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ECONOMIC DEVELOPMENT AND EMPLOYMENT HISTORY AND PRESENT SITUATION

There are two distinct stages in Taiwan's economic development and employment history: (1) the period of Japanese Colonial Administration from 1895 to 1945, and (2) the post World War II period of independence. During the first period, important technological changes took place which transformed the existing traditional and inefficient agriculture into a much more productive and labor intensive sector based on the use of modern intermediate inputs. During the second period, rehabilitation of war devastated productive enterprises and general economic development was undertaken. The aim was to develop and strengthen the nation's industrial basis and to expand its export trade. This required substantial changes in the agriculture sector which underwent an extensive land reform to stimulate output, income and employment.

Economic Development and Employment During the Colonial Administration (1895-1945)

During the Colonial period, Taiwan became the agricultural sector of the Japanese economy. The major task of the Colonial government was to transform Taiwan's subsistence agriculture into a more productive agriculture so that substantial food surpluses could be produced and transferred to Japan to support the latter's industrialization effort.

The proximity and the large size of the Japanese market meant that there was practically no constraint on the demand side. The farmers of Taiwan could sell any amount of their agricultural products which consisted mainly of rice, sugarcane, and sweet potatoes. On the supply side, however, output was dependent upon the availability of capital, land and

labor, and upon the state of agricultural science. The Colonial government was thus facing the problem of how to combine existing resources and how to bring about a change in technology so that the output of agriculture could be maximized.

At the time of colonization only traditional land and labor intensive technology was used. Taiwan was capital poor. Existing rice irrigation facilities were the most important form of capital in the country. Commercial fertilizers were not available, but farm produced fertilizers were used.

Taiwan today possesses nearly 900,000 hectares of arable land, about a quarter of its total area. At the beginning of colonization, the better and more accessible land was already under cultivation, but some unsettled arable land still existed. Thus, during the early part of the twentieth century, agricultural output could still be increased through land expansion. Furthermore, Taiwan is subtropical in climate, lying within the north-east trade wind zone. This extends the growing season and permits the cultivation of two and more crops on the same piece of land. Thus an alternative to bringing more land into production was to use the same land more intensively and adopt multiple cropping patterns.

No official estimates of labor input into agriculture exist for the colonial period. There are, however, three unofficial estimates described in [2]. On the basis of these and of the population growth which averaged about 1.7 percent annually during the period it appears that labor was not a constraint on agricultural output. The possible exception may have been during the middle 20's when the influenza epidemics of 1915, 1918, and 1920 drastically reduced the growth of agricultural population [2]. However, there is no evidence of unemployment during this period. Even

when additional land became scarce and led to the fragmentation of holdings and a deteriorating land-population ratio, more labor intensive methods were perfected within traditional agriculture (as has also been demonstrated in mainland China and Japan, see [2]), thus ensuring relatively full employment.

The success of the Colonial government in increasing Taiwan's agricultural output can be judged from the agricultural output data in Table 1. Between 1901-05 and 1936-40 total output produced on farms grew at an impressive compound rate of 3.4 percent per year. The average, however, conceals a distinct increase in the rate of growth of agricultural output during the late 1920's and the 1930's. The annual growth rate of gross output which was 2.6 percent prior to 1921-25, reached 3.8 percent afterwards. The decline of the index in 1941-45 was, of course, caused by the disruptive effects of the war in the Pacific.

The dramatic change in the growth rate of output in the 20's clearly indicates a turning point in the development of colonial agriculture. More insight is gained when inputs are quantified in greater detail, i.e., in terms of land, labor, fertilizers (i.e., intermediate capital) and land under irrigation (i.e., fixed capital) and then related to output. Inputs broken down in the four above mentioned categories for selected years are presented in Table 2. Using a Cobb-Douglas type production function*/ increases in agricultural output until the 20's can be explained

*/ The following relationship was postulated:

$$y = A(t)x_1^a x_2^b x_3^c x_4^d \qquad (a + b + c + d = 1)$$

where y stands for gross farm output, x_1, x_2, x_3, and x_4 for land, labor, fertilizer, and land under irrigation, respectively (the exponents are the relative shares of factor income) and A(t) represents technical change, broadly defined, assumed to be a function of time.

