

Rural Technologies and Institutions in Indonesia

SAYOGYO

ABSTRACT

The paper described and analysed the impact of modernization on rural technologies and institutions in Indonesia. The writer's emphasis was more on wet paddy plantation, upland crops production and cottage industry. The impact of modernization was more successful on wet paddy cultivation. The writer indicated that research in weeding and agronomy has not achieved any breakthrough to modernize upland farming system. On the cottage industry the paper showed that the 'food industry' was dominant but the impact of modernization was not clear as with wet paddy cultivation.

ABSTRAK

Kertas ini memerihal dan menganalisis kesan modernisasi ke atas teknologi dan institusi luar bandar di Indonesia. Penulis menekankan perbincangan kepada penanaman padi basah, pengeluaran tanaman di tanah bukit dan industri kampung. Kesan modernisasi lebih berkesan bagi penanaman padi basah. Penulis menunjukkan iaitu penyelidikan dalam penternakan dan agronomi belum dapat memodenkan sistem penternakan dan penanaman di bukit. Dari segi industri kampung pula industri makanan lebih dominan tetapi kesan modernisasi tidak begitu ketara seperti penanaman padi basah.

INTRODUCTION

This paper attempts to describe and analyse the impact of agricultural modernization on rural technologies and institutions in Indonesia. In this attempt, the changing technologies and institutions in wet paddy cultivation upland crops production and cottage industry will be analysed.

National efforts to attain self-sufficiency in rice have led to a wet paddy revolution involving large investments in modern infrastructure, production and supply of farm inputs and credit and a nation wide organization both on the production and distribution side. Among rural people, farmers and farm labour, such a scheme for growth has led to larger inequalities that showed in changing tenure relations and in pursuit of work opportunities outside one's own village.

New farming systems on upland with non-rice foodcrops on higher productivity levels are not yet in sight. Upland farmers producing annual crops are still at a disadvantage, and as consumers of corn and cassava they are also competing with feed suppliers to modern animal husbandry producers. Big business of plantation are preparing themselves to establish better cooperative relations with smallholders.

A short review of problems in cottage industry points to some problems of methods of relating it to institutions.

AGRICULTURAL TECHNOLOGIES AND RURAL INSTITUTIONS

Two ecosystems have developed in Indonesia: one in wet paddy with irrigation relying on a water-regime bringing life (fertilizing function) and protection with it and another one of slash-and-burn shifting cultivation (swidden) depending on accumulated fertility of forest soils. The wet paddy pattern has dominated the more fertile and highly populated islands of Java and Bali. This has been pushed into mainly food producing agriculture. The swidden pattern has evolved into tree crop farming producing small-holder's export such as rubber and coffee. Its establishment in many sub-regions still form part of the swidden regime/cycle. Having both food (rice) and cash crops in its system, it is the swidden pattern that has, since the 1920's, given farmers of "outer Indonesia" a higher level of living compared to the food farmers of "inner Indonesia" (Java/Bali) who in the meantime have also developed upland farming with "secondary" foodcrops (corn, soyabean, peanuts, tubers) besides double-cropping of rice in its wet paddy systems, or secondary foodcrops under upland conditions.

Both ecosystems have been touched by modernization: treecrop gardens producing new crops for an export market¹ and wet paddy serviced with modern irrigation works (mainly in Java) which pushed wet paddy into the extensive lowland plains. In Java's history it was the modern capital-intensive sugar plantation that was initially behind this modern development as Dutch research to breed modern cane varieties chose irrigated cane cultivation which at one time gave the highest yields per hectare world wide. Traditional cane farming has remained an upland perennial crop, while plantation cane develops into an irrigated annual crop, with no rotation after 15 months growth, as it is grown on rented peasant-owned land, in which the cane has to rotate with peasant's paddy crop.

