Office of Strategic Planning
Policy Directorate
U.S. Agency for International Development

MEMORANDUM

TO: See Distribution

FROM: Martin Hanratty, POL/SP

DATE: May 5, 1993

SUBJECT: Agriculture's Contribution to GDP

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Introduction

The Agency is currently undergoing a major rethinking of its mandate and objectives. One option being considered is the dedication of A.I.D. to the mandate of sustainable economic development. Proponents of this approach suggest that Agency programming focused on assisting developing countries resolve major constraints that inhibit long-term economic and employment growth.

Assuming that the Agency adopts this mandate, selection and prioritization of constraints to be addressed will depend on the relative importance that changes in different economic sectors have on overall economic growth and performance. Over the past few years, many within the Agency have suggested that agriculture's role in the growth process has declined as A.I.D. client countries have developed.

The purpose of this memo is to examine this hypothesis. The memo does not, nor should it, argue for increased donor or A.I.D. support for agricultural related activities on the basis of their relative size vis-a-vis other economic sectors. Questions of resource allocation are dependent on a different set of criteria - the public nature of the activity, the need for donor assistance, and the rate of anticipated return on investment relative to other investment opportunities.

The hypothesis, does agriculture decrease in importance with growth, is in part supported by sectoral data. As Table One suggests, as economies grow and per capita

income rises, agriculture's share of GDP relative to that of industry and services declines. In the least developed economies, where per capita incomes, expressed in purchasing power parity (PPP), range from $310 (Ethiopia) to $1770 (Pakistan), agriculture's share of GDP averages 32 percent with industry and services accounting for 27 and 40 percent respectively. In transitional economies, where per capita incomes range from $1890 (El Salvador) to $3120 (Paraguay), agriculture's share of GDP drops to 23 percent with industry increasing to 39 percent and services declining slightly to 38 percent. Finally, as economies reach a more mature, advanced development stage, where per capita incomes range from $3720 (Ecuador) and up (the last in the series is Korea at $7190), agriculture's share drops even further to 11 percent of GDP with industry also declining to 21 percent and services rising to 49 percent.

TABLE ONE. The Changing Role of Agriculture in Economic Development
Agriculture's Share of GDP

Type of Economy	Income Range (ICP/ capita)	Sector Shares of GDP		
		Agriculture (percent)	Industry (percent)	Services (percent)
Least Developed Economies	$0 – 1800	32	27	40
Transitional Economies	$1801 – 3400	23	39	38
Advanced Developing Economies	$3401 and up	11	20	48

NOTE: The income catorgies have been developed using income estimates developed by the United Nation's International Comparison Program, as reported by the World Bank in Table 20 of the annual World Development Report. Country grouping is based on the distribution of IPCs exclusively.

SOURCE: The World Development Report, 1992: Table 30, pp 276 to 277.

Agriculture's Relative Share in an Economy

The declining importance of agriculture's relative share in generating GDP has led many in A.I.D. and elsewhere to conclude that agriculture in less and less important as one moves up the development scale. Exclusive reliance on these sectoral aggregates, however, is at best questionable.

First, reliance on the relative share of agriculture in GDP implies that the absolute level of other parameters, such as agricultural value added and employment also decline as

economic growth continues. As Table Two suggests, both of these implied assumptions are not substantiated by the data. For example, agricultural GDP per agricultural worker per year continues to increase throughout the development process. Per worker output in 1990 in the least developed countries averaged about $42,000. In the transitional and advanced developed economies, presumably as a result of capital and technological investment, output per worker doubled to $84,000 in the transitional economies and increased by a factor of eight to $320,000 in the advanced developing countries. Although the magnitude of these numbers is questionable, probably due to an underestimation of the size of the agricultural labor force, the direction of the trend is consistent with perceived theory.

