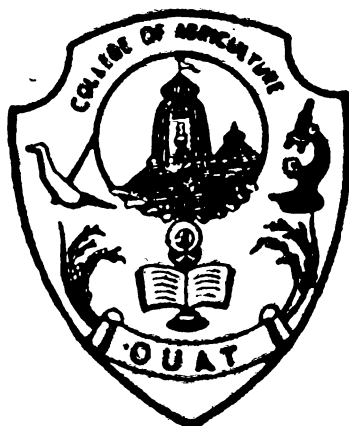


PRODUCTION AND MARKETING OF COLE CROPS IN SADAR BLOCK OF CUTTACK DISTRICT

**A THESIS SUBMITTED TO
THE ORISSA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, BHUBANESWAR
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF**

**MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL ECONOMICS)**

By
Monmohan Patnaik



**Department of Agricultural Economics
COLLEGE OF AGRICULTURE
Orissa University of Agriculture and Technology
BHUBANESWAR**

1993

THESIS ADVISOR

Mr. M. A. A. BAIG

DEDICATED
TO MY
BELOVED PARENTS

PRODUCTION AND MARKETING OF CEREALS AND

IN SADAR BLOCK OF CUTTACK DISTRICT

BY

MONMOHAN PATNAIK

A

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1993

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C E R T I F I C A T E

I hereby certify that the thesis entitled "PRODUCTION AND MARKETING OF COLE CROPS IN SADAR BLOCK OF CUTACK DISTRICT" submitted to the Orissa University of Agriculture and Technology Bhubaneswar in partial fulfilment for the award of the Degree of MASTER OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS) embodies the result of bona fide research work carried out by Sri MONMOHAN PATNAIK under my guidance and supervision and no part of the thesis has so far been submitted for any other degree or diploma. I further certify that such help or source of information as has been availed of in this connection is duly acknowledged.

Bf. M.A.A. Baig

M.A.A. Baig
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Dated the 6th August 1994

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Bhubaneswar

Dated the 6th August, 1994


Mohan Patnaik 6.08.94

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CHAPTER. - I

INTRODUCTION

Though Govt. organisation like IHR, IARI and various agricultural universities and research station located in different parts of country are continuing their efforts for the release of improved varieties of seeds, private organisations are taking the lead not only in releasing such varieties much faster in view of the availability of infra structural facilities, but also in importing the improved varieties from developed countries. In order to increase productivity of vegetables the govt. has put emphasis to provide seeds at subsidised rates.

In spite of the various constraints knowing the tremendous potential in vegetable production, corporate management are assisting the grower through soil testing, providing quality seeds of HYV and other inputs, extension service and financial assistance. There is good export potential of various fresh canned and dehydrated vegetables including chillies, onion, garlic, okra, tomato, potato, cabbage, cauliflower, beans and peas in spite of high domestic consumption. The total export earning under vegetables increased from Rs.34 crores in 1980-81 to Rs.120 crores in 1989-90 by registering annual growth rate of 20 per cent.

The diverse agro climatic condition in the country are suitable for the production of different types of vegetables throughout the year. This helps in a continuous supply of fresh vegetables and also providing scope for producing off season vegetables. However nearly 30 percent. of the total production gets

spoiled and wasted every year due to improper handling during harvest, transport, packing, storage and glut period for want of direct link between processor and growers.

The vegetables are generally dealt under thirteen groups, among which cole crops are important. This group includes cabbage (Brassica oleracea L.var capitata) cauliflower (Brassica oleracea L.var botrytis), Knol Khol or Kohl Rabi (Brassica caulorapa) Broccoli (Brassica oleracea L.var italica) Brussels sprouts (Brassica oleracea L.Var. gemifera Zenk) and chinese cabbage (Brassica pekinensis (lour) Rupr and Brassica chinensis). All cole crops are hardy and thrive best in cool weather except some acclimatized early cauliflour varieties. There has been substantial increase in the area of cauliflower and cabbage during the last decade in India. Some of the important cole crops growing states in the country are U.P. Karnataka, Maharashtra, West Bengal, Punjab and Haryana.

Keeping in view the importance of cole crops in human diet and market value it deems fit to know its production aspect and ultimately the cost and returns involved in the same. The present study makes an endeavour in this direction with respect to cole crops production in the state of Orissa. Cabbage and Cauliflour are the main cole crops grown in this state. However scanty data are available with respect to area production and yield of these crops. This indicates the sporadic nature of production of these crops. Poverty ridden economic of the farmers, lack of irrigation

eratic monsoon, short winter and poor market discourage farmers to produce these crops. However there are several patches enjoying irrigational facilities and proximity to urban consumer centres where farmers grow vegetables in abundance.

The present study has been made in the sadar block of Cuttack district which is one of the most important vegetable growing region of the state. About 73% of available area in the block is irrigated, moreover its geographical location provides a large ready market for the farmers. The village which grow predominantly cabbage and cauliflour are located around the national highway connecting Cuttack and Bhubaneswar city within a distance of 5-6 kilometres. This is the main advantage they gain so far as the marketing of their produce is concerned. Moreover being located within the economic nerve centre of the state, timely availability of inputs never pose any hindrance.

Due to the importance of the cole crops in the farm economy of the locality the study titled "PRODUCTION AND MARKETING OF COLE CROPS IN SADER BLOCK OF CUTTACK DISTRICT" has been conducted with following objectives.

OBJECTIVE

The working objectives of this study are :

1. To examine the cost structures of cabbage and cauliflower production in marginal, small and large size holdings

2. To compute various measures of farm income with respect to these two crops in marginal small and large size holdings
3. To calculate the efficiency of some farm resources in the production of the two crops in marginal, small and large size holdings
4. To estimate production functions and calculate the marginal productivity of the major farm resources in production of these two crops in marginal, small and large size holdings
5. To examine the existence of return to scale as per the estimating equation.
6. To examine the price spread of important marketing channels functioning on the study area.

HYPOTHESES

The hypotheses postulated in the present study are as follows:

1. The cost structure remains the same in cabbage and cauliflower irrespective of size group of holdings.
2. Difference in farm size does not influence the farm income in the two crops.
3. The resources are equally efficient in the production of cauliflower and cabbage in three sizes of holdings.
4. The productivity of resources in all the sizes of farm remains the same in both the crops.
5. Production of cole crops are neutral to scale.