In each case modernization has meant a market money economy, with wet paddy peasants in Java/Bali selling their paddy and other food crops, to pay taxes and by town (and town-mediated) products such as kerosene,

textiles and the like. Marginal rice farmers who do not have enough food from their own production for a whole season, are in the habit of "buying back" rice in their period of "lean months."

Looking back into the last 25 years, it is the wet paddy systems that has been a major priority in national policies, to attain the national goal of self-sufficiency in rice in a race with population growth. Efforts to modernize wet paddy by introducing a package of modern technology in the form of locally improved rice varieties and the use of imported fertilizer began before the arrival of the new IRRI-varieties in 1967/68. Those efforts represent the first wave of Rice Intensification Program (RIP) of the "Paddy Centre" (1959–61) mainly located in Java. A second wave came in 1964/65 after the results of an "action-research" project by Bogor Agricultural University IPB in three villages in West Java (Wiradi 1978). This project successfully tested a more intensive type of extension-work, with students staying in the village for a whole season. It has been adopted as a model for a revived national programme that came to be known as *Bimas* ("mass guidance program") since then. With the opening up of the national economy for foreign investors since 1967, aid from foreign companies was accepted to fund RIP which provided the imported new inputs from modern industry and the new IRRI varieties. At the initial stage, the locally improved varieties introduced earlier produced about the same level of yield compared to that of the new IRRI varieties. Data collected by the Agro-economic Survey in 1968–71 (Wiradi 1978) showed the two varieties required the same level of labour inputs: Some 150 man-days (8 hours/day basis) per hectare pre-harvest work on farms larger than 0.5 ha.²

Such high labour input in wet paddy has led Geertz (1963) to call it "agricultural involution" which is always managing to take in one more man without incurring a serious fall in per capita income showing its self-defeating characteristics. Further study in the 1970's, however, showed trends in which small farmers of the upper stratum in Java are seen to change older institutions in order to limit more labour input. This trend to some observers, could lead to the "death of involution" as upper strata of small farmers are further pushed into the money economy, pushing for higher efficiency and profitability of their wet paddy. But others (like Collier 1977, 1981) have found that "involution" has never really adequately represented the varied processes of historical change in many areas in Java, for which the concept of "evolution" would fit better. If "involution" means a high labour input in farming, recent data show that it is still at a high level in Java, even after various efforts have been made to exclude more labour, particularly for harvesting. In the latter case, one may point to the spread of an innovation on the part of wet paddy-owners to limit harvest-labourers: entrusted with the job of transplanting as a start, a limited number of farm-labourers have a right to a fixed share of

the harvest at a later stage. This-labour-harvest share exchange system is called *kedokan*. Alternatively, close to harvest time, wet paddy farmers sell their crop to a *penebas*-trader who is regarded as a middleman. Coming with their own labour (usually smaller in number) the *penebas*-traders are able to push harvest-shares down. The *penebas* may demand that labourers use a sickle instead of the *ani-ani*-hand knife because the new high yielding variety (HYV) shatter the grains more easily. They even use a scale to weigh the harvest of pay harvest labourer in cash rather than in kind. The use of thresher and especially the Japanese type rice mills has further cut down labour use. In this case, the women have been pushed out of handpounding of rice. National planners characterise this change as "overall-beneficial" as rice mills have contributed to lower rice prices benefitting both producers and consumers, including women who earlier earned income from rice handpounding. The women involved, however, have to find other off-farm income sources to benefit at all, as consumers.

