

CORRELATIVE STUDY OF FOOD CROPPING AND FARM MECHANIZATION IN AGRICULTURE OF PAKISTAN

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ABSTRACT

Agriculture in Pakistan contributes 21.9 percent to GDP, 70 percent labour is employed by agriculture sector and also it is the source of forex receipts. Despite tremendous increase in all major and minor crops and the corresponding increase in labour employment during the periods 1950-1955 and 2002-2003, there have arisen many issues. The employment also increased in crop production during this period and with the success of green revolution. The use of tractors and tube wells has resulted in lopsided improvement in favour of only big farms. The problem of foreign exchange earnings also persists due to heavy imports of food items like oil, milk and tea. Various measures are suggested to address these issues and for the improvement of agriculture efficiencies and performance.

INTRODUCTION

Agriculture is the major component of Pakistan's national income. Its share in the GDP is 21.9% and it employs 70% of the workforce. The important food and cash crops include wheat, rice, maize, fruits, cotton and sugarcane – value addition of these products is 10 % of GDP. The live stock subsector contributes 11% of GDP. The agriculture sector also serves as a source of raw material for large – scale industries such as textile and sugar. On the demand side, it consumes fertiliser manufactured domestically and is an increasingly important consumer of electricity and engineering goods.

The overall policy goal in agriculture is to raise productivity and profitability of the farming community enabling the country to raise living standard of rural masses. The institutional services as research in agriculture and extension are geared to raise productivity and profitability of the farmer. In respect of farm inputs, rules are framed to arrange adulteration-free availability at reasonable rates and steps were taken to reduce cost of farm inputs. In the procurement of agricultural commodities, the role of private

sector is being stressed, leading to public private sector partnership.

Yet, the performance of agricultural sector in Pakistan has been unsatisfactory. It is chiefly attributable to traditional way of cultivation, lack of motivation on the part of our illiterate and uninformed rural population, water scarcity and to natural disasters like floods and pest attacks. From input-output analysis conducted by analysts, it is concluded that the agricultural sector has had a decreasing returns for the inputs. This paper attempts to analyze correlation between mechanization and crop productivity of major cash crops in Pakistan.

CROP PRODUCTIVITY OF MAJOR CROPS

The total area under food crops has increased by more than 50% since 1959 – 60. In the 1960 – 65 periods, the four major crops covered about 53% of total cropped area, whereas by 2000-2003 this had increased substantially to 64%. See Table-1 below.

Table-1
AREA UNDER MAJOR CROPS 1950 – 2003 ('000 HECTARES)

Year	Wheat	Rice	Sugarcane	Cotton	Percentage
1950-1955	4,154.0	947.0	245.6	1,275.8	-
1955-1960	4,736.5	1,078.8	365.4	1,393.2	-
1960-1965	4,896.2	1,214.2	447.6	1,375.4	52.59
1965-1970	5,591.8	1,426.6	559.0	1,635.6	56.58
1970-1975	6,017.4	1,514.6	597.6	1,860.2	58.62
1975-1980	6,272.0	1,797.6	747.0	1,916.4	58.20
1980-1985	7,174.4	1,984.2	859.8	2,177.7	61.96
1985-1990	7,418.2	1,986.6	833.0	2,459.6	62.26
1990-1995	8,058.6	2,099.0	927.4	2,758.0	63.32
1995-2000	8,306.6	2,333.8	1,029.8	3,002.4	66.21
2000-2003	8,069.0	2,226.0	1,086.0	2,796.0	64.51

Source: For 1950-55 and 1955-60, Viqar A. & Amjad R. (1984). *Management of Pakistan's Economy 1947-1982*. For other years, Government of Pakistan. *Pakistan Economy Survey* [Various Issues].

There has been tremendous increase in all major and minor crops during the periods 1950-1955 and 2002-2003. The employment also increased in crop production during this period

with the success of green revolution. The production of major crops is given in Table- 2 below.