Table 1. Taiwan: Agricultural Output (Annual Averages)

Period	Agricultural Gross Output[1] (million TY 1935-1937 prices)	(index 1906-1910 = 100)
1901-1905	115.7	77.1
1906-1910	150.0	100.0
1911-1915	163.6	109.1
1916-1920	188.6	125.7
1921-1925	217.5	145.7
1926-1930	268.8	179.2
1931-1935	330.5	220.4
1936-1940	377.4	251.6
1941-1945	299.1	199.4

[1]Gross production minus seeds and feeds.

Source: [2].

Table 2. Taiwan: Agricultural Output and Inputs

Year	Gross Agricultural Output (T¥ million 1935-37 prices)	Crop[1] Area (1000 hectares)	Employment[2] (1000 man-years)	Fertilizers (T¥ million 1935-37 prices)	Land Under Irrigation (1000 hectares)
1910	152	751	1,078	9.5	227
1915	175	838	1,221	17.0	242
1920	178	859	1,117	23.4	305
1925	251	965	1,247	27.1	350
1930	293	1,012	1,267	35.6	441
1935	361	1,131	1,496	51.8	466
1940	345	1,174	1,563	73.5	530
1942	350	1,155	1,591	59.8	545

[1]Adjusted to the extent of double and multiple cropping.

[2]Adjusted by the multiple cropping index.

Adopted from: [2].

by increases in land, labor, farm produced fertilizers and land under irrigation. As the land-population ratio began to deteriorate and it was necessary to increase yields, there was an adjustment by adopting more labor intensive cultivating techniques. This change in technology was a process of learning by doing within traditional agriculture and was effective without the adoption of modern, nontraditional inputs.

The situation changed drastically after the 20's, a period of very rapid growth of output. There was a shift to new technology based on new, nontraditional inputs and new knowledge which provided an important source of growth. According to the Cobb-Douglas relationship, only 75 percent of increase in output could now be explained by increases in inputs. The remaining 25 percent were due to technological change.

One of the most important developments in the Taiwanese agriculture of this time period was the increasing use of commercial fertilizers. Two types were purchased: chemical fertilizers and vegetable (mainly soybean) oil cakes. In addition, there were significant advances in crop improvement--the successful adaptation to Taiwan of seeds with higher yield, greater resistance to disease and high wind, and greater response to fertilizer use and intensive care. The major breakthrough in rice production came in the 1920's with the successful introduction of the higher-yielding Japonica varieties, commonly called Ponlai rice. Also, new high-yielding varieties of sugarcane were introduced and became widespread, e.g., POJ 2725.

Economic Development and Employment in the Post World War II Period

Taiwan's agriculture had developed in close relationship with Japan. This relationship ceased to exist after the war. While independent Taiwan inherited a relatively modern and efficient agriculture, agricultural production witnessed a decline of over 50 percent, from the peak in 1929, in

the immediate postwar years [2]. Emphasis in the postwar period was placed upon the expansion of the nonagricultural activities, especially industrialization. The need to industrialize and diversify was recognized as a necessity to achieve rapid economic growth and full employment under stable (noninflationary) conditions (see [1]). In order to revitalize Taiwan's postwar economy and to support the objective of domestic industrialization a major effort in terms of output and productivity was required from agriculture. The instrument by which this was to be accomplished was the land reform program started in 1949.

Prior to the land reform, which proceeded in three stages (see [1]), much of agriculture's output was produced by tenant operated farms. The output and productivity of tenant farmers was gradually declining mainly because of extremely high taxes which amounted to approximately 50 percent of the total production of major crops. The tax ran as high as 70 percent in more fertile areas.