6. The market functionaries get due share of consumer's rupee according to the service rendered.

PLAN OF WORK

The present study is an attempt towards the assessment of production and marketing aspects of the two crops : Cauliflower and Cabbage under three sizes of holdings. Bearing this in mind the report has been divided into following few chapters.

The first chapter deals with the importance objectives and premises of the study.

The second chapter deals with the review of literature with respect to resource productivity in two crops and economics in different categories of farm.

The third chapter presents the background information regarding the area and the methodology adopted in the study.

In the fourth chapter, findings and discussions of the study have been presented under various subtitles based on the objectives of the study.

The last chapter presents the summary and conclusion of findings of the investigation.

CHAPTER - II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Review of literature is a sine qua non for any scientific investigation. Review of literature helps the research workers to formulate and specify the objectives, prepare a suitable questionnaire, select a representative sample from the population, undertake the survey, analyse the data, interpret the result, compare and make deductions, alternations or suggestion whenever necessary. Hence, a review of the available research studies on the "Production and marketing of cole crops" has been compiled and presented in this chapter in chronological order.

Suryanarayan (1958) : Examining the resource use efficiency on Telengane farms, reported that definite relationship exist between input and output. The study showed that diminishing return to inputs of different rent magnitudes were encountered in the Telengana region of Andhra Pradesh in each of the districts and each type of farm under study. It seemed that an increase in acreage without simultaneous increase in labour and capital per unit led to a decrease in production. The contribution of labour and capital was found to be positive and output per acre increased at decreasing rate with additional use of labour and capital.

Kahlon and Acharya (1967) found that major determinants of output were the input of the operating capital and management. They further showed that due to scarcity, family labour was being used at such intensive levels although increased input of labour

did not add much to output. Low capital labour ratio adversely affected productivity of additional labour. They found that return to scale was constant in agriculture. The partial correlation coefficient indicated that operating capital and management input were highly correlated with income.

Sen (1967) stated that output per unit of farm size as well as nonland inputs per unit declined with an increase in farm size. The higher level of resource use on the small farms was reflected in output per unit area which was the highest among the various size groups.

Remesh (1968) advanced the view that no single input like acreage of holding or labour unit can be considered alone while arriving at the optimum size of the farm. He argued that operational size of the farm varied according to different efficiency criteria. He was of the opinion that rate of return on capital investment was maximum for a larger sized farm than smaller farm.

Saini (1969) in his study in two states of Uttar Pradesh and Punjab with respect to variables such as land, human labour, bullock labour, farm yard manure, fertiliser and irrigation expenditure, found that these variables existed between 28-23 per cent of the variation in the logarithm on the gross value of the crop output. Land, human labour were the important inputs to which output was highly responsible in the agriculture of this region. The emergence of constant returns to scale was also

of particular interest in the context of the much discussed inverse relationship, between farm size and productivity. He also observed that, MVP of human labour (except for UP in 55-56) appeared to be moving in line with the level of market wage for casual labour in the respective region. MVP for other inputs were positive in all the cases with only exception of manure and fertilizer in UP. In both the states the MVP of land decreased with an increase in farm size.

Bora and others (1970) noticed that farm size had very little impact on days of employment. By using a norm of 300 man days as full employment, they observed that on an average 14% of the workers engaged mainly in agriculture became surplus.

They also noted that there was vast scope for employment of surplus labour in agriculture sector itself by introduction of HYV and intensive farm practices.

Chowdhury and others (1970) were of the view that the MVP of land, human labour, bullock labour and working capital were by and large higher on the package to non-package farms of ORISSA while that of bullock labour was negative in Andhra Pradesh, MVP for fixed capital on the package farms of Punjab and ORISSA was negative.

Sankhyan and others (1971), in their study in Himachal Pradesh, observed that the sum of elasticities in Cobb-Douglas function were 0.908 and 0.7447 in case of seed potato and maize farm respectively. The former was not significantly different

from unity and thus indicated constant return to scale. The MVP of land was significantly higher than its price taken as an average of imputed value of the crop share on the one hand and the contract value on the other in case of both the crops. They also revealed that MVP of the human labour was significantly lower than its price in case of maize crop and higher in seed potato. The MVP of other inputs in both the crops were not significantly different from their respective prices. The MVP of human labour was significantly lower than manures and fertilisers in case of maize. The optional level and existing level did not show much difference between them.

Sethuraman (1971) was of the opinion that there were few inefficiencies in resource use i.e. resources were used efficiently so as to maximise profit. He also revealed that constant returns to scale prevailed in Indian Agriculture.

Shukla (1971) observed that the potential rise in income largely depended upon the level of technology and extent of resource expansion in the farms. He observed that if the gains of technology and resource expansion are assumed to be additive, the income size potential - exceeds 60 percent. He concluded that there would be an interaction of technology and resource expansion to the advantage of the farm. coworkers (1972) showed from a study of 85 record books that labour cost constituted largest single item of expenditure, comprising of about 51 to 69 percent

of total cost. High yielding varieties absorbed 25 more man days per acre than non high yielding varieties. The performance earning was more in HYV or rice due to more extensive use of labour.

Gill and others (1972) were of the view that in a given farming area, production programme, crop intensity, farm income and cost structure were linked with farm size and availability of irrigation. Area with adequate irrigation displayed higher crop intensity and farm income and lower cost in comparison with similar farm with less irrigation, gross value of total production on a per acre basis was found to be the same for both large and small farms but a higher proportion of farm produce for marketing made both gross and net difference in cash income.

Saini (1972) in his study found that the regression coefficients in respect of various input factors indicated land and human labour as the most important input to which output was highly responsive. The author further observed that the elasticity of output with respect to human labour input turned out to be not only positive but also fairly high and statistically significant.

Singh (1972) pointed out that positive elasticity of production of human labour, meaning thereby that human labour input made a positive contribution towards return per hectare. The average and marginal value product of labour showed an increasing trend with an increase in size. The existing factor-price ratio indicated that small farmers were less efficient to human labour

use than large farms.

Singh and others (1972) revealed that majority of farm having low per acre income showed no inefficiency in resource allocation when the real alternatives available to the farmers and their resource limitations were carefully incorporated in the analysis. Acute scarcity of working capital which didn't permit the adoption of more remunerative production alternative was the most important factor responsible for low income per acre.

Srivastav (1972) pointed out that the productivity of human labour in term of return per rupee of labour input both with respect to net income and gross income were higher on big farms in India. The net income per unit area is positively correlated with the intensity of human labour input decreased with size of holding.

