

# Industrial Revolution versus Industrious Revolution

By Hayami Akira

## Introduction

Although it has recently become somewhat questionable, the Japanese are frequently referred to as being hard working. Among those who agree with the view are some who contend that it is part of the “national character” of the Japanese. The author feels that one ought not to use the notion of “national character” in any situation. The French term “*mentalité*” is used to indicate a fundamental state of mind of a social group that continues over a long period. The English term “mentality” is a different concept. The term “*mentalité*” is difficult to translate into Japanese, but it is not the same as “national character.”

The assiduity of the Japanese falls within the purview of the term “*mentalité*.” That is to say, it persists over a long period of time, but it is not the peculiarity of a particular ethnic group. Unless one takes this into account, there is an ever-present danger that the theory of the industriousness of the Japanese may occasionally lapse into a theory of ethnic superiority. However, no one can deny that for the past several hundred years the Japanese have been diligent. Indeed, foreign people who visited Japan during that period attested the fact in unison. Even in the present day, among the advanced industrial nations, Japan’s workers put in the most work hours per year, with a total of over 1,800 hours. If overtime were included, this figure would increase even further. Needless to say, long working hours do not automatically indicate industriousness. One has to consider the degree of concentration on labor during working hours, and one cannot overlook effectiveness, that is, productivity. However, it is also a fact that working long hours is not mandatory in Japan.

What I am saying is that for one rea-

son or another, the Japanese at one time became assiduous, and that at some point they will cease to be so. It may be that after more than 400 years, the period when the Japanese worked hard may be coming to an end. Setting aside considerations of the future for the time being, as a historian, I would like to investigate when and for what reasons the Japanese became so industrious.

## Industrious Revolution

Recently in Western academic circles, the term “Industrious Revolution” is being used as a concept in the study of history. For example, Professor Jan de Vries, a U.S. economic historian, presented at his inaugural meeting as president of the Economic History Association a speech titled “The Industrial Revolution and the Industrious Revolution,” which was later published in the association’s *The Journal of Economic History*.<sup>1</sup> Furthermore, Britain’s Windfall Films produced a television program called “The Day the World Took Off” for Channel Four Television in the United Kingdom, which was broadcast from May through July 2000 and received highly favorable reviews. The program investigated the historical roots of Britain’s Industrial Revolution. During the program, well-respected University of Cambridge cultural anthropologist Alan Macfarlane commented that in the rice paddy cultivation in agricultural villages in Asia, in which there is investment of the labor of large numbers of people, one can see the characteristics of the “industrious revolution.”<sup>2</sup>

Actually the author is the one who coined the phrase “industrious revolution.”<sup>3</sup> In later conversations with my friends de Vries and Macfarlane I communicated my ideas on the subject. In view of the fact that they have used the

term, they must have concluded that it was appropriate as a term of reference. However, when they employ the phrase “industrious revolution,” they do not always use it in the sense in which I use it. As is often the case, the term already seems to have a life of its own.

First, in the case of de Vries, as in the title of the article “The Industrial Revolution and the Industrious Revolution,” the two concepts are not seen as contrasting with one another. He argues that first in a society in which commercialization (also referred to as a market economy) has advanced, machines and then the steam power that moves those machines is introduced into industry, and the “industrial revolution” takes hold. In other words, there is a continuity from “industrious revolution” to “industrial revolution” which is not part of my own original conception.

Macfarlane, in a comment during the television program, uses the expression in regard to Asian agricultural villages – which judging from the context is the villages of Nepal which he has continued to study – to describe the situation where a large number of peasants are working in wet rice cultivation. Indeed, he then makes a valuable assertion and is certainly justified in pointing out that compared to wheat, rice has a high harvestable volume to planted volume ratio, and that given the same size plot of land, rice was able to support a greater number of people.

