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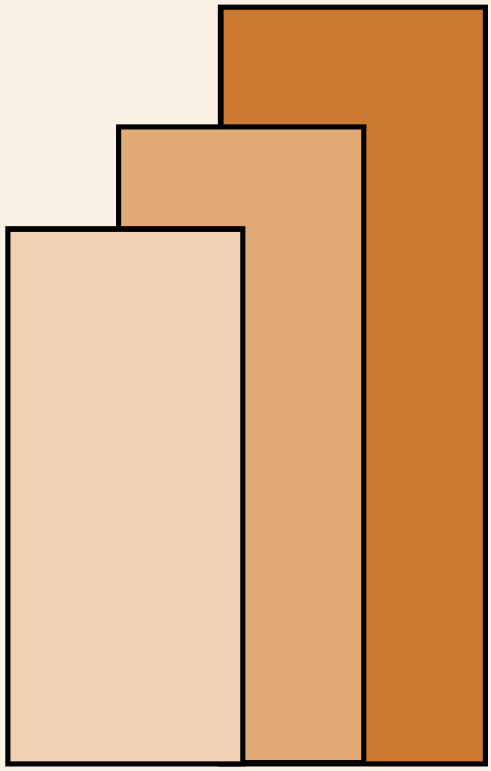

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Cristina C. David*

Introduction

The agricultural sector, which continues to be the major source of employment and income of the poorer segment of the population, has performed quite poorly since the 1980s. Whereas Philippine agriculture performed well relative to other Asian countries in the 1970s, it had one of the lowest growth rates in agricultural gross value added, food per capita, agricultural exports, and gross domestic product in the 1980s (Table 1). Indeed, the Philippines, together with Bangladesh, were the only two countries in Asia where food production per capita declined (Fig. 1). It is therefore not surprising that the Philippines' shares in the world trade of its major exports -- coconut products, sugar, bananas, pineapples -- all declined in the past decade (Table 2).

Depressed world commodity prices have partly caused the poor performance of Philippine agriculture in the 1980s. However, the fact that the decline in the agricultural growth rates was most pronounced in the Philippines suggests that the country is losing its competitive advantage in the sector. There are at least three major reasons for this: a) limited technological progress; b) inefficiencies in resource allocation due to price policy distortions and other policies such as the banana hectarage limitation; and c) limited infrastructure development.

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This paper shall focus on the first, i.e., the reasons behind the limited technological progress and the policy actions that should be undertaken to mitigate the problem.

With the closing of the land frontier and continued population growth, productivity growth through technological change is necessarily a key instrument for agricultural development. It is also the most cost-effective instrument for resolving the conflicting objectives of providing low agricultural prices to consumers and raising farmers' income over the long-term.

Because agricultural technology development and dissemination are characterized by economies of scale, long gestation period, riskiness, externalities, and public good attributes, the private sector will underinvest in such activities. The private sector will invest only in the development of technologies that can be embodied in purchased inputs and/or where ownership of the new technology can be effectively protected by patents such as hybrid seeds, farm machineries, pesticides, and fertilizers. It will not invest in a wide range of biological technologies such as high-yielding open-pollinated cultivars, improved farm management, integrated pest management, etc., where their use cannot be effectively limited to those who pay for them. It will not also invest in basic and strategic research that do not directly produce a technology that can be marketed, but which are crucial inputs in expanding the opportunities for technological development. Moreover, agricultural technologies are highly location-specific; relatively little can be directly borrowed from abroad without some measure of testing and adaptation. Unlike in industry, therefore, where new technologies can be largely imported, or developed by the private sector, the government will have to play the leading role in agricultural research and extension directly by producing new

technologies, funding public type of research and extension activities of non-governmental institutions or individuals, and providing the appropriate incentive structure for the private sector to invest in technology development.

Problems and Issues

The Philippine agricultural research and extension system has been plagued by underfunding and institutional weaknesses.