TABLE TWO. The Changing Role of Agriculture in Economic Development Changes GDP and Agricultural Employment

Type of Economy	Income Range (ICP/ capita)	Agriculture's Share of GDP (percent)	Agricultural Output Per Agricultural Laborer (in US$)	Agriculture's Share of the Labor Force (percent)
Least Developed Economies	$0 - 1800	32	42366	64
Transitional Economies	$1801 - 3400	23	84668	69
Advanced Developing Economies	$3401 and up	11	338634	30

SOURCE: Income data: World Development Report, 1992.
Labor force data: Human Development Report, 1991.

In addition, production agriculture remains the largest single employer of a nation's labor force up through the transitional phase in development. In the transitional economies, while agriculture production generates only 23 percent of GDP, it continues to employ 69 percent on the labor force (See Annex Graph One and Two for country level detail). In the less developed and transitional economies, agriculture production continues to employ approximately 65 per cent of a nations' manpower even as growth proceeds. Suprisingly, the data suggests that the proportion of a nation's labor force employed in agriculture actually increases from 64 to 69 percent as nations move from the former to the latter category.

Second, the above GDP data represent a very restrictive definition of agriculture. It only includes value added generated on the farm, not the value of goods and services supplied to the farm for use exclusively in production (fertilizer, agricultural chemicals, equipment, etc.) or the value associated with the storage, processing and distribution of commodities after they leave the farm. Value added associated with these latter activities

are listed as industrial or service related GDP, even though they depend exclusively on agriculture production for their market or as their raw material source. Attempts to combine the value added associated with these latter areas with that from agricultural production has been undertaken in a limited number of transitional countries. Summary results are presented below:

o In **Morocco** (1990 PPP per capita income of $2670), a detailed analysis of 1980 - 89 national account data[1] suggests that agriculture related production, goods and services accounted for 45 percent of GDP during the 80's: 17 percent from field crop production, 15 percent from agribusiness related services, 9 percent from agroindustry, and 4 per cent from agricultural equipment and inputs (See Chart in the Annex for sector detail).

o In **Pakistan** (1990 PPP per capita income of $1770), analysis of national account data from 1975 to 1990, indicates that agriculture and related activities accounted for slightly over 50 per cent of GDP generated during the period. Time series analysis[2] showed that as the value of field production declined from 34 to 22 per cent GDP over the period, that associated with agribusiness increased from 20 per cent to 29 per cent. This increase was sufficient to retain agriculture's position as the leading sector in the Pakistan economy. In 1987, the sector accounted for 56 per cent of GDP; 18 per cent from field crop production (other than cotton), 18 per cent from cotton bases production and processing, 12 per cent from tobacco production and processing, 3 per cent from agricultural chemical manufacture, and 3 per cent from other activities (See Chart in Annex for sector level detail). Even without textile manufacturing, which some analysts argue is a industrial not an agricultural sector related activity, the sector still accounts for 40 per cent of 19876 GDP.

o In the **Philippines** (1990 PPP per capita income of $2320), analysis of 1989 data[3] suggested that gross value added from the sector accounted for 50 per cent of GDP; 24 per cent from crop production, 13 per cent from industry, primarily agro-based manufacturing, and 13 per cent from agribusiness services provided by the transportation, trade , and finance sub-sectors. More detailed analysis, of 20 productive sub-sectors, using the nation's input/output tables, found that sub-sectors within the agricultural and natural resources complex had:

- The highest business multiplier amongst the 19 sub-sectors, i.e. the impact

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[1] The Contribution of Agribusiness to National Income in North Africa and the Near East; Ismael Ouedraoge, *et al*; Abt Associates, Inc.; Washington, D.C.; January, 1993.

[2] The Contribution of Food and Fiber System to GDP; Economic Wing, Ministry of Food and Agriculture, The Government of Pakistan; March, 1993.

[3] The Philippines Agriculture and Natural Resources Sector: A Proposed Strategy; Larry Morgan, *et al*; Chemonics International Consulting Division; Washington, D.C.; August, 1990.

that a one dollar increase in agricultural and natural related activities has on other business activity throughout the economy. The analysis found that every a one dollar increase in livestock and poultry production lead to a $3.77 increase in other business activity; a one dollar increase in food and feed processing to a $ 3.75 economy-wide increase. In comparison, a one dollar increase in manufacturing output led to only a $2.51 increase in overall business activity.