Desai (1973) in his study in Central Gujarat observed maximum net return on the use of fertiliser, manures, irrigation, hired human labour and other expenses on the sample farms of MDR. A similar conclusion emerged for the LDR samples for two inputs i.e. irrigation and other expenses.

Desai (1973) in his study in Central Gujarat noted that constant return to scale operates in the sample farms.

Rammurthy and others (1973) from their study indicated that output per unit was more in farm below 5 acres. The net profit per acre was higher in this size group of the farms. The Cobb-

Douglas production function revealed that all the variables, viz, labour, manures, fertilizers, seed, plant protection and management significantly influenced gross income in all the size group of farms. The opportunity of family labour employed in small farms was due to cumulative effect of all available resources.

✓ Aiyaswamy and others (1975) pointed out that intensity of family labour was the general characteristic of the small farms and employment of family labour was least in large farms.

~ Rao (1975) pointed out that small farmers use relatively a greater amount of labour per hectare than large farmers due to greater availability of family labour relative to land on small holding.

Singh and Kahlon (1975) in their study found that in a seven factor Cobb-Douglas production model elasticities of production of land and human labour were positive in all cases and significant in six out of eight cases. The significance of human labour input indicated that the marginal productivity of labour was almost zero. But expenditure on drought power and persian wheel plus canal irrigation indicated negative elasticity of production due to their excess use.

~ Mello (1981) revealed that potato production was important to the economy of the state of Sao paulo. The cost of seed was found to be most expensive item in all the regions followed by fertilisers.

Ahmed (1981) noticed that in traditional agriculture the labour requirement for individual crops were determined by nature and there was not much scope for variable use of labour as such, there would be no relationship between farm size and labour use for individual crops. The smaller farmers, however (a) adopt more labour intensive crops (b) have higher cropping intensity than large farmers. Together these two factors given rise to the inverse relationship between farm size and labour use.

Hooda and others (1985) from the field experiments conducted at vegetable Research Farm of Haryana Agricultural University, Hissar during the Winter Season of 1981-82 and 1982-83 reported that potato + mustard inter cropping system was found to be most economically viable proposition with a net return of Rs. 16,742.80 per hectare followed by Potato + Methi which resulted in a net return of Rs. 13,297.15 per hectare. The corresponding cost of cultivation per hectare were worked out to be Rs. 9,185.00 and Rs. 9,330.00 respectively.

Naik and Pattanaik (1986) in a study found that on an average the returns from one quintal of potato worked out to be Rs. 46.14, Rs. 43.57, Rs. 22.91 and Rs. 4.67 over cost A₁, cost B₁ and cost C respectively. The average gross return per rupee of investment in one hectare of potato crop. Yielded a return of Rs. 2.02, Rs. 2.02, Rs. 1.91, Rs. 1.36 and Rs. 1.08 respectively at cost A₁, cost A₂, cost B and cost C. The potato growers received

0.80, Rs.1.43 per rupee of investment over the period at cost C level.

Saraf and Mishra (1987) in a study of cost and return of vegetable crops in Jabalpur city of Madhya Pradesh, pointed out that tomato and brinjal are labour intensive. Material cost accounted for 55% of the total cost in potato 47% in cauliflower, 39% in brinjal and 35% in tomato.

Net return from cauliflower was Rs.1,467 per acre. It also showed that as the size of the farm increased, the employment days of family labour per acre declined and those of attached and casual labour increased. The employment of owned bullock labour also declined with an increase in the size where as the employment of hired bullock labour didn't show any particular trend.

In a study, Nayak and Pattnaik found that the returns per quintal of potato over cost A₁ and cost A₂ were Rs.80.72 in 1979-

80 is Rs.6774 in 1981-82 and Rs. 28.68 in 1979-80 to Rs.60.45 in 1981-82 respectively. At the level of cost B, potato growers sustained a loss of Rs.2.15 in 1979-80 as against a loss of Rs.23.07 in 1976-77 and Rs.2372 in 1979-80 over costs.

CHAPTER - I I I

MATERIALS
AND
METHODS

TABLE 3.15 LOCATION OF SAMPLE VILLAGE WITH RESPECT TO
EDUCATIONAL INSTITUTION.

(Distance in Km)

Name of the Village	Primary School *	M.E. School *	High School *
Gopalpur	1	2	2
Telengapentha	1	2	3
Muganhanga	2	3	2

* Located in village

3.19 CREDIT SYSTEM

Poor economic condition of average farmer does not permit him to adopt modern technology which is, no doubt, an expensive proposition. So agricultural finance is essential for adopting modern technology. Not only easy access to finance is important but its timely availability and utilisation in the desired direction are also essential. There are some agencies which cater to the credit needs of the farmers of these villages. Regional rural bank (Cuttack Gramya Bank), United Commercial Bank and primary agricultural credit societies are the agencies from where the farmers of these blocks receive their financial support. Refusal of many sample farmers when asked about the loaning intensity of money lenders, gives an erasent role of these people in village economy through out the country.

3.1.22 SUPPLY OF AGRICULTURAL INPUTS

Farmers of these villages generally purchase the agricultural inputs, such as seed, fertiliser and pesticides from the registered dealers or retailers present in Telengapentha and Cuttack city which are at a distance of 7-8 km and 19-20 km respectively from these villages. It is encouraging to note that these inputs are now available even in the villages itself. The village shopkeepers well realising the demand for these inputs have started selling these inputs in their shops although at a higher price.

3.2. SAMPLING TECHNIQUE

The sampling technique adopted in this study is multi-stage stratified random sampling. A list of the villages of the block producing cole crops was prepared. Out of these villages three villages i.e., Gopalpur, Telengapentha and Mugabhanga were selected at random. For the purpose of selecting the desired number of sample units from each village, the farm-households of these villages were listed separately. The households listed were again stratified into three size groups. (1) House hold having less than one ha. of operational holding (2) House hold having one to two ha. of operational holding and (3) House hold having more than two ha. of holding or more. These three groups have been designated as marginal size small size and large size group

in subsequent chapter. Then from each size group 40,30 and 20 cultivators were selected at random respectively by using random table. Thus 90 respondents from three size groups of the three villages were selected by using random selection procedure. The study relates to the year 1992-93.