Underfunding

In the early 1970s, the Philippines had one of the highest levels of public investments in agricultural research in Asia as evidenced by the ratio of agricultural research expenditure to gross value added in agriculture (Fig. 2). As the agricultural sector bore the brunt of the budgetary squeeze in the 1980s, public expenditures for agricultural research in real terms and as a ratio to agricultural gross value added (GVA) declined significantly throughout the past decade. In contrast, the other Asian countries have increased public investments for agricultural research. And by the early 1990s, the Philippines had one of the lowest public expenditures for agricultural research relative to GVA, next only to Nepal.

Although expenditures for agriculture recovered by the late 1980s, the Philippines continued to have the lowest ratio of public expenditure for agriculture to total public expenditures and gross domestic product among ASEAN countries (Table 3). Moreover, the increases in public expenditures in agriculture in the late 1980s went mostly to agrarian reform, environmental protection, and price support rather than to growth-enhancing investments such

as agricultural research. About two-thirds of the agrarian reform expenditures were for support services such as credit and extension, but the linkage to land reform rather than to technological opportunities reduces the cost-effectiveness of such expenditures. The allocation of funds would also be biased towards short-term support projects (e.g. credit subsidies) against institution- building efforts or projects that will have long-term impacts (e.g., agricultural research). It should be emphasized that the estimated rates of returns of agricultural research in the Philippines and worldwide are very high, much higher than estimates for infrastructure investments which typically range from 15 to 25 percent (Table 4).

Institutional Weaknesses

Limited technological progress in Philippine agriculture has been caused not only by underinvestments but also by institutional weaknesses that adversely affect the financial support, efficiency, and effectiveness of the research and extension system. These stem from the fragmented, overlapping and commodity-based nature of the organizational structure for agriculture governance.

Whereas the Department of Agriculture (DA) assumes the responsibility for accelerating agricultural development, the mandate, authority and budget for technology generation and dissemination are spread over several agencies. The mandate for technology generation in agriculture, fisheries, and natural resources officially belong to the Philippine Council for Agriculture, Forestry, and Natural Resources Research Development (PCARRD) and the Philippine Council for Agriculture and Marine Research and Development (PCAMRD) under the Department of Science and Technology (DOST). These councils, however, currently control only a minor share of total public

expenditures for agricultural research, technology generation and development. Yet they have overall coordinating roles, which to a large extent, overlap with the Department of Agriculture (DA) - Bureau of Agricultural Research coordinating functions within the DA and its attached agencies.

Research and extension for major exportable crops such as coconuts, sugar, and tobacco are the mandates of the Philippine Coconut Authority (PCA), Sugar Regulatory Authority (SRA), and Philippine Tobacco Administration (PTA), agencies attached to but are basically independent from the Department of Agriculture. These agencies have multiple functions and have tended to put more attention to their regulatory functions rather than to developmental activities, especially technology generation.

The state colleges and universities (SCUs) also directly receive a significant share of the budget for agricultural technology generation and in fact account for the bulk of the available scientific manpower. However, neither their research priorities nor outputs are strongly linked to farmers' needs directly or indirectly through the DA, the government agency ultimately responsible for raising farmers' welfare.

Mainly because of such an organizational structure, the Philippine agricultural research and extension system is beset by the following problems.

* - *Extremely weak linkage between research and extension.* The designation of the Secretary of Agriculture as Vice-Chairman of PCARRD and PCAMRD is not a sufficient mechanism for linkage because the necessary interaction is not merely at a policy level but at a working - scientific and grass roots - level. Effective linkage requires that both research and extension be accountable to the same office.

* *Budget allocation for technological development is biased against research in favor of extension.* While the country has one of the lowest public expenditures for research as a ratio of GVA in Asia, its extension budget and manpower resources are among the biggest among developing countries. Such imbalance may be explained by the widespread belief that there are a substantial number of mature technologies on the shelf and it is the weak and underfunded extension system that is a constraint. In fact, there are too many extension agents but too few appropriate technologies to extend. When a new technology is clearly profitable, as it was with modern rice varieties or chemical spraying of mangoes, not much resources were required to have them widely adopted. Yet, budgets for extension type of activities continue to grow, and wasteful duplication and fragmented efforts persist.

