4 Four Major Crops

This chapter discusses four major crops which have played a dynamic role in agricultural development: rice, cassava, sugar and rubber. It will concentrate on economic and technical aspects relevant to the explanation of production trends. Much of this chapter will verify the thesis that these trends were the result of choices made by producers on the basis of the aim to optimise the use of their productive resources (labour, land, irrigation facilities and capital), given the market information available to them. In doing so, the chapter will contribute to an explanation of why and to what extent producers were in a position to make use of the public facilities discussed in the previous chapter.

4.1 THE MAIN FOOD CROP: RICE

Figure 2.4 shows that rice has been the single most important crop since 1880. Rice is the main staple crop in most of the Malay archipelago. Only in some areas, such as the Maluku Islands, Irian Jaya and Madura are sago or maize the main staples. Understanding changes in the Indonesian rice economy is therefore important in the interpretation of productivity change in agriculture as a whole.

Decomposition of the Growth of Rice Production

For the same reasons as noted in section 2.3, a decomposition of the growth of rice production can best be approximated with partial productivities. The growth of rice production can be decomposed as follows:

\[
Y = HA/A \times Y/HA \\
g(Y) = g(A) + g(HA/L) + g(Y/HA) + \frac{g(A) \times g(HA/A) \times g(Y/HA)}{100} \quad (1a) \\
\]

\[
Y = \text{Production} \quad HA/A = \text{Harvesting Ratio} \\
HA = \text{Harvested Area} \quad Y/HA = \text{Production per Harvested Area} \\
A = \text{Arable Land} \quad g = \text{compound growth rate} \quad (1b) 
\]
Agricultural Growth in Indonesia

For irrigated paddy in Java information is also available on the area where crops failed. This information is included as follows:

\[
Y = A \times \text{PA/A} \times \text{HA/PA} \times \frac{Y}{\text{HA}}
\]

\[
g(Y) = g(A) + g(\text{PA/A}) + g(\text{HA/PA}) + g(\frac{Y}{\text{HA}}) + \frac{g(A) \times g(\text{PA/A}) \times g(\text{HA/PA}) \times g(\frac{Y}{\text{HA}})}{100}
\]

\[
PA = \text{Planted Area} \quad \text{HA/PA} = \text{Success Ratio}
\]

\[
\text{PA/A} = \text{Cropping Ratio}
\]

Equation (1b) indicates that the supply side offers three explanations for an increase in paddy production. Firstly, the expansion of cultivated area. Secondly, more crops are produced per year from the same area because of the increasing use of short-growing varieties, and/or through the construction of irrigation facilities which facilitate double cropping of rice fields. Thirdly, an increase of average yield per harvested area due to crop rotation, pest control, or increasing use of fertiliser and fertiliser-responsive rice varieties. Equation (2b) adds a factor: decreasing failure of planted fields because of improved pest and disease control or diminished impact of drought.\(^1\)

For Java, Table 4.1 indicates for instance that the annual average increase of irrigated rice production was 0.42 per cent during 1880–1900, mainly due to the expansion of irrigated land. Average yield fell by 0.21 per cent on average, but was compensated by the increase by 0.19 per cent per year of the harvesting ratio. The change in the harvesting ratio is in turn explained by an increase in the cropping ratio of 0.35 per cent and a fall of –0.15 per cent in the success ratio, which underlines the importance of irrigation.

During 1900–37 the harvesting ratio is the main factor explaining the growth of production of irrigated rice, which can be expected on the basis of the irrigation policies and the expansion of technically-irrigated land. Increasing yields per harvested hectare assisted the harvesting ratio in explaining the acceleration of production growth during 1920–37. The contribution of the extension of arable land during these years is largely the result of the demise of sugar production in Java during the 1930s. Factories hired less farm land, which became available for rice production. This explains about a third of the growth of production during 1920–37. Most of the growth is explained by increases of cropping ratio and crop yields.