Here in Japan Umehao Tadao, through Kawakatsu Heita, has responded positively to this notion. Here the concept of “industrious revolution” is understood appropriately and it is inserted in the image of world history of both of these scholars.<sup>4</sup>

As can be assumed from the title of the present article, my own conception of these two revolutions is that they take different courses and contrast with

one another. Let me explain my idea in detail.

## **From Animal Power to Manpower: Conversion of the Agricultural Production System in Tokugawa Japan (Edo period: 1603-1867)**

I have done research on population and agriculture in Owari (now the western part of Aichi Prefecture) and Mino (now the southern part of Gifu Prefecture) provinces during the Edo period. Of extreme interest was the following change. The most powerful *daimyo* (territorial lord) of Owari and Mino provinces was Owari *Han*<sup>5</sup> who held the castle at Nagoya. This domain carried out a survey in the 1670s and 1820s of the population, and the number of households, oxen and horses of each village within its territories. The 1670s survey was carried out under the auspices of the *han*, while the 1820s survey was ordered by a vassal of the *han*. Although the 1820s survey was not official, and they are of different characters, they do allow us to compare statistical surveys such as population, and the number of residences, horses and oxen. The two surveys clarify the number of *mura*<sup>6</sup> (villages) in existence at the time. The survey of the 1670s – which is slightly incomplete because one *gun* is not included – shows that there were 725 in Owari and 209 in Mino, making a total of 935. The total population of these *mura* was 266,071 in Owari and 77,315 in Mino. One hundred and fifty years later these figures had increased to 332,258 and 112,298, respectively. Within all of the eight *gun* of Owari – excluding the missing *gun* – there was an increase in population. The same was true of the 18 *gun* of Mino. However, at the level of the *mura*, some showed a decrease of population. Of special interest is the fact that in many of the *mura* in the vicinity of the castletown of Nagoya (population of 100,000), we can observe a reduction in population. This is considered to have been the result of the “urban graveyard effect.”<sup>7</sup>

Such exceptions did exist, but when we look at the overall region, we see

that the population increased in Owari by approximately 25% and in Mino by approximately 45%. Considering the length of the period of 150 years, this degree of population growth amounts to approximately 2 to 3 *per mil.* per annum, which compared to the standards of the modern period is not particularly high. However, if it continues over a long period of time, even this relatively low level of growth leads to a large increase in population, and in actuality during the Tokugawa (Edo) period the Owari and Mino provinces were one area which did show higher growth.

From these observations, the author obtained the concept of industrious revolution, which neither has in view an industrial revolution, nor merely indicates the large number of workers in Asian agriculture. The industrious revolution, more than anything else, is a method by which the peasants as a group of producers increased the amounts they produced in order to cope with the market economy. It was precisely this kind of motivation that was a necessary as well as sufficient condition for the industrious revolution.

This is not simply a way of referring to the rice cultivation for which many workers were required. That is, what it refers to is the phenomenon realized by the fact that increasing the amount of production (Y) was not an increase in the factor of capital investment (K = capital = livestock), but rather it was an increase in the investment of another factor in production: labor (L). The phenomenon of the increase of Y was actualized despite a decline in the ratio of K/L. When there is an increase in the amount of capital (K), the eventual result is an industrial revolution. In other words, when there was an increase in the amount of labor (L) invested, it did not lead to an industrial revolution, although there might be a development of “soft techniques.” As a result, Japan during the Edo period was unable to achieve an industrial revolution on its own. Instead, as a result of its encounter with the nations of the West, who had already experienced an industrial revolution, Japan imported

one. Hence, my use of the term industrious revolution is restricted to mean that “increasing the level of productivity (Y) became an opportunity.”