- The highest employment multipliers amongst the 19 sub-sectors. For every one dollar increase in output from the food and feed processing sub-sector, 17.5 new jobs were created in the economy. This multiplier is over two times the 5.7 multiplier associated with increases in manufacturing sector output and ten times those in the production agriculture (rice, corn, coconut and sugar production) sub-sectors.

Third, in the best of all possible worlds, sectoral investment decisions should be guided not by the size of a sector's contribution to GDP, but by the rate of return on investments in a given sector or program area. In this respect, agricultural sector investments have had mixed reviews. Evaluations that have attempted to determine the economic returns generated by investments in research, extension, and related farm level costs have generally been favorable. In a comprehensive summary of 87 major economic evaluations of agricultural research and extension projects, conducted in developed and developing countries since 1958, analyst found returns ranging from 0 to 133 percent.[4] More recent work done in Africa indicate similar returns, ranging from 0 to 135 per cent.[5] In the only two evaluations that focused exclusively on returns to research, Kenyan corn and Japanese rice, returns ranged from 40-60 per cent in the former case and 25-27 per cent in the latter case.

Investments in other agricultural related activities, however, have tended to be problematic with performance problematic in recent years. For example, the World Bank in a review of its agricultural lending portfolio rated only one half of completed agricultural project as satisfactory, down from two-thirds in the 1974-88 period.[6] Ratings were particularly poor for Africa and Latin American and the Caribbean regions, and for irrigation, agroindustry, and area development projects.

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[4] Methods for Diagnosing Research System Constraints and Assessing the Impact of Agricultural Research, Volume II: Assessing the Impact of Agricultural Research; Proceedings of an ISNAR/Rutgers Agricultural Technology Management Workshop, 6-8 July 1988, Rutgers University, New Jersey; ed. Ruben G. Echeverria; 1990.

[5] The Impact of Agricultural Technology in Sub-Saharan Africa: A Synthesis of Symposium Findings; James Oehmke and Eric Crawford; "Symposium on the Impact of Technology on Agricultural Transformation in Africa" held at the Ramada Renaissance Techworld Hotel, Washington D.C.; October 14-16, 1992.

[6] **Agricultural Sector Review**; The World Bank; Washington, D.C.; March 1993.

They attributed poor performance to poor macroeconomic and sector policies that discriminated against agricultural production, poor project design, weak national institutions and inadequate project supervision. Another report underlines the impact of inappropriate macroeconomic and sectoral policies to agricultural performance. For example, an evaluation of macroeconomic and sectoral policy in 17 developing countries found that agricultural had been heavily taxed during the 1974-88 period, significantly reducing producer incentives to intensify production, thus leading to poorer overall sector as well as project level performance. On average, the effects of direct and indirect government intervention has been enormous- resulting in income transfer out of the sector in the neighborhood of 46 per cent of agricultural GDP a year during the period 1960-84. These massive withdrawals adversely effected both agricultural and overall growth rates. In highly interventionist economies agricultural and overall economic growth averaged 2.5 and 3.3 percent per year, 2.5 and 3.2 percent below those countries that provided a limited amount of protection to the sector.[7]

Finally, evaluations conducted by the International Finance Corporation in the late 1980's indicated that the overall experience with agricultural processing and storage ventures had been poor.[8] Of the fourteen ventures they had been involved in only four were expected to provide financial returns greater than 10 per cent, six were expected to provide negative financial returns, and seven were expected to provide negative economic returns. Performance problems originated with the inability of processors to secure steady supplies of relatively inexpensive commodity inputs and limited access to seasonal working capital in sufficient quantities to take advantage of favorable seasonable market conditions. The strong forward linkages between Philippino agriculture and the food and feed processing sub-sector would seem to substantiate these findings.

