labor force, its size and age and sex compositions underwent both complicated and drastic change by the unprecedented demographic transition. Such change includes the sharp decline in the labor force participation rate by youth because of trends of opting for higher education, high labor force participation rate among the aged, and others.

High economic growth has largely shaped Japan's industrial structure and remarkable advances in science and technology brought about diversification and specialization in the employment structure. The Japanese labor force also underwent quantitative and qualitative changes corresponding to innovative developments in industry and employment.

This study analyzes the development of postwar Japan, a country whose economic, social and cultural aspects are dissimilar to the developed countries of Europe and the U.S., in terms of labor force perspective. I would like to give my heartfelt thanks to the researchers in this discipline for their cooperation in preparing this report.

Lastly, I offer my sincere appreciation to the Japan Shipbuilding Foundation (Chairman, Mr. Ryoichi Sasakawa) and United Nations Fund for Population Activities (Executive Director, Mr. Rafael M. Salas) for their assistance in materializing this text.

December 1986

Tatsuo Tanaka
Chairman
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C O N T E N T S

OVERVIEW AND INTRODUCTION

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The labor force is a major factor in development. The quantity and quality of the labor force as a part of the total population are fundamental determinants for the development and survival of a country.

The character of the labor force began to draw attention after World War II. It is true that the quantitative increase of the labor force is an important driving force for economic development. The quality of the labor force, however, is also a significant contributing factor. Consequently, human investment centering on education came to be considered important. The importance of quality of labor force has been further highlighted by the trend in the advanced countries toward declining labor supply caused by lower birth rates.

The labor force is determined by various factors. First of all, its size is determined by the labor force participation rate by age and sex and by the overall composition of the population, which in turn is determined by birth, death and migration. At the same time, social, cultural and economic factors affecting labor force participation should also be given consideration, especially social and cultural (and often religious) factors that influence female participation in the labor force. It goes without saying that social and economic advances such as changing industrial structure, occupational diversification, and rising educational standards, will affect the participation rate.

This book is a wide-ranging collection of studies of labor force in Japan in relation to development.

Chapter 1 is a general survey on the theme of this book, "Labor Force and Development", where fundamental issues such as the following are introduced: Proposal to create a new systematic study of labor force demography; the stability of the gross activity rate as proportion of labor force to the total population; historical trends in labor force participation rate by age and sex; the relation between gross activity rate and trends in population distribution by age; and the importance of qualitative factors of the labor force.

Chapter 2, "Labor Force and Economic Development" deals with: trends in the (1) productive age population from which labor force is drawn; (2) labor force participation rate; (3) change of labor force; (4) economic development and increase of economically active population, and (5) the relation between age composition of labor force and the industrial structure. Lastly, the author points out that although high economic growth has so far been attained because of favorable interactions between the labor force and economic development, the aging population will create various difficult problems in the future.

Chapter 3, "Aging of Labor Force" analyzes the problems related to the aging of the overall population, and thus of the labor force, aging of workers in the company, and the kinds of jobs available to the aged

and their characteristics. The author also examines the future estimate of the labor force, and proposes that in order to utilize the growing aged labor force, multiple employment system and expansion of job opportunities in different fields, not limited to a particular field, should be created.

Chapter 4, "Labor Force and Technological Innovation" deals with technological advances and employment, characteristics of technological innovation during the high-growth period, and the effects of recent innovations centered in the field of microelectronics. It is pointed out here that the influence of technological innovation differs according to the size of companies. For example, over a recent 10 year period (1971 - 1982), employment in large companies decreased, while that in smaller companies increased.

Chapter 5, "Regional Distribution of Labor Force" examines historical trends in Japan's labor force by region, characteristics of regional trends in labor force, including labor force by region, age and sex, and regional differences in the composition of labor force by industry and in educational level. The author also concludes here that high educational standards of labor force is correlative to high labor productivity.

Chapter 6 is entitled "Future Labor Force Projection". Because of the many factors which affect the labor force, forecasting the future of the labor force is much more difficult than doing so for the total population, though it is indispensable for the formulation of future development programs. In this chapter, the author first explains the methods used to forecast labor force trends and assesses the significance of such forecasts, then examines projections conducted by period: before World War II; after the war until 1960; a period during which the supply of young people in the labor force declined; and lastly, the period of aging population, until 2000.

These studies on labor force in relation to development are based on Japan's experiences through periods of postwar devastation, high economic growth, slowdown of the economy, and an increasingly aging society. Although the findings here are specific to Japan, but they are significant as experiences in Asian society. It is our hope that this book will be of some use for policy-making in this field.

CHAPTER 1

LABOR FORCE AND DEVELOPMENT

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1. Demography of the Labor Force

As requisites to existence and survival of the humankind, labor and production represent two fundamental activities. In the evolution of society beginning from the hunting and gathering stage to present highly industrialized society, man has engaged himself in the activity of work to meet his own needs as well as those of society at all stages of development of civilization. However, over time which witnessed significant cultural and civilization developments, the characteristics of labor have changed dramatically. Together with the innovation of scientific technology, the increased specialization and division of labor, revolutionary changes in economic functions, and changes in society itself, human needs and man's productivity output have undergone substantial increase and diversification. In other words, significant changes in quantity, quality and the characteristics of man's labor have taken place.

The labor force, as it is sometimes called "economically active population", is sub-population engaged in active economic productivity, thus, labor force is both an economic and demographic concept. In this manner, the concept of the labor force can be included in discipline of demography, the scientific study of human populations.

The size of a labor force population and its proportion to the total population have significant correlations with the productive capacity of a nation's economy and the level of per capita national income. Another important variable other than labor force size is represented by the qualitative characteristics of the labor force. Sex and age composition of the labor force are relevant in analyzing labor force quality. However, skill, experience, aptitude, level of education, health conditions and so on represent the primary determinants of the potential levels of productivity and economic growth. The extent to which human quality affects economic growth, the specific variable of education in particular, has been inquired by numerous economists in the post-World War II era. Attracting wide attention recently is the study "Investing in People: The Economics of Population Quality", by Prof. Schultz (*1). Schultz attempted to demonstrate the validity of his assumption that human abilities, namely education, skills, and health, represent a primary determinant of economic growth.

The size, change composition and distribution of labor force are basically determined by population size, sex and age composition and mobility of population, all of which are demographic factors. In turn, population size and sex and age composition are determined by the demographic variables of fertility, mortality and mobility of population. The determinants of labor force participation rate by sex and age are various social, cultural and economic variables. However, such variables include numerous demographic variables such as marital

status and age at marriage, fertility and mortality rates, marriage and divorce rates, and others. Furthermore, extension of the period of formal education, retirement age, life style trends and other cultural and economic variables as well affect the labor force participation rate. The particular field that comprehensively takes up the study of labor force population changes from a demographic perspective can therefore be referred to as "labor force demography".

2. Labor Force Participation Rate

Labor force size as percentage of total population is known as the crude activity rate which has been analyzed in detail by Durand (*2). His cross-sectional global analysis spanning 20 years from 1946 to 1966, clearly indicated that the crude activity rate moves in a U-pattern and is primarily determined by the level of economic development. Participation of females in the labor force, in particular, is at its highest level in developing countries, drops in countries of mid-level development, and then increases again as economic development progresses. One theory states that the crude activity rate decreases with the continuing progress of modernization, but this theoretical assumption appears to lack general validity. Since numerous variables, including increases in productivity and rising standard of education, and change of age composition of population, which occur when a country undergoes transition from agrarian to industrial society, influence the labor force participation rate, it is clear to say that changes in this crude activity rate are extremely complicated ones.

The crude activity rate of the labor force, ratio of females in the labor force, and the economic dependency ratio for the case of Japan since 1920 are as shown in Table 1.

The crude activity rate of Japan had undergone a declining trend in the prewar period, and reached its lowest level of 43.2% in 1950, but thereafter recorded successive increases over a 20-year period until 1970. This period of increase coincides roughly with the nation's period of high economic growth. It then dropped slightly in 1975, and began registering increases again up to recent years, and reaching to the 50%-line in 1985. The ratio of female workers to the total labor force rose from the prewar standard of 35 - 37% to 39% in the postwar period. But, in 1975 it suddenly fell to 36.9%, from 39.1% recorded in 1970. This decline is believed to be attributable to the economic recession brought about by the first oil crisis in 1973. However, it is important to note that the figure, after dropping to 36.9% in 1975, has been showing a trend of steady growth, registering 37.7% in 1980 and 38.5% in 1985.

The economic dependency ratio, which is the percentage of inactive

persons per 100 economically active population, was approximately 120 before the war (while the age dependency ratio - percentage of the combined populations of the aged and young per 100 persons of productive age - is based on age, the economic dependency ratio is a statistical summary of ratio of unemployed persons to the employed, and is thus a more realists indicator of dependency). The ratio then suddenly rose to 135 after the war in 1950, but it rapidly turned to fall below the 100-line thereafter, recording 96 in 1970. It increased slightly since then, but has been maintaining a stable trend at arround the 100-line. In other words, although one worker had to support about 1.4 persons immediately after the war, the same worker today only supports roughly one dependent. The burden has thus been reduced. The decline of the ratio to the very low level of 96 in 1970 is primarily attributable to a change in the age structure, i.e., the age dependency ratio decreased to a historical low of 45 in 1970. This ratio of the number of economically dependent individuals is generally high in developing countries and low among developed nations. In the communist bloc, in particular, the ratio is at its lowest level or generally below the 100-line due to the high rate of female labor force participation among such countries.

3. Labor Force Participation Rate by Sex and Age

Changes in the labor force participation rate by sex and age over a 65-year period from 1920 to 1985 are as analyzed in Table 2.

Substantial changes are observed when controlling for the variables of sex and age. When a comprehensive analysis of trends in the male labor force participation rate is conducted, it is significant to note that although 90% was recorded in the prewar period, continuous declines were registered in the postwar period, dropping to 80% in 1985. On the other hand, the female labor force participation rate was stable during both periods, recording figures around the 50%-line. It is also important to note that the rate declined to 46% in 1975, and then showed a slight recovery trend in 1980 and 1985.

These changes become very conspicuous when controlling for the variable of age.

First is the significant decrease in the labor force participation rate of those in the youngest age bracket of 15 to 19. Regarding the male labor force, the rate has decreased sharply to below the 20%-line at the present from the figure of 80% observed in the prewar period and the figures exceeding 50% immediately after the war. As for the present-day standard in comparison to the pre- and immediately post-war figures, it amounts to a quarter of the former and two-fifths of the latter. Among females, the rate dropped from the prewar level of 60-70%

to 50% immediately following the termination of the war, and thereafter recording figure below the 20%-level since 1980. The figures of 18.8% and 17.6% registered in 1980 and 1985 are even lower than those of their male counterparts.

In the prewar years, the labor force participation rates for both males and females in the 15 to 19 age bracket were significantly larger than that of the 65-plus age category. Upon termination of the war, however, and among working males in particular, the labor participation rate of those in the 65-plus age bracket has surpassed that of the 15-19 age group from 1955, and the former exceeds the latter by two-fold at the present. Regarding the same rate among females, that of the 15-19 age bracket exceeded the figure registered in the 65-plus group still in the postwar period, but in recent years the former has decreased to virtually the same level as the latter, though maintaining a slightly higher margin.

As should be clear, such a low labor force participation rate for the young 15-19 population group is explained by the high percentage of those opting for further education in high school and college within the same age bracket. Consequently, the labor force participation rate for the 15-19 age group is expected to decline further in the future.

Labor force participation of those in the 20-24 age bracket indicates divergent rates when controlling for the variable of sex. For the male members of this group, the rate exceeded 90% before the war, but began to decline after the war and has continued on a downward trend to register 75% at the present. Among females in the same group, however, an opposite trend is observed. Although the rate was below 60% during the prewar period, it began rising following the war to record more than 70% today. It is assumed that the decrease in the male labor force participation rate is cuased by increasing numbers going on to college. In a different way, however, the increase in the percentage of females participating in the labor force appears to be the result of many females opting for 2-year junior colleges rather than 4-year institutions and the later age at marriage.

Concerning the male labor force in the 25-55 age category, the participation rate has been continuously high at around 97-98%, undergoing very little fluctuation. Even among those in the 55-59 age bracket, the rate has remained unchanged at more than 90%.

The labor force participation rates among the aged population groups of 60 to 64 and 65-plus had been indicating a relatively stable trend, but it is important to note that recent figures point to a trend of significant decline. The rate began to drop from the 85% level of 1965-1975, registering 78% in 1985. Among those in the 65-plus age group, a rate of approximately 55% had been maintained after the war, but it shifted to register declines since 1975. The 41% seen in 1985

indicates a rather significant decrease.

Fluctuations in the female labor force participation rate are seen to be more complicated in comparison to their male counterparts. The first noteworthy point is that the female labor force participation rate has remained stable at around the 50%-line for a considerable length of time, but a declining trend has been observed since 1975.

Secondly, similar to their male counterparts, the labor force participation rate among females in the 15-19 age bracket has undergone substantial decline. In spite of the high level exceeding 60% in the prewar period, drops to the 50%-level following the war, rather large declines since 1960 and to below 18% in 1985 have been observed. Over a 25-year period, the figure was reduced to approximately one-third of that seen in 1960. Needless to say, primary causal factor of this decline has been the rapidly increasing number of females opting to continue on to institutions of higher education.

The third important observation is that the labor force participation rate for the 20-24 age bracket increased to the 70%-line after 1970 and the same rates among older female workers -- 40-44, 45-49 and 50-54 age grouping -- have been continuously increasing. The labor force participation rates for the age brackets of 55-59 and 60-64 have maintained a very stable trend. Dissimilarly, however, the figure for aged females of 65 years of age and over has been showing a downward trend.

Changes in crude activity rates, the labor force participation rates among males and females as well as male and female age specific activity rates, described in the above, are summarized in Figure 1, 2 and 3 to facilitate easy interpretation.

4. Crude Activity Rate and Distribution of Population by Age

It is appropriate to assume that the crude activity rate is a statistical summary of the number of dependents to those working in a given population. In Japan, the rate has been extremely stable from the prewar period to the present, with the figures falling within the 43-50% range. In other words, half of the Japanese population is working and providing support for the other half as well as sustaining the society. When calculating the average of this crude activity rate for the case of Japan, it is approximately 45 to 46, or similar to the averages of other developed nations. The crude activity rate among developed nations was 45.7 in 1950, 45.0 in 1960 and unchanged at 45.0 in 1970, coinciding with the Japanese figures. Among the developing regions of the world, the respective rates are slightly lower at 41.4 in 1950, 41.7 in 1960 and 40.4 in 1970 (*3).

In spite of the impact of progressing scientific technology and changing industrial structures and labor system, which cause some degree of change in the ratio of income-producers to consumers, it appears that the crude activity rate, in relationship to the survival and maintenance of human society, does not undergo significant change.

If the crude activity rate is given a particular value, it can be assumed that the labor force participation rates by age and sex would have to be adjusted in order to maintain a given size of the crude activity rate. Furthermore, it might also be reasonable to assume that when a drastic change of age structure of population comes to be inevitable, adjustment of the labor force participation rates by sex and age themselves becomes imperative to maintain the given value of the crude activity rate.

The types of necessary adjustments in the labor force participation rate are shown in the following using a simple hypothesis as an instance. If applying the labor force participation rate by age in 1980 (total of male and female) to the population broken down by age (5-year brackets above 15 years old) 20 years later in 2000, the labor force population comprising all age brackets of over 45 in 2000 is more than 10 million larger than that for the same group in 1980. Furthermore, the percentage of the labor force over 45 to the total labor force increases substantially from 37.8% in 1980 to 48.4% in 2,000. On the other hand, the labor force comprised of age brackets 15-19, 30-34, 35-39, and 40-44 decrease in 2000 when compared to the actual figures recorded in 1980. The labor force of the 20-24, 25-29 brackets increase by a mere 8.6% and 10.1%, respectively compared with those in 1980. The percentage distribution of labor force by age bracket and growth rates are presented in Table 3.

While the labor force comprised of those younger than 45 years of age accounted for 62.2% of the total labor force in 1980, it is expected to undergo a significant decline to 51.9% in 2000. It is obvious that the aging trend observed in the labor population will become increasingly conspicuous in the coming century. However, it may not be reasonable to assume that the 1980 age composition of the labor force, when the aging of population is at its initial stage, would continue at its current level. Nevertheless, it is still important to appropriately study the major adjustments in the distribution of the labor force by age and sex in advance.

5. Labor Force and Development

The labor force is a component of the population, and is a vitally important factor regarding development. A population is comprised of two components; namely, the labor force and those not in the labor

force, and it is assumed that the two have a very stable correlationship. Although the structure of the dependency relationship of one nonworker per worker changes as a result of economic development and changes in the industrial structure and social system, as well as the fact that differences exist among countries, the relationship between the labor force and non-labor force in human society shows an almost stable relationship. There are a number of studies stating that modernization tends to reduce the labor force participation rate (crude activity rate), or that the rate is in an inverse correlation with the status of economic development. However, it is fairly stable in the long run. Obviously, substantial differences are observed in the transitional changes in labor force participation rates by sex and age.

It has come to be recognized that not only the quantity of the labor force but also its quality are especially important factors in the development process. Such concepts as human capital (*4), human resources or human investment emphasize the importance of investment effects in the areas of education, research, training and health in relationship to economic development.

Regarding the regional distribution of the labor force, if conspicuous imbalances in the distribution of people with high educational backgrounds exist, the effects on regional development must be considerable. For example, university graduates tend to concentrate themselves in great urban centers of a country. The population of the Tokyo Metropolitan Area (Tokyo, Kanagawa, Saitama and Chiba prefectures) accounted for 24.5% of the nation's total population in 1980, but it was observed that 37.0% of all university graduates were concentrated in this area. In 1970, the rate was as high as 40%, so this slight diffusion trend is viewed as desireable (*5).

Regarding the relationship between educational attainment and economic development, important research was conducted by Lee-Jay Cho (*6) concerning the Asia and Pacific Region, with special attention to the East Asian and ASEAN nations.

One aspect of the quality of the labor force that cannot be overlooked is the changes occurring in a population's age structure. In the case of Japan, in particular, it has been stated in the above that the age structure of the Japanese population in the productive age bracket as major labor supply source will change significantly. Assuming that the crude activity rate remains constant, adjustment of the labor force participation rates by age becomes unavoidable. In addition to age adjustment, it would probably be necessary to adjust the female labor force participation rate by age, which is comparatively low.

Aging of the work force will inevitably occur, as the population itself ages. The future aged labor force can be expected to be a high

quality work force since they belong to the generation brought up during the age of high educational standards. Nevertheless, in the present era of rapid technological innovation, measures to cope with the increasing numbers of aged workers, and also the large number of middle-aged workers who are coming up to aged workers soon, namely, technology-related measures for assisting the aged work force and training programs for aged and middle-aged workers, are vital.

Notes

(*1) Theodore W. Schultz, Investing in People - The Economics of Population Quality, 1981 (Translated by Nagamasa Ito and Dan Otsubo, Ningen Shihon no Keizaigaku, Nihon Keizai Shimbunsha, 1985); The same author, The Economic Value of Education, Columbia University Press, 1963 (Translated by Yoshihiro Shimizu, Kyoiku no Keizai Kachi, Nihon Keizai Shimbunsha, 1964), and Mikio Sumiya, Kyoiku no Keizaigaku (Economics of Education), Yomiuri Shimbunsha, 1970.

(*2) John D. Durand, The Labor Force in Economic Development - A Comparison of International Census Data 1946-1966, Princeton University Press, 1975, Especially 4. Economic Development and Relative Size of the Labor Force (refer to p.p. 78-92).

(*3) The crude activity rates for the developed and developing countries in 1950 and 1960 are based on the World Summary (Geneva) on the Estimates and Projections of Labor Force of the ILO, 1977 (based on The Determinants and Consequences of Population Trends, Volume I, United Nations, New York, 1973, p. 296, Table IV. 2) Figures for 1970 and 1980 are calculated based upon Philip M. Hauser, Aging of Population and Labor Force for World, More Developed and Less Developed Areas and Their Regions: Population Aging 1970-2025; Labor Force Aging 1970-2000, NUPRI Research Paper Series No. 15, Nihon University Population Research Institute, Tokyo, Japan, Table 1 (p. 40) and Table 5 (p. 45).