The first stage of the land reform was the farm rental reduction by lowering the rental paid by tenant farmers to the landlords from 50-70 percent of the annual yield to 37.5 percent and by imposing this as a ceiling. This ensured that any increase in production thereafter would go entirely to the tenant farmer. The second stage consisted of the selling of government-owned land in 1951 at a price set at two and one half times the annual yield of the main crop, to be paid in ten-year installments. The third stage was the implementation of the Land-to-the-Tiller program in 1953, whereby each land owner was restricted to three hectares of middle grade paddy or twice that amount of dry land. Any portion in excess thereof was sold to the government, then resold to the tenant-farmers tilling the land according to the criteria governing the selling

of government-owned land.

The sale of public land and its limitation of size was intended to help establish owner-farmers. The completion of land reform increased the area of owner-farmers from 55 percent in 1948 to 86 percent by 1959. The number of farm households rose from 620,000 in 1949 to 830,000 in 1964. Of these, owner-tiller households rose from 220,000 to 550,000, those who own part of the land from 160,000 to 170,000, and tenant farming households decreased from 240,000 to 110,000 [1]. Along with the wider distribution of land ownership, the average size of farm holdings were reduced. Thus, while only 25 percent of land holdings were smaller than 1 hectare in 1952, this percentage increased to 35 in 1953 [3].

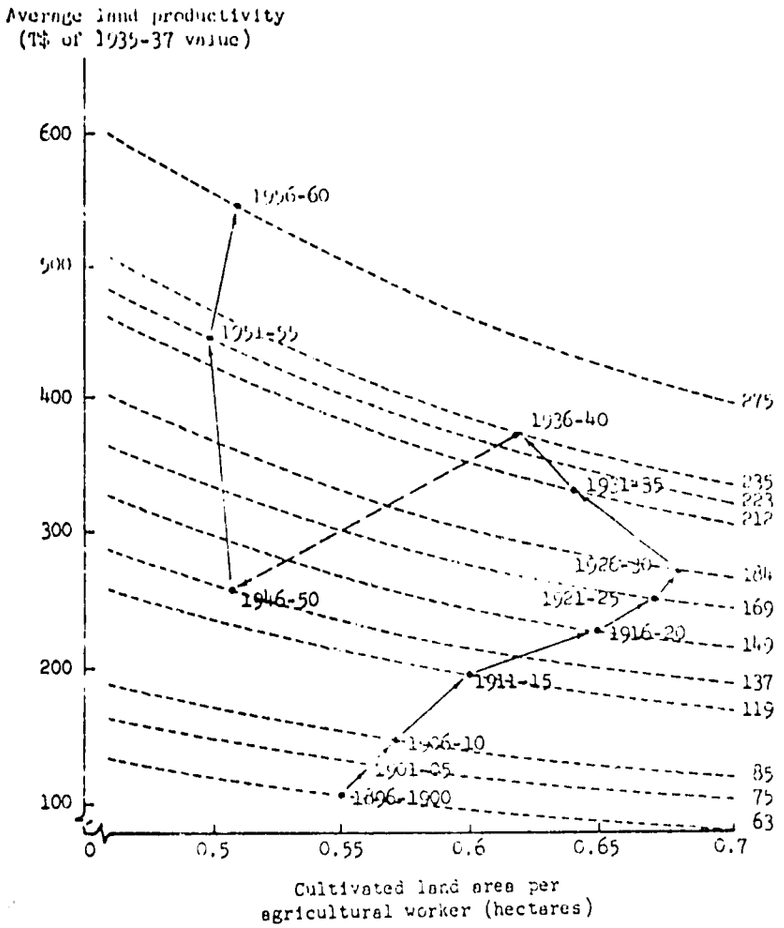
The historical growth path of Taiwan's agricultural development which was just discussed is presented more formally in Figure 1 in terms of labor and land productivity and land-labor ratio. The following definitional relationship is involved:

$$\frac{Y}{L} = \frac{Y}{D} \cdot \frac{D}{L}$$

where Y is output, L, input of labor, and D, input of cultivable land. In the figure, which represents a three dimensional situation, land productivity, $\frac{Y}{D}$, appears on the vertical axis and the land labor-ratio, $\frac{D}{L}$, on the horizontal axis. The product of these two ratios is equal to labor productivity, $\frac{Y}{L}$. For each observation in the figure the corresponding value of labor productivity is read off from the isolabor-productivity curve (broken lines).