These results have led the World Bank to reconfirm its commitment to both macro and sector policy reform and to a programming approach that treats the agricultural sector not as a set of isolated sub-sectors, but as a system that looks at production, processing, and consumption as a continuum.[9] Bank analysis suggests that reforms in agricultural commodity and input markets, land and rural labor markets, markets for rural credit, commerce, regulatory constraints to improve the operation of provincial transportation and communications and strengthening private sector capacity to manage commodity price risks may be required prior to or simultaneous with macroeconomic policy changes, if a significant supply response are to be generated in production agriculture.[10]

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[7] The Plunder of Agriculture in Developing Countries; Maurice Schiff and Alberto Valdes; the World Bank; 1992.

[8] Lessons From IFC's Experience in the Agricultural Processing and Storage Sub-Sector; The International Finance Corporation; Washington D.C.; December, 1988.

[9] **Agricultural Sector Review**; pp. 32-33.

[10] **Agricultural Sector Review**; pp 33-35.

Conclusions

The above analysis suggest the following conclusions:

o While the relative share of GDP generated by agriculture field production declines during development, the sub-sector remains an important contributor to value added throughout the development process.

o The agricultural production sub-sector remains the single largest employer in developing countries and it retains that position much longer that previously thought. Countries with per capita incomes of $3000 per year continue to retain more than 50 per cent of their national labor force in agricultural production.

o Declines in the relative importance of agricultural field production to GDP are more than offset by increases in value added associated with agricultural input supply and output processing. Taken as a whole, the system continues to account for approximately 50 per cent of GDP over a select sample of least developed and transitional economies.

o The source of value added in the agricultural sector shifts from field production to agribusiness as development proceeds. Sub-sectors associated with agribusiness tend to be labor intensive and thus high priority areas for employment generation.

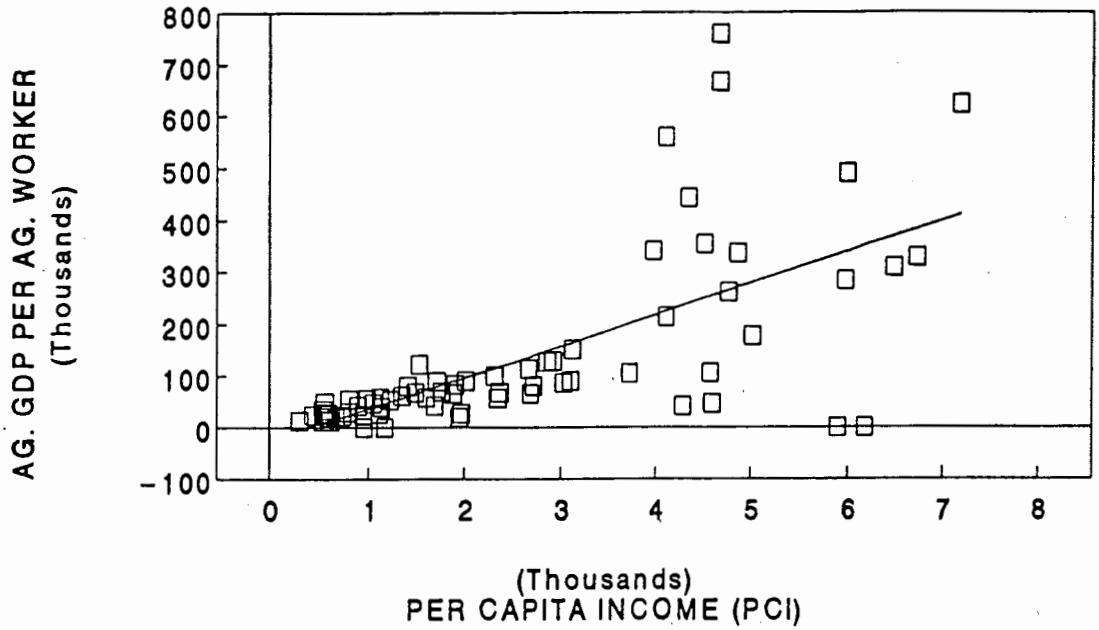
o Agricultural field production has strong backward and forward linkages with the rest of the economy. Growth in the overall economic system relies on a steady increase in the demand for agricultural production related goods and services and the availability of a relatively cheap source of agricultural inputs for the food and feed processing sub-sector.

o Rates of return on agricultural related investments, with the exception of agricultural research, still face problems. The problems, inappropriate policy, bad design, inadequate supervision and management and limited access to capital and raw material inputs are solvable.

o Given the strong forward and backward linkages within a nation's agricultural system, agricultural programming should be closely tied to macroeconomic distortions and adjustments and should be carried out within a systems context, not activity by activity.