(*4) In addition to Schultz's research mentioned in (*1), Becker's study, which directly takes up human capital is also worthy of notice. Gary S. Becker, Human Capital - A Theoretical and Empirical Analysis with Special Reference to Education, Second Edition (Translated by Yoko Sano, Jin-teki Shigen - Kyoiku wo Chushin to shita Riron-teki Keiken-teki Bunseki, Toyo Keizai Shimposha, 1976). Regarding the effect of educational capital on Japan's economic development, refer to Toshio Kuroda, National Development Policy-New Dimension of Development and Population-, Paper presented for First Conference of the Asian Forum of Parliamentarians on Population and Development, 17-20 February

1984, New Delhi, India, and also Saburo Okita, Toshio Kuroda, Naohiro Ogawa and Philip M. Hauser, Population, Natural Resources and Human Resources in Development, NUPRI Research Paper Series No. 11, Nihon University Population Research Institute, Tokyo, Japan, March 1982. A research study conducted by the Ministry of Education states that while the national income increased approximately 10-fold, labor force 1.7-fold and material capital 7-fold in a 55-year period between 1905 and 1960, educational capital grew 23-fold, exhibiting the significant effect of educational investment on economic development (Japan's Economic Development and Education (Nihon no Keizai Hatten to Kyoiku), Ministry of Education, 1962, p. 11.)

(*5) Sumiko Uchino, "Jinko Ido Pataan no Hendo to Kaihatsu", Nihon no Jinko Toshika to Kaihatsu ("Changes in the Migration Pattern and Development", Urbanization and Development in Japan) Population and Development Series No. 3, The Asian Population and Development Association, 1986.

(*6) Lee-Jay Cho, Development and Education, unpublished paper

(*7) Toshio Kuroda, Aging of Labour Force and Technical Progress, paper presented at the United Nations International Symposium on Population Structure and Development organized by the Population Division of the Department of International Economic and Social Affairs, United Nations Secretariat, Tokyo, 10-12 September 1986

Table 1 Crude Activity Rates of the Labor Force and Related Statistics

Year	Labor force [1] (1,000)	Crude activity [2] rate (%)	Percentage of [3] female labor force (%)	Economic [4] dependency ratio
1920	25,866	46.2	36.8	116
1930	28,548	44.3	35.0	126
1940	32,661	44.7	37.4	121
1950	36,347	43.2	38.5	135
1955	40,358	44.8	39.0	123
1960	44,384	47.1	39.1	112
1965	48,627	49.0	38.9	104
1970	53,321	50.9	39.1	96
1975	54,390	48.6	36.9	106
1980	57,231	48.9	37.7	104
1985	60,271	49.8	38.5	100

(Source) Figures are calculated based upon the results of respective rational census. As for figures for 1985, they are based on Showa 60-nen Kokusei Chosa Chushutsu Sokuho Shukei Kekka (1985 Population Census of Japan-Prompt Report of the Basic Findings), Statistics Bureau, Management and Coordination Agency, May 1986.

(Notes) 1) The labor force is the total of both employed and wholly unemployed persons.
2) The crude activity rate is the percentage ratio of the labor force to total population.
3) Females as percentage of the total labor force.
4) Number of inactive persons per 100 economically active.

Table 3 1980 and 2000 Comparison of Labor Force by Age (assuming that 1980 labor force participation rate by age (male and female total) is constant)

Age	1980 percent distribution	2000 percent distribution	Growth rate in 2000 over 1980 (%)
15 - 19	2.8	2.2	Δ 9.3
20 - 24	10.0	9.5	8.7
25 - 29	11.6	11.4	10.1
30 - 34	13.7	9.8	Δ 17.6
35 - 39	12.4	9.6	Δ 11.3
40 - 44	11.7	9.4	Δ 7.3
45 - 49	11.3	10.9	10.6
50 - 54	9.8	12.2	43.8
55 - 59	6.9	9.2	54.1
60 - 64	4.5	6.7	70.9
65 -	5.4	9.3	100.0

(Source) The figures for 1980 are based on the population census. The age composition for 2000 are based on "Nihon no Shorai Jinko Shin Suikei ni tsuite" (Provisional Future Population Projections, August 1986), Institute of Population Problems, Ministry of Health and Welfare.

Table 2 Changes in Labor Force Participation Rates by Sex and Age between 1920 and 1985

Age \ Year	1920	1930	1940	1950	1955	1960	1965	1970	1975	1980	1985
					Male						
Total	92.2	90.5	90.1	83.4	85.3	85.0	83.3	84.3	83.4	82.1	80.4
15 - 19	83.4	78.5	77.6	53.1	54.3	51.6	38.6	36.5	23.3	20.3	19.4
20 - 24	93.7	91.8	91.4	90.5	88.2	87.9	87.1	83.5	79.1	74.7	74.6
25 - 29	97.1	96.7	96.5	95.5	96.2	96.9	97.9	98.2	97.8	97.6	97.1
30 - 34	98.0	98.0	97.8	97.1	97.0	97.7	98.5	98.6	98.8	98.6	98.2
35 - 39	98.2	98.2	98.0		97.3	97.7	98.4	98.5	98.7	98.7	98.4
40 - 44	98.2	97.9	98.0	97.0	97.4	97.6	98.3	98.3	98.4	98.4	98.3
45 - 49	98.0	97.0	97.4		97.0	97.1	98.0	98.1	98.1	98.0	98.0
50 - 54	97.0	95.3	95.5	92.4	95.5	96.0	97.2	97.3	97.5	97.3	97.1
55 - 59	94.7	91.9	90.8		91.1	90.5	93.8	94.2	94.7	94.0	93.0
60 - 64	75.3	85.3	83.6	65.3	82.5	82.5	85.2	85.8	85.4	81.5	77.7
65 -		63.0	62.0		56.5	54.4	55.1	54.4	49.7	46.0	41.5

Age \ Year	1920	1930	1940	1950	1955	1960	1965	1970	1975	1980	1985
					Female						
Total	53.4	49.1	52.6	48.7	50.6	50.9	49.8	50.9	46.1	46.9	47.6
15 - 19	68.4	61.8	66.6	46.9	50.1	49.6	37.6	35.7	22.6	18.8	17.6
20 - 24	59.8	53.9	59.3	64.0	68.2	69.4	69.7	70.8	66.8	71.1	72.9
25 - 29	53.6	46.7	46.6	48.4	51.9	50.2	46.5	45.1	43.5	49.4	53.5
30 - 34	54.3	48.9	48.7	50.2	49.6	51.4	48.0	47.3	43.2	46.5	49.3
35 - 39	55.6	52.0	52.8		53.5	55.1	58.3	56.3	52.8	55.5	57.6
40 - 44	56.6	53.9	56.4	53.3	55.6	56.8	62.1	63.6	59.7	61.8	65.5
45 - 49	56.4	53.6	58.5		54.5	56.8	62.6	64.6	61.9	62.3	65.8
50 - 54	52.8	50.8	57.2	48.4	51.4	51.8	57.3	60.9	58.6	58.7	59.4
55 - 59	47.5	45.1	52.1		45.8	46.8	50.1	53.7	50.9	50.7	50.1
60 - 64	28.2	35.4	43.9	27.3	38.5	39.2	39.4	43.3	39.2	38.8	37.5
65 -		18.6	23.6		20.7	21.0	17.6	19.6	15.8	16.1	15.1

(Source) Nihon no Jinko - Showa 55-nen Kokusei Chosa - Saishu Houkokusho (Shiryo-hen) (Population of Japan - Final Report of the 1980 Population Census (Statistics Tables)), Statistics Bureau, Management and Coordination Agency, 1985 and Showa 60-nen Kokusei Chosa Chushutsu Sokuhou Shukei Kekka Kaisetsu (Final Report of the 1985 Population Census), Statistics Bureau, Management and Coordination Agency, 1986.

Figure 1 Crude Activity Rates and Labor Force Participation Rates by Sex

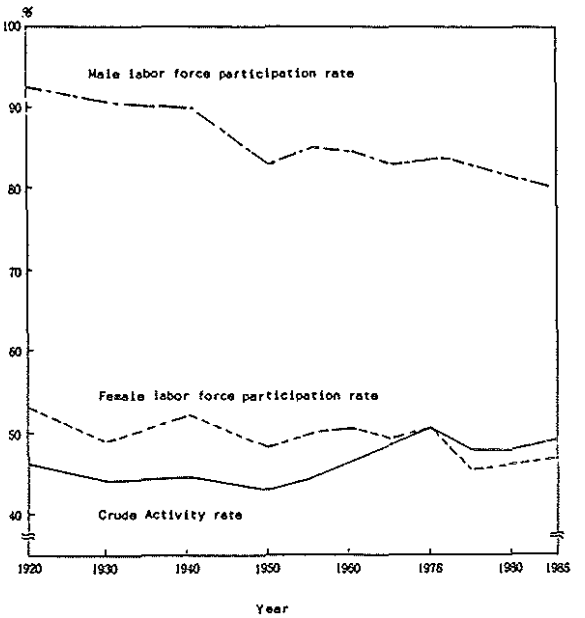


Figure 2 Changes in Male Labor Force Participation Rates by Selected Age Brackets

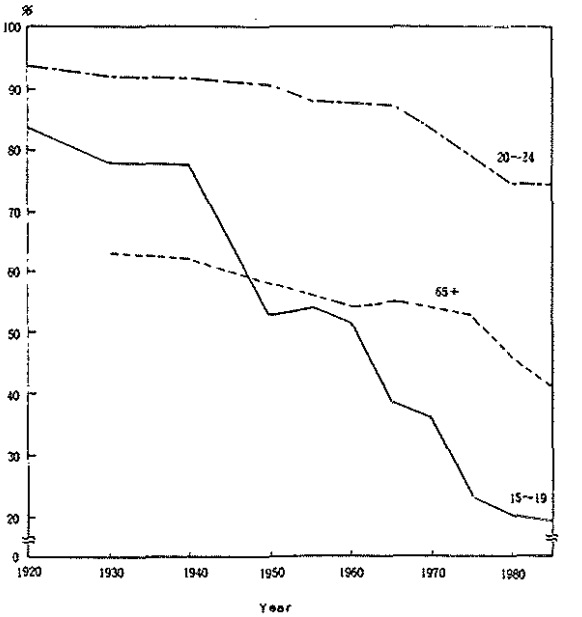
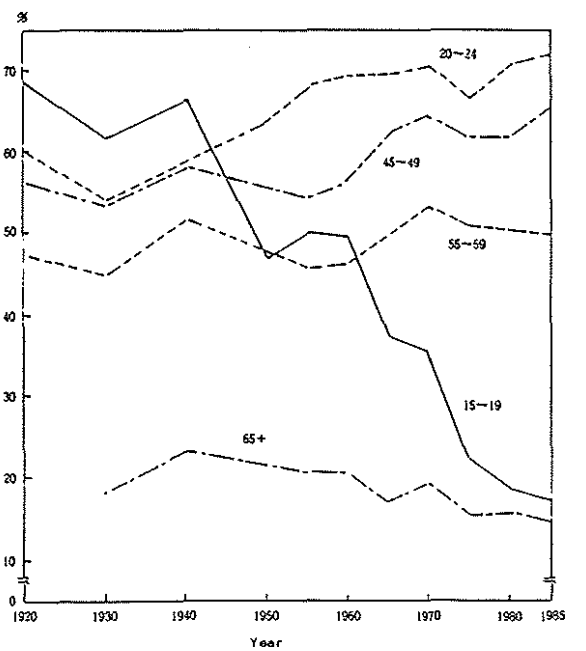


Figure 3 Changes in Female Labor Force Participation Rates by Selected Age Brackets



CHAPTER 2

LABOR FORCE AND ECONOMIC DEVELOPMENT

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Introduction

The labor population and economic development are related. While the labor population operates on economic development as one of the so-called production factors, it, in turn, is influenced by various social and economic conditions created by economic development. This chapter aims to analyze the relations between labor population and economic development in Japan. This study covers the period from 1955 to the present. This particular period is characterized by remarkable changes in the Japanese economy, and provides data best suited the purpose of our analysis. It is hoped that the results yielded will furnish suggestions and advice useful for developing countries in their efforts for economic and social development.

1. Changes in Productive Age Population

The study will start with a review of the changes in productive age population (ages of 15 years and upward), the main constituent of the labor population. The productive age population increased from 59,758 thousand in 1955 to 94,893 thousand in 1985, an increase of about 60%. Noteworthy are the changes in the annual rate of growth: 2.0% in 1955 - 1960 and 2.3% in 1960 - 1965, after which it fell down to the 1% mark, dipping to 1.2% in 1980 - 1985. As will be discussed later, the labor force participation rate also declined over the same period. The slowdown in the rate of increase of the productive age population has apparently resulted in a decline in the growth rate of the labor population.

The age composition of the productive age population during this period also underwent changes. Table 1 divides the productive age population into four age groups and shows the growth rate for each group. The lowest group, 15 - 29 years, amounted 41% of the total productive age population in 1955, but fell to 37% in 1970 and 26% in 1985. The growth rate for this age group was 1.1% in 1955 - 1970 and dropped down to -0.1% in 1970 - 1985. The composition percentage of the other age groups has increased. However, the increase percentage for the middle age group, 30 - 54 years, has decreased from 2.3% to 1.7%, while the rate rose in the two older age groups.

These changes in productive age population - particularly that in age composition - have extremely significant implications. Behind these changes is the postwar drop in the birth and death rates. This trend in dynamics of population was mainly due to the remarkable advance in the standard of living, reflecting the economy's growth.

As will be shown in Chapter 6, the aging of the population will continue to increase, and will result in even more dramatic changes in

the age composition of the productive age population. Needless to say, these future changes will be reflected in the labor population.

2. Changes in the Labor Force Participation Rate

The labor force participation rate represents the ratio of those who participate in labor to the total population of a certain age group, and is closely linked to economic and social conditions.

When examining the changes in the labor force participation rate (Table 2), a large difference between men and women can be observed. The labor force participation rate of men is generally higher than that of women. However, common to both sexes is decrease in the participation rate. As will be explained later, the reason for the decline is the same for both groups.

The rate of men 15 - 19 years old dropped drastically from 54.3% in 1955 to 36.5% in 1970 and 19.4% in 1985. This is obviously a result of the rise in the ratio of students who go on to schools of higher grades; not only those who go on to senior high schools after completing compulsory education at the age of 15, but also those who enter universities. The situation also applies to the 20 - 24 age group, which also shows a fall in the participation rate. It is natural that over 90% of the 25 - 59 age group should participate in labor. The rate for the 60 - 64 group has dropped very recently, reflecting structural changes in industry and occupations. In addition, the full development of the public pension system has exerted an influence. The rate for the 65 plus age group has fallen away further than that of the age group of 60 - 64 years, and has yielded to a greater influence of the above-mentioned structural changes in the industry and occupations.

The labor force participation rate of women 15 - 19 years has also steeply declined, due to the rise in the ratio of students who continue beyond compulsory education. While in the 20 - 24 age group the percentage for women is slightly lower than that for men, but shows a sign of increasing in the long run. The percentage indicates not only a trend toward higher education, but an increasing number of women who are participating in labor after graduation. In the 25 - 40 age group, the female labor participation rate falls as women leave for marriage and childcare. This trend, characteristic of Japan, differs from the female labor participation in western countries. The pattern formed by Japanese female labor participation still has an "M" shape, but is moving toward the Western pattern.

The Japanese female rate rises again starting at age 40. In recent years, the rate of the 40 - 49 age group has shown a remarkable increase. For example, the figure for the 40 - 49 age group expanded

from 55.6% in 1955 to 63.6% in 1970 and 65.5% in 1985. This trend continues through the first half of the 50s. This upward movement reflects galloping economic growth from 1955, and the recent expansion of the service industry sector. Both factors have increased, demand of labor for female workers.

The rates for the 60 - 64 and 65 plus age groups have been rather low, and will decline further. The downward trend is mainly due to structural changes in the industry. The occupations in which older women are usually engaged agriculture and other independent enterprises, have been scaled-down, while mechanization has further reduced the demand for labor.

3. Changes in Labor Population

In this section, the effects that the changes in the productive age population and the labor force participation rate have had on the labor population will be discussed.

The total labor population increased from 40,239 thousand in 1955 to 53,321 thousand in 1970, and 60,271 thousand in 1985. Its annual growth rate decreased almost by half, from 1.9% in 1955 - 1970 to 0.9% in 1970 - 1985 (Table 3).

The expansion of the labor population was examined by the same four age categories used in the productive age population analysis. The most remarkable change was a fall in the rate of increase for the 15 - 29 age group; in 1955 it was 42%, in 1970 34% and in 1985 it dropped to 23%. Meanwhile, the rates of all the other age groups have risen with the 30 - 54 group showing the largest increase. The rate for 55 - 64 group has been on the rise, while the rate for the 65 plus group has been stable.

At first glance there seems to be a striking difference between a decline in the 15 - 29 age group and a rise in the 30 - 54 age group. But when analysized by their respective growth rates, a slowdown in both groups can be observed. The younger age group increased 0.5% annually from 1955 - 1970, and decreased 1.9% in 1970 - 1985. During this latter time period, the 30 - 54 group growth rate slowed to 1.8% from 2.7% in the previous period. In contrast, the growth rate for the 55 - 64 age group, though dropping slightly from 2.8% to 2.3%, has maintained quite high percentages. The fact that the workers of the retirement age group has greatly increased implies serious problems. The rate for the 65 plus group has slowed from 2.8% to 1.5%; this indicates a recent decline in Japan's aged labor population, said to be larger than that of other countries.

4. Economic Development and an Increase in Employed Persons

The year 1955 was a turning point for postwar Japan; the economy had normalized and high growth expansion had begun. From 1960, when the plan to double incomes was formulated, to the oil crisis and its resultant recession at the end of 1973, Japan enjoyed rapid economic growth of over 10% during the boom period and 5% even in the slack times. This kind of growth had never before been expected, either before or after the war. The following are considered to be contributing factors to this rapid growth: (1) The global economy was prospering; (2) suitable economic policies were carried out by the government in cooperation with the private sector under a free economic system; and (3) the country was abundant in high quality workers.

The Japanese government had good reason to encourage a rapid expansion of the economy, for it faced both a real and a potential excess workers. Not only had those born in the prewar high fertility era entered the labor market in 1955, jobs had to be created for the future workers of the postwar baby boom. The most effective and most prompt solution was to realize a high economic growth.

The government succeeded in creating a great demand for labor which not only solved the employment problem, but also exerted a large influence on the industrial and occupational structures.

A look at the respective growth rates of the labor population and employed workers in Table 4 shows that the percentage rise for the employed in 1955 - 1960 was 2.2%, exceeding that of the labor population, 2.0%. These figures imply that economic growth had encouraged employment and created jobs for the unemployed included in the laobr population. Since then full employment has been sustained and the growth rates of the two populations have been almost the same. However, during the periods of 1970 - 1975 and 1980 - 1985, the growth rate of the labor population was higher than that of the employed, which shows that the deep recession during the above periods had caused unemployment.

Another notable change depicted in the Table 4 is the difference among the growth rates of employment by industry. From 1955 to 1960, the secondary industry had shown an extremely high annual increase of 6.7%, and the tertiary industry also climbed 3.7%. Labor productivity in the secondary industry improved, but increasing productivity did not necessarily induce an increase in the labor force. In 1955 - 1960 relatively labor-intensive expansion occurred even in the secondary industry, since labor force was abundant and cheap. The total number of workers increased 2.0% annually, and the number of those employed rose 2.2% annually, absorbing surplus labor. Another source of laobr supply was the primary industry where great number of working forces existed:

The primary industry had reduced its labor forces at an annual rate of 2.5%, thus supporting the development of the secondary and tertiary industries.

During 1960 - 1975 the employment growth rate in the secondary sector fell by about half to 3.4%, reflecting improvements in productivity, while the number of workers employed in the tertiary industry increased 4.4%. The slowdown in the growth rate of the labor force precipitated the decrease of those employed in the primary industry. The same situation continued in 1965 - 1970.

During 1970 - 1975, the recession caused by the oil crisis induced a slowdown in the development of industries, and forced many workers to leave the labor market. The decrease in primary industry workers was greatest in this period. During 1975 - 1980 and 1980 - 1985 efforts were made for more labor efficiency in the secondary industry, which allowed only a slight increase of workers in this industry. Instead, the tertiary industry increased its labor force. The labor force in the primary industry has been continuing to decrease, but not as sharply as before.

The above changes in the working population can be also analysed in the light of the industrial composition of employed persons (Table 4). In 1955, 41% of those employed workers in the primary industry, 23% in the secondary, and 36% in the tertiary. Since then the percentage in the primary industry had shown a sharp drop while those in the secondary and tertiary have increased. From 1970 on, the increase in the secondary industry has levelled off while the ratio in the tertiary has continued to increase. The present precentage is 9%, 33%, and 58%, respectively.

5. Ages of Employed Persons and Industrial Structure

The preceding section examined the shift in the industrial composition of the labor force in economic development. Table 5 is designed to clarify several significant phenomena observed in this shift. Table 5 (1) presents the industrial composition of the employed by age in 1955 when Japanese economic development began. Even that time the composition pattern was showing certain differences. For example, while the percentage distribution is almost the same in all industries for the ages from 15 - 19 to 40 - 44, the percentage was higher for the older age groups in the primary industry. This shift in the industrial composition reflects either that the rate of retirement in the secondary and tertiary industries is higher than that in the primary industry, or that those workers who retire from the secondary and tertiary industries enter the primary industry. Important to note is no significant difference can be seen in the industrial composition among the core groups

of working age.