* *Limited research funds are allocated thinly to too many commodities; allocation favors minor crops over commodities of major economic importance.* The misallocation in the distribution of funds among commodities, the lack of focus on technological issues of greatest scientific and economic potentials as well as bureaucratic problems in disbursements of funds lower the effectiveness of public expenditures.

* *Distribution of scientific manpower is heavily biased towards agricultural universities against DA-related agencies which are directly linked to farmers and responsible for their welfare.* Such unevenness is caused not only by the bias in the manpower development efforts since the 1970s but also by the lower economic incentives and institutional support for research in the DA agencies compared to SCUs.

- *Problems in the overall organizational structure obscure accountability.* The Secretary of Agriculture is ultimately responsible for the performance of the sector, yet he does not have effective control over agricultural research and development budgets and management. The research community blames slow technological progress on the weakness of the extension system, not realizing that such weakness stems from the lack of profitable new technologies to extend. Since neither the DOST nor the SCUs are held accountable for agricultural development and are independent of the DA, there is no effective pressure on the research system in general to improve its performance through more efficient allocation of resources. Even within the DA, the multi-functional commodity-based structure and autonomy of several major commodity agencies make it extremely difficult to effectively manage and monitor performance of the research units under its umbrella.

Policy Implications

Budget

Agricultural research is an area of public investments that should be evaluated in terms of its social benefits and costs, in the same way as investments in physical and other social infrastructure. The very high estimated rates of return as well as the very low research expenditure in the Philippines compared to other Asian developing countries clearly indicate substantial underfunding of agricultural research in the country. Public investment in agriculture research should increase by at least four-fold to be comparable with Thailand and nearly ten-fold to reach 1 percent of gross value added, a norm considered feasible and desirable for developing countries. Earmarked taxation to fund research for exportable commodities where the

benefits from productivity growth accrue to producers rather than to consumers should increasingly be used.

Organizational Structure

Accompanying substantial increases in public expenditures for agricultural research should be the rationalization of the organizational structure of the research system. This is all the more imperative with the devolution of the agricultural extension function to the local governments. That rationalization will involve the following:

a. Complete devolution of all extension functions to the local governments, i.e., PCA, SRA, DAR and other central level agencies should transfer extension personnel and budget to local governments.

b. Integration of the management of public expenditure and non-university institutions for agricultural research (particularly the applied and adaptive research) under the Department of Agriculture in an office to be headed by an undersecretary. This shall include PCARRD and all offices concerned with research and development under the DA and its attached agencies. The current coordination and management functions of PCARRD and the Bureau of Agricultural Research should be integrated. That office may then be organized by major commodities/commodity groups/resources, and appropriate mechanisms for interactions and collaborative activities with extension offices of local governments developed.

c. Allowing the DA to have sufficient influence over government appropriations and general direction and priorities for applied agricultural research and extension activities of SCUs. The latter remains an important sector in applied agricultural research and extension. However, the general administration and supervision, including appointments, salaries, and business

operations as well as the budget for basic and strategic research must remain under the SCUs' control. The SCUs may also freely contract applied research with local governments and external agencies.

d. Retention of a council-type of structure to manage the applied research and development. It is essential that this structure be under the DA. The mandate to promote basic research in agriculture may continue to be with the DOST.

Such an organizational structure will be expected not only to raise efficiency and effectiveness of the research and extension system through better prioritization, stronger linkage of research and extension, greater accountability but also to raise the public expenditure budgets for agricultural research. The DA will have greater clout in raising funds for the agricultural sector than DOST and SCUs as well as in reallocating existing resources in favor of agricultural research over extension, and other market and regulatory functions. It should be noted that most countries in developing and developed countries assign the responsibility for applied agricultural research to their respective Departments or Ministries of Agriculture. While the land grant universities in the US are directly responsible for research and extension to the state legislature, the US Department of Agriculture maintains effective influence through a system of counterpart funding and its own administered research programs and institutions. The Indian research system is also university-based but managed by a semi-autonomous council responsible to the Ministry of Agriculture.