With strong population pressure on limited land resources and unlimited labour supply, the trend of decreasing returns to labour relative to land is inevitable. With scarce land, as in Java/Bali, the modern rice varieties are part of a new package of landsaving and labour using technologies. Its potential lies in its higher yield and larger surplus for farmers. Hayami and Kikuchi (1981), reckon that farm wage levels will have a better chance to improve if farmers and labourers are wed in such a patron-client relationship as in the *kedokan-harvest* share exchange system. They call such a process "stratification" in which the social mode of a "moral economy" is maintained in a situation of differentiation from landlords to landless labourers. They do not however, mention any other costs or obligation, only "benefits on either side", from relations in their farm-business which is seen as a "personalized market." However, in their "model-village" (in West-Java) alongside *kedokan-labour* one still finds piece-work, hired labour (41% of non-household labour) especially in land preparation. Are these wage labourers (after land preparation) to become *kedokan-farm* labourers? In the more probable case there are many more farm labourers at hand. This means that only a portion of them will be taken up in the *kedokan-system*. Other farm labourers will not be taken up in such a "patron-client" system and will be without patron(s). One may put the question: in what ways does this situation reflect a process called "polarization", with impersonal market relations between land-owners and casual labourers who normally "gang-up"? One may then conclude that both "stratification" and "polarization" do exist side by side at the same time.

If wet paddy farmers in Java are not induced (seduced) to use hand tractors (power tillers) for their land preparation, their relations with casual farm labourers would not lead directly to conflict situations. Here

we face a dilemma: economic growth calls for measures to favour farmer-producers, if necessary with the help of machines.

In peasant-farming, in terms of status and farmsize, owner-farmers are occupying the top stratum, followed by owner-tenants who lease in additional land, and the landless tenants occupying the bottom stratum. Behind the shifts in tenancy status in 1963 – 1980 period one can see the effects of the green revolution (use of HYV package):

1. In the 1963 – 73 period the percentage of tenants dropped from 35 to 25%, with sharper drops in Java. With new HYV and cheap bank credit (*Bimas*-program) own farming became more attractive and, therefore, more owner-operators emerged.

2. Over the longer range (1963 – 80) the percentage of owner-tenants has dropped steadily from 29 to 22 and 11. Even when rice farming has become more attractive, farmer's terms of trade have not improved so that relatively more enterprising farmers may have shifted their interests to other non-farming businesses. The number of farmers in the top stratum in Java has dropped from 3.8 to 2.8 million.

3. The percentage of tenants has increased from 3 to 15 percent especially in 1973 – 80 period. Although it has been estimated that 80 percent of the landless tenants are in the marginal farm-size (less than 0.5 ha), it is not known how many of them are in fact in the *kedokan-harvest* share exchange system.

On the whole, it is the top stratum of small farmers (average 1.2 ha) who lease out land to the landless and marginal farmers. Because of the higher yields per hectare even smaller farms, including those less than 0.5 ha are now producing surplus. With tenants on smaller farms submitting part of shares to landlords, the relation between them must have led to a more unequal distribution of farm-earning, compared to a situation without tenancy. "Work-spreading" (Geertz 1963: 97 – 100) will then not have its effects of "shared poverty" but rather the opposite. Such exploitative institutions do exist alongside other types such as the patron-client community type.

Differential control over land has led to larger inequalities: for the upper stratum of small farmers who have a potential farming surplus, off-farm activities mean new opportunities of investment and capital accumulation, in comparison with landless or near-landless households who have only their labour and tiny amounts of capital to offer, with much lower returns.

Farmer's involvement in primary cooperative units has been programmed, since the first wave of BIMAS-program in rice intensification started earlier in specific "farmer's co-operative units", later in village-wide all-purpose cooperative, and recently in a village-unit (or cluster) primary co-operative with membership from a score of villages within one

subdistrict. In Java, the average membership of such a cooperative unit is about 10,000 households. As such a unit of primary co-operative is, by any standard, large. And it has not yet grown into a unit in which farmers and other members feel at home. It is seen as a big servicing institution, not unlike any other supra-village agency, first in getting inputs to each farms either the form of credit, or and afterwards, in buying rice locally, to ensure "a good floor price" for farmers. Much in that business, however depends on government decisions.

At the field or neighbourhood level, some successful efforts involving co-operating farmers have been recorded (as in *Insus*-program) but it is not known in what ways such small beginnings of small group participation may, in due time, lead to bottom-up growth, giving life to the functions of each primary co-operative unit.