In contrast, in 1980 (Table 5 (2)), the industrial composition changes considerably between the 15 - 19 and 40 - 44 age groups reflecting a change in the location of workers by industry during the 25 years from 1955.

Econominc development has created two conditions which contribute to changes in the industrial structure. A large number of labor force entrants are absorbed into developing industries rather than sluggish or ailing industries. Also, workers already employed in ailing industries switch occupations and migrate to more promising industries. Postwar Japan has experienced both conditions. But when the industrial structure of the labor force has been examined from the viewpoint of the relation between economic development and the labor population, the first condition the movements of labor force entrants, was given relatively little attention.

Table 6 analyses the change in the industrial structure from this aspect, and breaks down the number of the employed in the 15 - 19 age group by industry for the period from 1955 - 1980. It is assumed here that this age group represents almost all the newly employed. The Table shows that as the total number of new labor force entrants decreased, the secondary and tertiary industries obtained quite a large number of entrants, while the number in the primary industry has been declining sharply.

Younger entrants are cheap and adaptable to new technology, therefore attractive to enterprises. An abundant supply is vital to economic development. One of the contributing factors to the rapid economic growth in ten years over 1960 was large and youthful labor population resulting from the prewar high fertility and the postwar baby boom.

6. Conclusion

So far we have explored the implications of economic development and the labor population based on the experience of Japan. They are closely related and this relation has worked favorably for the Japanese economy. However, the future prospect may be different. As explained in the following chapter, the Japan's population is expected to age rapidly which will result in the aging of the labor population as well. This will pose various problems, including two serious problems concerning the labor force. There will be a relative shortage of young and active workers. This problem can be addressed by technological progress. In this connection, problems the aging labor force may have with technology also should be solved. In addition, consumer demands will change as the population ages. This will then bring about changes

in the industrial structure, thereby forcing the labor force location to change as well. The central problem will be services for the aged, which will involve a wide variety of industries and occupations, particularly in the medical and health care and welfare sectors.

Both problems are of considerable importance; but since the former problem is covered in another chapter, I would like to discuss here the latter. According to economic principles, capital and labor migrate as demands increase. This principle may apply to the services for the aged. However, this is realized only when the demands are revealed. The principle will certainly not work effectively if demands are latent. The problem is, the demands of the aged often tend to be latent. Even if such demands become obvious, they are unlikely to be met since they are pushed aside by other demands and adequate capital and labor cannot be obtained for this purpose. This poses a problem in relation to the future income of the aged.

So far we have dealt with workers who are in the actual labor market. However, the aged require the labor of family members. This kind of work is not included in ordinary labor problems, but is not unrelated. As the aged population increases, family members will become more involved in their care and may have difficulty participating in the labor force. The problem of labor force that the forthcoming aging society will necessitate should be addressed by a broader view of the labor force, a population which includes both the workers in the market and those hidden at home.

Table 1 Age Composition of Productive Age Population (15 years and upward)

(thousand, %)

Age	1955	(%)	1970	(%)	1985	(%)	Annual growth rate '55 - '70	Annual growth rate '71 - '85
15 - 29	24,672	(41)	29,043	(37)	25,041	(26)	1.1	Δ1.0
30 - 54	24,611	(41)	34,869	(44)	45,077	(48)	2.3	1.7
55 - 64	6,711	(10)	8,207	(10)	12,381	(13)	2.4	2.8
65 years and over	4,763	(8)	7,393	(9)	12,395	(13)	3.0	3.5
Total	59,757	(100)	79,512	(100)	94,894	(100)	1.9	1.2

(Source) Population Census

Table 2 Changes of Labor Force Participation Rate (by sex)

Age	1955	1960	1965	1970	1975	1980	1985
Male	85.3	85.0	83.3	84.3	83.4	82.1	80.4
15 - 19 years	54.3	51.6	38.6	36.5	23.3	20.3	19.4
20 - 24	88.2	87.9	87.1	83.5	79.1	74.7	74.6
25 - 29	96.2	96.9	97.9	98.2	97.8	97.6	97.1
30 - 34	97.0	97.7	98.5	98.6	98.8	98.6	98.2
35 - 39	97.3	97.7	98.4	98.5	98.7	98.7	98.4
40 - 44	97.4	97.6	98.3	98.3	98.4	98.4	98.3
45 - 49	97.0	97.1	98.0	98.1	98.1	98.0	98.0
50 - 54	95.5	96.0	97.2	97.3	97.5	97.3	97.1
55 - 59	91.1	90.5	93.8	94.2	94.7	94.0	93.0
60 - 64	82.5	82.5	85.2	85.8	85.4	81.5	77.7
65 and over	56.5	54.4	55.1	54.4	49.7	46.0	41.5
Female	50.6	50.9	49.8	50.9	46.1	46.9	47.6
15 - 19 years	50.1	49.6	37.6	35.7	22.6	18.8	17.6
20 - 24	68.2	69.4	69.7	70.8	66.8	71.1	72.9
25 - 29	51.9	50.2	46.5	45.1	43.5	49.4	53.5
30 - 34	49.6	51.4	48.0	47.3	43.2	46.5	49.3
35 - 39	53.5	55.1	58.3	56.3	52.8	55.5	57.6
40 - 44	55.6	56.8	62.1	63.6	59.7	61.8	65.5
45 - 49	54.5	56.8	62.6	64.6	61.9	62.3	65.8
50 - 54	51.4	51.8	57.3	60.9	58.6	58.7	59.4
55 - 59	45.8	46.8	50.1	53.7	50.9	50.7	50.1
60 - 64	38.5	39.2	39.4	43.3	39.2	38.8	37.5
65 and over	20.7	21.0	17.6	19.6	15.8	16.1	15.1

(Source) Population Census

Table 3 Age Composition of Labor Population

(thousand, %)

Age	1955	(%)	1970	(%)	1985	(%)	Annual growth rate '55 -'70	Annual growth rate '71 -'85
15 - 29 years	16,717	(42)	18,125	(34)	13,656	(23)	0.5	Δ1.9
30 - 54	18,108	(45)	27,015	(51)	35,383	(59)	2.7	1.8
55 - 64	3,701	(9)	5,600	(11)	7,933	(13)	2.8	2.3
65 and over	1,713	(4)	2,581	(5)	3,209	(5)	2.8	1.5
Total	40,239	(100)	53,321	(100)	60,271	(100)	1.9	0.8

(Source) Population Census

Table 4 Industrial Composition of Employed Persons

(thousand, %)

Year	Labor force	Employed persons	Primary industry	Secondary industry	Tertiary industry	Employed persons	Primary industry	Secondary industry	Tertiary industry
1955	40,239	37,590	16,291	9,247	14,051	100	41	23	36
1960	44,384	44,042	14,389	12,804	16,841	100	33	29	38
1965	48,627	47,960	11,857	15,115	20,969	100	25	32	44
1970	53,321	52,593	10,146	17,897	24,511	100	19	34	47
1975	54,390	53,141	7,347	18,106	27,521	100	14	34	52
1980	57,231	55,811	6,102	18,737	30,911	100	11	34	55
1985	60,271	58,218	5,419	17,206	33,488	100	9	33	58
1955 - 60	2.0	2.2	Δ2.5	6.7	3.7	-	-	-	-
1960 - 65	1.8	1.7	Δ3.8	3.4	4.4	-	-	-	-
1965 - 70	1.9	1.7	Δ3.1	3.4	3.2	-	-	-	-
1970 - 75	0.4	0.2	Δ6.3	0.2	2.3	-	-	-	-
1975 - 80	1.0	1.0	Δ3.6	0.7	2.4	-	-	-	-
1980 - 85	1.0	0.8	Δ2.3	0.5	1.6	-	-	-	-

(Source) Population Census

Table 5 (1) Industrial Composition of Employed Persons by Age

1955 (thousand , %)

Age	Primary industry	Secondary industry	Tertiary industry	Total	Primary industry	Secondary industry	Tertiary industry	Total
Total No. of the employed	16,111	9,220	13,926	39,257	41.0	23.5	35.5	100.0
15 - 19	1,430	1,470	1,428	4,328	33.0	34.0	33.0	100.0
20 - 24	2,041	1,852	2,481	6,374	32.0	29.1	38.9	100.0
25 - 29	1,984	1,349	2,178	5,511	36.0	24.5	39.5	100.0
30 - 34	1,660	1,002	1,626	4,288	38.7	23.4	37.9	100.0
35 - 39	1,446	860	1,380	3,686	39.2	23.3	37.4	100.0
40 - 44	1,458	853	1,368	3,679	39.6	23.2	37.2	100.0
45 - 49	1,388	689	1,170	3,247	42.7	21.2	36.0	100.0
50 - 54	1,349	510	922	2,781	48.5	18.3	33.2	100.0
55 - 59	1,175	330	634	2,159	55.3	15.3	29.4	100.0
60 - 64	928	180	388	1,496	62.0	12.0	25.9	100.0
65 years and over	1,230	124	350	1,704	72.2	7.3	20.5	100.0

(Source) Population Census

Table 5 (2) Industrial Composition of Employed Persons by Age

1980 (thousand, %)

Age	Primary industry	Secondary industry	Tertiary industry	Total	Primary industry	Secondary industry	Tertiary industry	Total
Total No. of the employed	6,111	18,737	30,901	55,749	11.0	33.6	55.4	100.0
15 - 19 years	36	551	924	1,511	2.4	36.5	61.2	100.0
20 - 24	145	1,598	3,754	5,497	2.6	29.1	68.3	100.0
25 - 29	282	2,139	4,042	6,463	4.4	33.1	62.5	100.0
30 - 34	380	2,741	4,538	7,659	5.0	35.8	59.3	100.0
35 - 39	391	2,687	3,899	6,977	5.6	38.5	55.9	100.0
40 - 44	573	2,567	3,439	6,579	8.7	39.0	52.3	100.0
45 - 49	815	2,366	3,197	6,378	12.8	37.1	50.1	100.0
50 - 54	953	1,789	2,758	5,500	17.3	32.5	50.1	100.0
55 - 59	832	1,123	1,849	3,804	21.9	29.5	48.6	100.0
60 - 64	683	609	1,137	2,429	28.1	25.1	46.8	100.0
65 years and over	1,021	568	1,365	2,954	34.6	19.2	46.2	100.0

(Source) Population Census

Table 6 Industrial Composition of Employed Persons of 15 - 19 years

(thousand, %)

Year	Primary industry	Secondary industry	Tertiary industry	Total
1955	1,430	1,470	1,428	4,328
1960	793	2,117	1,698	4,608
1965	340	1,976	1,708	4,024
1970	211	1,548	1,422	3,181
1975	66	735	936	1,737
1980	36	551	924	1,511
1955	33.0	34.0	33.0	100.0
1960	17.2	45.9	36.8	100.0
1965	8.4	49.1	42.4	100.0
1970	6.6	48.6	44.7	100.0
1975	3.8	42.3	53.9	100.0
1980	2.4	36.5	61.2	100.0

(Source) Population Census

CHAPTER 3

AGING OF LABOR FORCE

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1. Aging of Labor Force

(1) Change of the Aging

The choice of indices used to describe and definition of the aging of the labor force will vary according to the objective of the study and the limits of available data.

In this chapter, for the purpose of summarizing the age structure of the Japanese labor force in this period of past-high economic growth, the workers were categorized into three groups, young labor, 15 - 34 years of age, middle-aged labor, 35 - 54, and aged labor, 55 and over. The changes in the composition of these groups were studied as shown in Table 1. It was with some reluctance that the author categorized those of 55 years of age and over as aged labor. Since the age limit is often set at 55-60 in Japan, the use of classification of every 5 year age groups accompanies some sense of artificiality. But this classification was adopted for this study. I also enabled rearrangement of age groups by showing a breakdown of the aged group in order to examine the group closely.

Trends in aging, including prospects of the labor force until the year 2000, are shown in the Table 1.

In tracing the age structure of the labor force back to 1960, the start of Japan's high economic growth, according to the above-mentioned 3 age groups, it is important to note that younger workers have declined not only in terms of a composite ratio, but in absolute numbers as well, a decrease of 2.2 million. This clearly reflects the rise in the number of those who enter schools of higher education in the last quarter century.

In contrast, middle-aged workers, who are in the prime of their careers, have been ballooning in number, and are the driving force behind, the high growth of the economy. The composite ratio of aged labor force, workers of 55 years and over, dramatically increased to 18% in 1985, after maintaining a ratio of 15 - 16% until 1980.

The above observations have led to the conclusion that the aging of the labor force had been brought on primarily by a reduction of the younger force and an increase of middle-aged labor.

However, future trends in aging, up until the year 2000, will take a different course. While a decline in the composite ratio of the younger age group will bottom-out, middle-aged workers will start to decrease. Consequently, around the turn of the century, aging of the labor force will be primarily due to an increase in older workers. Particularly in view of male workers, the ratio of the aged labor force,

is expected to exceed 25% in 2,000, marking the advent of an era when one out of every four is a senior worker (Table 1-2).

In consequence of this aging trend, the average age of the employed is also rising. In 1960, the average age of all of those employed was 30.9 years. In 1983, it reached 37.3 years. During this period, age increase was particularly conspicuous among female workers. In 1960, the majority of industries employed women in their twenties. This majority, however, was reduced to nothing in 1983. The average age for the entire female labor population has increased by 9 years. Although the margin of increase for men is smaller than that for women, some industries already have a male work force with an average age in the forties. It is anticipated that the average age of the entire male labor population will exceed 40 within several years.

The dramatic rise in age of female workers is due to the increasing number of those between 25-29 years who remain employed even after marriage, as well as those who return to part-time work after child rearing.

However, for male workers, except for a decline of the labor force participation rate due to an increased ratio of students on grade, there is no marked change. In addition, the aged labor force participation rate is on a downward trend, caused by the reduction in scale of the primary industry.

Therefore, rise of male worker's average age is entirely a reflection of the aging of the population.

Of all the industries, the agricultural sector has shown the most drastic change in the age structure of its employed persons. During the years of high economic growth, a vast supply of labor came from rural areas. As a consequence, the population of workers engaged in agriculture has been declining, while the age has risen. Specifically, the number of people engaged in the agricultural sector (including a small numbers of those employed in the forestry industry) totalled 9.7 million in 1967, but dropped by more than half in less than 20 years, shown in Table 3. Meanwhile, ratio of those of 55 and over has increased from 28.6% to 53.7%. Thus, it is no exaggeration to say that Japanese agriculture is supported by aged workers. This is particularly true for men, male workers in the 55 plus age bracket account for 56.7% of the agriculture labor force, and those in the 65 plus group make up 25.8%. Hence, Japanese agriculture is faced with such a rapid and striking aging. According to data provided by International Labor Organization (ILO), the number of those employed per 100 hectare of arable land in China is 274, in Japan 134, India 101, Brazil 20, the U.S.S.R. 9, United Kingdom 7, and in the U.S.A. 1. From this perspective, one is obliged to say that the nature of Japanese agriculture is different from that of other advanced nations.

(2) Aging in Enterprises

The management system of an organization based on seniority, which had helped the development of Japanese businesses in the labor aspect, had disappeared in the 1970's. Instead, a different scenario is predicted for the future. The problem of the 1980's will be the treatment of middle-aged workers, while the 1990's will be characterized by a serious shortage of managerial posts. By the year 2,000, businesses will be concerned about the treatment of older members, as well as measures to secure retirement allowances.

By the turn of the century, members of the second baby boom generation, born in 1971 - 74, will have entered the labor market. As a source of young workers, they will provide a spark of hope in business' efforts to rejuvenate. But their impact will not be great enough, and aging in enterprises will continue to be a problem.

During the first half of 1970's, towards the close of the period of high economic growth, large corporations conducted massive recruiting of new employees, mostly those of the baby boom generation in order to give incentives to their organizations. However, in the latter half during the subsequent period of economic stagnation triggered by the oil crisis, enterprises were compelled to drastically reduce the number of new hirings. This, together with a policy to hire primarily employees with an advanced academic background, has precipitated the rise of the average age of workers.

Regarding academic background of employees, the policy of hiring workers with more education began to gain momentum in starting 1970's. In 1980, composite ratio of university graduates (including junior college graduates), high school and junior high school graduates of the larger corporations was 3 : 5 : 2. Unless a major change occurs in the ratio of students going onto higher levels of education, difference between academic backgrounds of new and retiring employees will enhance the ratio of employees with a higher educational background. As a result, in the year 2000, the above composition ratio is expected to be 4 : 5 : 1.

The rise of the level of employees' academic background was primarily promoted by large corporations during the period of high economic growth. However, in the post-oil crisis period, large enterprises substantially reduced the number of new hirings, and instead medium-sized enterprises concentrated on hiring university graduates. In 1980, the composition of the academic backgrounds of workers in medium-sized firms was similiar to that of the larger organizations. This trend is expected to continue. However, qualitative difference is recognized between the trends of large and smaller enterprises: while the hiring course followed by larger corporations has shown a drastic shift from junior high school graduates to university graduates, smaller

firms underwent a gradual change from junior high school to senior high school graduates. As was explained earlier, changes in the Japanese labor market may be characterized as a trend toward workers with higher academic backgrounds in conjunction with the aging of employees.

As a large number of workers with advanced educational backgrounds, mainly the postwar baby boomers, reach the age for managerial posts (directors and managers), the shortage of such posts will be further aggravated. Although presently, in large corporations, three out of every four university graduates assumed managerial positions before retirement, in the 21st century, the ratio will drop to one to three.

In viewing the promotion system from operational point of view, those in the 36 - 45 and 46 - 55 year age groups are eligible for promotion to manager and director posts, respectively. But the ratio of managers and directors belonging to these age groups wil be reduced from 49% in 1980 to 29% in 1990.

With such a dramatic change on the horizon, it will no longer be acceptable for companies to continue their policy of encouraging competence and increasing wages are deemed unprofitable, to resign as early as possible. In the same manner, workers must revise their expectation of promotion to section chief at the age of 30, manager at 40 and director at 50. These patterns of retirement and promotion were valid only during the time when high economic growth and a youth-dominated society continued smoothly under Japanese employment traditional practice. Today, however, the climate is in transition, and the economy slowed down while our dominated society is aging. Under such conditions, if the notion that an older worker is a liability remains fixed, no company, not even a growing one, can survive and continue to be viable in this era of aging. Without doubt, Japanese employment practices served as a source of growth, and it still maintains advantages. However, the current perceptions of the aged are impending better utilization of older workers.

Management is to be encouraged to review and adjust the wage, bonus, and retirement allowance systems, and to redevelop human resources in order to eliminate underutilized employees. Workers, on their part are urged to take positive steps toward self-improvement in order to better respond to the needs of the job drastically changed by technological innovation. Efforts by both management and labor will be essential to eliminate the existing negative attitudes towards the aged, and to construct a structure making the best use of their potential.

2. Employment Opportunities of the Aged Labor Force

(1) Labor Force Participation Rate of the Aged

Basically there are two major options that may be used as strategies in the advancement of aging of the labor force. One calls for aged workers to stay employed as long as possible to be able to support themselves. Or, a system can be developed under which aged persons are able to retire as soon as conditions permit and to enjoy leisure time. If the first option is adopted, a variety of issues such as whether increasing older workers could be used effectively, and whether younger workers would be deprived of their positions, must be faced. The second option would require an immediate shift to a welfare society, including improvement in the pension system, which in turn would burden the working population.

The labor force participation rate of men, irrespective of age bracket, is declining (Figure 1). However, the rate of decrease is gradual. On the contrary, this ratio for women has been on an upward trend since 1974, though the rise is yet marginal.

Compared to other countries, the number of older workers, despite the decline of men, is regarded to be unusually high. As shown in Table 4, the labor force participation rate of those of 55 years and over has already been reduced to 30 - 40% in advanced nations, whereas, in Japan it still exceeds 60%. In the case of Japanese women, the figure is also high, marking a clear contrast with European nations, where the ratio amounts to half of Japan's.

As explained earier, the high level of employment of aged labor has been identified as one conspicuous characteristic of Japan. Among the factors contributing to this higher level compared with foreign nations, economic reasons come first, while the need for social participation and a rewarding job are minor considerations. Moreover, those who wish to continue their current job accounted for almost 90% in the 65 plus age group, suggesting a strong, deep-rooted need to be employed and enthusiasm.

Thus even if there is a marginal decline in the labor force participation rate of aged workers, the rate is expected to remain high. Therefore, it is quite unlikely that the European way, where senior members retire early and spend their remaining years in comfort will be adopted in the near future. Consequently, it becomes important to find better ways to utilize increasing aged labor.

(2) Way of Utilizing Aged Labor Force

In what manner will the increased aged labor force be employed in

the future? As a clue to this question, recent data on the occupations of people in the 55 plus age group will be reviewed.