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Table 1

Average growth rates of gross domestic product, agricultural value added, food production per capita, agricultural exports in selected South and Southeast Asian countries, 1970-1992
(In percent)

	1970-1980				1980-1992			
	Gross domestic product	Agriculture gross value added	Food per capita	Agriculture export	Gross domestic product	Agriculture gross value added	Food per capita	Agriculture export
Indonesia	8.4	4.4	1.4	17.5	5.6	2.9	2.1	2.6
Malaysia	9.1	6.5	5.1	17.5	6.2	3.4	3.9	1.8
Thailand	6.7	4.2[c]	2.1	20.7	9.9	5.8	0.5	5.2
Philippines	6.1	4.9	1.6	14.3	1.5	1.1	-1.4	-3.2
India	3.9	1.8	0.2	14.3	5.6[a]	3.8[b]	1.6	5.1
Pakistan	5.3	3.0	0.5	15.5	13.1	11.3	0.9	1.6
Nepal	2.0	0.8	-0.9	-1.8	4.5	4.6	1.1	-1.0
Bangladesh	4.7	1.4	-1.2	0.1	4.0	2.9	-0.3	-1.5
Sri Lanka	3.7	1.9	1.2	7.8	4.1	1.8	-1.6	-0.4

[a] Data up to 1990 only.
[b] Data up to 1991 only.
[c] Average of 1972-80.

Table 2

Trends in the share of world trade of selected Philippine agricultural exports, 1960-1992

	Coconut products					Sugar[b]	Bananas	Pineapple
	Total	Copra	Coco oil	D'cated coconut	Copra meal			
1960-64	48	54	31	56	34	9	0	-
1965-69	55	62	47	52	47	7	0	-
1970-74	56	61	53	53	46	7	3	-
1975-79	63	60	65	61	54	4	8	18[c]
1980-84	65	38[a]	68	62	59	4	9	20
1985-89	57	34[a]	59	51	51	1	7	15
1990-92	52	26	59	43	45	1	5	14

[a] 4 year average only because of copra export ban in 1984 and 1985.
[b] Includes centrifugal and refined sugar.
[c] Average of 1978 and 1979 since world export data on pineapple started in 1978 only.

Table 3

Measures of government revenue and agricultural expenditures in selected Asian countries, 1988

	Agricultural expenditures as % of Total expenditure	Agricultural expenditures as % of GDP	Total revenue as percent of GDP
Philippines	5.2	1.1	13.7
Indonesia	6.8	1.5	18.1
Thailand	10.3[a]	1.9[a]	20.6
Malaysia	7.0	2.1	23.9

[a] 1987

Source: Adopted from Manasan, R. G. "A Review of Fiscal Policy Reforms in the Asian Countries in the 1980s," PIDS Working Paper No. 14, May 1990.

Table 4

Summary of rates of returns estimates of public agricultural research

	Percent
Developing Countries (Evenson and David,1992)	
5 studies	0
8 studies	0 - 20
28 studies	30 - 50
37 studies	50+
Philippines	
Rice (Flores, Evenson, & Hayami, 1978)	75
Corn (Librero and Perez, 1987)	29 - 48
Sugar (Librero, Perez, and Emlano, 1987)	51 - 71
Poultry (Librero and Emlano, 1990)	100 +