Table-2
PRODUCTION OF MAJOR CROPS 1950 – 2003 ('000 TONNES)

Year	Wheat	Rice	Sugarcane	Cotton ('000 Bales)
1950-1955	3,235.8	837.2	7,192.6	-
1955-1960	3,677.6	909.6	10,318.6	-
1960-1965	4,016.4	1,107.8	14,247.8	1,995.8
1965-1970	5,175.6	1,512.6	20,718.0	2,625.0
1970-1975	7,145.6	1,929.2	17,402.8	3,705.0
1975-1980	8,765.0	2,778.2	26,743.0	3,094.0
1980-1985	11,330.6	3,292.2	32,651.6	4,926.6
1985-1990	12,947.2	3,232.2	31,973.4	7,632.4
1990-1995	15,724.0	3,412.0	40,901.6	9,648.4
1995-2000	18,238.0	4,487.0	48,371.0	9,837.0
2000-2003	19,235.0	4,487.0	52,049.0	10,211.0

Source: Government of Pakistan. *Pakistan Economy Survey* [Various Issues].

Table-3 shows the average yield for major crops comparing the period 2002- 2003 with early 1950s. The yield of wheat went up from 776kg/hectare to 2,384; of rice increased from 878 to 2,012, though much of the improvement was in the early years. Sugarcane increased from 29,180 to 48,000 and cotton from 212 to 621. This Table perhaps best exemplifies the huge impact of the green revolution, where due to the high yielding variety seeds for wheat and rice, there was a marked increase in output. For example, between 1974 – 75 and 2002 – 2003 the yield for rice increased by 39%, although the yield for wheat continued to show large increases by as much as 81%. However, it now took two decades to achieve what was achieved earlier in only one decade.

Table-3
YIELD OF MAJOR AGRICULTURAL CROPS 1950-2003
(KG/HECTARE)

Year	Wheat	Rice	Sugar Cane	Maize	Grain	Cotton
1950-1955	776.6	878.4	28,180	-	-	212.0
1955-1960	782.2	846.8	28,240	-	-	212.0
1960-1965	831.8	929.6	33,580	-	-	254.0
1965-1970	977.0	1,507.6	37,840	-	-	289.4
1970-1975	1,251.0	1,549.0	35,508	1,160	544.0	346.0
1975-1980	1,454.0	1,569.0	37,038	1,249	486.0	284.0
1980-1985	1,596.0	1,684.0	37,460	1,267	476.0	343.0
1985-1990	1,773.0	1,600.0	38,574	1,339	514.0	544.0
1990-1995	1,950.0	1,623.0	44,000	1,407	452.0	594.0
1995-2000	2,194.0	1,919.0	46,887	1,657	614.0	557.0
2000-2003	2,384.0	2,012.0	47,927	1,812	615.0	621.0

Source: Viqar A., & Amjad, R. (1984). *The Management of Pakistan's Economy 1947-1982*. Government of Pakistan. *Agricultural Statistics of Pakistan* [Various Issues].

IMPACT OF GREEN REVOLUTION

The introduction of new technology in the agricultural sector was termed as Green Revolution, the scientific breakthrough in the form of inputs like high yielding varieties of seed (HYV), fertilisers and pesticides together with the spread of agricultural mechanisation. The core of green revolution which is the HYVs of wheat and rice are most significant. The fact that new HYVs are not sensitive to differences in day-length makes them adaptable to a wide range of conditions and thereby increases the possibility of wide adoption in many parts of the world (Faiz 1986).

When a new technique of production is innovated the landlords do not like to introduce changes which would improve the output of land. However, on adoption of high yields, Pakistan's total output of wheat increased during these years from 4.5million tonnes in 1960 to 8.4million in 1980 – an increase of 83% in 20 years. And an additional advantage of these varieties is that water is used efficiently in comparison to traditional varieties. Moreover, induction of hybrid maize has generally posted 30%

increased yield of maize. Consequently, the increased productivity is likely to improve the economic conditions of the tiller of the soil. Although the green revolution may have resulted in reduced tenant's shares but at the same time decreased the costs and as a result the tenant's net income is to increase more than that of land owners.

Correspondingly, there is relative boost in employment. The changes in cropping pattern and in the physical input of labour per crop acre of various crops determine the labour intensity. Table-4 shows increase in job opportunities due to increase in production. It may be noted that as a consequence of HYVs, labour opportunities increased to 3.29% in 1964–68, and after minor slack in 1968–72, increased by 2.8% in 1972 – 1976 and to 2.6% in 1976–80. This trend persists except in severe conditions during drought and floods.