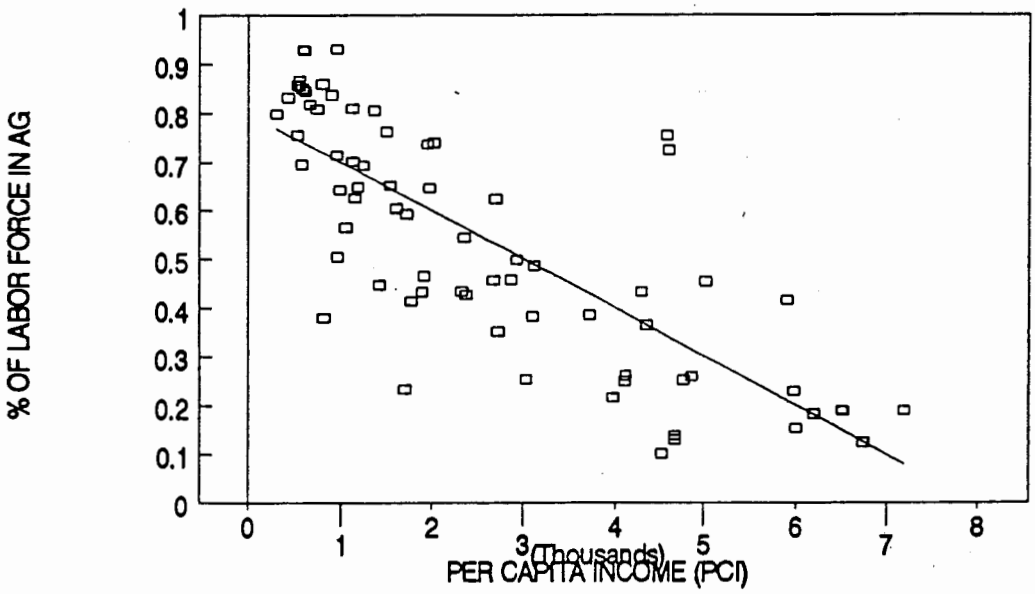
GRAPH I

AVERAGE OUTPUT PER
AGRICULTURAL WORKER



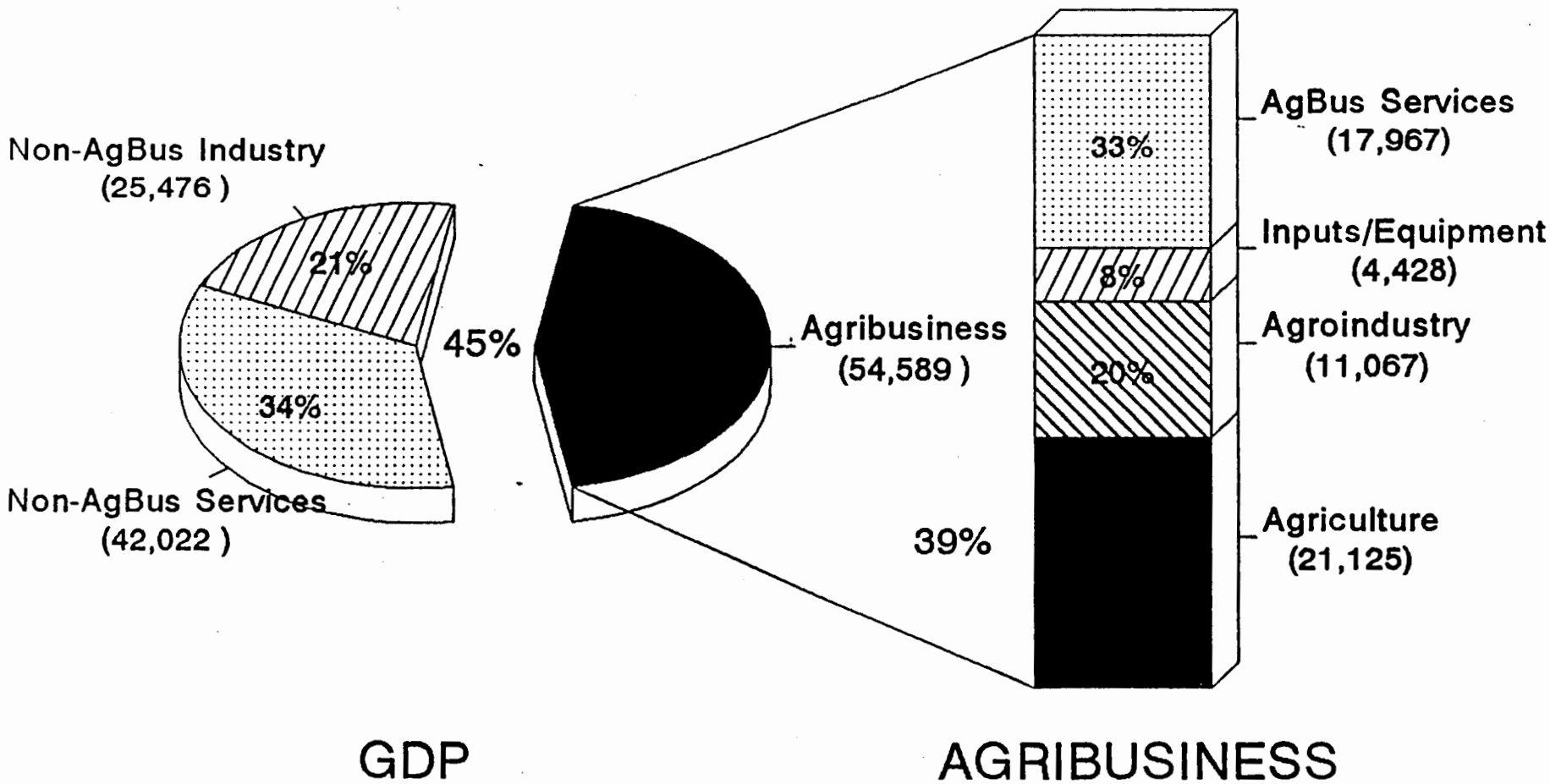
GRAPH II

% OF LABOR FORCE IN AGRICULTURE