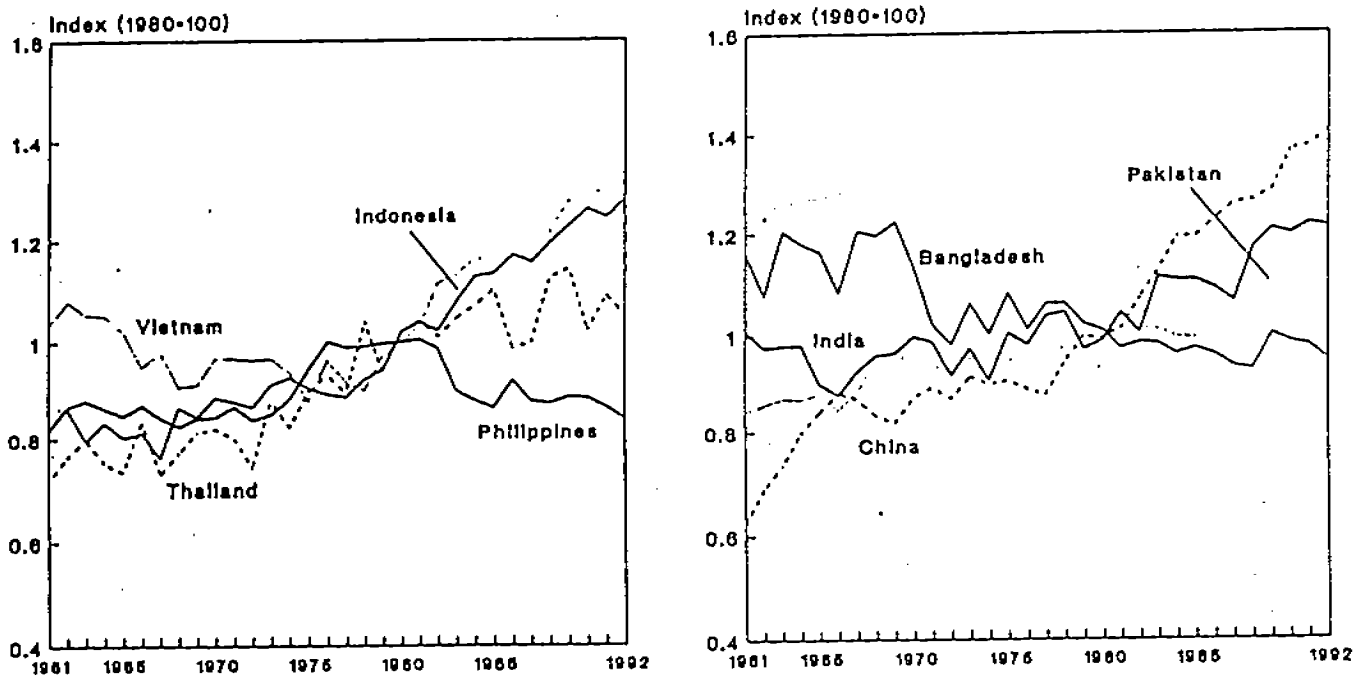

Fig.1. Trends in food production per capita, 1961-1992.