3.5. METHOD OF INVESTIGATION

Information about the sample villages and the respondents were obtained through a set of well thought out and pretested questionnaires prepared before hand in conformity with the specific objectives.

General information regarding the sample villages were obtained from secondary sources such as Block office, Revenue Department, AEO offices VAWs and Census reports.

Household was taken as the unit of investigation and the head of the family as the respondent. As a common phenomenon prevailing in most of the villages of the country, the farmers of these villages also do not keep any record of their farming operations and expenses. As such the investigator was left to the mercy of their memory.

3.3 ANALYTICAL PROCEDURE USED

3.31 Defination of Cost Concepts Used

The following cost concepts in vogue in the farm management studies were used in the current findings.

- a Operational cost
- b Fixed cost
- c Total cost

- (a) Operational cost : it included the cost of following items.
- i Seed (home produced and purchased)
 - ii Manure (home produced and purchase)
 - iii Fertilisers
 - iv Pesticides
 - v Hired human labour
 - vi Hires charges or imputed value of owned bullock labour
 - vii Hired machinery charges
 - viii Irrigation charges on the crop
 - ix Interest on working capital
 - x Miscellaneous expenditure
 - xi Imputed value of family labour
- (b) Fixed cost included
- i Land revenue cesses and taxes
 - ii Depreciation on implements and farm houses
 - iii Rent paid for leased in land
 - iv Imputed rental value of own land
 - v Imputed interest on own fixed capital (excluding land)
- (c) Total cost included
- i Fixed cost plus
 - ii Operational cost

3.32 Estimation of Working Capital

(i) Bullock labour: Both the hired and owned bullock labour were charged at Rs.25.00 per pair per day of six working hours, since the local hiring rate of a pair of a bullock is Rs.25/- per day.

(ii) Human Labour: This constitutes both family and hired labour. The adult equivalent was calculated by equating 2 children days = 1.25 woman days = one man day. Both cash and kind payment made to hired labour were taken into account. The prevailing daily wage rate of Rs.25.00 was used for imputing family labour wage.

(iii) Seeds: The seed cost includes the cost of purchased seeds and the imputed value of home produced seeds. But none of the farmers of the three sample villages used home produced seed. They purchased the required amount of seeds from dealers and retailers.

(iv) Manures and fertilisers: The home produced manures were valued at prevailing market price. The cost of fertilisers were calculated at their purchase price plus the cost of transportation of these materials to the farm. The purchased manures were charged at purchase price plus the cost of transportation of manures to the field. Home produced manure was too inadequate for vegetable production. Hence the entire requirement of manure was purchase from outside.

(v) Plant protection measures: The cost of plant protection chemicals were calculated like that of fertiliser.

(vi) Hired machinery charges : This was excluded in estimating the working capital of the sample farmers since they do not use any hired machinery in their farming operations.

(vii) Interest on working capital : Interest on working capital was computed at the rate of 12 percent per annum for half the period covering the time span intervening between sowing and marketing of crop.

(viii) Miscellaneous charge: This cost includes the cost of minor repairs and maintenance charges of farm implements, cost of ropes, watering jugs, bamboo baskets and other unaccountable cost.

3.33 Estimation of Fixed Capital :

The fixed capital assets in the study included land, cattle shed, stores and godowns for farm tools, implements and dead stocks.

(i) Valuation of land : The valuation of land was done on the basis of its price prevailing in the locality at the time of investigation.

(ii) Valuation of farm building: Valuation of farm building is not necessary for the present study because the produces of the farmers of the sample villages do not find

their way into their homes.

(iii) Valuation of tools and implements : The farm tools and implements including other dead stock were evaluated at cost minus depreciation charges. The depreciation charge was calculated by the straight line method.

(iv) Valuation of draft animals: Assessment of the value of draft animals was made by taking into account their respective market values at the time of investigation.

3.34 Estimation of Fixed Cost:

(i) Depreciation : Depreciation of farm buildings was calculated at the rate of 5% per annum. Depreciation on draft animals were charged at 12% per annum. Depreciation on farm tools and implements were estimated at the rate of Rs.0.05 per hour of human labour engaged in farming, since there is a direct linkage between operation of farm tools and implements and engagements of human labour.

(ii) Interest on fixed capital : The interest on fixed capital excluding land was charged at the rate of 10% per annum.

(iii) Irrigation charge : The annual irrigation charge is Rs.250 per acre.

(iv) Rental value of own land : The rental value of own land was imputed at 25% of the value of gross produce.

3.35 Estimation of Measures of Farm Income.

(i) Gross Farm Income: Gross Farm Income was estimated

at the prevailing market prices of main product and byproduct at the time of harvest.

(ii) Net farm income : This is the total cost deducted from gross farm income, $NI = GI - TC$.

(iii) Family labour income = Net income + Imputed value of family labour wage.

3.36 Estimation of Farm Efficiency Measures

(i) Gross ratio : It was obtained by dividing the total cost (TC) by the gross farm income of the farm, $GR = TC / GI$.

(ii) Fixed cost ratio : The ratio of fixed cost per year and the gross income of the farm yielded the fixed cost ratio, TFC / GI

(iii) Operating cost ratio : It is estimated by dividing total operating cost (TVC) by net farm income, TVC / NI

(iv) Return per family labour day = Family labour income / Adult Man - Day equivalent of family labour.

(v) Return per worker (RW) : This is obtained by dividing the net income plus cost of human labour by the total adult human labour unit employed in the farm.

(vi) Return over variable cost : This was calculated by deducting operating cost (TVC) from the gross farm income,

$$RVC = GI - TVC.$$

3.4 COMPUTATIONAL PROCEDURE

Cobb-Douglas Production Function:

In estimating the productivity of individual resources and all the resources in combination, the Cobb-Douglas production function was used for the following reasons.

(a) It conserves degree of freedom and may provided good estimates even with smaller sample size.

(b) Elasticities of production of individual resources are obtained directly from this function and comparison of productivity of resources becomes easier.

(c) Return to scale is obtained easily by adding the individual regression coefficient.

3.41 Model used for Cobb-Douglas Production function

$$Y = a x_1^{b_1} x_2^{b_2} x_3^{b_3} x_4^{b_4} x_5^{b_5} x_6^{b_6} x_7^{b_7}$$

Where , Y = Gross output of cabbage and cauliflower in number of heads.

a = Constant

X_1 = Land in hectars

X_2 = Human labour days.