The growth path reflects four periods: (a) the traditional (1895 to 1926-30) in which the land-labor ratio was quite favorable and rising and productivity grew on the basis of land expansion with traditional

Figure 1. Growth of Labor Productivity in Taiwan's Agriculture, 1895-1960.



Note: Figure indicates relationship between average productivity per hectare $\left(\frac{Y}{D}\right)$ and cultivated land area per agricultural worker $\left(\frac{D}{L}\right)$. The product of these two ratios is equal to labor productivity per agricultural worker, i.e., $\frac{Y}{D} \times \frac{D}{L} = \frac{Y}{L}$. For each observation in the figure the corresponding value of $\frac{Y}{L}$ can be read off from the isolabor-productivity curve.

Source: T. H. Lee, Intersectoral Capital Flows in Economic Development of Taiwan, 1895-1960, unpublished thesis, Cornell University, 1967, Chapter 5.

methods; (b) the period of agriculture's transformation (1926-30 to 1936-40) into more labor intensive, modern operation on the basis of advances of agricultural science (commercial fertilizers, high yielding varieties, irrigation) and a network of rural institutions which led to the application of modern inputs. Due to rapid population increases, the land-labor ratio declined, but labor productivity continued to increase quite rapidly; (c) the war and postwar period (1936-40 to 1946-50) which required reconstruction and readjustment and during which the land-labor ratio deteriorated further and labor productivity fell. This was the period of an extensive land reform to lay the groundwork for future productivity increases for both land and labor through widespread private land ownership; (d) the period (1951-55 to 1956-60) of rapid labor productivity growth under relatively constant land-labor ratio made possible by the increased use of intermediate inputs. The high growth of the industrial and service sectors led to a relatively high productive absorption of labor thereby relieving the labor supply pressure in agriculture.

Beginning with 1953 three four-year economic development plans (see [1]) have been implemented to develop agriculture, to accelerate the growth of industry and mining and to expand export trade so as to raise national income and employment opportunities. As a result of overall growth, agriculture's share in total employment has been on the decline ever since, as illustrated in Table 3. The change in the structure of employment has been quite considerable especially in comparison with the 1930's when employment in agriculture accounted for 70 percent of total employment. A large part of the released labor force appears to have gone into the service-type activities. Thus, for example, in the period 1966-68 the rate of growth of manufacturing and construction

Table 3. Taiwan: Changes in the Structure of Employment (Percentage Shares in Total Employment)

Year	Agriculture	Other Goods Producing Sectors*	Service-Type Activities
1956	56.0	16.7	27.2
1963	52.3	20.2	27.5
1968	39.9	24.9	35.2

Source: [6].

*Mining, manufacturing, construction, public utilities.

employment was 8.2 percent and 16.6 percent respectively, while employment in commerce and services grew at 17.9 and 7.7 percent respectively [6].

Agricultural production has been on the increase and its growth rates are among the highest in the East and Southeast Asian region. According to FAO sources [5], the annual rate of growth of Taiwan's agricultural output for the period 1956-58 to 1966-68 averaged 3.8 percent per year in comparison to 3.2 percent per year as the average for the region.

Other growth indicators for the postwar period are also quite good [7]. The GNP growth in real terms for the period 1953-69 averaged 8.0 percent per year. Per capita income, in real terms, (adjusted for the terms of trade) grew at an average of 4.7 percent per year for the same period. This was achieved while the population grew at an average rate of 3.3 percent per year, almost twice as fast as in the colonial period.