## **Changes in the Number of Livestock**

In addition to population, the two surveys by Owari *Han* investigated the livestock numbers of each *mura*. Traditionally the livestock used for agriculture were horses in eastern Japan, oxen from central into western Japan and horses in the far western region. Owari and Mino provinces were at the western edge of the eastern region where horses were employed, and if one crossed a mountain range one came to the province of Omi (now Shiga Prefecture), where oxen were employed. As a result, in the surveys of livestock, horses were far and away in the majority. It is not clear, however, exactly what type of horses were in use in this region during the periods investigated. Compared with the Western horses imported to Japan beginning in the Meiji period (1868-1912), the native horses which remain in the extreme western portions of Japan were much smaller and could not possibly exert one horsepower. Nonetheless, they were stronger and faster than oxen, and required more feed.

A survey from the 1670s shows 12,337 horses and oxen for the 635 *mura* of Owari. The figure was 4,197 in an 1820s survey, a reduction to approximately one-third. The most conspicuous reduction was in the area around Nagoya and the flatlands along the coast, where the figure decreased to about 20%.

The decrease in Mino was not as large as that in Owari, but even so, the number in the flatlands decreased to about 45%. The mountainous areas in Mino saw a reduction to only 78%. As can be seen, the decrease in livestock varied by topography, but given the fact that the population increased, the number of livestock per capita was dramatically reduced in all areas.

In Owari in the 1670s, the number of livestock per capita was 0.05, and this

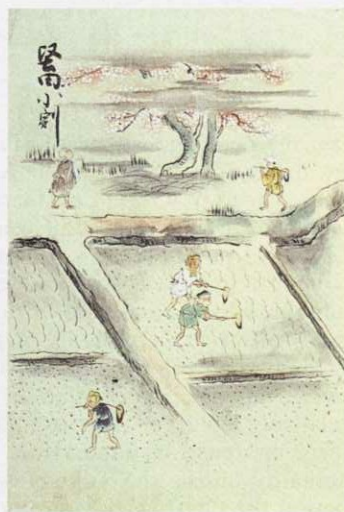
Photos: Sakurai Kentaro

shrank to 0.013 in the 1820s, a decrease to approximately one-fourth. In Mino in the 1670s survey the per capita figure in the flatlands was 0.065, which declined to 0.021 in the 1820s, amounting to about one-third. This major change in the K/L ratio resulted from the fact that the human population increased while the number of livestock declined. What does this reduction of the K/L ratio indicate? Needless to say, it shows that the work previously carried out by domesticated animals came to be carried out by humans. Manpower was substituted for animal power.

Of course, the above-mentioned observations are phenomena limited to Owari and Mino provinces, and we do not know the situation in other areas. Especially in the areas where oxen were dominant there is the possibility that they did not decrease, because the efficiency of oxen was higher than that of horses.<sup>8</sup> However, the decrease in the numbers of livestock apparent in Mino and Owari provinces cannot be seen as a phenomenon entirely unique to that region, so at the very least there seems very little doubt that the number of horses decreased in eastern Japan and in the far west region of Japan.

Ordinarily, "modern development" in agriculture indicates the increase of labor productivity by; 1) the investment of more capital (K) in production, 2) the ratio of labor (L), another factor in production, declines as a result, and 3) consequently the per capita productivity (Y/L) increases. If that is the case, then the phenomena observed in Tokugawa Japan is a change to the reverse. Within such a transformation, with the decrease of labor productivity, did the per capita income of peasants rise? Or did it decline; that is, did they become poorer?

This is not an easy question to answer. However, at a minimum, it does not appear that the rural population's standard of living was lowered. On the contrary, there seem to have been improvements in all aspects of their lives: clothing, food and housing. As a direct result of this, life expectancy at birth rose. In the case of the



Manpower was substituted for animal power; the number of livestock decreased while the population increased, which led to a change in the capital/labor ratio in the Edo Period

Suwa district of Shinano Province (now Nagano Prefecture) in the late 17th century, the life expectancy was 25, and in the early 19th century it had extended to 35 years. During the period prior to the introduction of modern medicine and public sanitation, such a lengthening of life expectancy can only have come from an improvement in the standard of living, and certainly could not have occurred under conditions of poverty.