Table-4
ANNUAL GROWTH RATES OF JOBS IN CROP PRODUCTION
SUB-SECTOR

Year	Cropland	Labour Input	Cropping Pattern	Total Annual Growth Rates
1964 – 1968	1.88	0.69	0.72	3.29
1968 – 1972	0.77	0.73	0.20	1.70
1972 – 1976	1.32	0.73	0.75	2.80
1976 – 1980	1.32	0.72	0.56	2.60

Source: Chaudhry, G.M. (1982). *Green Revolution and Redistribution of Rural Incomes*. pp.184-187.

The impact of green revolution on agrarian structure, especially income generated in the process, indicates that green revolution has helped the pursuit of greater social equality and a more egalitarian distribution of income (Chaudhry 1982). But, inequality of incomes in the rural areas of Pakistan has increased (Khan 1985). However, given the nature of the distribution of the means of production, i.e. land in agriculture, one may expect an unequal and differentiated pattern of income distribution in Pakistan (Naqvi 1989).

FARM MECHANISATION AND PRODUCTIVITY

Some research studies have shown that mechanisation has resulted in an increasing demand for seasonal labour and consequently the rural wages have become more or less at par with urban wages. As far as the small farm sector is concerned farming operations continue mostly with the use of bullocks. Therefore, the labour displacement effect of farm mechanisation is of minor significance in their case. Besides, the fertiliser and pesticides technologies are generally labour augmenting. Table-5 shows the impact of agricultural mechanisation on agricultural labour.

Table-5
IMPACT OF MECHANISATION ON AGRICULTURAL LABOUR

Farm Size (Acres)	No. of Tractor Owners	Number of Tractors Reporting Change			
		Increased	Decreased	No Change	Net Change %
Under 12.5	2,080	480	423	1,177	-2
12.5 – 25	3,627	842	989	1,796	-4
25 – 100	16,366	4,723	2,717	8,926	-12
Over 100	32,083	9,381	6,728	15,974	-8

Source: Viqar, A. & Amjad, R. (1984). *The Management of Pakistan's Economy 1947-1982*, p.175.

The labour will increase if tractors are assembled within the country and if maintenance and servicing units for agricultural machinery are set up in rural areas. Also, the influence of mechanisation on employment varies with the system of irrigation and the package of mechanisation used. In canal irrigated areas with a tube well, employment per cultivated acre is more. A number of studies report higher productivity due to mechanical cultivation has resulted into the distribution of income in favour of large farmers which shows that the tube wells and tractor technology would have been used by them but in reality it has been used by small and big farmers.

CONCLUSIONS AND RECOMMENDATIONS

The major conclusions drawn from this paper were:

- There has been tremendous increase in all major and minor crops during the periods 1950-1955 and 2002-2003.
- The production of all food grains including wheat and Rice fell sharply during the period 1999 – 2000.
- The employment opportunities were created in the crop production sector as a result of increase in the production due to the effects of Green Revolution.

The importance of the agriculture in Pakistan economy requires that the government should exploit agricultural comparative advantage as a policy measure to finance imports requirements rather than striving for achieving the self sufficiency in industrial products.

Following measures are recommended for the efficiency and improvement of agricultural sector:

- The economic uplift in rural areas could be brought by transformations from traditional way of life to industrial.
- It should be ensured as a policy measure to discourage the absentee landlordism and the landowners should live as close as possible to the farms.
- Agriculture extension service personnel should have the proper information and the knowledge of technologies regarding the land utilization systems needed for different regions.
- The agricultural development technology system needs to be upgraded through education, research and extension.
- The government policies that distort input/output markets should be avoided as they would adversely affect the optimal allocation of resources.
- The government strategy with regard to public expenditure and investment must focus on adjustment of market failures and provision of public goods and services.
- The government should pursue policies that encourage exports of agriculture products or the manufactured goods using the agriculture products as inputs.
- The market forces of demand and supply may be allowed to work in agricultural output markets. The government should interfere, where ever necessary.

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