Morocco: Agribusiness in GDP and its Components

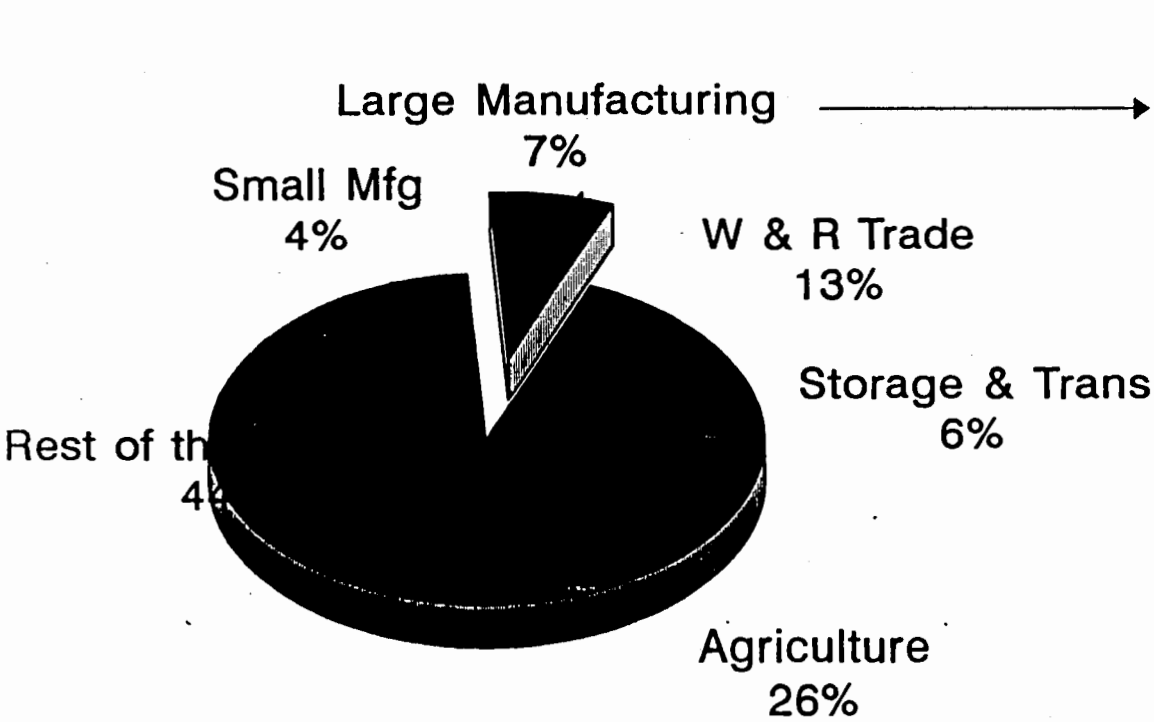
(Value Added at Factor Cost, Current Prices, 000 Dirhams)
Average 1980 - 1989