Let us now consider the benefits of domesticated livestock in agriculture. Especially in the case of Japan, where paddy rice cultivation is dominant, domesticated animals were of greatest use during cultivation in spring. Crushing hardened soil as one plows up makes it possible to cultivate crops at a specific depth, increasing the vertical direction of cultivation within the planting acreage. The deeper cultivation is, the greater the increase in productivity. Prior to the early Edo period, plows for domestic animals were small, and deep plowing was virtually impossible. On the contrary, the use of manpower with plows and hoes made deep cultivation possible.

The use of barnyard manure, made from such materials as livestock dung and weeds, when spread over soil increased the nutrients. In other words, it increases the amount of soil that is used in cultivation in a solid way. For this point, livestock were doubly beneficial in the work of cultivation and in the production of fertilizer. However,

when water was introduced into the farmyards and sprouts were transplanted from rice-seedling beds in the process of cultivating rice, livestock became redundant. The work of cultivation in paddies filled with water included weeding and supplementary fertilizing, but these were mainly done by manpower and there was no room for the introduction of livestock.

After the spring cultivation, livestock were used solely for transportation. Livestock were of considerable merit, while fertilizer was primarily made by taking material from the villagers' communal land, woodlands and grass cutting places, and mixing grass with animal dung. In addition, following the harvest, these animals were necessary for the transportation of the crops.

In the Edo period, however, materials including the dregs from making *sake* and fish (especially dried sardines and dried herrings) were substituted as fertilizer. Due to the population increase, woodlands were developed into areas for cultivation so that food and materials for human consumption were grown there, and consequently land for growing livestock fodder gradually shrank. Necessarily, it became more expensive to obtain feed for livestock. Furthermore, peasants began to purchase fertilizer from merchants. In a phrase of the period, fertilizer was referred to separately as "natural manure" (self-sufficient manure) and "money manure" (purchased manure). Dependence on purchased manure required a variety of

investment, and being interdependent on the peasants' market-oriented production, agriculture became an enterprise managed by a family. In an enterprise, the principle of maximum benefits for minimum expense comes into play. Livestock which offered minimal benefits and were costly to raise became relatively useless.

This transformation is eloquently illustrated by the change in the K/L ratio of Owari and Mino provinces. Within these provinces, the area where the number of livestock decreased the least was the area where pottery was produced, because livestock were most beneficial in the transportation of raw materials and fuel. There was also a smaller decrease in the mountainous areas with lots of woodlands. In these areas the expenses for raising livestock were lower. However, in the flatlands, livestock disappeared almost entirely, and even where a small number remained, they decreased so greatly it is inconceivable that they were used in cultivation.

### Changes in Cultivation Methods and Structure of Households

As a result of this livestock decrease, it is probable that peasants had to work harder and for longer hours. We have no statistics regarding the daily working hours of the peasants or the number of days they worked per year. Nor have we found long-term journals or records of agricultural operations that related to the decline in livestock numbers.

However, despite it being in a different region, we can trace the great change that took place in the structure of farming families. In the Suwa district of Shinano Province, we can trace through records the process by which the joint family households that were numerous at the end of the 17th century were dismantled into stem or nuclear family households.<sup>9</sup> In these joint family households lived large numbers of unmarried servants. Of the children of the household head families, these were people who did not succeed to the household or did not go to other houses

as adopted children or in marriage, and they spent their entire lives in that household. In all likelihood, their numbers were decided in line with the labor demands of the busiest agricultural season, and when work fell off, either there was no work for them or they simply performed miscellaneous chores. It need hardly be mentioned that their productivity was low, and when the primary factor of market productivity was introduced to this region, they gradually disappeared. The joint family household also dissolved into conjugal family units.