It is a well-known fact that the ratio of aged employees in the primary industry is high. It accounts for 26.3% and 33.9% for those 55 and over and those 65 years and over, respectively. The ratio of workers of 54 and under has already dropped to 6.5%. Meanwhile, the ratio of those employed in the primary industry is expected to well further decline substantially. As a consequence, employment opportunities of the aged workers will be reduced.

In contrast to the primary industry, the secondary sector is characterized by the fact that fewer aged workers are employed there. For instance, in the manufacturing sector, the employment ratio of those of 55 and over is 17.8%, as compared to 26.0% for those of 54 and under. When viewed in detail, ratio breaks down to 20.9% for the 55 - 59 age group, 17.1% for those 60 - 64 and 14.1% for those of 65 and over. In the secondary industry, employment trends of the older workers is thought to be affected by the introduction of micro electronics-related equipment. As the results of past surveys and studies suggest, penetration of such equipment must be recognized as a factor in the decrease of jobs suited for the aged workers, particularly skilled laborers. In that case, the ratio of aged labor force within the secondary industry will shrink even further.

The tertiary industry has now become a sector providing largest employment opportunities for the aged. In particular, opportunities are concentrated in the retail, wholesale and service industries. Among the workers of 55 and over 47.7% are engaged in the tertiary industry; of them as much as 81% are working in these three categories. In the group of 65 and over, 86% are employed in the retail, wholesale and service sectors.

Since the employment ratio in the tertiary industry is not showing any conspicuous decline, even in the upper age brackets, some believe this area to be an expanding source of employment opportunity for aged workers. However, it seems that this conclusion cannot be drawn so easily.

For example, the situation of the aged labor force can be viewed in terms of employment status. According to the "Labor Force Statistics" of 1985, whereas the ratio of the employees is rising to 79.3% for those between 15 - 54, it drops to 48.9% for the 60 - 64 age group, and to 33.9% for those of 65 and over. However, while the ratio of self-employed workers account for only 12.3% amongst those of 15 - 54, it rises to 44.1% for those of 65 and over, thus indicating that a large portion of aged workers are self-employed. The majority of these workers are concentrated in the primary industry, particularly in agriculture, and retail and wholesale sectors. Since such sectors are

expected to decline compared with other industries of the employees, as opposed to rather self-employed, must increase among aged workers.

However, as discussed before, the ratio of people working as employees will be declining rapidly as the age gets higher. Therefore, since the situation requires the continuation of employment as long as possible, measures to find ways to solve this apparent conflict are necessary.

One possible effective way is work-sharing among aged workers. Although for the higher age groups of employees, working hours are slightly shorter, they still substantially exceed 40 hours per week, even among those of 65 and over. This implies that in Japan, aged workers must choose, de facto, between full-time employment and no work at all. Therefore, it is necessary to develop such emloyment opportunities as intermediate types of employment between them according to the older worker's will and capabilities, other than the two choices.

In the past, the employment policy in Japan has attached importance to creation of more full-time work and reduction of the number of part-time jobs and underemployed persons. However, with the advent of an aging society, the Government is required to respond to more diversified needs.

As discussed earlier, aged workers have had a tendency to concentrate on industries and occupations different from those of younger workers. However, in the future, it is essential to develop an environment which allows an even distribution of aged workers in all industries and all occupations, so that they may take more active roles together with the young.

Table 1-1 Age Structure of Labor Force (Total)

(10 thousand persons, %)

Age \ Year	1960	1965	1970	1975	1980	1985	1990	2000
15 - 34	2,214 (49.1)	2,306 (48.2)	2,356 (45.7)	2,225 (41.8)	2,137 (37.8)	1,993 (33.4)	2,019 (31.8)	2,178 (32.7)
35 - 54	1,611 (35.7)	1,776 (37.1)	2,042 (39.6)	2,297 (43.2)	2,601 (46.0)	2,894 (48.5)	3,030 (47.7)	2,907 (43.6)
55 -	691 (15.3)	707 (14.8)	756 (14.7)	802 (15.1)	912 (16.1)	1,076 (18.0)	1,301 (20.5)	1,577 (23.7)
55 - 59	271 (6.0)	275 (5.7)	303 (5.9)	314 (5.9)	385 (6.8)	488 (8.2)	584 (9.2)	662 (9.9)
60 - 64	195 (4.3)	203 (4.2)	222 (4.3)	243 (4.6)	248 (4.4)	288 (4.8)	377 (5.9)	429 (6.4)
65 -	225 (5.0)	229 (4.8)	231 (4.5)	245 (4.6)	279 (4.9)	300 (5.0)	340 (5.4)	486 (7.3)
Total	4,511(100.0)	4,787(100.0)	5,153(100.0)	5,323(100.0)	5,650(100.0)	5,963(100.0)	6,350(100.0)	6,662(100.0)

Table 1-2 Age Structure of Labor Force (Male)

(10 thousand persons, %)

Age \ Year	1960	1965	1970	1975	1980	1985	1990	2000
15 - 34	1,287 (48.1)	1,382 (47.9)	1,420 (45.4)	1,409 (42.2)	1,313 (37.9)	1,194 (33.2)	1,178 (31.2)	1,282 (32.1)
35 - 54	953 (35.7)	1,044 (36.2)	1,220 (39.0)	1,414 (42.4)	1,588 (45.8)	1,738 (48.3)	1,783 (47.2)	1,710 (42.8)
55 -	448 (16.8)	459 (15.9)	489 (15.6)	513 (15.4)	563 (16.2)	665 (18.5)	819 (21.7)	1,006 (25.2)
55 - 59	177 (6.6)	171 (5.9)	186 (5.9)	190 (5.7)	228 (6.6)	307 (8.5)	357 (9.4)	403 (10.1)
60 - 64	127 (4.8)	135 (4.7)	145 (4.6)	154 (4.6)	151 (4.4)	171 (4.8)	247 (6.5)	282 (7.1)
65 -	144 (5.4)	153 (5.3)	158 (5.0)	169 (5.1)	184 (5.3)	187 (5.2)	215 (5.7)	321 (8.0)
Total	2,673(100.0)	2,884(100.0)	3,129(100.0)	3,336(100.0)	3,465(100.0)	3,596(100.0)	3,780(100.0)	3,998(100.0)

Table 1-3 Age Structure of Labor Force (Female)

(10 thousand persons, %)

Age \ Year	1960	1965	1970	1975	1980	1985	1990	2000
15 - 34	929 (50.5)	925 (48.6)	936 (46.2)	816 (41.1)	825 (37.8)	800 (33.8)	841 (32.7)	896 (33.6)
35 - 54	657 (35.7)	732 (38.5)	821 (40.6)	881 (44.3)	1,013 (46.4)	1,156 (48.8)	1,247 (48.5)	1,197 (44.9)
55 -	242 (13.2)	247 (13.0)	266 (13.1)	289 (14.5)	348 (15.9)	411 (17.4)	482 (18.8)	571 (21.4)
55 - 59	94 (5.1)	104 (5.5)	116 (5.7)	126 (6.3)	156 (7.1)	182 (7.7)	227 (8.8)	259 (9.7)
60 - 64	68 (3.7)	68 (3.6)	77 (3.8)	89 (4.5)	97 (4.4)	116 (4.9)	130 (5.1)	147 (5.5)
65 -	80 (4.4)	75 (3.9)	73 (3.6)	76 (3.8)	95 (4.3)	113 (4.8)	125 (4.9)	165 (6.2)
Total	1,838(100.0)	1,903(100.0)	2,024(100.0)	1,987(100.0)	2,185(100.0)	2,367(100.0)	2,570(100.0)	2,664(100.0)

(Source) Annual Report on the Labor Force Survey, Statistics Bureau, Management and Coordination Agency.
Forecasts for 1990 and 2000 are based on Challenge to the Aging Society, Japan Economic Research Center.

Table 2 Average Age of Employed Persons by Industry

	1960			1983		
	Total	Male	Female	Total	Male	Female
All industries	30.9	32.8	26.3	37.3	38.2	35.2
Mining	36.2	36.4	34.3	42.7	42.9	41.1
Construction	34.5	35.0	30.7	39.7	39.8	38.8
Manufacturing	29.7	31.8	25.8	38.1	38.5	37.1
Wholesale & retail	28.4	29.9	25.8	34.1	35.3	31.6
Finance & insurance	32.3	34.5	28.8	35.1	37.5	32.8
Real estate	33.7	37.4	27.6	40.3	42.4	33.6
Transportation & telecommunication	34.0	35.1	26.8	39.3	39.7	35.4
Electricity, gas and Waterworks	35.6	36.0	31.1	38.0	38.6	32.6
Service	-	-	-	37.3	38.5	35.8

(Source) Basic Survey on Wage Structure, Ministry of Labor.

Table 3 Workers Engaged in Agriculture and Their Age Structure

(%, 10 thousand persons)

	1967			1975			1985		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
15 - 34	24.6	23.9	24.9	15.4	15.7	15.2	10.7	11.6	10.4
35 - 54	46.9	43.1	50.2	49.4	43.8	53.9	35.6	32.2	39.4
55 -	28.6	33.0	24.7	35.3	40.3	30.4	53.7	56.7	50.2
55 - 59	15.5	16.2	15.0	11.5	11.2	11.8	16.8	15.9	17.7
60 - 64				10.5	11.5	9.3	15.3	15.0	15.2
65 -	13.1	16.8	9.7	13.3	17.6	9.3	21.6	25.8	17.3
Number of employed persons	970	457	513	618	295	323	464	233	231

(Source) Annual Report on the Labor Force Survey, Statistics Bureau, Prime Minister's Office.

Table 4 Comparisons of Labor Force Participation Rate of Population of 55 years old and over

	Male					Female				
	Japan	U.S.	France	F.R.G.	U.K.	Japan	U.S.	France	F.R.G.	U.K.
1965	73.4	56.5	49.2	52.5	61.2	34.0	23.6	21.0	16.6	18.5
1970	69.7	54.2	43.5	47.6	58.1	31.6	24.4	19.0	15.5	20.4
1975	65.7	52.7	37.7	41.5	54.6	29.4	24.5	17.2	14.2	20.0
1980	63.0	45.5	32.8	32.1	45.2	29.7	22.3	15.3	12.3	17.6
1982	62.3	42.8	30.3	32.8	41.6	29.8	21.8	14.3	12.4	16.3

(Source) Year Book of Labor Statistics, ILO, 1983.

Table 5 Employment Ratio of the Aged by Industry (1982)

(%)

	15 - 54 years old	55 and over			
		Total	55 - 59 years old	60 - 64 years old	65 and over
Total	100.0	100.0	100.0	100.0	100.0
Agriculture & forestry	5.8	25.2	19.7	25.4	32.7
Fishing & marine products	0.7	1.1	1.1	1.1	1.1
Mining	0.2	0.2	0.3	0.2	0.1
Construction	9.8	7.9	9.5	8.1	5.6
Manufacturing	26.0	17.8	20.9	17.1	14.1
Wholesale & retail	22.8	19.6	17.2	20.3	22.5
Finance, insurance & real estate	3.9	3.4	3.2	3.7	3.5
Transportation & communication	6.8	3.4	5.2	2.8	1.4
Electricity, gas & waterworks	0.6	0.4	0.6	0.2	0.1
Service	19.5	18.8	19.3	19.6	17.4
Public sector	3.7	2.1	3.0	1.5	1.4
Primary industry	6.5	26.3	20.7	26.5	33.9
Secondary industry	36.0	26.0	30.7	25.4	19.8
Tertiary industry	57.3	47.7	48.5	48.1	46.3

(Source) Employment Structure Survey, Statistics Bureau, Management and Coordination Agency.

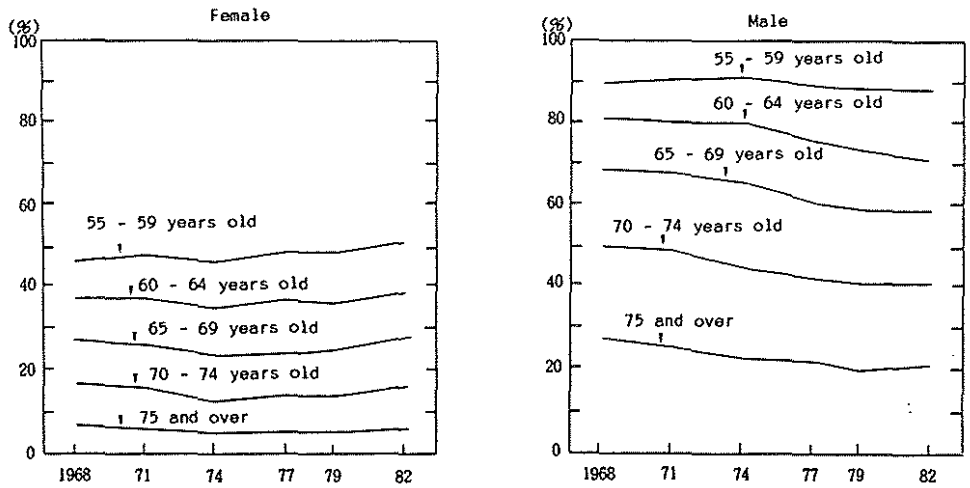
Table 6 Type of Employment of Senior Employed (1985)

(10 thousand persons, %)

	Total	Self-employed persons	Family workers	Employees
Total	5,807 (100.0)	916 (15.8)	559 (9.6)	4,313 (74.3)
15 - 54	4,765 (100.0)	586 (12.3)	377 (7.9)	3,780 (79.3)
55 - 59	473 (100.0)	112 (23.7)	60 (12.7)	299 (63.2)
60 - 64	274 (100.0)	88 (32.1)	51 (18.6)	134 (48.9)
65 -	295 (100.0)	130 (44.1)	66 (22.4)	100 (33.9)

(Source) Annual Report on the Labor Force Survey, Statistics Bureau, Management and Coordination Agency.

Figure 1 Trends in Employment Ratio of the Aged



(Source) Employment Structure Survey, Statistics Bureau, Management and Coordination Agency.

CHAPTER 4

LABOR FORCE AND TECHNOLOGICAL INNOVATION

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1. Progress of Technological Innovation

(1) Accumulation of Capital Stock

Japan had been achieving an annual economic growth rate of almost 10% before the first oil crisis and subsequent economic slump. However, according to a factor analysis of this economic growth, approximately 3 percent point of the growth was attributable to the high rate of technologial progress. That is to say, such considerable technological advancement enabled substantial increases in productivity by converting the Japanese economy from a labor-intensive to capital-intensive one, which in turn, resulted in high economic growth.

However, such technological advancement was not evoled smoothly, but occurred in waves, and had a force which can be called "righteous" technological innovation. One peak of advancement was reached in the beginning of the 1960's, a period of high economic growth when new industries appeared successively and it was said that investment in growing industries called for other investments. The period between 1945 and 1955 was the so-called rehabilitation period, and the major task of that time was the restoration of conventional production facilities and technologies. Although new technologies would be required for full-scale growth thereafter, there existed at that time a large gap in the technological standards between Japan and the advanced industrialized countries due also to the war. As a result, technologies were imported from advanced countries, mainly the U.S., under official administrative guidance to close this gap.

There was only a little accumulation of capital in the Japanese economy at that time. However, aided by offical finance, capital gradually increased. When analyzing fluctuations in capital stock of private enterprises since 1955, the capital accumulation more than doubled every 10 years, as shown in Table 1: ¥34.4 trillion in FY1955, ¥82.7 trillion in FY1965, ¥255.8 trillion in FY1975, and ¥497.9 trillion in FY1985. This capital was amassed mainly in modern industries; the capital accumulation of the secondary industry increased substantially by approximately 20 times in 30 years, while that of the industry on the whole increased by approximately 14-fold. Needless to say, capital was accumulated as produciton facilities and subsidiary equipment by enterprises, particularly by large leading enterprises.

However, in the long run, increase in capital stock of the tertiary industry has tended to grow larger than that of the secondary industry due to the rise in importance of the service sector in the economic structure. In 1985, the capital stock of the tertiary industry exceeded that of the secondary industry. This reflects the fact that, as mentioned later, the technological innovations of the high-technology industry which occurred in 1975-1985 also swallowed the tertiary

industry.

(2) Increases in Number of Employed Persons

The capital stock accumulation, and large increases in production, and employment opportunities resulted in increases in the number of those employed as shown in Table 2. Considerable increases, 5 million every 10 years, were realized, and the number of the employed rose by approximately 17 million in 30 years, from 40.90 million in 1955 to 58.07 million in 1985, at an annual rate of 1.2%. There are contrasting trends in employment. While the number of workers declined in the primary industry, it increased in the other industries. However, when analyzing each 10-year period, the growth rate for the tertiary industry gradually climbed, while that of the secondary industry slowed. The fact that the growth in the secondary industry has recently been showing a substantial decline reflects the tremendous labor decrease in efficiency effected by technological innovation. When analyzing the composition ratio of employed persons by industry, workers in the primary industry, who accounted for one-third of the total in 1955, declined to less than 10% in 1985. While the tertiary industry employed less workers than the primary industry in 1955, the number rose to amount to half of all employed persons.

(3) Increases in Labor Equipment Ratio

When analyzing the conditions under which Japan shifted from a labor-intensive to a capital-intensive economy by trend in the labor equipment ratio (capital stock per worker), it is observed that the ratio, which was ¥843,000 in 1955, increased rapidly and approximately doubled in every 10 years. In 1985, it reached ¥8,565 million, exceeding 10 times that of 1955. Needless to say, the level of the labor equipment ratio is high in the secondary industry, and it still exceeds that of the tertiary industry at present. This means that the facilities for the production of goods require a greater amount of capital than the production facilities for services. However, even among the facilities which produce goods, there are considerable differences by industry, and the labor equipment ratio is high in modern industries which require a high level of technology. As shown in Table 4, the labor equipment ratios of industries including iron and steel, and chemicals, which call for huge production facilities, are high, three to four times that of the machinery industry and almost five times that of the textile industry.

(4) Improvements in Labor Productivity

Next, effects of technological innovation and improvements in the labor equipment ratio will be analyzed in terms of productivity. As shown in Table 5, the real GNP per worker maintained substantial annual growth rates excepting 1974, a period of economic stagnancy due to the

oil crisis, when the rate dropped to 0.2%. In the period of high economic growth, annual growth rates exceeding 10% were often recorded. Even in the economic stagnation in 1975-1984, productivity had continued to increase by more than 2%. On the average, though the growth rate considerably slower in 1975-1984 than in 1955-1964, and 1965-1974, when the rate had increased by approximately 8%, productivity still grew by around 3%. Since the labor productivity of the manufacturing industry is greatly affected by the trade cycle, fluctuations in the annual growth rate are substantially larger than those of the entire industry. Declines in the growth rate of productivity are attributable to the fact that production facilities sometimes cannot be operated full-scale on a short term basis. In addition, there may be delays in adjusting employment to cope with declines in production. However, on the average, the growth rate of productivity of the manufacturing industry maintains a considerably high level, 6% even in 1975-1984, while 10% growth was registered in the periods 1955-1964 and 1965-1974. Owing to such improvements, Japan's productivity reached approximately 10% below that of the U.S. and exceeded the level of Europe in 1977.

(5) Qualitative Changes in Labor Force

Technological innovation has greatly affected the quality of labor. When analyzing the composition of labor force by occupation as in Table 6, the percentage of professional and technical workers increased to almost two-fold, from 5% in 1960 to 9.1% in 1980. It is still slightly lower than the approximately 15% of the U.S. and France and 13.5% of the F.R.G., however, it is anticipated that it will rise to around 11% in 1985. These professional and technical workers were engaged mainly in production technologies in the periods 1955-1964, and 1965-1974. However, since 1975, they have been increasingly engaged in software related tasks due to information-oriented society, the rise in information technology and services. Technological innovation requires labor to be accustomed to sophisticated technology, and the changes in work content reflect improvements in the labor supply, such as education and training. When these changes are analyzed in terms of increases in the rate of students entering schools of higher education, it can be seen that the percentage of those who enter high school after compulsory education rose from 51% in 1955 to 91% in 1975, and those who enter universities rose from 18% to 34% during the same period.

Increases in the percentage of managers and officials are also noteworthy, although the increases are smaller than for professional and technical workers. This reflects that economic activites must be conducted more effectively, and is also an effect of the technological innovation in a broad sense. Needless to say, rise in number of those with more advanced academic degrees is directly related to this trend. In addition, while there is an increase in clerical and related workers, craftmen, production process workers and laborers are decreasing. It is obvious that this shift from blue-collar to white-collar workers is the

long-term outcome of technological innovation. However, in the short term, for example, in 1960-1970, there were increases in craftsmen, production process workers and laboreres. This reflects the fact that at the initial stage of technological innovation complicated tasks were divided into tasks involving sophisticated technology and simple labors. These simple tasks are then performed by machinery at a high stage of technological innovation. As will be mentioned later, when technological innovation spreads to the clerical sector, increases in the number of clerical and related workers also drops.