OTHER LAGGING AGRICULTURAL SECTORS

If at earlier phases, the green revolution looked more like a "fertilizer" revolution (the country now producing most of its fertilizer needs), recent trends show that it is a wet paddy revolution, centered in its HYV, with a machinery from the centre to farmers' small groups in their fields and hamlets. In the last 14 years, rice production has more than doubled, and by 1982 it has reached 23 million tons.

How are other rural people outside the "wet paddy complex" or those cultivating wet paddy who have not got the right bargain going? A recent study (Said Rusli 1982) tried to relate agricultural modernization land tenure patterns and outmigration. The focus was on nonpermanent (circulation or commuting) migration of people over 15 years of age during the last 10 years. The study also recorded outmigration for purpose of work or seeking work only.

Research in breeding and agronomy has not achieved any breakthrough to modernize upland farming systems in the tropics, especially with annual crops. The needs of the minority of poor rural people in Central and East Java in terms of their corn and cassava consumption (in their rice-corn-cassava mix) as well as the production of these crops especially on upland farms, are not so high in the priority list. Similarly low priority was given to these "secondary annual crops" even when they were needed to support intensive forms of animal husbandry to produce eggs, chicken, and cow's milk which were in demand by the upper strata. As growth is the aim, both feed supplies or breeding stock have been imported. Breeding of own local stock (as in the case of chicken) has not started seriously while big investors maintain their dependence on imported stock in cooperation with multi-national firms.

Since the Second Plan (1974 - 78) the idea has been to make the stronger and more modern plantation sector help the weaker smallholders.

Such a relationship started in the sugarcane business in Java, while in perennial crop gardens a pilot project was started in North Sumatera with foreign loans. It is called a "nucleus estate-smallholders" (NES) project in which the plantation with its processing plant will not only be managing its own plantings but also render its services to smallholders who have their own gardens within the same "farming locality." In essence, its main ideas are quite similar to those of Felda (Federal Land Development Authority) scheme in Malaysia. Until smallholders (in rubber, coffee, pepper, coconut, etc) have managed to outgrow their gardens from its "swidden regime" origins, and cease to depend on a primitive infrastructure, their fate still remains in a "half-revolution." Will plantation personnel be up to its task in performing its new role as leader or patron? No less than a "rebirth of its soul" is demanded for a new future. One may see some hopeful signs when one exponent of plantation side puts it this way: "The main problem is not one of technology, but it is a social problem, how to get the right approach with cooperating small farmers...." In that scheme, farmers who cooperate are expected to join a primary cooperative unit in their dealings with the plantation-nucleus.

In this interface between "modern agents of change" and the so-called traditional peasants, one may discern varying approaches on the side of "modern agents." On the one hand, there is the "trust given to adults" as farmers, for instance, they are persuaded to look, try and learn for themselves. On the other hand, farmers may be looked upon as "traditional, irrational,"; guiding them means pushing or pulling them, to get them moving "The latter attitude is that of an authoritarian patron (district head or other civil service personnel) while the former symbolises that of a "social animateur", an attitude common among field extension-workers who can relate to fellow humans with empathy.

It is interesting to note that in the process of recruiting change agents to approach people somehow or through certain projects for any possible purpose, more "special agents" are overcrowding the field. The blown-up size of a local bureaucracy at subdistrict-level has, for a long time, made many village-heads a nervous wreck, who complain that they have as many bosses as there are ministers in the national capital. For example, if some 10 years ago "the Agricultural Ministry" had some 7,000 field extension workers to support the *Bimas* (rice intensification program), recently the number of special agents has been estimated at about 39,000 people, or some 15 men/women agents per rural subdistrict. Somehow the lower half strata of peasant farmers are not being reached despite the staggering number of "change agents" in the field.