Why did this dismantling occur? In the same way that the number of livestock declined in the Owari and Mino provinces, it resulted from the farming households choosing a more efficient means of management. In a society centered on rice cultivation like Japan, rather than choosing an operation that aims at large-scale areas of cultivation by employing a large quantity of labor, peasants achieved higher economic efficiency by pursuing small-scale cultivation operated by the family. During the busy agricultural season, there developed a custom of farming households exchanging labor. Regardless of whether the peasants possessed their own land for cultivation or whether they did not, they pursued operations that relied upon family labor.

There are no records, but there is no doubt that in the Suwa district of Shinano Province, there was a decrease in the number of livestock per capita accompanying the change in family structure. The raising of livestock and the collection and transporting of manure was work given to the servants of large families. Following the changes in agricultural methods, it was no longer necessary to maintain large numbers of servants. In terms of the necessity or lack of necessity of agricultural labor, there is a strong element of seasonality. Looking at the busy seasons of rice cultivation, spring is when soil is plowed and rice-seedlings are transplanted; summer is a time of weeding; and autumn is harvest time. After the harvest, there is an off-season. Consequently, the traditional form of

manpower employed to match the busy agricultural season and that maintained throughout one's life did not contribute to productivity during the off-season. On the contrary, they had to be supported in the off-season, so they became low-efficiency laborers. When the principles of a low-cost high-return market economy were introduced to the agricultural villages, this traditional form of farming household broke up and by necessity there was a transition to the form of the conjugal family, which became the central unit of agricultural households.

However, this change did not take place overnight. Rather, it occurred over a long period of time, and from a modern perspective the change spread slowly. In the case of the Suwa district of Shinano Province, if we observe the process with the indices of the average size of the households in each *mura*, we will find that this change developed in concentric circles spreading outward from the castle town of Suwa. The average household size did not go below 4.5 and when it reached this figure, the traditional method of farming completely disappeared, and one can set that point as the establishment of the Tokugawa agricultural method by which the family, mainly the conjugal family, is the provider of labor. Suwa *gun* had a diameter of approximately 25km, and it took almost 120 years for the average household size to reach 4.5 throughout the *gun*. This was a pace of about 200m per year.

Whether this is considered slow or fast is difficult to determine because of a lack of comparison. Compared to the changes of our contemporary information-oriented society, it is of course slow. However, when one considers that it took place without the means of information orientation provided by modern technology and without the issuance of legal statutes, but only by word-of-mouth circulation among families or between villages, such a pace cannot be judged particularly slow.

In addition, in terms of the peasants who lived at that time – especially those in charge of managing traditional agricultural methods – it is not difficult

to imagine that there must have been hesitation and resistance to fundamental change in agricultural methods. It was no easy thing to dissolve the operation method of using the collateral families and lifetime servants, which had been passed down for generations, and make a transition to the system that left agricultural operations to each family's management and charged land rents. It is probable that they saw a family close at hand which made this transition successfully and determined to dissolve the old pattern, and it might take several generations to complete the process.

**Conclusion**

In Japan, this industrious revolution had no religious background. In this sense, it was different from the "Protestant ethic" of the West. In the West, industriousness was propagated through the churches, but in Japan it was primarily the families which passed along the spirit from parent to child to grandchild. The Meiji administration made industriousness a fixed line of national policy, setting up statues of Ninomiya Kinjiro in the courtyards of each elementary school as a symbol of diligence.

At present, in the West, accompanying the weakening of the church in society, the channel for propagating industriousness has grown feeble. In Japan, a pouring out of criticism following the defeat in the war of national government controlling education and the loosening of family bonds weakened the channel by which industriousness is promoted. In the period of high growth after the end of the war, a particular generation worked furiously to raise the level of the Japanese economy which had been severely lowered by wartime defeat, creating in the eyes of the world an image of the "industrious Japanese." However, once the goal had been reached and criticism of excessive working hours grew, and as the trend toward a social welfare state came into view, the Japanese gradually came to be not so particularly devoted to work. The "industriousness" of Japanese has achieved its historic mission during the

past 400 years and is now gradually leaving the spotlight. Now that families have fewer children and society is graying, and in a few years the population begins to decrease, it will be extremely interesting to see what choices will be made by the Japanese in the future.<sup>10</sup>

MITI

**Notes**

1. Jan de Vries, "The Industrial Revolution and the Industrious Revolution," in *The Journal of Economic History*, Vol. 54, No. 2, 1994, pp.249-270.