2. Technological Innovation in Period of High Growth

(1) Characteristics of Technologial Innovation

Long-term developments of technological innovation and its effects on labor force have been analyzed so far. Next, characteristics in the period of high growth, which coincides with the first period of technological enhancement will be considered.

The textile industry, which played a leading role among export industries in 1945-1954, and the iron and steel industry which followed, and furthermore, the home electric appliance industry were all required to improve their international competitiveness, and from 1955, they exerted utmost efforts in rationalization, advances in productivity and cost reduction. During this process, the latest technologies were imported mainly from the U.S., and served as stimuli for the industries, sparking investments, and the rate of technological innovation was speeded up even more.

One of the technological innovations of the time centered on automation adopted to improve accuracy and to increase production speed in the mechanical processing process. This is known as mechanical automation, the effect of which was labor efficiency. The second type of innovation was process automation, observed mainly in the equipment industry, which aimed to increase capacity in order to receive the scale merit. This industry tried to convert to an instrument operation, mainly by increasing its scale and implementing continuous operation. The third type was computerization, related to the previous two types, and which aimed to improve efficiency in the clerical sector.

These technological innovations were adopted in numerous ways in accordance with the characteristics of each industry, and their rate of advancement varied. However, they had one thing in common, they accompanied the increases in the labor equipment ratio. As seen in Table 4, the labor equipment ratio of the manufacturing industry increased by 2.86-fold in 1960-1970, and those of the iron and steel, and chemical industries increased to approximately 3-fold during the same period.

However, the machinery industry was still in the stage of technological innovation where labor is divided into the simple and the technical. Thus the level and the increases of the labor equipment ratio were not as high as those in the equipment industry. Yet in the manufacturing industry on the whole, labor equipment ratio continued to record increases, and did not slow even after 1965 (Table 7). This is attributable to the fact that new technologies gradually permeated and were distributed not only among large enterprises but also among small- and medium-sized enterprises.

Mass production was adopted to pursue the scale merit mainly by large enterprises, and as the production scale expanded, the demand for labor increased. From 1965, Japan gradually developed to a labor shortage, it was the small-and medium- sized enterprises that experienced difficulties in securing worker. As a consequence, those enteprises had no choice but to adopt labor-efficient technologies, which in turn, increased the labor equipment ratio. When analyzing the differences in the labor equipment ratios between large and small- and medium-sized enterprises (Table 8), the percentage of that of small- and medium-sized enterprises in that of large ones accounted for only 25.6% in FY1960, but rapidly increased to 29.6% in FY1965 and to 30.9% in FY1970, quickly lessening the difference. The fact that the growth rate of the labor equipment ratio did not slow even after 1965 is attributable to this narrowing of the gap.

(2) Increases in Labor Productivity and Employment

Effects of technological innovation owing to the improvement in the labor equipment ratio are reflected directly in the increase in labor productivity. Labor productivity in the manufacturing industry exhibited substantial increases from 9.2% in 1955-1959 to 7.6% in 1960-1964, and to as much as 13.4% in 1965-1969. After 1970, productivity turned and recorded considerable stagnation due to the stagflation caused by the oil crisis. However, it recovered to register increases thereafter (Table 9).

By sector, it was the equipment industry which mainly registered high increases in productivity in 1955-1964. After 1965, the machinery industry also began to record comparable growth rates. This was due to the fact that the industry had entered the second phase of mechanical automation, and gradually automated simple labor. A good example is the use of automation in the assembly line observed in home electrical appliance and automotive sectors.

This substantial increase in productivity increased labor efficiency, but, the fact that it did not result in declines in employment can be observed in the employment conditions shown in Table 10. The employment indices of the manufacturing industry on the whole increased considerably, by approximately 60% in 1955-1959 and by 30% in

1960-1964. This is due to the fact that despite the effects of labor-efficiency, production increased at a rate far exceeding that of the effect, thus expanding employment opportunities. In particular, the machinery industry, which substantially expanded its production scale, registered increases in employment rates which exceeded the average for the entire manufacturing industry along with great improvements in productivity.

However, after 1965, the employment indices of the manufacturing industry on the whole considerably slowed down to record a rate of 18% in 1965-1969. The production growth rate, on the contrary, had risen 2.05-fold in 1965-1970, compared to 1.72-fold in 1960-1965. Stagnation of the employment growth rate under the increasing trend in production is nothing but the labor-efficiency effect of technological innovation.

(3) Qualitative Change in Labor Force

While technological innovation exerted a quantitative effect on employment, it also greatly influenced the quality of labor, partially through changes in labor conditions. Such effects are shown directly in Table 11, which indicates the dramatic differences in the composition of the labor force observed when a new plant for steel rolling (one process in the iron and steel industry) is compared to a conventional plant. Regarding age, at the conventional plant, the majority of the employees were skilled workers in their 30s and 40s. However, in the new plant, young workers in their 20s came to account for the majority. The composition ratio of workers' educational backgrounds, also showed a discrepancy; while there were no high school graduates at the conventional plant, they amounted to half the workers at the new plant.

However, it is remarkable that such qualitative changes were not realized by laying off the traditionally skilled middle-aged workers. As shown in Table 12, a wide relocation of workers, and not only within the plant, was implemented. The fact that the scale of relocation was larger when the scale of an enterprise was greater indicates that when the scale of technological innovation is bigger the necessity for deployment is also greater. Needless to say, deployment of employees involved changed in working conditions, and is subjected to labor-management conferences. However, the deployment went smoothly. The fact that the deployment implemented more smoothly was due to conditions of production expansion and increases in employment opportunity by chance. However, it also is evidence of the flexible labor-management relations in Japan.

While demands for young workers and those of higher educational backgrounds increased, the labor market conditions tightened considerably, mainly for young workers. The ratio of job offers to seekers, of general workers showed a trend of excessive supply, registering 0.28 in 1955 and 0.61 in 1965. However, the rate for junior

high school graduates rapidly increased from 1.10 to 3.72, and that for high school graduates similarly rose from 0.73 to 3.50.

3. Effects of Recent Micro Electronics Innovation

(1) Advancement and Characteristics of Technological Innovation

The so-called micro electronics (ME) innovation in the machinery industry, mainly in the electronic industry, worked as a spring for the Japanese economy, which continued to show steady economic growth having recovered from two oil crises. The technological innovation during the period of high growth was realized by imported technologies. However, regarding recent technological innovations, considerable originality was displayed in the stage of application and development, although it depended on the imported technology in the beginning. Such originality should be highly regarded since it expanded the areas in which the products and technology of the electronic industry can be utilized.

In analyzing the conditions of micro electronics introduction, in other words, the employment of micro electronics equipment, Table 13 shows that the equipment have been popularized among large enterprises and are also increasingly adopted by small- and medium-sized enterprises. Regarding the time of adoption, it becomes clear that quite a great number of large enterprises had already introduced the new technology even prior to the first oil crisis. However, development of micro electronics began full-scale after 1975. It is also clear from the indices of adoption plan enterprises that this technological innovation will continue to advance at a rapid rate in the future. Such adoptions of new technologies are understandable also in view of motivation for plant and equipment investment (Table 14). During the period of high growth, great efforts were exerted to expand production and increase capacity. Recently, though efforts equivalent to those exerted in capacity improvement are put to research and development, and rationalization, etc. Under these conditions, improvements in the labor equipment ratio, not only have led to the increase in productivity, but also have caused qualitative changes, that is, improvements in the levels of technology in the long-term viewpoint.

Technological innovation is crucially affecting employment conditions. As shown in Table 15, development of micro electronics reduced employment opportunities at 30% of the plants surveyed, and those that increased the number of employees were exceptional. But it should not be overlooked that among plants which manufacture micro electronics equipment, due to the expansion in production, the number of those which increased work opportunities was greater than those which reduced the employment opportunities. A similar situation was also observed under technological innovations during the high growth period, which

accompanied mass production. This is remarkable since the increases in investments due to technological innovation exceeded increases in labor efficiency. This means that technological innovation brings about labor efficiency to all industries except for industries that manufacture products related to technological innovation, or the innovation leader.

The fact that the increase in the labor equipment ratio did not slow down as much as the economic growth rate and the production growth rate from 1975 was indicated in Table 7. In addition, the fact that the increase in the labor equipment ratio in the tertiary industry has been recently catching up with that of the secondary industry was exhibited in Table 3. Next, the effects of the development of technological innovation, as seen in the increase in the labor equipment ratio, on employment conditions will be analyzed.

(2) Changes in Employment Conditions

In analyzing recent trends in the rate of employment increase by industry as shown in Table 16, it can be seen that the growth rate for the manufacturing industry was 1.1% on the average in 1980-1985 and considerably lower than the produciton growth rate of the same period (4.3%). This clearly shows the effects of technological innovation. However, it is remarkable that while wholesale and retail, and service industries, etc. realized high increases in the rate of employment increase, as much as double the average increase of all industries, financing and insurance, and transportation and communication sectors registered declines in the rates of employment increase in 1980-1985, although they are also tertiary industries. This indicates that these sectors are becoming leading industries in the so-called information-oriented technological innovations. Although not clearly shown in the trends up to 1985, it is believed that technological innovation is gradually demonstrating its labor-efficiency effect on industries which resemble the equipment industry, such as the wholesale sector of the wholesale and retail industry, the service sector for business establishments of the service industry and the elelctricity, gas and waterworks sector.

Next, when analyzing the employment conditions of the manufacturing industry by sector (Table 17), 12 out of 20 sectors, that is, more than half, registered declines, in the number of employees, and it was only the electrical machinery sector which recorded an increase of more than 30% in the five years between 1980 and 1985. The precision machinery sector followed with 15.8%. These sectors are the two leading industries in micro electronics innovation.

The effects of the advancement of technological innovation on employment are directly shown in the comparison of large and small- and medium-sized enterprises (Table 18). In the approximately 10 years between 1971 and 1982, the number of employees in the manufacturing

industry, on the whole, leveled off. However, the growth rate in the number of employees was larger when the scale of the enterprises was smaller, and all enterprises with a less than 100 employees registered a growth exceeding 10%. In contrast, the larger the enterprise became, the bigger the decline in the number of employees was, and those with more than 500 employees registered a decline of 14%. This indicates that workers who lost jobs due to technological innovations in mainly large enterprises are seeking employment in small- and medium-sized enterprises which are comparatively labor-intensive.

Table 1 Capital Stock of Private Enterprises by Industry

(¥ 10 billion)

Year (FY)	All industries	Primary	Secondary	Tertiary
1955	3,448	730	1,085	1,633
1960	5,037	992	1,990	2,055
1965	8,275	1,406	3,766	3,103
1970	15,475	2,472	7,616	5,655
1975	25,584	4,066	11,937	9,579
1980	34,857	5,925	15,235	13,696
1985	49,794	7,576	20,313	21,905

(Source) Capital Stock Statistics (value as of FY1980), Economic Planning Agency.

Table 2 Number of Employed Persons by Industry

(10 thousand persons)

	Year	Total	Primary	Secondary	Tertiary
Actual number	1955	4,090	1,536	1,190	1,364
	1960	4,436	1,340	1,481	1,615
	1965	4,730	1,113	1,801	1,815
	1970	5,094	886	2,144	2,056
	1975	5,223	661	2,203	2,348
	1980	5,536	577	2,307	2,639
	1984	5,766	512	2,349	2,885
	1985	5,807	509	2,368	2,930
Increase/ decrease	1955-1965	640	Δ423	611	451
	1965-1975	493	Δ452	402	533
	1975-1985	584	Δ152	165	582
Composition ratio	1955	100.0	37.5	29.1	33.3
	1965	100.0	23.5	38.1	38.4
	1975	100.0	12.7	42.2	45.0
	1985	100.0	8.8	40.8	50.0

(Source) Labor Force Statistics, Statistics Bureau, Management and Coordination Agency.

Table 3 Capital Stock per Worker

(¥ 10 thousand)

Year (FY)	All industries	Secondary industry	Tertiary industry
1955	84.3	91.5	79.8
1965	174.9	209.1	170.9
1975	489.8	541.8	407.9
1985	856.5	857.8	747.6
Fold			
1955-1965	2.07	2.28	2.14
1965-1975	2.80	2.59	2.38
1975-1985	1.75	1.58	1.83

Calculated from Tables 1 and 2.

Table 4 Tangible Fixed Assets per Employee

(¥ 10 thousand)

	1960	1970	1980	1983	1960-1970	1970-1980	1980-1983
Manufacturing total	73	209	448	534	2.86	2.14	1.19
Textile mill products	53	118	235	281	2.26	1.99	1.18
Chemical and allied products	191	558	1,030	1,253	2.92	1.84	1.21
Iron and steel	221	673	1,624	1,795	3.04	2.41	1.10
General machinery	54	159	327	424	-	2.05	1.29
Electrical machinery		103	226	319	-	2.19	1.41
Transportation machinery		213	451	604	-	2.11	1.33
Precision machinery		90	208	306	-	2.31	1.47

(Source) Calculation results based on Industrial Census, Ministry of International Trade and Industry.

Table 5 Growth Rate of Productivity

(%)

Year	Real GNP per worker (1)	Labor productivity in manufacturing industry (2)
1956	4.6	-
1957	6.9	-
1958	5.1	-
1959	10.1	-
1960	11.6	-
1961	12.5	-
1962	5.4	2.8
1963	11.4	9.4
1964	9.5	12.1
1965	4.7	3.5
1966	10.1	13.0
1967	11.8	16.5
1968	11.5	14.3
1969	9.6	13.5
1970	9.1	10.4
1971	6.0	4.4
1972	7.6	11.4
1973	4.9	20.1
1974	0.2	0.8
1975	3.5	Δ5.1
1976	3.8	12.0
1977	3.8	5.0
1978	3.9	7.9
1979	4.0	11.8
1980	2.9	6.3
1981	2.5	2.4
1982	2.0	1.0
1983	2.4	4.5
1984	4.0	10.0
1985	3.5	3.6

(Source) 1) Report on National Accounts, Economic Planning Agency.
2) Productivity Statistics, Japan Productivity Center.

Table 6 Composition of labor Force by Occupation

(%)

	1960	1970	1980
Total	100	100	100
Professional and technical workers	5.0	6.6	9.1
Managers and officials	2.3	3.9	4.9
Clerical and related workers	10.3	14.0	17.3
Sales workers	10.6	12.0	14.1
Agricultural, forestry and fisheries workers	32.4	19.2	10.6
Mining workers	0.8	0.3	0.1
Workers in transport and communication occupation	3.4	4.5	4.3
Craftsmen, production process workers and laborers	28.7	31.9	31.0
Protective service workers	1.1	1.2	1.4
Service workers	5.4	6.5	7.0

(Source) Population Census, Management and Coordination Agency.

Table 7 Growth Rate in Capital Equipment Ratio of Private Enterprises

(%)

Year (FY)	All industries	Manufacturing industry
1965	10.1	11.6
1966	4.2	2.0
1967	7.5	11.8
1968	12.2	12.9
1969	14.0	29.6
1970	13.9	16.8
1971	11.3	12.7
1972	10.4	7.0
1973	11.9	10.6
1974	10.5	13.1
1975	3.7	4.9
1976	8.8	8.1
1977	7.1	4.0
1978	3.7	3.2
1979	8.4	2.8
1980	8.6	9.7
1981	5.3	5.3
1982	5.0	1.8
1983	7.3	7.8

(Source) Statistical Annual Report of Incorporated Enterprises, Ministry of Finance.

Table 8 Labor Equipment Ratio by Scale

(¥1,000)

Year (FY)	Major enterprise	Small & medium enterprise	Defference (%)
1960	1,184	303	25.6
1965	1,983	588	29.6
1970	3,353	1,117	30.9

(Source) Financial Statements of Principal Enterprises, Financial Statements of Small Business, Bank of Japan.

Table 9 Growth Rate of Labor Productivity in Manufacturing Industry by Sector

(%)

	1955 - 60	1960 - 65	1965 - 70	1970 - 75	1975 - 80	1980 - 84
Foodstuffs	Δ0.2	3.3	3.7	4.8	1.0	Δ0.3
Textile	6.8	6.9	9.8	5.0	5.8	3.2
Lumbering	4.0	0.4	4.9	Δ0.3	3.4	Δ1.5
Pater & pulp	6.8	7.7	13.8	5.9	9.1	4.5
Chemical	9.8	10.2	15.6	5.7	9.6	5.9
Petroleum	15.8	16.7	16.2	2.1	0.8	0.5
Rubber	2.1	2.3	11.8	9.2	11.3	2.7
Leather	2.2	7.1	7.4	5.7	0.8	3.3
Ceramics	6.2	7.8	11.0	4.5	8.6	2.4
Iron & steel	9.1	10.8	17.5	6.3	7.7	2.3
Nonferrous metal	10.3	8.9	13.5	5.5	9.5	1.7
Metal products	-	-	14.9	4.2	7.9	Δ0.2
General machinery	-	3.7	15.7	6.5	11.3	7.7
Electric machinery	-	6.2	20.6	9.2		
Transportation machinery	-	-	13.6	6.9		
Precision machinery	-	8.5	13.7	4.3		
Total of manufacturing industry	9.2	7.6	13.4	5.5	8.6	4.5

(Source) Productivity Statistics, Japan Productivity Center.
(Note) Growth rates are year-on-year grwoth rates.

Table 10 Employment Indices of Manufacturing Industry by Sector

(1960 = 100)

	1951	1955	1960	1965	1970
Total of manufacturing industry	51.9	60.4	100	129.9	150.1
Foodstuffs	36.4	57.2	100	168.5	186.6
Textile	86.9	85.2	100	105.0	92.4
Clothing	40.7	53.6	100	143.1	191.6
Lumbering	53.6	59.5	100	135.5	147.4
Furniture	22.9	38.3	100	139.7	183.1
Paper & pulp	43.4	61.3	100	125.7	118.6
Publishing & printing	52.4	72.9	100	128.3	133.1
Chemical	63.0	71.1	100	123.5	131.5
Petroleum	52.3	74.4	100	111.1	151.8
Rubber	49.3	55.4	100	106.4	118.4
Leather	51.8	57.4	100	150.0	136.6
Ceramics	45.1	56.2	100	126.5	140.4
Iron & steel	60.1	63.5	100	125.8	130.0
Nonferrous metal	38.6	55.0	100	126.6	141.7
Metal products	31.8	44.0	100	140.0	165.7
General machinery	42.8	51.3	100	133.1	203.7
Electric machinery	32.3	39.5	100	136.7	209.2
Transportation machinery	59.6	64.5	100	139.3	175.9
Precision machinery	38.6	50.1	100	139.1	158.8

(Source) Monthly Labor Statistics Survey, Ministry of Labor.

Table 11 Changes in Composition of Labor Force at Steel Rolling Sector

(%)

		Conventional plant	New plant
Age	Total	100	100
	21 - 30	6	34
	31 - 40	44	12
	41 - 50	40	1
	51 and over	10	0
Educational background	Total	100	100
	Higher primary school	100	43
	New junior high school	0	17
	Old junior high and new high school	0	6
	Technical high school	0	34

(Source) Labor Productivity Statistical Survey, Ministry of Labor, 1959.

Table 12 Implementation Ratio of Relocation Accompanied by Changes in Plant and Equipment Technology

	Total	5,000 employees or more
Within the same establishment	34.5	48.0
Relocation to another establishment	16.9	36.0
Total	43.1	58.7

(Source) Survey on Actual Conditions of Using Labor Force, Japan Economic Research Institute.

Table 13 Condition of Micro Electronics Introduction

(%)

	Rate of introduction	Time of introduction			Plan	
		- 74	75-79	80 -	Within 1 year	Within 2-3 years
Total	59.3	31.0	40.6	28.3	2.6	6.6
1,000 persons or more	95.6	66.2	28.8	4.6	0.5	1.6
300 - 999	77.1	39.8	40.2	20.0	1.9	3.8
100 - 299	51.2	22.2	42.4	35.3	2.9	7.8
30 - 99	40.9*					

(Source) Survey on Technological Innovation and Labor, Ministry of Labor, November 1982.

(Note) Figures for 1980* are based on Survey on Actual Conditions of Labor Force by Occupation, Ministry of Labor.

Table 14 Motivation of Plant and Equipment Investment

(%)

	FY1973	FY1985
Capacity consolidation	44.1	34.0
Rationalization	15.5	22.2
Research & development	3.8	13.0

(Source) Private Fixed Investment in Japan, Japan Development Bank.

Table 15 Effects of Micro Electronics Evolution on Employment (Changes by establishment)

(%)

	Increase	Decrease	Establishments manufacturing machinery related to micro electronics	
			Increase	Decrease
Total	4.6	30.1	22.3	10.9
1,000 persons or more	3.5	40.3	21.0	15.6
300 - 999	4.1	34.3	24.7	11.7
100 - 299	5.1	26.8	21.2	9.1

(Source) Survey on Technological Innovation and Labor, Ministry of Labor.