X_3 = bullock labour days

X_4 = manures in rupees

X_5 = fertilisers in rupees

X_6 = pesticides in rupees

X_7 = Other working capital in rupees

(Seed cost + irrigation charge)

b_1, b_2, \dots, b_7 are regression coefficients

3.42 Statistical Tools used

(i) 't' test

The test of significance of regression coefficients was made by using 't' test.

$$t = \frac{b_i}{S.E.b_i}$$

Where b_i is regression coefficient

S.E. b_i is standard error of regression coefficient.

This test helps in determining the significance of coefficient of determination R^2

$$F = \frac{R^2 (n-k-1)}{K (1-R^2)}$$

Where n = Size of samples.

k = Number of x variables

R^2 = Coefficients of multiple determination

Marginal value product

The marginal value product of each factor taken in Cobb-Douglas production function is estimated at their respective geometric mean level, using the formula :

$$P_y \cdot M.P.P.X_i = P_y \cdot b_i Y/X_i$$

where $i = 1, 2, \dots, n$

b_i = Regression coefficient of the factor i

Y= Estimated level of gross output and other factors excepting the one under consideration are kept fixed at their geometric mean level.

3.6 LIMITATIONS OF THE STUDY

1. The degree of reliability and accuracy of the of the data are subjected to the conditions imposed by the hesitancy of the farmers to give information relating to their income due to apprehension of being a prey of government taxation and legislation.

2. This is further accentuated by the fact that household do not maintain any farm records and accounts and reliance had to be placed on the respondent's memory.

3. Agriculture being a biological phenomenon, is subjected to a number of uncertainties from natural hazards, price fluctuation, market condition and institutional factors. Hence the best estimates may prove fallacious.

4. The information collected for a particular year or season may not provide a true picture of the situation due to change in the economy.

5. The study was confined to a particular geographical area and certain farm sizes. Hence, necessary precaution ought to be taken for any generalization from this findings and its application to other areas and different farm sizes.

CHAPTER. - I V

*RESULT
AND
DISCUSSION*

RESULTS AND DISCUSSION

The results and discussions are presented below according to the objective of the study.

4.11 COST STRUCTURE IN PRODUCTION OF CABBAGE AND CAULIFLOWER

The total variable cost, total fixed cost and total costs of the production of cauliflower and cabbage in various size groups of farms are presented in Table 4.11.

It may be observed from the table that within each size group, per hectare total cost of production of cabbage was higher than that of cauliflower except in the marginal farm. So far as the total fixed cost per hectare is concerned it was higher in case of cabbage within each size group as compared to cauliflower.

The total variable cost accounted for more than half of the total costs in cauliflower production by all sizes of farms (53 to 64%) but in case cabbage the total variable cost accounted for (48 to 54%) in all the farm size groups.

The total fixed cost increased with the increase in size of holdings in both the crops.

The per hectare total cost of production of cauliflower was Rs.30382.59, 25673.01 and 28038.54 in marginal, small and large farms respectively. The total costs per hectare of cabbage production was Rs.28313.64, 39068.22 and 35826.43 in marginal small and large farms respectively.

TABLE 4.11. TOTAL COST OF PRODUCTION CAULIFLOWER AND CABBAGE
IN SAMPLE HOLDINGS OF CUTTACK SADAR BLOCK 1992-93.
(Costs in Rupees)

Size group	Area under crop inha.	Crop	Total variable cost TVC	Total fixed cost TFC	Total cost (TVC + TFC)
Marginal farm	.313	Cauliflower	6157.00 (64.79)	3352.75 (35.21)	9509.75 (100)
Marginal farm	.269	cabbage	4144.62 (54.41)	3471.75 (44.59)	7616.37 (100)
Small farm	.709	Cauliflower	9733.58 (53.47)	8468.59 (46.53)	18202.17 (100)
Small farm	.401	Cabbage	7614.7 (48.60)	8051.66 (51.4)	15666.36 (100)
Large farm	1.06	Cauliflower	15718.97 (52.88)	14001.81 (47.12)	29720.78 (100)
Large farm	.652	cabbage	11139.00 (48.36)	11893.58 (51.64)	23032.58 (100)
PER HECTARE					
Marginal farm	.313	cauliflower	19670.93	10711.56	30382.59
Marginal farm	.269	cabbage	15364.67	12870.28	28234.95
Small farm	.709	Cauliflower	13728.60	11944.11	25672.71
Small farm	.401	Cabbage	18989.27	20078.98	39068.25
Large farm	1.06	Cauliflower	14829.23	13209.31	28038.54
Large farm	.652	Cabbage	17084.47	19241.15	36325.62

Figures in the parentheses indicate percentage of total cost.

The composition of total variable cost of production of cole crops in different size of farms was presented in table 4.12.

It was seen that in all cases human labour contributed lion's shares amounting to about 30 to 43% of total variable cost. Other yield stimulating inputs like fertilizer, pesticides, manures, bullock labour and other working capital constituted about 57 to 70% to the total variable cost.

The comparison of cost structure of variable cost in the two crops revealed that in all the size groups the relative shares of human labour, manures, fertilizer, bullock labour, pesticides were more in case of cauliflower while the other working capital was more in case of cabbage.

In all the size of farms cauliflower production had higher cost per hectare than the cabbage production in case of human labour, bullock labour and manures while the cost on working capital was more in case of cabbage than cauliflower.

Composition of total fixed cost of production of cauliflower and cabbage is presented in table 4.13

It may be observed from the table that rental value of land alone contributed about 81 to 87% to the total fixed cost in both the crops irrespective of the farm size. The interest on fixed cost and depreciation constituted about 5 to 8% alone to the fixed cost. The per hectare comparison reveals that the rental value of land in cabbage was higher than that of cauliflower so also the interest on fixed cost was in the same trend in all the

Table 4.12 COMPOSITION OF VARIABLE COST OF CAULIFLOWER AND CABBAGE
IN THE SAMPLE HOLDINGS OF CUTTACK SADAF BLOCK 1992-93.