2. The subtitle of the program was "The Roots of the Industrial Revolution." The series of eight 50-minute programs was broadcast biweekly beginning May 28, 2000 and it is a really high quality production. The text version of the program by Sally and David Dugan is *The Day the World Took Off* (Macmillan, 2000).

3. Hayami Akira, the introductory chapter "Keizai Shakai no Seiritsu to sono Tokushitsu - Edo-jidai Shakai Keizai-shi eno Shiten (The formation and characteristics of economics and society; the point of view of the history of Edo period society and economics)," in *Atarashii Edo-jidai Zo wo Motomete - Sono Shakai Keizai-shi teki Sekkin (The Search for New Images of Edo Period History: A Socio-economic Historical Approach)*, Toyo Keizai Inc., 1977, pp.3-18. See also "Kinsei Nihon no Keizai Hatten to Industrious Revolution (Modern Japanese Economic Development and the Industrious Revolution)," in Shinbo Hiroshi (eds.), *Suryo Keizaishi Ronshu 2: Kindai Ikoki no Nihon Keizai (Essays on Quantitative Economic History Vol 2: The Japanese Economy during the Period of Modern Transformation)*, Nihon Keizai Shimbum Inc., 1979, pp.3-14.

4. Umesao Tadao (eds.), *Bunmei no Seitashikan wa Ima (Current Perspectives of an Ecological View of History)*, Chuo Koronsha, 2001.

5. Toward the end of the Tokugawa period, a *daimyo* (territorial lord), when referred to as an organization of administration, came to be described as a *han*.

6. For an explanation of the terms "mura" and "gun," see the quotation below from Hayami Akira, *The Historical Demography of Pre-modern Japan*, University of Tokyo Press, 2001,

pp.179-180: "There were approximately 70,000 villages throughout Japan during the Edo Period, and some villages had several lords. ... [but] the Japanese village was small and had much community character. ... The local level above ... *mura* is the *gun*, which might be translated as 'county.' However, during the period we are studying, the *gun* had no meaning as an administrative unit. The term was used simply as an expression to indicate a geographical area; moreover, the 'gun' was entirely different from the English 'county,' ..."

7. In general, before the outcome of modern industrial technology was applied to urban living, the death rate was higher than the birth rate, and the natural population growth was negative in urban areas, especially in terms of the concentration of the populace in the major cities. To maintain and expand the population of urban centers, it was necessary to have a major influx of population from the neighboring agricultural villages, which resulted in a stagnation of population growth in the areas surrounding the cities. In Europe this is referred to as the "urban graveyard effect," and this author refers to the Japanese case as the "*Toshi Ari-jigoku Setsu* (urban ant lion theory)."

8. Oxen were not used as a food source during the Edo period, but their hides and bones were important materials used in handicrafts. In addition, in certain areas from central to western Japan where cattle were bred as domestic animals, we can even observe the increase of their number.

9. Hayami, *Historical Demography*, chapter 4, pp.66-119.

10. If we restrict consideration to the population of productive age (15 to 64 years), when people have the greatest income and also the greatest needs, Japan reached a peak in 1995 of 87,260,000 in that age group (69.4% of the total population), and the figure has declined since then. It is this author's opinion that this special feature of the population structure is one of the true causes of the present depression in current-day Japan, but no prominent figures or politicians have touched upon it.

*Hayami Akira is a Professor at the Department of International Economics, Reitaku University. He specializes in the Economic History of Japan and Historical Demography.*