Table 16 Rate of Employment Increase over Preceding Year by Industry

(%)

Year	All industries	Manu-facturing	Wholesale and retail	Finance and insurance	Transpor-tation and communi-cation	Electricity, gas and waterworks	Service
1980	1.5	1.0	2.1	Δ0.6	0.1	2.6	4.9
1981	1.9	1.1	2.7	0.2	0.7	1.6	4.1
1982	1.2	0.7	1.8	0.4	0.0	0.6	2.7
1983	0.3	Δ0.1	1.2	Δ0.5	Δ1.5	Δ0.6	1.8
1984	0.9	1.4	0.5	Δ0.2	Δ1.4	Δ2.8	2.3
1985	1.2	1.8	0.5	Δ0.3	Δ1.3	Δ2.4	3.2

(Source) Monthly Labor Statistics Survey, Ministry of Labor.

Table 17 Indices of Employment of Manufacturing Industry by Sector

(1980 = 100)

	1971	1975	1980	1985
Total of manufacturing industry	113.7	105.5	100	104.9
Foodstuffs	93.5	92.9	100	105.8
Textile	173.3	126.5	100	86.9
Clothing	88.6	100.8	100	95.3
Lumbering	155.7	129.5	100	69.8
Furniture	108.9	102.3	100	90.4
Paper & pulp	116.4	109.4	100	93.0
Publishing & printing	108.3	107.5	100	105.6
Chemical	119.4	110.9	100	95.1
Petroleum	105.1	109.6	100	87.0
Rubber	125.6	107.0	100	99.0
Leather	115.0	104.4	100	80.1
Ceramics	116.5	107.6	100	89.4
Iron & steel	125.4	121.9	100	91.2
Nonferrous metal	113.2	106.6	100	100.4
Metal products	119.0	107.0	100	101.6
General machinery	124.9	113.3	100	106.4
Electric machinery	101.4	89.9	100	131.9
Transportation machinery	106.8	114.5	100	106.9
Precision machinery	97.9	91.0	100	115.8

(Source) Monthly Labor Statistics Survey, Ministry of Labor.

Table 18 Number of Employees by Scale of Enterprise (Manufacturing industry)

(1,000 persons)

	1971	1977	1982	'82/'71
Total	11,743	11,640	12,008	102.2
1 - 9	1,245	1,420	1,488	119.5
10 - 29	1,666	1,754	1,909	114.5
30 - 99	1,991	2,239	2,236	112.3
100 -299	1,580	1,605	1,733	109.6
300 -499	685	633	606	88.4
500 or more	4,558	3,979	3,935	86.3

(Source) Employment Structure Survey, Management and Coordination Agency.

CHAPTER 5

REGIONAL DISTRIBUTION OF LABOR FORCE

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1. Regional Distribution of Labor Force

In this chapter, the regional distribution of labor population in Japan will be clarified. First, however, postwar changes in the regional distribution of labor population in Japan and its characteristics will be analyzed.

Japan, excluding Okinawa, is divided into 13 regions, as shown in Figure 1. The composition ratio of the working population in each area was calculated as shown in Table 1. The result indicates the fact that Japan's working population is concentrated especially in the Kanto I, Tokai and Kinki I areas. These areas incorporate three of the 4 Largest Metropolitan Areas in Japan, Keihin, Chukyo, and Keihanshin Metropolitan Areas. Not included in the region of high concentration of workers in Kitakyushu-Fukuoka Metropolitan Area.

When we analyzed the extent of regional concentrations of the working population using Hoover's index of population concentration Δ, it was found that the values of the Δ of Japan's working population showed a trend of gradual increase (Table 2). From this, it can be noted that one of the characteristics of Japan's working population is its intensified degree of regional concentration. Hoover's index of population concentration Δ, hereby employed, is defined as:

$$\Delta = \frac{1}{2} \sum_{i=1}^{13} |L_i - A_i| \qquad (1.1)$$

where L_i is the composition ratio of the working population in region i (i=1,2,.....13) to the working population in all regions, and A_i is the composition ratio of the area of region i to the area of all regions. As is clear from this definition, the value of Δ nears 1 as the degree of regional concentration of the working population intensifies.

2. Characteristics of Changes in Labor Force by Area

In order to analyze recent changes in the working population by area in more detail, the size of the working population of respective areas in the two 10-year periods of 1960-1970 and 1970-1980 was calculated as shown in Table 3. According to the values of Table 3, during the 10-year period of 1960-1970, when Japan's economic activities made great strides, the nationwide working population recorded a high growth rate of 19.6%. In addition, there were substantial regional differences in the growth rate of working population. The highest growth rate of the working population in this period was 42.5% for the Kanto I area, while the lowest rate was - 3.9% for Southern-Kyushu. A difference of 46.4 percent points (42.5-(-3.9)) was found between them. In contrast, in the 10-year period of 1970-1980, considerable regional

differences in the growth rate of the working population which were observed in the prior period were not exhibited, and regional differences in growth rates were reduced to 13.0 percent points.

3. Composition of Labor Force by Area, Sex and Age

Regional characteristics of the working population, especially characteristics of working populations in urban and rural areas, as well as their transformations over time, will be examined in this section.

Table 4 shows Japan's labor force participation rates in 1960 and 1980 by area (urban and rural), by age (those from 15 to 64, and those 65 and over) and by sex. According to the table, it is clear that the labor force participation rate is lower for the higher age bracket, and the differeces in the rates were greater in 1980 than in 1960. In addition, the labor force participation rates in the urban area are generally lower than those of the rural area for both men and women (except in 1980, when the rate of all men and that of those 65 and over for the urban area exceeded those of the rural area).

In 1960, substantial differences were seen in the labor force participation rates between the urban and rural areas. The difference margin was reduced in 1980 by a downtrend in the rates for the rural area. The similarity in the urban and rural areas characterizes recent labor force participation rates.

4. Regional Differences in Composition of Labor Force by Industry

So as to analyze the composition of the working population by area and by industry, we divided Japan into 5 areas: 4 areas which include three areas of the 4 Largest Metropolitan Areas, Kanto I, Tokai, Kinki I and Northern-Kyushu, and the rest of Japan. The composition ratios of the working population of each area by industry were calculated for 1947, 1960 and 1980. As shown in Table 5, the composition ratio of the working population engaged in the primary sector of industry rapidly dropped in all areas after 1947, while the composition ratio of the working population engaged in the tertiary sector of industry sharply increased. As a result, in 1980, the sum of the composition ratios of the working population engaged in the secondary and tertiary sectors of industries exceeded 80% in all areas.

In general, the composition ratios of the working population engaged in the latter two sectors of industries tend to increase as urbanization advances (*1). However, when the relationships between the composition ratio of the working population engaged in the secondary and

tertiary sectors of industries ($L_{II, III}$), and the composition ratio of the working population engaged in the secondary sector of industry (L_{II}), and the composition ratio of the urban population (U) were analyzed, the relations indicated in Figure 2 were observed (*2). As is clear from this chart, the composition ratio of the working population engaged in the secondary and tertiary sectors of industries ($L_{II, III}$) consistently showed a close positive correlation with the composition ratio of the urban population. The composition ratio of the working population engaged in the secondary sector of industry (L_{II}) showed a poor correlation with the composition ratio of the urban population (U) in 1980. However, the correlation between L_{II} and U was consistently positive. Consequently, the fact that there is a positive correlation between the composition ratio of the urban population and the compositon ratio of the working population engaged in industries other than the primary sector of industry was also confirmed by this figure.

5. Regional Differences in Educational Level of Labor Force

Lastly, regional differences in the educational level of the working population will be analyzed. Table 6 shows the composition ratios of graduates and students for each educational institution in elementary, secondary and higher education in the region incorporating the 4 Largest Metropolitan Areas (refer to Figure 3) and in the rest of Japan for 1968 and 1982. It can be noted in the region incorporating the 4 Largest Metropolitan Areas, a larger number of those who finished higher education can be consistently observed. Furthermore, the table demonstrates the fact that the percentage of female graduates from higher educational institutions has recently increased.

As shown in Figure 4, the relationships between the net product per person employed (Y) and the composition ratio of graduates of secondary and higher educations ($E_{S, H}$) and the composition ratio of graduates of higher education (E_H) were extremely close, and a significant and positive correlation was observed (level of significance was 5%) (*3). This seems to suggest that in order to realize high labor productivity, workers with a higher educational background are required.

Notes

(*1) United Nations: Patterns of Urban and Rural Population Growth, New York, United Nations, 1980, pp. 17 - 19.

(*2) Figure 2 was based upon the composition ratio of urban population (U) indicated below, and the figures in Table 5.

Composition Ratio of Urban Population by Area

Area	Area code	Composition ratio of urban population	
		1960	1980
Kanto I	III	84.2%	92.3%
Tokai	V	66.0	76.5
Kinki I	VII	85.7	91.2
Northern-Kyushu	XI	58.8	68.5
Other areas	-	50.5	63.3

(Note) Figures for "other areas" do not include Okinawa Prefecture.

(*3) Figure 4 was obtained using the value of the following table.

Composition Ratio of Working Population by Area and by Educational Level and Labor Productivity by Area

1968

Area		Composition ratio of graduates		Net regional product per person employed (¥ million)
		Secondary & higher education	Higher education	
Metropolitan Areas	Keihin	58.4	19.3	1.22
	Chukyo	41.6	8.8	0.98
	Keihanshin	54.8	13.4	1.13
	Kitakyushu	54.2	11.2	0.87
Other areas		29.2	6.2	0.70

1982

Area		Composition ratio of graduates		Net regional product per person employed (¥ million)
		Secondary & higher education	Higher education	
Metropolitan Areas	Keihin	74.3	29.0	4.72
	Chukyo	60.4	17.3	4.43
	Keihanshin	69.6	22.3	4.40
	Kitakyushu	72.3	20.4	4.30
Other areas		57.6	13.3	3.25

(Note) Figures for "other areas" do not include Okinawa Prefecture.

Table 1 Composition Ratio of Working Population in Japan by Area

Area	Area code	1947[1)]	1960[2)]	1970	1980[3)]
Nationwide	-	100.0	100.0	100.0	100.0
Actual number (Unit: 1,000)		(33,329)	(43,691)	(52,235)	(55,382)
Hokkaido	I	4.9	5.0	4.7	4.7 (4.7)[4)]
Tohoku	II	11.5	9.8	8.7	8.5 (8.5)
Kanto I	III	12.5	19.1	22.7	24.3 (24.1)
Kanto II	IV	10.7	8.9	8.3	8.2 (8.2)
Hokuriku	V	7.2	6.0	5.4	5.1 (5.1)
Tokai	VI	11.0	11.4	11.8	11.9 (11.8)
Kinki I	VII	9.5	12.1	13.6	13.2 (13.1)
Kinki II	VIII	3.3	2.8	2.8	2.8 (2.8)
Sanin	IX	2.1	1.7	1.4	1.3 (1.3)
Sanyo	X	6.7	6.0	5.7	5.5 (5.4)
Shikoku	XI	5.3	4.4	3.8	3.7 (3.6)
Northern-Kyushu	XII	8.7	7.7	6.8	6.7 (6.7)
Southern-Kyushu	XIII	6.4	5.1	4.1	4.1 (4.0)

(Source) Bureau of Statistics, Office of the Prime Minister: Japan Statistical Yearbook, 2nd Edition, Tokyo, Japan Statistical Association, 1951, pp.42-43, 18th Edition, 1968, pp.55-56, 24th Edition, 1974, pp.61-63, and Statistical Bureau, Management and Coordination Agency: Japan Statistical Yearbook, 35th Edition, Tokyo, Japan Statistical Association, 1985, pp. 77-78.

(Notes) 1) Composition ratio of working population to total population (Unit %).
2) Figures for the periods after 1960 are the composition ratios of working population (%) for the population 15 years of age and over.
3) Okinawa is excluded for purposes of comparison.
4) Percentages in parentheses are the composition ratios when Okinawa is included.

Table 2 Transitions in Degree of Regional Concentration of Working Population Using Hoover's Index of Population Concentration (delta)

Year	1947	1960	1970	1980
Δ	24.3	30.4	34.9	36.0

(Note) Values of Δ (%) were obtained using figures in Table 1.

Table 3 Working Population by Area, and the Growth Rate

Area	Area code	Working population (Unit: 1,000)			Growth rate (%)	
		1960	1970	1980	1960-1970	1970-1980
Nationwide	-	43,691	52,235	55,382	19.6	6.0
Hokkaido	I	2,183	2,460	2,598	12.7	5.6
Tohoku	II	4,286	4,568	4,734	6.6	3.6
Kanto I	III	8,329	11,872	13,431	42.5	13.1
Kanto II	IV	3,891	4,337	4,569	11.5	5.3
Hokuriku	V	2,619	2,822	2,840	7.8	0.6
Tokai	VI	4,997	6,184	6,595	23.8	6.6
Kinki I	VII	5,265	7,107	7,308	35.0	2.8
Kinki II	VIII	1,236	1,444	1,537	16.8	6.4
Sanin	IX	743	737	738	-0.9	0.1
Sanyo	X	2,632	2,984	3,020	13.4	1.2
Shikoku	XI	1,915	2,010	2,033	5.0	1.1
Northern-Kyushu	XII	3,350	3,546	3,727	5.9	5.1
Southern-Kyushu	XIII	2,249	2,163	2,251	-3.9	4.1
Difference		-	-	-	46.4	13.0

(Note) Tabulated using figures in Table 1.

Table 4 Composition of Working Population by Area, Age and Sex

<<1960>>

Nationwide

Unit: million persons
(Composition ratio: %)

Age bracket	Total (100.0)	15-64 (91.8)	65 and over (8.2)
Total			
Population	65.3 (100.0)	59.9 (100.0)	5.4 (100.0)
Working population	44.0 (67.4)	42.1 (70.2)	1.9 (35.5)
Male			
Population	31.5 (100.0)	29.2 (100.0)	2.3 (100.0)
Working population	26.8 (85.0)	25.5 (87.5)	1.3 (54.4)
Female			
Population	33.8 (100.0)	30.7 (100.0)	3.0 (100.0)
Working population	17.2 (50.9)	16.5 (53.9)	0.6 (20.9)

Urban areas

Age bracket	Total (100.0)	15-64 (92.9)	65 and over (7.1)
Total			
Population	42.6 (100.0)	39.6 (100.0)	3.0 (100.0)
Working population	27.3 (64.0)	26.4 (66.6)	0.9 (29.9)
Male			
Population	20.7 (100.0)	19.4 (100.0)	1.3 (100.0)
Working population	17.5 (84.2)	16.8 (86.5)	0.6 (50.4)
Female			
Population	21.9 (100.0)	20.1 (100.0)	1.7 (100.0)
Working population	9.8 (44.9)	9.6 (47.4)	0.3 (15.2)

Rural areas

Age bracket	Total (100.0)	15-64 (89.5)	65 and over (10.5)
Total			
Population	22.7 (100.0)	20.3 (100.0)	2.4 (100.0)
Working population	16.7 (73.6)	15.7 (77.3)	1.0 (42.2)
Male			
Population	10.8 (100.0)	9.8 (100.0)	1.1 (100.0)
Working population	9.4 (86.5)	8.7 (89.4)	0.6 (59.3)
Female			
Population	11.9 (100.0)	10.6 (100.0)	1.3 (100.0)
Working population	7.4 (61.9)	7.0 (66.1)	0.4 (28.5)

<<1980>>

Nationwide

Unit: million persons
(Composition ratio: %)

Age bracket	Total (100.0)	15-64 (88.1)	65 and over (11.9)
Total			
Population	89.5 (100.0)	78.8 (100.0)	10.6 (100.0)
Working population	57.2 (64.0)	54.2 (68.7)	3.1 (28.8)
Male			
Population	43.4 (100.0)	38.9 (100.0)	4.5 (100.0)
Working population	35.6 (82.1)	33.6 (85.8)	2.1 (46.0)
Female			
Population	46.0 (100.0)	39.9 (100.0)	6.1 (100.0)
Working population	21.6 (46.9)	20.6 (51.6)	1.0 (16.1)

Urban areas

Age bracket	Total (100.0)	15-64 (89.2)	65 and over (10.8)
Total			
Population	68.0 (100.0)	60.6 (100.0)	7.3 (100.0)
Working population	42.9 (63.2)	40.9 (67.4)	2.1 (28.4)
Male			
Population	33.1 (100.0)	30.0 (100.0)	3.1 (100.0)
Working population	27.2 (82.1)	25.8 (85.8)	1.4 (46.1)
Female			
Population	34.8 (100.0)	30.6 (100.0)	4.2 (100.0)
Working population	15.8 (45.2)	15.1 (49.4)	0.6 (15.4)

Rural areas

Age bracket	Total (100.0)	15-64 (84.5)	65 and over (15.5)
Total			
Population	21.5 (100.0)	18.2 (100.0)	3.3 (100.0)
Working population	14.3 (66.4)	13.3 (73.1)	1.0 (29.6)
Male			
Population	10.3 (100.0)	8.9 (100.0)	1.4 (100.0)
Working population	8.5 (82.0)	7.8 (87.7)	0.6 (45.7)
Female			
Population	11.2 (100.0)	9.3 (100.0)	1.9 (100.0)
Working population	5.8 (52.0)	5.5 (59.1)	0.3 (17.8)

(Source) Bureau of Statistics, Office of the Prime Minister: 1960 Population Census of Japan, Vol. 2, No. 1, Tokyo, Japan Statistical Association, 1962, pp. 20-31.
Statistics Bureau, Prime Minister's Office: 1980 Population Census of Japan, Vol. 2, No. 1, Tokyo, Japan Statistical Association, 1982, pp. 198-200.

(Notes) Figures in parentheses in the age column are the composition ratios of the population for the respective age brackets. In the working population column, the numbers in parentheses are the compostion ratios of the working population to the total population, in other words, the labor force participation rate.

Various composition ratios were not obtained from figures in the table, but based upon the population values using 1,000 persons as the unit.

Figures for 1960 do not include Okinawa Prefecture, but those for 1980 do include this prefecture. The total working population of the Okinawa Prefecture in 1980 were 0.46 million (Statistics Bureau, Prime Minister's Office: 1980 Population Census of Japan, Vol. 3, Part 2, 47 Okinawa-ken, Tokyo, Japan Statistical Association, 1983, p. 194). When the figures for Okinawa Prefecture are subtracted from the figures listed on this table, the composition ratios are not significantly altered.

Table 5 Composition Ratio of Working Population by Area and by Industry

Units - Total: 1,000
- Composition Ratio: %

<<1947>>

Area	Area code	Total	Composition ratio				
			Total	Sector(s) of industry(ies)			
				Primary	Secondary	Tertiary	Secondary and tertiary
Nationwide	-	33,329	100.0	53.4	23.7	22.9	46.6
Kanto I	III	4,170	100.0	33.6	32.7	22.7	55.4
Tokai	VI	3,654	100.0	51.0	27.1	21.9	49.0
Kinki I	VII	3,151	100.0	29.2	37.7	33.1	70.8
Northern-Kyushu	XII	2,902	100.0	49.2	27.9	22.9	50.8
Other areas	-	19,452	100.0	62.7	18.3	19.0	37.3

<<1960>>

Area	Area code	Total	Composition ratio				
			Total	Sector(s) of industry(ies)			
				Primary	Secondary	Tertiary	Secondary and tertiary
Nationwide	-	43,691	100.0	32.6	29.7	37.7	67.4
Kanto I	III	8,329	100.0	14.1	38.7	47.2	85.9
Tokai	VI	4,997	100.0	27.7	37.5	24.8	62.3
Kinki I	VII	5,265	100.0	12.1	43.2	44.7	87.9
Northern-Kyushu	XII	3,350	100.0	33.0	26.9	40.1	67.0
Other areas	-	21,750	100.0	45.7	21.7	32.6	54.3

<<1980>>

Area	Area code	Total	Composition ratio				
			Total	Sector(s) of industry(ies)			
				Primary	Secondary	Tertiary	Secondary and tertiary
Nationwide	-	55,382	100.0	10.9	34.3	54.8	89.1
Kanto I	III	13,431	100.0	3.7	35.1	61.2	96.3
Tokai	VI	6,595	100.0	8.2	41.8	50.0	91.8
Kinki I	VII	7,308	100.0	3.2	38.1	58.7	96.8
Northern-Kyushu	XII	3,727	100.0	13.4	28.0	58.6	86.6
Other areas	-	24,321	100.0	17.6	31.7	50.7	82.4

(Notes) Tabulated based upon the figures of Table 1. Consequently, the working population for 1947 represents the working population in the total population. The working population for the other years is the working population among those of 15 years of age and over.
Okinawa Prefecture is excluded from all figures, national and otherwise, in all years.