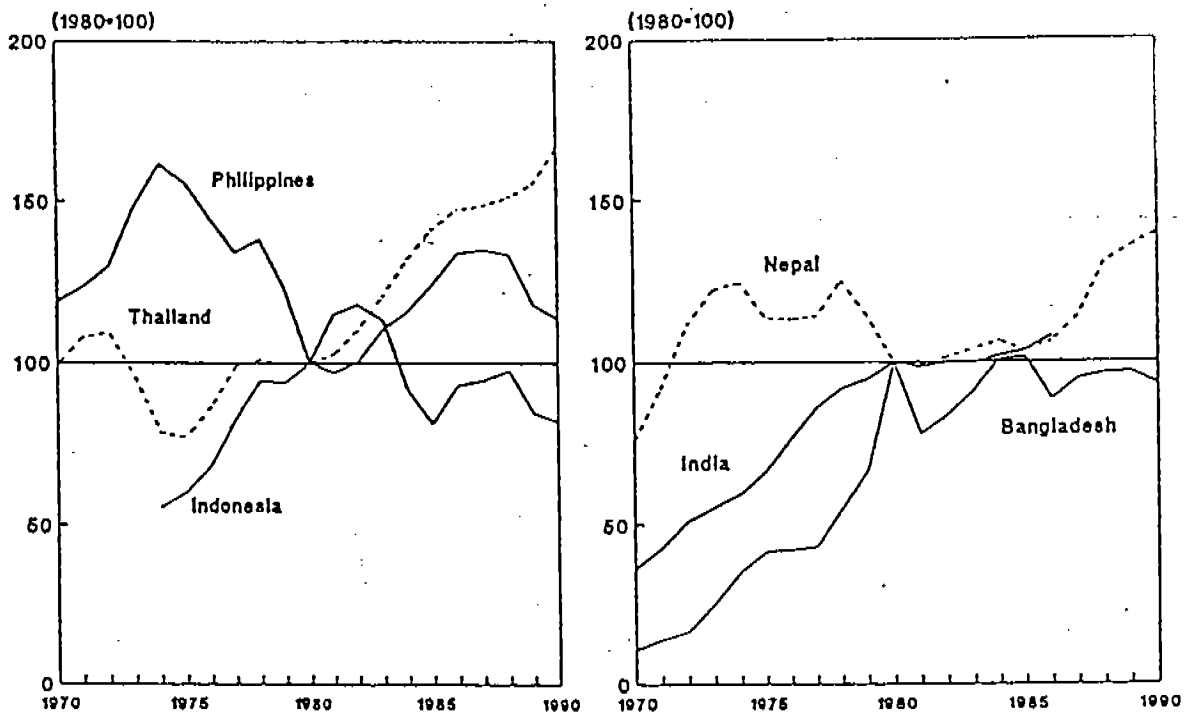

Fig 2a. Trends in agricultural research expenditures in real terms 3-year moving average.

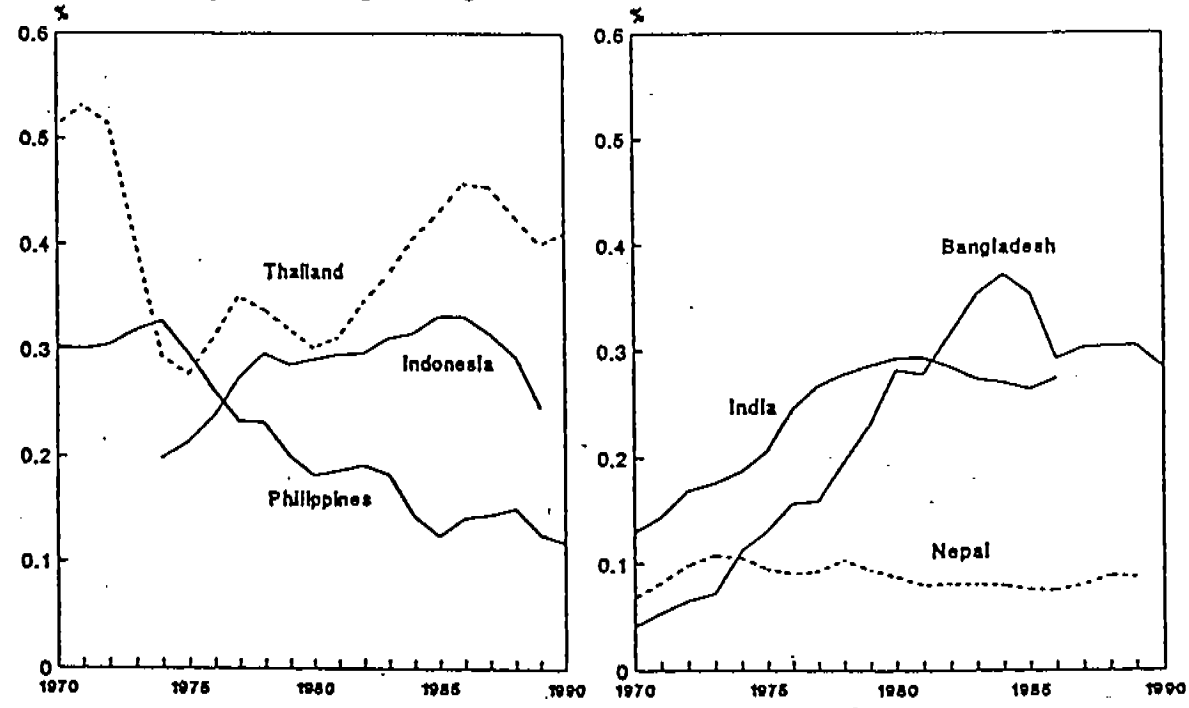

Fig 2b. Trends in agricultural research intensity ratios (% of agricultural research expenditures to gross value added in agriculture) 3-year moving average.