THE SEARCH FOR LABOUR INTENSIVE TECHNOLOGIES FOR HOME AND RURAL INDUSTRIES

A recent survey of 74 subdistricts in six Provinces in Java, Bali and West-Nusatenggara (LIPPI 1981) discovered 48 types of technologies being

used in the various home and rural industries. Out of these, ten were selected to be developed further. The criteria used to select the ten included the following being based on some traditional technology, labour intensive, having the potential for higher productivity and being part of a continuous process.

The ten technology-package are: brick and tilemaking, utilization of coconut, utilization of soyabean, managing drinking water in rural areas, basket making, utilization of cassava, producing chips (snack), utilization of marine products, ceramics making, and utilization of cement.

Another survey of ten villages in a district in West-Java, shows the technologies found in use by people covered agricultural (pre-and post-harvest) technologies, those in use for "basic needs" such as clean water and energy, and those to further support home/small industries such as the efficient uses of a good oven, uses of ferrocement, food processing implements, food storage bins, and blacksmith implements (LIPPI 1981).

Though mention is made of the need to "develop strategic sectors" it is not quite clear on what basis such strategic sectors have been identified. Comparing the list (after observation in the Java), data from both sources show that "food industry" is dominant. In this sub-sector, the labour-intensive industry of coconut-sugar, is giving the lowest value added (less than 1 kg of rice per man-day). Most of food industry is a little better-off with value added between 1 and 2 kg of rice/man-day. Tile-making has a higher value of 2 – 3 kg/man-day and brick-making has a much higher value added of 3 – 4 kg/man-day.

Although the two reports by LIPPI (1981, 1982) provide a good description of implements used, forces employed, actions involved and amount and variety of interaction needed for its completion, at the most, one can only visualize its relevant production-unit. In the case of home/cottage industry, it is a household-production unit employing on the average three persons per unit. A small industry unit employs an average of 7 people, most of whom are wage-labourers.

The two reports have not mentioned market institutions. The reports, for example are silent on how much is there competition among units of the same subsector or across sectors: home industry versus medium industry, etc. At the micro level, the reports have not identified the implications and problems involved when such income-earning manufacturing activities of the households are stopped or delayed because other jobs or enterprising opportunities show up and bring in better returns.

Although the two reports do mention some aspects of housing needs being met by industries that produce bricks, tiles, toilet and well construction, the building and rebuilding of house itself has not been mentioned as a manufacturing industry of very large proportion, probably as large as the growing population. There is in fact, special volume on housing in the 1974/75 Industrial Census which indicates that it is the largest manufactu-

ring industry, taken on by home small industry units as well as medium and large units.

New data from the Bureau of Statistics (CBS) show that in the 1974 – 79 period the number of industrial workers has decreased by about 0.4 million. The home or cottage industry recorded the largest drop of about 1.1 million while the medium and large industrial units recorded an increase of 0.7 million.

The 1979 – data also show that 94 percent of units in home industry are found in rural areas, and 93 percent of its 3.9 million workers are women. This means that it is mainly women workers that have been pushed out of this subsector. The various ways this has been the result of changes in the market structure and institutions need further study.

NOTES

¹ In the case of rubber, it was peasant farmers in Sumatera who pioneered rather than big capital-intensive plantations.

² For comparison: in the 1930's pre-harvest labour requirement in wet paddy was on the average 960 hours/hectare of some 120 mandays/hectare (8 hours/day basis). "Small farms" larger than 0.5 ha (the average farm size in 1963 was 1.2 hectares) in Java are in the upper stratum of landownership. As these farm use more wage labour (some 80% or more) than own household labour, they are not really "family-farm" units. Marginal farms (less than 0.5 ha: in Java average 0.25 ha/unit) do use more own labour than wage labour (some 36%).

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Departemen Pendidikan dan Kebudayaan
 Pusat Studi Pembangunan
 Lembaga Penelitian
 Institut Pertanian Bogor
 Indonesia.