Table 6 Composition Ratio of Working Population by Area, Sex, and Educational Level

<<1968>>

Units - Total: 1,000
- Composition ratio: %

Nationwide

Age bracket	Total	Composition ratio					
		Total	Graduates				Students
			Total	Elementary education	Secondary education	Higher education	
All the working population							
Total	49,006	100.0	99.2	55.3	33.6	10.3	0.8
15 - 64	46,703	100.0	99.2	53.8	34.8	10.6	0.8
65 and over	2,303	100.0	100.0	85.4	9.0	5.6	0.0
Male							
Total	30,253	100.0	99.2	52.4	33.3	13.5	0.8
15 - 64	28,644	100.0	99.1	50.7	34.6	13.9	0.9
65 and over	1,609	100.0	100.0	82.2	10.3	7.5	0.0
Female							
Total	18,627	100.0	99.3	60.0	34.1	5.1	0.7
15 - 64	17,933	100.0	99.3	58.8	35.2	5.3	0.7
65 and over	694	100.0	100.0	92.8	5.9	0.1	0.0

4 Largest Metropolitan Areas

Age bracket	Total	Composition ratio					
		Total	Graduates				Students
			Total	Elementary education	Secondary education	Higher education	
All the working population							
Total	21,887	100.0	99.0	44.6	39.1	15.4	1.0
15 - 64	21,119	100.0	99.0	43.4	40.0	15.6	1.0
65 and over	768	100.0	100.0	77.2	12.8	10.2	0.0
Male							
Total	14,615	100.0	99.0	42.1	37.5	19.3	1.0
15 - 64	14,032	100.0	99.0	40.8	38.5	19.6	1.0
65 and over	583	100.0	100.0	73.4	13.9	12.9	0.0
Female							
Total	7,272	100.0	99.1	49.4	42.1	7.5	0.9
15 - 64	7,087	100.0	99.1	48.4	43.0	7.7	0.9
65 and over	185	100.0	100.0	89.2	9.2	1.6	0.0

Areas Outside the 4 Largest Metropolitan Areas

Age bracket	Total	Composition ratio					
		Total	Graduates				Students
			Total	Elementary education	Secondary education	Higher education	
All the working population							
Total	27,119	100.0	99.4	64.0	29.2	6.2	0.6
15 - 64	25,584	100.0	99.3	62.3	30.5	6.4	0.7
65 and over	1,535	100.0	100.0	89.4	7.1	3.4	0.0
Male							
Total	15,638	100.0	99.3	61.9	29.3	8.1	0.7
15 - 64	14,612	100.0	99.3	60.2	30.8	8.3	0.7
65 and over	1,026	100.0	100.0	87.1	8.3	4.5	0.0
Female							
Total	11,482	100.0	99.5	66.7	29.0	3.7	0.5
15 - 64	10,973	100.0	99.4	65.4	30.2	3.8	0.6
65 and over	509	100.0	100.0	94.1	4.7	1.2	0.0

<<1982>>

Units - Total: 1,000
- Composition ratio: %

Nationwide

Age bracket	Total	Composition ratio						
		Total	Graduates				Students	Unknown
			Total	Elementary education	Secondary education	Higher education		
All the working population								
Total	57,430	100.0	98.9	34.9	45.1	18.9	0.9	0.1
15 - 64	54,368	100.0	98.9	32.9	46.5	19.5	1.0	0.1
65 and over	3,059	100.0	99.9	70.7	20.5	8.8	0.0	0.1
Male								
Total	34,797	100.0	98.9	33.0	43.7	22.3	0.9	0.1
15 - 64	32,835	100.0	98.9	30.9	45.1	22.9	1.0	0.1
65 and over	1,962	100.0	99.9	67.2	20.8	11.9	0.0	0.0
Female								
Total	22,630	100.0	99.0	37.8	47.4	13.8	0.9	0.1
15 - 64	21,533	100.0	98.9	35.8	48.8	14.3	1.0	0.1
65 and over	1,097	100.0	100.0	76.8	19.8	3.2	0.0	0.1

4 Largest Metropolitan Areas

Age bracket	Total	Composition ratio						
		Total	Graduates				Students	Unknown
			Total	Elementary education	Secondary education	Higher education		
All the working population								
Total	28,063	100.0	98.4	27.5	46.0	24.8	1.5	0.2
15 - 64	26,847	100.0	98.3	26.0	47.0	25.3	1.5	0.2
65 and over	1,216	100.0	99.8	61.2	25.0	13.7	0.0	0.0
Male								
Total	17,742	100.0	98.3	26.0	43.6	28.7	1.5	0.2
15 - 64	16,927	100.0	98.3	24.5	44.5	29.2	1.5	0.2
65 and over	815	100.0	99.8	56.6	25.2	18.0	0.0	0.0
Female								
Total	10,321	100.0	98.4	30.1	50.2	18.1	1.5	0.1
15 - 64	9,920	100.0	98.3	28.5	51.2	18.6	1.5	0.2
65 and over	401	100.0	100.0	70.6	24.2	4.7	0.0	0.0

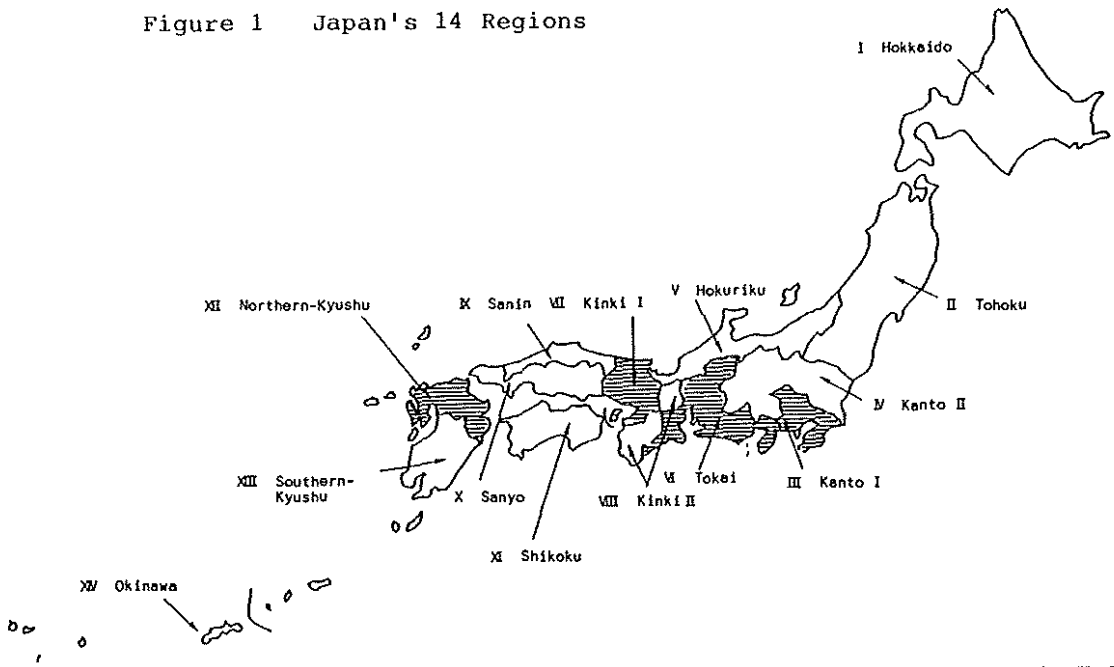
Areas Outside the 4 Largest Metropolitan Areas

Age bracket	Total	Composition ratio						
		Total	Graduates				Students	Unknown
			Total	Elementary education	Secondary education	Higher education		
All the working population								
Total	29,364	100.0	99.5	42.0	44.3	13.3	0.4	0.1
15 - 64	27,521	100.0	99.5	39.6	46.1	13.8	0.5	0.1
65 and over	1,843	100.0	100.0	77.0	17.6	5.5	0.0	0.1
Male								
Total	17,055	100.0	99.5	40.3	43.8	15.5	0.4	0.0
15 - 64	15,908	100.0	99.5	37.8	45.6	16.1	0.4	0.0
65 and over	1,147	100.0	100.0	74.7	17.7	7.6	0.0	0.0
Female								
Total	12,309	100.0	99.4	44.3	45.0	10.2	0.5	0.1
15 - 64	11,613	100.0	99.4	42.1	46.6	10.7	0.2	0.1
65 and over	696	100.0	100.0	80.5	17.2	2.3	0.0	0.1

(Source) Bureau of Statistics, Office of the Prime Minister: 1968 Employment Status Survey, All Japan, Tokyo, Japan Statistical Association, 1979, pp. 14 - 19, pp. 346 - 347, pp. 364 - 401.
Statistics Bureau, Prime Minister's Office: 1982 Employment Status Survey, All Japan, Tokyo, Japan Statistical Association 1984, pp. 484 - 491, pp. 334 - 388.
Statistics Bureau, Prime Minister's Office: 1982 Employment Status Survey Regional Resutls II, 1984, p. 430.

(Note) All the figures in these tables do not include Okinawa Prefecture.

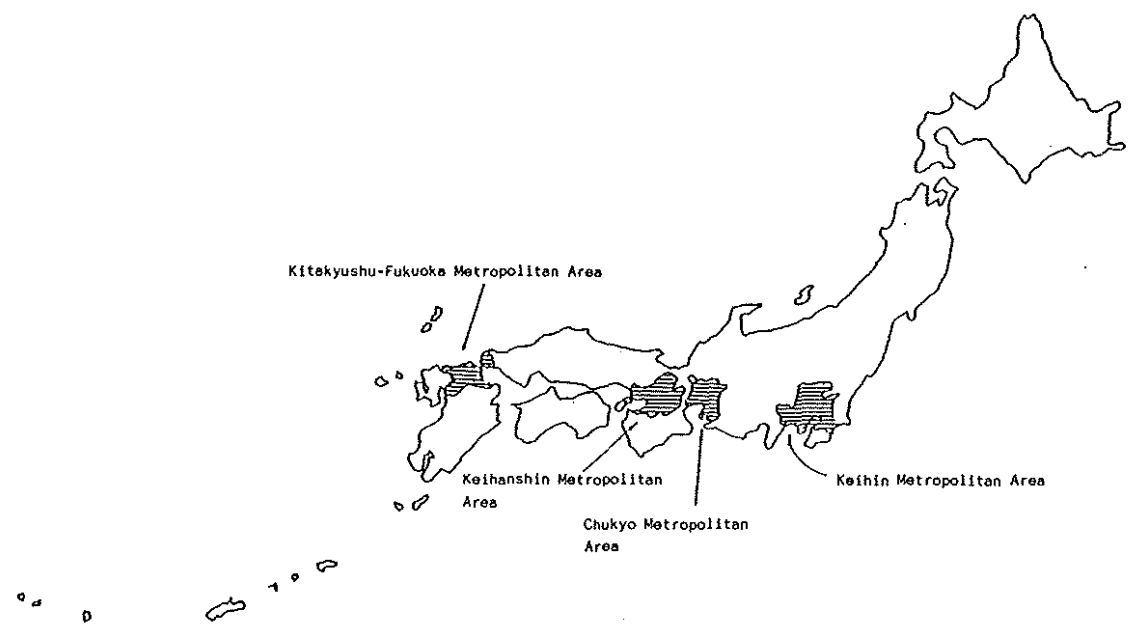
Figure 1 Japan's 14 Regions



(Source) Statistics Bureau, Prime Minister's Office: 1982 Employment Status Survey, Regional Results III, Tokyo Japan Statistical Association, 1984, p. 5.

(Note) Shaded portions indicate the areas regarded as those incorporating the 4 Largest Metropolitan Areas (cf. Figure 3).

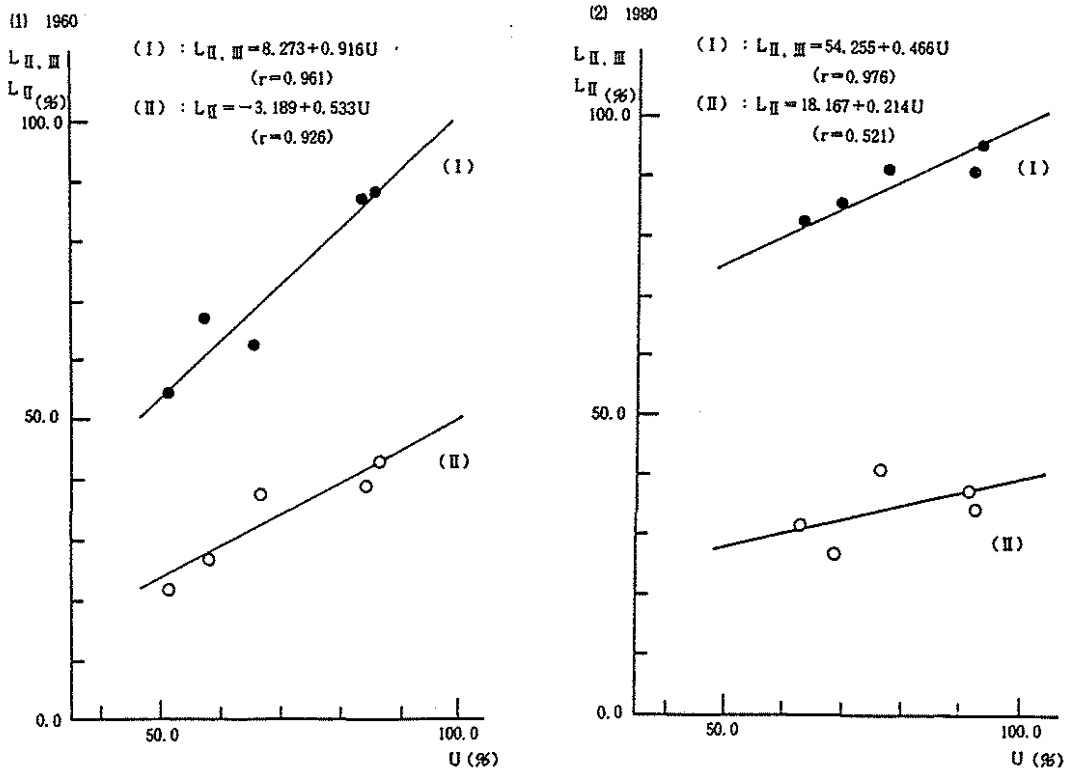
Figure 3 Regions Incorporated in the 4 Largest Metropolitan Areas in 1982



(Source) Statistics Bureaus, Prime Minister's Office: 1980 Population Census of Japan, Reference Report Series No. 4, Population in Metropolitan Areas, pp. A-1 - B-10.

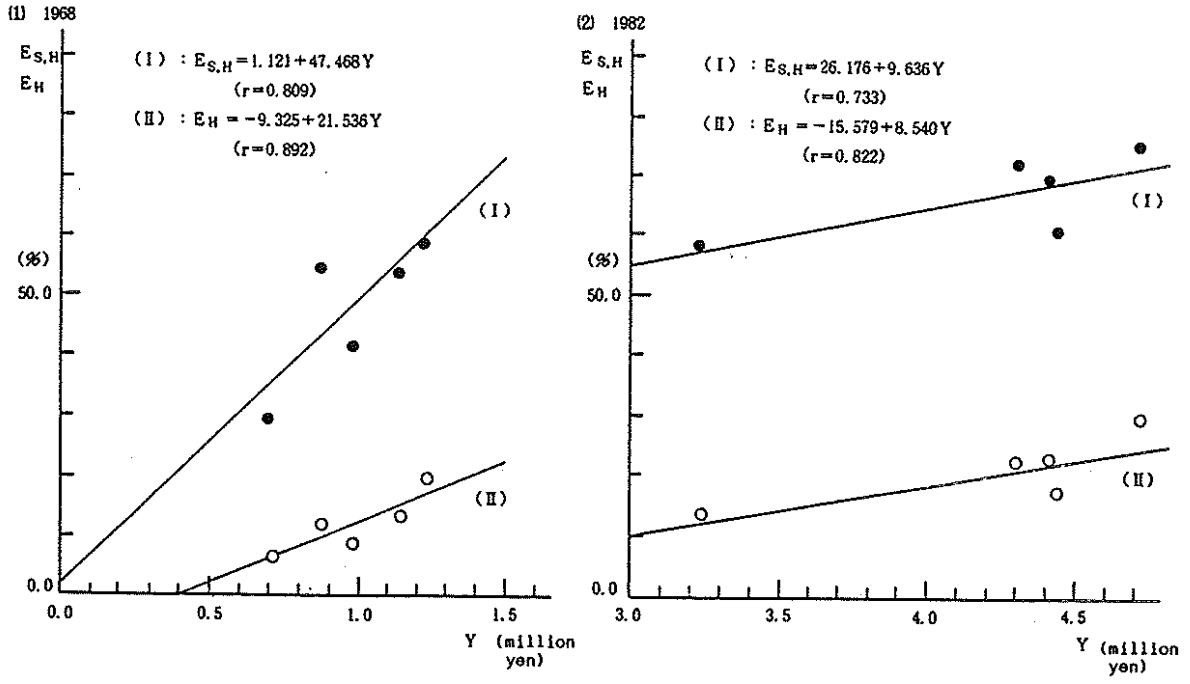
(Note) Regions incorporated in the 4 Largest Metropolitan Areas in 1968 are similar to those of 1982.

Figure 2 Relationship between Composition Ratio of Urban Population (U), and Composition Ratio of Working Population Engaged in Secondary and Tertiary Sectors of Industries ($L_{II, III}$) and Composition Ratio of Working Population Engaged in Secondary Sector of Industry (L_{II})



(Note) These diagrams were based upon figures indicated in Table 5 and the following:
Bureau of Statistics, Office of the Prime Minister: Japan Statistical Yearbook, The 13th Edition, Tokyo, Japan Statistical Association 1963, pp. 14-15.
Statistics Bureau, Management and Coordination Agency: Japan Statistical Yearbook, The 35th Edition, Tokyo, Japan Statistical Association, 1985, p. 29.

Figure 4 Relationship between Net Product per Person Employed (Y) and Educational Level ($E_{S,H}$, E_S)



(Source) Planning Bureau, Economic Planning Agency: Ken-min Shotoku Tokei (Dai-3-kai) (Prefectural Income (Third Edition)), Tokyo, Shisei-Do, 1974, pp. 28-29
Planning Bureau, Economic Planning Agency: Ken-min Keizai Keisan Nempo (Annual Report of Prefectural Account), Tokyo, Printing Bureau, Ministry of Finance, 1986, pp. 20-21.

(Note) These diagrams were based upon figures indicated in Table 6.
Net regional product per person employed for each metropolitan area is that of the following areas: (1) Keihin Metropolitan Area: Saitama, Chiba and Kanagawa Prefectures and Tokyo, (2) Chukyo Metropolitan Area: Aichi Prefecture, (3) Keihanshin Metropolitan Area: Kyoto, Osaka and Hyogo Prefecture and (4) Kitakyushu and Fukuoka Metropolitan Area: Fukuoka Prefecture.

CHAPTER 6

FUTURE LABOR FORCE PROJECTION

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1. Purpose of This Chapter

The purpose of this chapter is not to review estimates of future labor force conducted in Japan in the past, but to examine why and with what view in mind such estimates were made. The purpose of conducting such estimates, whether of labor force or not, is to watch for future trends in issues which are already important, or likely to become important in the future. Developments in these future trends and their degree of importance have been indicated on the basis of quantity. In other words, subject matter, method and results of conducting such estimates are greatly influenced by the way of thinking of the researchers and organizations in charge. Therefore, inherent aspects of the labor force estimates and how they are related to problems of each generation and population trends will be examined in this chapter.

The interrelationships of economy and population, determining the trends in labor force, have already been discussed in the previous chapters. It is, however, appropriate to summarize them here and to point out the significance of estimates on future labor force (*1).

> Goods are produced, traded and consumed within a country, every day. Needless to say, the driving force of this economic flow is the people's labor. Of course, not all, but about half of the total population, centering on the young and middle-aged, take part in this economic activity. Some engage in production, some work in the distribution sector and wholesale and retail trade and many are active in services. Some are temporarily away from work and some are unemployed and looking for a job. In Japan, the term "labor force" refers to all those related to the economic activity, including those who are presently working and those who are temporarily away from work and unemployed. Therefore, the rest of the people, such as children, students, most of the aged and housewives, who are not working and do not have the desire to work, are included in the population not in labor force. When the people is thus classified, labor force refers to those on the supply side of the labor market who are already working or willing to work. The economic prosperity of a country is greatly influenced by the trends of this labor force and, conversely, the economic trends of a country are reflected in the structure of the labor force. An individual on the other hand, gains income by labor and thus maintain his daily life. Therefore, existence of unemployed who do not have the opportunity to work, in spite of being willing to do so, presents a great social problem indeed.
>
> It is clear, therefore, that an understanding of the labor

force trend is one thing that is absolutely essential in grasping the economic and social conditions of a country. To these ends, the Labor Force Survey is conducted to discern monthly changes in labor force.

The purpose of the future projection of labor force is to measure potential change of economic activities. In sum, the information of future trends of labor force is one of the most important information for the plan of national economic developments.

2. Methods of Estimating Future Labor Force Supply

Most of the future estimates of labor force are based on the labor force participation rate. Labor force participation rate refers to the ratio of the labor force to the total population. This rate can be calculated according to age and sex by referring to the Population Census or the Labor Force Survey.