Beginning in 1949, the government first undertook the restoration of several war devastated Japanese built industries such as electric power, paper, sugar, fertilizer, petroleum and aluminum. Subsequent industrial development centered on three industries: power, fertilizer, and textiles. Thereafter, efforts were made in many directions and the emphasis gradually shifted from import substitution to export expansion. As a result, the processes of using more capital intensive production methods outside agriculture became quite important beginning in 1958 [3] and slowed down the growth rate of nonagricultural employment to about 3.5 percent per year which was barely sufficient to cope with the growth in the nonagricultural labor force. Thus, while both the agricultural and the nonagricultural sectors registered high output growth, open unemployment was not absent. Table 4 illustrates the extent of

Table 4. Taiwan: Unemployment as a Percentage of the Labor Force

Year	Unemployment (Percent)
1963	5.3
1964	4.4
1965	3.4
1966	3.1
1967	2.3
1968	1.7

Source: [6].

unemployment for a recent six year period. The rate of unemployment among the age group of 15 to 24 years was found to be more than twice as high as for the total labor force. Furthermore, it was three times as high in urban areas as in agriculture. Although differences in concept and measurement make close international comparisons questionable, unemployment in Taiwan appears less serious than in other Asian countries and exhibits a rapidly declining trend.

Income distribution in Taiwan is quite equal and more equitable than in most of the Asian countries, including Ceylon, India, and the Philippines. Much of this is mostly due to the Land-to-the-Tiller program of the land reform. According to 1964 data (see [6]), the lowest 20 percent of income earners received 8 percent of total income, the lowest 50 percent received 28 percent and the lowest 60 percent received 37 percent of total income. The highest 20 percent of income earners received 41 percent of total income, and the highest 10 percent received 26 percent of total income.

MAJOR FACTORS RESPONSIBLE FOR UNEMPLOYMENT

During the course of Taiwan's development, output and employment have been constrained by the combination and interaction of various factors including capital, land, and technology.

Capital

When Japan acquired Taiwan in 1895, its peasants were engaged in subsistence farming. Of the three inputs to agriculture, land and labor were relatively abundant, while capital was in very short supply and mostly in the form of traditional irrigation facilities. Although output could be increased by expanding the area of land under cultivation, access to

irrigation was the key to more labor intensive practices because only irrigated areas permit two (or more) crops of rice, the country's most important crop.

To transform agriculture into a more efficient and labor intensive agriculture which is essential after a decreasing trend in the cultivable land-population ratio sets in, additional capital is required in the form of high-yielding seeds, chemical fertilizers, insecticides, and other nontraditional inputs. These inputs are highly complementary, at least in a rice agriculture such as Taiwan's. High yielding rice varieties, for example, to be effective, require extensive use of commercial fertilizers, more modern irrigation facilities, more land under irrigation and more intensive plant cultivation. The shortage of some of these inputs, notably commercial fertilizers, explains the lack of productivity increase during the early period.

Taiwan's special relationship with Japan during the colonial period provided access to Japanese capital, labor, technical and entrepreneurial talents. Except for the first years of colonization, when there was a diversion of resources from Japan to Taiwan, Taiwan maintained an export surplus which grew rapidly after 1915 and took on impressive magnitudes, never falling below 20 percent and often reaching and exceeding 30 percent of total exports [2]. Table 5 provides the relevant data on Taiwan's trade surplus which represents a net diversion of real resources from Taiwan. It is believed that the transfer was primarily achieved through government taxation and the monopsonistic power of the large Japanese corporations operating in Taiwan.

During the period of independence, Taiwan's development and employment has been largely dependent on foreign capital, mostly U.S. aid. From 1953

Table 5. Taiwan: Trade Balance (Annual Averages)

Period	Total Export Surplus (in million current T¥)	Total Export Surplus (in million 1925 T¥)
1900-1904	-2.7	-19.1
1905-1909	0.5	2.2
1910-1914	4.1	-1.8
1915-1919	35.9	56.5
1920-1924	60.9	37.1
1925-1929	64.4	60.4
1930-1934	74.9	97.6
1935-1939	121.9	180.9
1940-1942	97.3	132.9

Source: [2].

to 1964, for example, gross capital formation amounted to 18.4 percent of the GNP. Capital expenditures equivalent to 5.6 percent of the GNP or 30 percent of gross capital formation, have been financed with external resources [1].