Size group	Average area un- der cole crops	Crop	Human labour	Bullock labour	Manuvers	Fertilizer
Marginal farm	.313	cauli flower	2671.25 (43.38)	285 (4.32)	887.5 (14.41)	593.25 (9.63)
Marginal farm	.269	cabbage	1522.62 (38.73)	160.62 (3.87)	246 (5.9)	372.3 (8.9)
Small farm	.709	cauli flower	4249.16 (43.65)	478.33 (4.71)	1445.33 (14.84)	962.53 (9.88)
Small farm	.401	cabbage	2276.66 (29.89)	247.5 (3.2)	703.00 (9.35)	551.93 (7.24)
Large farm	1.06	cauli flower	5973.75 (37.99)	798.25 (5.07)	2152.00 (13.68)	1447.95 (9.2)
Large farm	.652	cabbage	3743.5 (33.6)	392.5 (3.52)	140.00 (4.84)	905.65 (8.13)
Per Hactare						
Marginal farm	.313	cauli flower	8531.35	910.35	2035.47	1895.36
Marginal farm	.269	cabbage	5644.57	595.45	911.95	1380.16
Small farm	.709	cauli flower	5993.17	674.65	2038.54	1357.58
Small farm	.401	cabbage	5677.45	617.2	1775.56	1376.39
Large farm	1.06	cauli flower	5635.61	753.26	2030.18	1365.99
Large farm	.652	cabbage	5741.5	601.79	829.22	1389.03

Cont.....

Size group	Average area un- der cole crops	Crop	Plant protec- tion	Other working capital	Interest on working capital	Total variable cost
Marginal farm	.313	cauli flower	451.62 (7.33)	1089.05 (17.68)	179.33 (2.91)	6157.00 (100)
Marginal farm	.269	cabbage	323.92 (7.8)	1398.45 (33.74)	120.71 (2.91)	4144.62 (100)
Small farm	.709	cauli flower	1557.3 (15.99)	763.26 (7.341)	277.67 (2.85)	9733.58 (100)
Small farm	.401	cabbage	1052.7 (13.82)	2552.13 (33.11)	221.70 (2.91)	7614.70 (100)
Large farm	1.06	cauli flower	2450.5 (15.58)	2447.45 (15.56)	458.09 (2.91)	15718.99 (100)
Large farm	.652	cabbage	1495.6 (8.13)	3733.4 (33.51)	324.43 (2.91)	11139.08 (100)
Per Hactare						
Marginal farm	.313	cauli flower	1442.88	3479.39	512.93	19670.93
Marginal farm	.269	cabbage	1200.33	5103.76	467.51	15364.67
Small farm	.709	cauli flower	2196.47	1076.53	391.63	113720.60
Small farm	.401	cabbage	2625.13	6364.42	551.07	18989.27
Large farm	1.06	cauli flower	2302.79	2308.91	432.96	14829.23
Large farm	.652	cabbage	2300.00	5726.07	497.6	17084.47

TABLE 4.13 COMPOSITION OF FIXED COST OF CAULIFLOWER
AND CABBAGE IN THE SAMPLE HOLDINGS OF
SADAR BLOCK OF CUTTACK 1992-93
(Cost in rupees for particular area)

Size Group	Area under cole crops (in ha.)	Crop	Rental value of land	Interest on fixed cost	Depreciation	Total fixed cost
Marginal Farm	0.313	Cauli flower	2881.75 (81.95)	231 (6.83)	240 (7.15)	3352.75 (100)
Marginal Farm	0.269	Cabbage	3000.57 (86.42)	231 (6.6)	240 (6.91)	3471.75 (100)
Small Farm	0.709	Cauli flower	7378.55 (87.12)	610 (7.2)	480 (5.66)	8468.59 (100)
Small Farm	0.401	Cabbage	6961.63 (86.46)	610 (7.57)	480 (5.96)	8051.66 (100)
Large Farm	1.06	Cauli flower	11971.87 (85.50)	1070 (7.84)	960 (6.85)	14001.87 (100)
Large Farm	0.652	Cabbage	9863.5 (82.93)	1070 (8.09)	960 (8.07)	11893.5 (100)
Per Hectar						
Marginal Farm	0.313	Cauli flower	9206.86	738.02	766.78	10711.66
Marginal Farm	0.269	Cabbage	11123.52	856.34	889.71	12870.25
Small Farm	0.709	Cauli flower	10407.04	860.367	577.00	11944.41
Small Farm	0.401	Cabbage	17360.75	1521.19	1197.01	20078.95
Large Farm	1.06	Cauli flower	111235.91	1004.22	700.98	112941.11
Large Farm	0.652	Cabbage	15128.06	1641.10	1172.39	18241.55

size groups. All the items of fixed cost were higher in large holdings as compared with smaller holdings.

Cost of production per unit of cauliflower and cabbage in different size groups has been presented in table 4.14.

It was seen total variable cost per unit (AVC) of cauliflower and cabbage were same in large size group i.e. 0.75 while there is little difference of 4 paise in favour of cauliflower in marginal farms and infavour of cabbage in small farm. The total fixed cost per unit of cabbage was same in case of small and large farms. But much variation in (AFC) of cauliflower was observed in marginal and small farms. A little difference of 4 to 5 paise was observed in case of cauliflower in all the size groups. The average total cost was in a declining stage as the size of holding increased except in case of small farm but the declining of average total cost was evinced as the size of holding increased. It was Rs. 1.62, Rs. 1.58 and Rs. 1.36 in case of cabbage in marginal, small and large farms respectively.

The finding on structure of cost in production of cauliflower and cabbage in marginal, small and large farms provide ample evidence of variation in cost structure of particular crop in different size groups and variation in cost structure between the two crops within a particular size group, thus there are sufficient grounds in support of rejecting the hypothesis which proposes that the cost structure remains the same in cauliflower and cabbage irrespective of the size group of holdings.

TABLE 4.14 COST OF PRODUCTION PER UNIT OF CAULIFLOWER AND CABBAGE
IN THE SAMPLE HOLDINGS OF SADAR BLOCK OF CUTTACK 1992-93.
(In rupees)

Size group	Area under the crop	crop	Number of heads	TVC per head	IFC per head	TC per head
Marginal farm	.313	cauli flower	6715	0.92	0.50	1.42
Marginal farm	.269	cabbage	4685	0.88	0.74	1.62
Small farm	.709	cauli flower	13274	0.73	0.64	1.37
Small farm	.401	cabbage	9885	0.77	0.81	1.58
Large farm	1.06	cauli flower	20988	0.75	0.66	1.41
Large farm	.652	cabbage	14745	0.75	0.81	1.56

4.2.COMPUTATION OF VARIOUS MEASURES OF FARM INCOME IN THE TWO SIZE GROUPS FOR CAULIFLOWER AND CABBAGE

It may be observed from the table 4.21, the gross return per hectare ranged between Rs. 41632.19 to Rs. 48170.76 in case of cauliflower and between Rs. 48755.72 to Rs. 65441.54 in case of cabbage in different size groups.