Why the labor force participation rate used so often for this estimation?

Figure 1 shows the labor force participation rate according to age and sex based on both a pre-war and a recent Population Census. It is clear here that the patterns of the rates by age and sex have not significantly changed from pre-war times up to the period of stable growth after high economic growth. That is, most of the young and middle-aged men aged between 25 and 55 and about half of the young and middle-aged women are included in the labor force, although fluctuations may be more noticeable in the case of women.

The relative stability in age patterns of the labor force participation rates by sex over the half century indicates that labor supply is affected not by total population increase but by changes in age composition, particularly within the young and middle-aged population. Also worth mentioning is that the increase of the productive age population signifies a three-quarters' increase in the labor force.

During the period in which the labor supply exceeds the rate of economic growth, the number of unemployed also increases. Conversely, the rapid expansion in the economic activity brings about a labor shortage. It is therefore particularly important to estimate present and future labor supply or productive age population when the unemployement rate is high. This was first pointed out by Teijiro Ueda whose view is explained in the next section.

3. Future Estimation during the Period of Oversupply of Labor Force

(1) Pre-war Estimation

Unemployment was considered one of the biggest demographic and social problems in the pre-war Japan because "the land is small and natural resources are precious. Moreover, its industry and economy are not yet fully developed. In such a country, any population increase would lead to further imbalance in the labor supply and demand and would in turn lead to an unstable life for the people (*2)".

Among the various studies conducted on problems of unemployement at that time, Ueda's study in 1932 observed that (*3):

> the population increase in accordance with changes in the society. In fact, when the number of job openings increase, population increases at an accelerated pace and on the contrary, when there are fewer jobs, the population automatically decreases. The growth rate of population, however, do not change so rapidly. The population that increased in good days cannot immediately be reduced. Those who were born 15 or 20 years ago now reach the productive age and start looking for jobs. It follows, therefore, that in a country where the birth rate continued to rise in the past 20 years, the number of those who enter the labor market in 20 years from now on will increase. This results in the imbalance between the population and the industry. Looking at present-day Japan, it seems to me that we have already, or soon will, entered that stage.

Ueda argues, therefore, that in order to see the future population trend of Japan it is necessary to "estimate, if possible, over the next 20 to 30 years, as to i) to what extent Japan's total population will increase, ii) the number of productive age population, and iii) the number of children and aged to be supported or educated (*4)." This was a completely new idea, because until 1933, when until Ueda reported his estimates of future population by age groups up to 1970, all the estimates of future population conducted in Japan were those of total population where extrapolations of past rates of population growth were applied to the future (*5).

Ueda first estimated the population by age from 1930 to 1970 by using what is now called the cohort comportment method. The assumption made there on death and birth was simple. That is, based on the population by age (5 years groups) derived from the 1930 Population Census and the census survival ratio between the 1925 and 1930 Census, and assuming annual births of 2.1 million, estimates were conducted as to population

by age up to 1970 (*6). His idea was that though a slight error might arise from estimates based on such simple assumptions, the general tendency could be determined (*7).

Table 1 shows the population by age classified into three categories (*8). The following conclusions can be drawn from the data. "The population will continue to increase over the next 20 years, but growth rate will rapidly decline. Population increase will peak somewhere between 1960 and 1970. The roughly estimated total population will not likely exceed 80 million (*9)". Further, "upon examining the age composition, particularly the number of children have increased since the turn of the century, and is now at its peak. The total number of children will continue to remain the same and their ratio to the total population is expected to decline." Therefore, "the productive age population will increase rapidly within the next 20 years (annually by 400 thousand to 580 thousand. Its rate of increase will come to exceed that of the total population by about 2%). Sufficient jobs will then have to be found for them. Birth control will only serve as a method to reduce their burden."

(2) Estimates since Immediately after the War up to 1960

The future labor force estimates, necessary for the formulation of the national economic plans, had become particularly important during the post-war period when the national economy was devastated and the population increased rapidly. Within a few years after the end of the war, 6.25 million Japanese repatriated from abroad. Although 1.4 million foreign residents left Japan, the population increase totaled 5 million. Half of these repatriates were deactivated soldiers, which meant a sudden increase in the young and middle-aged population. At the same time, a rise in birth rate occured which war had held down during wartime.

"The First Draft of the Economic Reconstruction Plan" was formulated and announced by the Economic Stabilization Board in May 1984. It pointed out that the following four conditions be indispensable to stabilize the post-war economy (*10):

1) Achievement of a rational living standard enabling labor reproduction
2) Sufficient exports to cover the necessary amount of imports (self-supporting economy)
3) Production standards to meet the above two goals and a balanced industrial structure
4) Increase in labor productivity and actualization of full-employment as an ultimate goal

How did the productive age population increase and what was the situation of unemployment during this period? The number of unemployed,

"1.51 million, or 2.3% of the total population during 1930 and 1934," was estimated to be around 3 to 4 million when the Plan was formulated (*11). "As a result, crimes by those not able to get legitimate jobs increased and causing rampant injustice and creating social unrest and disorder (*12)." Further, it was already expected that the productive age population would increase by about 6 million every five years after 1955. This was indeed a serious problem as the rate of increase was more than double that of the 1930s, when unemployment was a major social issue.

The increase in the productive age population was brought about by a demographic transition, i.e. the demographic transition from high fertility and high mortality to low fertility and low mortality (*13). Those who were born before 1925 had many siblings, but their mortality rate was also high. For those born between 1925 and 1950, even though the number of children per couple gradually decreased, number of survival children was twice as high as that of their parents because of the decline of mortality rate, particularly among infants and youth. As pointed out by Ueda, those in the transitional period of the demographic transition, who might be called the 'high fertility and declining or low mortality' generation, become part of the productive age population starting in the late 1950s. Because the actual mortality rate was lower than Ueda's estimate, the productive age population increased even more rapidly, and a problem of "oversupply of labor" was more serious, which continued over 10 years (*14).

The impact on the economy of increase in the productive age population, especially that of younger generation, is stated in the White Paper on Population announced by the Council on Population Problems in 1959 (Table 2) (*15). First, the labor force, which stood at 39.91 million in 1955, would reach 53.49 million in 1970. This increase of 13.59 million in 15 years was 1.4 times that of 9.38 million in 30 years from 1920 to 1950. Second, the labor force of the primary industry, especially that of agriculture, had remained stable at around 15 million from the middle of Meiji period to the end of World War II, and the modernization of agriculture required a reduced work force. Thus the increase in labor force should be absorbed by the secondary and tertiary industries. Third, to secure employment, "the business scale of modern enterprises should be more than doubled between 1955 and the 1970s."

As explained so far, the Government's economic goals in the 15 years from 1950 when the reality was massive supply of labor were, "to increase employment by maximum expansion of economic activities (*16)" and "to steadily improve the national living standards, aiming at full employment by sustaining maximum growth rates (*17)."

Hayato Ikeda who became the Prime Minister in 1960 accomplished this high economic growth through his "National Income Doubling Plan". Although an average annual increase of only 7.2% is necessary to double

the national income in 10 years. Ikeda's goal was a "9% annual increase in the first three years starting 1960. The reason for setting the initial goal so high was that those born during the post-war 'baby boom' would start working during that period. To prevent unemployment, the economy should be expanded (*18)."

Actually, "contrary to his expectations, because of higher income, many of the increased population advanced to high schools and higher education by 1963, and the young labor force, instead, became scarce (*19)."

Meanwhile, what problems were posed by demographers who studied the trends in population over the 10-years span? As Tachi pointed out in 1954, "because of a marked improvement in the mortality rate... and the sharp decline of the fertility rate since 1950, the population now the youngest among the civilized countries, is rapidly aging.... unprecedented both in speed and scale which no other modern civilized countries have ever experienced (*20)." Kuroda also pointed out in 1955 in "Konenka Jinkogaku no Kihon Mondai (Fundamental Problems of Aging Demography)" that the aging of labor force and employment for the aged would be of major socio-economic impact of the aging population (*21).

It follows, then, that it was not Japan's high economic growth that had taken advantage of the rapid increase in young labor force. Instead, it was the increase in the productive age population, brought about by the high fertility and declining or low mortality generation that had required the high economic growth. At the same time, the early 1960s would be a historical turning point when the chronic problem of the labor oversupply and unemployment shifted to that of labor shortage.

4. Future Estimates during the Period of Decreasing Young Labor Supply

The Government's "National Income Doubling Plan" of 1960 was to improve the national standard of living and further to achieve full employment by maintaining high growth rates. Shortly after the Plan was devised, however, it became clear that the labor situation would shift from oversupply to shortage (*22).

This was because in the late 1960s, instead of the former high fertility and low mortality generation, the low fertility and low mortality generation born after 1950, started to enter the labor force according to population estimates by age and sex and those of labor force. At the same time, economic growth enable the society and parents to give higher education to their children. As shown in Figure 1, this led to the decline of the labor force participation rate for those under 25 years of age.

As a result of changes in age composition of population and various other social changes, the economic plans formulated after the "Middle-term Economic Plan" of 1964 estimated the labor force according to the following procedure: First, estimate the total labor force as in previous estimates, and determine the supply capacity of the labor force caused by change in age composition of the population. Second, using such indices as labor productivity by industry, estimate the total of the labor force and the demand for labor by industry when the economic growth rate is high and assuming a higher participation rate around 50% for middle-aged and older women. Third, calculate the number of employed by industry by taking into account the "natural increase", based on death and retirement of employees and hiring of new graduates, and compare those figures with the labor demand by industry. Last, estimate the number transferring their jobs from one industry to another (*23).

Possible changes in the economic growth rate or in labor force composition by industry were subsequently examined based on this procedure. A similar method was later used for determining a long-term outlook on economic plans and labor force problems (*24).

5. Estimates Regarding Future Labor Force in the Period of Aging: The Problems up to the Year 2000

The Japanese population will rapidly age until it stabilizes after around 2015. The employed of the high fertility and low mortality generation, who had been the driving force of high economic growth, would then reach retirement age. On the other hand, a significant increase in labor force cannot be expected, as those who will henceforth be included in the labor force would be those of the low fertility and low mortality generation. The problem of labor supply and demand in the coming age can therefore be summarized based on the recent labor estimates (*25):

(a) Along with the decline in the labor population increase, middle-aged and older women and the aged will come to be the crux of the surplus labor supply. The labor force is expected to increase by 7.63 million in 20 years, from 56.50 million in 1980 to 64.10 million in 2000. Its average annual growth rate, however, will only be 0.4% and will largely consist of an increase in female (2.73 million) and aged workers.

(b) As pointed out by Kuroda in the 1950s, there will be a rapid aging of labor force. It is estimated that the workers aged 55 and above will increase by 5.62 million during the 20 years from 1980 to 2000. These older workers would come to occupy 74% of the total labor force increase. As a result, the percentage of the labor force aged 55 and over will change from 16.1% in 1980 to 23.0% in

2000.

(c) Tertiary industries will come to occupy larger share of the industrial structure. The labor force of the primary industries, which stood at 5.76 million in 1980, will decrease by 1.6 million with the retirement of older agricultural workers, etc. Higher productivity is expected for secondary industries which so far have absorbed the bulk of labor force increase. Workers of this sector are estimated to increase by 0.7 million. The largest increase, however, is expected in the tertiary industries, reflecting greater demand for services accompanying the changes in people's lifestyle. The total number of workers in this sector, therefore, will increase from 30.35 million in 1980 to 40.27 million in 2000.

(d) The industrial structural changes over the next 20 years will inevitably require inter-industry job-transfer. As job-transfereres will be mostly older people, with more women advancing to the labor market, there will be less chance of their reemployment. Thus, unemployment is likely to become a bigger issue.

In short, there should be more jobs created for middle-aged and older people.

There people, of the high fertility and low mortality generation who have started working in late 1950s, have long been the focus of labor force estimates. In the pre-war and the period immediately after the war, even before they reached the productive age, it was already expected that they would bring about an increase in young labor population after the 1950s. After the 1960s, they drew attention as job transferers who would cause change in the industrial structure. In the 1980s, upon reaching the retirement age, their reemployement and unemployment becomes a major issue.

6. Conclusion

We have so far seen that the inherent aspects of the future estimations of labor force have been greatly influenced by the problems of the corresponding period of society and changes in the age structure of population.

During the period in which the increase rate of labor force exceeded that of the economy, unemployment was a major issue, it was therefore important to estimate the labor supply of the near future. Since the labor force participation rate by age and sex had remained stable, the change in labor force was largely affected by trends in the productive age population and therefore, it was possible to conduct an accurate estimate of the labor supply based on the estimate of the future population by age.

With the decline of the fertility, the low fertility and low mortality generation reaching the productive age, increase in the young labor force subsided. Accordingly, on one hand, inter-industrial transfer of workers became an important factor in the structural adjustment of industry to sustain further economic growth. On the other hand, women and aged whose labor force participation rates had been low came to be regarded as an important labor supply source.

Notes

(*1) Rodoryoku Chosa Kaisetsu (Manual on Labor Force Survey)" in Tokeikyoku Chosa Shiryo (Research Material, Statistics Bureau), Vol.5, Statistics Bureau, Prime Minister's Office, July 1950, pp.1-2.

(*2) Jinko Shokuryo Mondai Chosakai Jinkobu Toshin Setsumei (Explanation on the Report of the Population Committee, Population and Food Problems Research Council), Population and Food Problems Research Council, April 1930, p.164 (taken from Kiyoshi Hiroshima. "Gendai Nihon Jinko Seisakushi Shoron -- Jinko Shishitsu Gainen wo Megutte (1916-1930) (A Brief Study on the History of Modern Japanese Demographic Policies -- Over the Concept of the Quality of Population (1916-1930))", in "Jinko Mondai Kenkyu (Journal of Population Problems)" No.154, April 1980, p.51.)

(*3) Teijiro Ueda, "Wagakuni Genka no Shitsugyo to Jinko Mondai (The Current Problems of Unemployment and Population in Japan)" in Nihon Jinko Mondai Kenkyu (Journal of Japanese Population Problems), Vol.1, July 1933, p.52.

(*4) Ibid., p.61.

(*5) Hidehiko Hama, "Nihon ni okeru Shorai Jinko Yosoku no Kaiko (Review on the Estimation of Future Population in Japan)" in Jinko Mondai Kenkyu (Journal of Population Problems), No.150, April 1979, table 1 in p.50.

(*6) Teijiro Ueda, "Chikaki Shorai ni okeru Nihon Jinko no Yosoku (Estimation of the Japanese Population in the Near Future)", Nihon Jinko Mondai Kenkyu (Journal of Japanese Population Problems), Vol.1, July 1933, pp.6-22.

(*7) Ibid., p.22.

(*8) Ibid., pp.34-35

(*9) Based on his assumption that the annual number of births after 1930

(2.1 million) and the survival ratio by age would not change, the population would increase up to around 2015 until consisting of those born after 1930, and would stabilize after that. The crude birth rate would become 21.9 (the same as the crude death rate). When the total population reaches 95.88 million. The population, however, increased from then on because of a decline in death rate, whereas the number of births (except for the post-war "baby boom") would be between 1.4 million and 2.1 million.

(*10)Keizai Fukko Keikaku Dai Ichiji Shian (The First Draft on Economic Rehabilitation), Economic Stabilization Board, May 1984, abstract.

(*11)Ibid., p.149.

(*12)Ibid.

(*13)Tatsuya Itoh, "Noson Toshi no Jinkogakuteki Baransu (Demographic Balance between Rural and Urban Areas)" in Nihon no Jinko Tenkan to Noson Kaihatsu (Demographic Transition of Japan and Rural Development) - Jinko to Kaihatsu Shirizu 1 (Series 1: Population and Development). Ajia Jinko Kaihatsu Kyokai (Asian Population and Development Association), p.109.

(*14)Jinko Hakusho, Tenkanki Nihon no Jinko Mondai, Showa 34 Nen (White Paper on Population - Population Problems of Japan in Transition - 1959), Council on Population Problems, August 1959, p.2 and pp.16-21.

(*15)Ibid., pp.32-36.

(*16)Keizai Jiritsu Gokanen Keikaku (Five-year Program for Self-supporting Economy), December 1955.

(*17)Shin Choki Keizai Keikaku (New Long-term Economic Program), December 1957.

(*18)Masaya Ito, Ikeda Hayato to sono Jidai (Hayato Ikeda and His Age), August 1985, pp.104-105 (Revised and retitled edition of the one published in 1966).

(*19)Ibid., p.105.

(*20)Minoru Tachi, "Jinko no ronenka (Aging of Population)" in Nihon Koshu Eisei Zasshi (Japan Public Health Magazine) Vol.1-No.5, 1954, p.35.

(*21)Toshio Kuroda, "Konenka Jinkogaku no Kihon Mondai (Fundamental Problems of Aging Demography)" in Jinko Mondai Kenkyujo Kenkyu Shiryo dai 104-go (Institute of Population Problems Research

Material No.104), February 1955.

(*22)Nihon Keizai no Choki Tenbo (Long-term Perspective of the Japanese Economy) by the Economic Council (May 1950) mentioned population dynamics change as precondition for long-term economic outlook. Based on the White Paper on Population announced a year before, it states that "the sharp decline in birth and death rates would lower the population growth rate to less than 1%, bringing about a major change in the trend of the productive age population. It will go on increasing annually by 1.35 million between 1962 and 1965. The increase will then subside after 1965, and around 1980 the annual increase would be only 0.5-0.6 million (p.5)." Further, "Such change in productive age population... would first bring about a rapid expansion of the industries with many job opportunities... and later, the growth of labor-saving industries. A decline in the increase rate of labor force would also decelerate economic growth." Fundamentally, the trends pointed out here all turned out to be true.

(*23)For example, Nihon Keizai no Choki Tenbo (Long-term Perspective of the Japanese Economy) by the Economic Council gives estimates on the following issues on employment:

- The total future labor force, using the labor force participation rate based on the future population estimate of the Institute of Population Problems.
- Trends in labor demand accompanying the development of industry.
- Trends in employment of new graduates and outlook for inter-industry job-transfer.
- Trends in employment of agricultural population.
- Educational systems and trends in the ratio of students advancing to higher education.
- Company offered vocational education and training programs for the job-transferers and reemployed.

(*24)Some examples:

- "Rodoryoku Jukyu no Tenbo to Seisaku no Hoko (Prospect for Labor Demand and Supply and Policy's Aim)", Shin Keizai Shakai Hatten Keikaku no Zenbo (Overall Picture of the New Economic and Social Development Program), Economic Planning Agency, May 1970, pp.478-493.
- Rodoryoku Jukyu no Choki Tenbo (Long-term Perspective of Labor Supply and Demand), Study Group on Employment of Ministry of Labor, June 1981.
- Nihon 21-seiki eno Tenbo (Prospect of 21st Century Japan), National Land Agency, November 1984.

(*25)Referring to reports given in (24).

Table 1 Population Estimate by Three Age Groups, 1920-1970

(1,000 persons)

Age group \ Year	1920	1930	1940	1950	1960	1970
Total	55,963	64,067	71,846	78,355	83,582	87,723
0-14	20,416	23,502	25,795	25,824	25,824	25,824
15-59	30,949	35,827	40,399	45,963	50,392	53,384
60 and over	4,594	4,737	5,652	6,568	7,364	8,524

(Source) Teijiro Ueda, "Chikaki Shorai ni okeru Nihon Jinko no Yosoku" ("Japanese Population Estimates of the Near Future"), Nihon Jinko Mondai Kenkyu (Journal of Japanese Population Problems), Vol.1, July 1933, pp.22-23.

Table 2 Trends in Population by Three Age Groups and Labor Force, 1930-1975

Year	Population by 3 age groups				Labor force
	Total	0-14	15-59	60 and over	
Number (million)					
1930	64.5	23.6	36.0	4.7	28.5
1935	69.3	25.5	38.5	5.1	——
1955	90.1	30.1	52.6	7.2	39.9
1960	64.5	23.6	57.5	8.2	44.2
1965	96.4	22.9	64.0	9.4	49.3
1970	99.6	20.6	68.3	10.6	53.5
1975	102.7	20.6	70.2	11.9	55.8
Increase in 5 years (million)					
1930-35	4.8	-1.9	2.5	0.4	
1955-60	4.1	-2.4	5.5	1.0	4.3
1960-65	3.0	-4.7	6.5	1.2	5.1
1965-70	3.2	-2.3	4.3	1.2	4.2
1970-75	3.2	-0.0	1.9	1.3	2.3

(Source) Population Census, for the figures of 1930 and 1935. Showa 32 nen Gogatsu Shorai Suikei Jinko (Future Population Estimate, May 1957), Institute of Population Problems, for the figures after 1955.

(Reference) Jinko Hakusho, Tenkanki Nihon no Jinko Mondai, Showa 34 nen (White Paper on Population - Population Problems of Japan in Transition, 1959), Council on Population Problems, August 1959, p.17.

Figure 1 Labor Force Participation Rates in Japan: 1930 and 1985