A shortage of capital has continued to constrain output and employment. However, as the savings capacity has been enlarged and the capability of borrowing abroad established, capital shortages may not be too serious a handicap in the future.

Land

The land area under cultivation which totaled nearly 900,000 hectares in 1952 has remained virtually unchanged. According to surveys [1] about 100,000 hectares of slope and marginal land may be developed into grazing land for animal industry, planting of fruit trees, medicinal herbs, tea, etc. Another 54,000 hectares of reclaimed tidal land on the west coast can be used for fish culture, building of salt fields and planting of special crops. If this land is fully developed, it can help solve the problem of natural increase in population by providing additional food and employment. However, the main effort will have to be concentrated on increasing the productivity of land, especially the yield of rice, inasmuch as the supply of arable land on the island is limited. Therefore, the development of water resources and improvement of irrigation facilities are necessary to raise the acreage planted with rice and to adopt multiple cropping systems for intensive use of land and labor.

RURAL INSTITUTIONS AND TECHNICAL SKILLS

During the period of colonization, special emphasis was placed on the development of a network of rural institutions to disseminate knowledge

and make it effective at the farm level. This was based on the experience that science alone cannot transform agriculture without institutional facilities being created first or at least concomitantly. Agriculture's transformation places great demand on administrative, organizational and technical skills. Taiwan did not possess these skills in sufficient amounts and the lack of skilled personnel, along with inadequate rural institutions explains much of the difficulties in the process of adoption of more labor-intensive, modern production techniques during its development history, especially after the war.

Employment Policies and Strategy in the Colonial Period

As indicated previously, the major objective of the Colonial Administration was to increase the productivity of Taiwan's agriculture and to divert productivity increases to Japan. At the same time the Administration was determined to use the colony's existing resource endowment as efficiently as possible. Thus, while the issue of full employment was not made explicit (the population was growing at a relatively slow rate of 1.7 percent per year during the colonial era), a full employment policy was actually embodied in the objective to increase output.

1. Agricultural Research. Labor-intensive and more productive technological change came with modern agricultural science through better seeds, commercial fertilizers and more effective cultivating techniques. A notable feature was the thoroughness with which research was conducted for the adoption of new technology. As early as 1899 funds were allocated to establish agricultural research and experimental stations. The very important Taiwan Agricultural Research Institute was founded in 1903 and there was a number of experimental stations established in strategic farming

districts in the subsequent years. Skilled technicians and agronomists were imported from Japan and they began to adopt improvements developed in Japan and elsewhere to the conditions in Taiwan. With the help of scientists and the network of experimental stations, improved seed and modern intermediate inputs were developed as a labor-intensive package after controlled experimentation. It became available to the farmers in the early 20's and explains the sharp increase in labor productivity, growth, and employment later in the period.

2. Rural Institutions. For a new labor intensive technology to become effective, innovations must be adopted and properly employed at the farm level. Institutional facilities, therefore, must be sufficiently organized and distributed to disseminate information, to convince of the benefits of the innovation and to facilitate its adoption. This may require the restructuring of existing rural institutions or the creation of new ones.

An important step towards the dissemination of agricultural science and the supply of inputs was already taken in 1908 with the establishment of Taiwan Farmers' Association. This association eventually performed such important functions as the improvement and extension of seeds, the research and control of diseases, the training of agricultural technicians, the carrying out of agricultural surveys, the purchase of fertilizers and farm equipment and many other useful functions. At a later date the Association was reorganized into smaller, decentralized units to serve better as means of contact between farmers and agricultural experts.

3. Rural Credit. Separate from the Farmers' Associations were the Agricultural Cooperatives which provided credit and helped with the distribution of fertilizers. The availability of credit was an extremely

important factor in transforming Taiwan's agriculture. The new technology required an increase in intermediate capital inputs. Given the traditional character of the existing agriculture (low productivity, low income) the transformation could not clearly have been accomplished without making credit more available in rural areas, which the Cooperatives did.