The highest amount of gross return was obtained by marginal farms in cauliflower production and by small farms in cabbage production. The same trend was observed while considering net return per hectare. It was Rs. 17888.17 in small farms for cauliflower.

flower and Rs. 30373.32 in small farms for cabbage. While considering the net return per hectare of cauliflower and cabbage within the same group it was seen the small farms obtained nearly more than 15 thousand in cabbage production but in other two size groups it varied between nearly Rs. 3000 to Rs. 10000.

The highest return over variable cost per hectare of Rs. 50452.27 was enjoyed by small farms in cabbage and Rs. 30347.65 by large farms in cauliflower production.

The imputed value of family labour per hectare in cauliflower was the highest of Rs. 5591.06 in marginal farms and lowest of Rs. 1886.79 in large farms. The imputed value of family labour within each group was more in cauliflower except in large farms. The family labour income per hectare in cauliflower production was the highest of (Rs.23479.23) in case of marginal farms and the lowest of (Rs.18956.29) in case of small farms but the small farm obtained the highest amount of per hectare family labour income (Rs. 33180.29) in cabbage production and the lowest of Rs. 24170.55 shared by marginal farms.

Existence of variations in various measures of farm income between size groups farm the same crop and between crops within a size group are quite conspicuous from the above findings hence the hypothesis that the difference in farm size don't influence the farm income in the two crops is not acceptable.

TABLE 4.21 GROSS RETURN NET RETURN AND VARIABLE COST AND COST AND FAMILY LABOUR INCOME IN SAMPLE HOLDINGS OF SADAR BLOCK OF CUTTACK 1992-93. (In Rupees)

Size group	Area under the crop (in ha)	Crops	Gross return (in Rs)	Total cost (inRs)	Net return (in Rs)	Return over variable cost	Imputed value of family labour	family labour income
Mrginal farm	.313	Cauli.	15108.75	9509.75	5599.00	8951.75	1750	7349.00
Mrginal farm	.269	Cab.	13118.25	7616.37	5501.18	8973.63	1000	6501.00
Small farm	.709	Cauli.	29517.36	18202.17	11315.19	19783.78	2125	13440.19
Small farm	.401	Cab.	27846.06	15656.36	12180.3	20231.36	1125	13305.3
Large farm	1.06	Cauli.	47887.50	29720.86	18166.64	32168.31	2000	20166.64
Large farm	.653	Cab.	39542.00	23032.58	16509.42	28402.92	1250	17759.42
Per hectar								
Mrginal farm	.313	Cauli.	48270.76	30382.59	17888.2	28599.84	5591.06	23479.23
Mrginal farm	.269	Cab.	48766.72	28313.64	20453.08	33359.2	3717.47	24170.55
Small farm	.709	Cauli.	41632.38	25673.01	15959.37	27903.78	2997.17	18956.29
Small farm	.401	Cab.	69441.54	39068.22	30373.32	50451.27	2805.48	33180.29
Large farm	1.06	Cauli.	45176.88	28038.54	17138.34	30347.65	1806.79	19025.13
Large farm	.652	Cab.	60554.36	35271.05	25283.31	43469.53	1914.24	27196.66

4.3 FARM EFFICIENCY MEASURES

The gross ratio, fixed cost ratio and operating cost ratio for cauliflower and cabbage in various size groups of holdings are presented in table 4.31.

It was observed that for one rupee of gross income total cost incurred in cauliflower declined from 0.629 (marginal farm) to 0.616 (small farm) and had increased to 0.620 in large farm. It is appeared that in all most all the size groups the gross ratio was around 0.62 for cauliflower. In case of cabbage gross ratio was around 0.58 in all the size groups. So far as fixed cost ratio is concerned it was increased from 0.221 to 0.292 in case of cauliflower while the size of holding was increased. The same trend was also noticed (0.265 to 0.301) in case of cabbage as the size of holdings increased. Comparing the fixed cost ratio of cauliflower and cabbage it was more in case of cabbage in each size group.

The operating cost ratio for cauliflower and cabbage was also declined as the size of holding increased. But here within each size group the operating cost ratio of cauliflower was more than that of cabbage.

It can be summarised that though the gross ratio showed appreciable variation between two crops within each size group but there was very little variation for the same crop in different size groups. So far as fixed cost ratio, and operating cost ratio are concerned both showed variations between the crops

TABLE.4.31 GROSS RATIO, FIXED COST RATIO & OPERATING COST RATIO FOR
CABBAGE & CAULIFLOWER IN THE SAMPLE HOLDINGS OF CUTTACK
SADAR BLOCK 1992-93.

Size group	Area under the crop (in hac.)	Crop	Gross ratio	Fixed cost ratio	Operating cost ratio
Marginal farm	.313	cauli flower	0.529	0.221	0.408
Marginal farm	.269	cabbage	0.580	0.265	0.315
Small farm	.709	cauli flower	0.516	0.287	0.329
Small farm	.401	cabbage	0.562	0.289	0.273
Large farm	1.06	cauli flower	0.520	0.292	0.328
Large farm	.652	cabbage	0.583	0.301	0.282

TABLE 4.32 RETURN PER FAMILY LABOUR DAY IN THE PRODUCTION OF CAULI-
FLOWER & CABBAGE IN S-4-DAR BLOCK OF CUTACK 1992-93

Size group	Area under the crop (in ha.)	crop	Family labour income	Family labour days	Return per family labour days
Marginal farm	.313	cauli flower	23479.23	123.60	104.98
Marginal farm	.269	cabbage	24710.55	148.69	162.55
Small farm	.709	cauli flower	18936.54	119.88	158.12
Small farm	.401	cabbage	33100.29	112.21	295.69
Large farm	1.06	cauli flower	19015.13	75.47	252.08
Large farm	.652	cabbage	27116.66	76.55	355.23

within the size group and for the same crop in different size of farms.

Return per family labour day from cauliflower and cabbage has been presented in table 4.32.

It may be noted from the table that for both the crops the employment of family labour was more in smaller size group.

The return per day of employment of family labour was maximum of Rs. 252.08 for cauliflower in the large farms and minimum of Rs. 104.98 for the same crop in marginal farm.