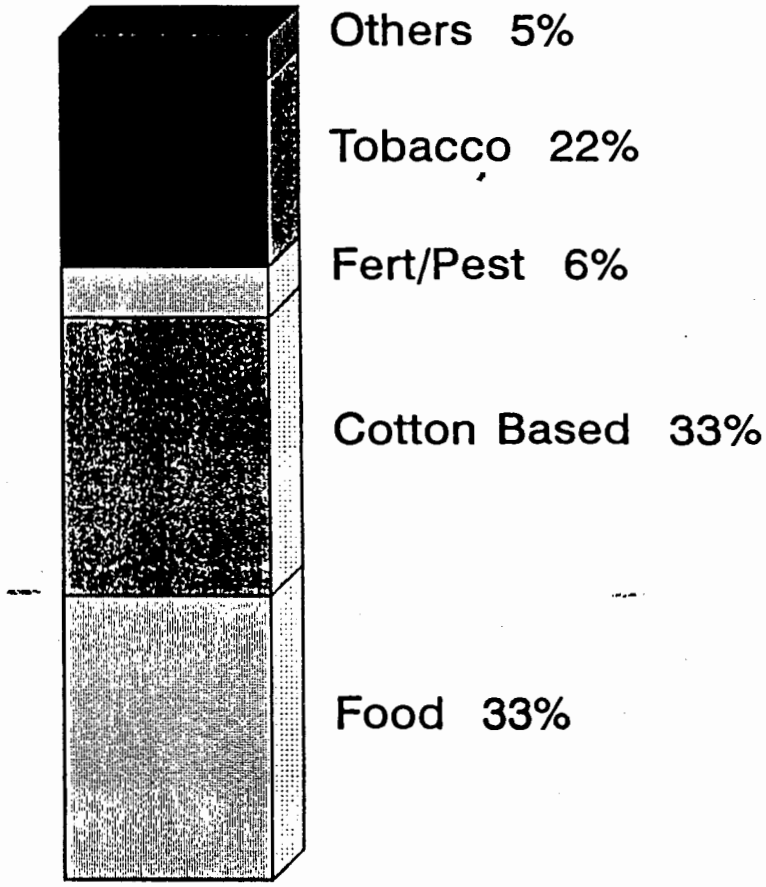


Abt Associates Inc., APAP II

PAKISTAN: AGRIBUSINESS

Agriculture (26%) Agribusiness (30%) Rest of the Economy (44%)





SECTORAL SHARES IN GDP

SHARES IN LARGE MANUFACTURING GDP

Basis: 1986/87 data on GDP (new methodology) and manufacturing.

Prepared by: Abdul Wasay/ARD Dated: Sept 92