The extent and the nature of rural credit can be seen from the following (based on [2]). In the 1933 credit survey it was found that 34 percent of the rural credit was provided by the organized money market (development bank, commercial banks, and the Agricultural Cooperatives). By the time of the 1940 survey, the organized money market provided over 50 percent of rural credit. As credit expanded, there was a decline in the interest rates. Of the outstanding rural debts in 1933 only about 40 percent carried an interest rate of less than 10 percent. By 1940 loans financed at an interest rate of less than 10 percent constituted nearly 90 percent of the total loans. With credit made less expensive, more borrowing for productive purposes took place. In 1933, 50 percent of outstanding debts were incurred for productive purposes. By 1940 this share had increased to nearly 64 percent.

The importance which the Colonial Government attached to rural organizations and the extent to which they were developed can be judged by the following figures. In the late 1920's and the early 1930's Farmers' Associations and Agricultural Cooperatives employed close to 40,000 persons of which 13,000 were extension workers. Of the latter, 9,000 worked at the village level. On a per farm basis, there was about one extension worker per 32 farm households [2].

Employment Policies and Strategy in the Postwar Period

1. Land Reform. During the colonial period, Taiwan's subsistence

agriculture began to transform itself into a much more productive organization retaining labor intensive production techniques with the combination of modern intermediate inputs accompanied by the creation of supporting rural institutions network. After the war, along with the loss of the Japanese market, much of this ceased to exist. Furthermore, the ownership pattern of land was disrupted and titles to land continued to be determined quite arbitrarily. Some land was held by absentee landlords and land ownership in general tended to become more concentrated within a small segment of the population and weakened the effective link between effort and reward for the farmer. As agriculture continued to emerge from this period, it became more and more important to ensure that adequate rewards accrue directly to those who till the soil, i.e., to create growth motivation and to sustain it. Without the possibility to work for himself on his own land and make a financial gain, no farmer was interested in adopting multiple cropping or other more intensive production methods. For this reason the provision by the government of low cost irrigation, fertilizers, improved seeds and other inputs did not have desired effects.

By conferring private ownership to a substantial number of farmers, agrarian reform, especially the Land-to-the-Tiller program, which was described in detail above, succeeded in providing the required incentives and in stimulating internal demand. Agricultural productivity and output grew quite rapidly and became among the highest in Asia. As a result, changes in economic structure could take place and led to the development of industry, service, and other sectors and consequently to a more diversified economy.

Agrarian reform in Taiwan led not only to the wider distribution of land ownership, but also to a reduction in the size of holdings, hence to

more intensive production and greater employment. The contribution of the small size farms to increased productivity and output appears quite important. It is interesting to note that as a result of the land reform, productivity in general increased as the size of the holdings decreased. This has been especially noticeable in the case of rice where, according to a study [3], land holdings of less than 0.5 hectare produced the highest yields for both the first and the second rice crops. The same study also reveals that a higher percentage of land on small farms is given over to multiple cropping than on large farms. It was found that on farms of less than 0.5 hectares, 63 percent of the land yielded two or more crops and that this percentage declined as the holding size increased until on holdings of more than 7 hectares the proportion of two-crop land was only 17 percent.

The impact of land reform on the extent of multiple cropping is further illustrated by the growth of area under this practice. As a result of the incentives provided by the land reform, the multiple-cropped area was expanded from 18 percent of the total crop area in 1946 to an impressive 89 percent in 1966. By 1969 an average of two crops were harvested on all crop land [8]. Because of multiple cropping Taiwan now is not only self-sufficient in rice, it has become an exporter of it.

The land reform program in Taiwan was introduced on the assumption that it would provide the farmer with greater incentives for production and also have a favorable effect on the productivity of land and labor. This assumption has been borne out by subsequent developments. As already indicated and graphically depicted in Figure 1, land and labor productivity went up considerably. The data on output indicate a similar trend. There is evidence [10] that total agricultural output increased by about 21

percent from 1950 to 1955 including a 92 percent increase in livestock and poultry.

An important consequence of the land reform was that in spite of an essentially constant land-labor ratio, agricultural employment has grown at an increasing rate. Its growth rate averaged 0.8 percent per year during 1946-60 and went up to an average of 1.1 percent per year for the 1952-69 period (see [3] and [1]), while agricultural population continued to grow at about 2.2 percent during 1952-69. The increase in the capacity to absorb labor was of course the result of a deliberate policy to stimulate by private ownership of land and by means of other supporting measures the application of labor intensive production technology based on the use of new seed varieties, commercial fertilizers, irrigation and the practice of multiple cropping.

Along with the agrarian reform, there evolved a new form of agricultural production: the consolidated or joint farming organization. It involved the consolidation of several small farms into a single large unit for management purposes. While private ownership was retained, consolidated farming permitted the farmers to benefit from the intensity of cultivation associated with small holdings and the economies derived from larger operations. This was especially advantageous for the rice producing operation where common dikes were involved, where effective water control management was possible only on a multifarm basis. Also, where crop producing fields were so small that mechanization of some operations was not feasible on an individual basis, consolidated farming in Taiwan permitted the coordination of such operations as planting, irrigating, and pest control. The immediate benefit was in the form of increased land and labor productivity, hence, of increased incomes. One source estimates

that in certain cases consolidated farming boosted output by as much as 25 percent (see [3]).

2. Education. In terms of an employment strategy, education plays an important dual role. Firstly, it provides an intermediate stage in the rural-urban transfer process of population in which training and education is provided to the unskilled. It thus relieves the pressure on employment in the short run. Secondly, education provides a potential in the long run to supply the skilled labor for industrial expansion.

Education played a significant role in the observable decline in the rate of unemployment in the 50's despite the low labor absorption rate outside agriculture. As labor productivity and incomes increased, education became more accessible to a larger number of rural population. The proportion of male labor force in agriculture attending schools increased from 6.4 percent in 1951 to 18.8 percent in 1965. For the female labor force, the increase was from 3.4 to 13 percent in the same period [4]. It is clear that without a growing proportion of the labor force enrolling in schools, the unemployment rate would have been much higher.

3. Joint Commission on Rural Reconstruction (JCRR). The success of Taiwan's postwar development is largely due to the accomplishments of the joint U.S. Taiwanese Commission on rural reconstruction, the JCRR. This organization was essentially a source of foreign (U.S.) assistance. It provided the inflow of external capital, skilled personnel and technology and ensured their effective use in the postwar development of Taiwan's economy. The basic JCRR program goals were to increase the production of food for domestic use, to expand, diversify and improve the quality of agricultural exports and to provide an increasing supply of raw materials of agricultural origin for industrial processing and industrial expansion.

These goals were supported by the following program of action:

1. To further develop, conserve, and manage Taiwan's land and water resources.

2. To strengthen the operation of agricultural cooperatives and other marketing facilities.

3. To raise the level of organizational efficiency and coordination of those rural institutions--research, education, extension, credit, rural health and producers' associations--that have a contribution to make to increased agricultural output and productivity.

One of the outstanding accomplishments of the JCRR was its aid to the government in planning and implementing the postwar agrarian reform, in particular, the Land-to-the-Tiller Program.

Land reform by itself would not have been enough. It was necessary to combine it with other supporting measures such as continuous improvement by experimentation and research of agricultural technology, institutional changes in the form of the reorganization of farmers' associations, establishment of adequate rural credit facilities and a sound price policy. The follow-up work such as land consolidation was also of great importance. These and other supporting measures were planned, financed, and recommended by the JCRR and consequently more or less fully adopted by the government. They made it possible to obtain by means of labor-intensive technology the high degree of agricultural and overall economic development which is observable in Taiwan today. For more details on the part played by JCRR in the development of Taiwan consult [10].

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