These figures for cabbage were Rs. 355.23 and Rs. 162.55 in the large and marginal size group respectively.

Return per worker from cauliflower and cabbage has been presented in the table 4.33.

It was revealed from the table that employment of human labour increased with the increase in size of holding for each crop. Within the size group the employment of labour was higher for cabbage as compared to cauliflower.

The comparison between table 4.32 and 4.33 will show that return per day of family labour was about two times of return per day of human labour in corresponding crop and sizes. It shows that extra profit is entirely appropriated by the farmer without giving any extra benefit to hired labourers.

In a nut shell the basis of the findings on various measures of farm efficiency it may be deduced that there was existence of difference in these measures between crops within a particular size group and for same crop in different size groups. Hence the hypothesis that "the resources are equally efficient in production of the two crops in different size of holdings" is rejected.

TABLE 4.33 RETURN PER WOEKER FROM CAULIFLOWER & CABBAGE IN CUTTACK
SADAR BLOCK 1992 - 93

(Figures on per hectare basis)

Size group	crop	Net income (in Rs)	Total labour wage (in Rs.)	Return to human labour	Human labour days	Return per worker
Marginal farm	cauli flower	17888.17	8534.35	26422 52	341.36	77.40
Marginal farm	cabbage	20453.08	5644.57	26057 65	225.78	115.58
Small farm	cauli flower	15959.37	5993.17	21952 54	239.72	91.57
Small farm	cabbage	30373.32	5677.45	36050 77	227.09	158.75
Large farm	cauli flower	17138.34	5635.61	22773 95	225.42	101.02
Large farm	cabbage	25283.31	5741.50	31024 81	226.66	135.09

4.4 ESTIMATION OF PRODUCTION FUNCTION

The following explanatory variables were used in all cases to predict the output of cauliflower and cabbage in number of heads .

$$Y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 x_6 + b_7 x_7$$

Where , Y = Gross output of cabbage and cauliflower in number of heads.

a = Constant

X₁ = Land in hectares

X₂ = Human labour days

X₃ = bullock labour days

X₄ = manures in rupees

X₅ = fertilisers in rupees

X₆ = pesticides in rupees

X₇ = Other working capital in rupees

(Seed cost + irrigation charges)

b₁, b₂, ..., b₇ are regression coefficients

(elasticity of production of respective explanatory variables

X₁, X₂, X₃, ..., X₇ etc.

R² stands for multiple coefficient of determination. The respective standard error of regression coefficients are given below the corresponding variables within)

The estimated functions are given below for both the crops in various size groups of sample holdings.

4.41 Marginal farm.

(1). Cauliflower.

$$Y = 1.3613 + 0.0109 X_1 + 0.1106 X_2 + 0.7243 X_3 + 0.0049 X_4 + 0.0468 X_5 + 0.0021 X_6 + 0.0890 X_7$$

(0.2032) (0.1558) (0.0318) (0.0137)

(0.0193) (0.0207) (0.0442)

$$R^2 = 0.98$$

* Significant at 5% probability level.

** Highly significant at 1% probability level.

It may be observed that 98% of variance in the field of cauliflower was explained by these explanatory variables. The multiple correlation coefficient is highly significant. The regression coefficient of X_3 (bullock labour days) was highly

significant at 1% level of probability and others were not significant. The variables like X_1 , X_2 , X_4 , X_6 and X_7 though not significant had positive contribution towards the yield of cauliflower.

(2) Cabbage

	**		*
Y = 4.9026	1.2789	-0.0017	-0.4370
X ₁	X ₂	X ₃	X ₄
(0.1930)	(0.0296)	(2.1827)	(0.1258)
	-0.0440	0.0856	0.0023
X ₅	X ₆	X ₇	
(0.1034)	(0.0460)	(2.0893)	

$$R^2 = 0.88$$

* Significant at 5% probability level.

** Highly significant at 1% probability level.

It was revealed from the function that more than 88% of the variance in the dependent variable was explained by the seven

independent variables. The contribution of land was highly significant. It shows that 1% increase in land area brings out 1.278% change in yield of cabbage while other explanatory variables are held fixed at their geometric mean level. Three variables such as X_2 (Human labour), X_3 (Bullock labour) and X_5 fertilizer exhibited negative productivity. The variable X_3 was significant at 1% probability level though other remaining variables were not significant. The negative values implies the excessive utilisation of human labour, bullock labour and fertilizer.

4.42 Small Farm

(1). Cauliflower.

	**			
	3.5932	0.527	0.0126	-0.152
Y=12.9643	X_1	X_2	X_3	X_4
	1	2	3	4
	(0.3464)	(0.1114)	(0.0199)	(0.0245)
	**		**	
	-0.0210	-2.1201	-1.1008	
	X_5	X_6	X_7	
	5	6	7	
	(0.0374)	(0.2908)	(0.0147)	

$$R^2 = 0.99$$

* Significant at 5% probability level.

** Highly significant at 1% probability level.

The coefficient of determination indicates that about 99% variability in the yield of cauliflower was explained by seven predatory variables. The regression coefficient of X_1 was

positive and highly significant which shows that 1% increase in land area brings out 3.593% change in yield of cauliflower while other explanatory variables are held fixed at their geometric mean level. The variables X_4 (manure), X_5 (fertilizer), X_6 (pesticides) and X_7 (other working capital) had negative contribution towards yield. Out of these the negative productivity of X_6 and X_7 were highly significant denoting excessive utilisation of these resources.

(2) Cabbage

$$\begin{array}{rcccc}
 & & ** & & \\
 & 1.7643 & 0.1990 & -0.6938 & -0.0347 \\
 Y = 6.5241 & X_1 & X_2 & X_3 & X_4 \\
 & (0.3925) & (0.1201) & (0.1555) & (0.1451) \\
 & -0.1447 & -0.0280 & -0.0825 & \\
 & X_5 & X_6 & X_7 & \\
 & (0.2247) & (0.0373) & (0.2546) &
 \end{array}$$

$$R^2 = 0.9706$$

* Significant at 5% probability level;

** Highly significant at 1% probability level.

The same trend was also noticed like cauliflower. The variable like land was highly significant and the regression coefficient was positive and more than one. The variables like X_3 , X_4 , X_5 , X_6 and X_7 were having negative regression coefficient. These variables though not significant indicate excessive utilisation of these resources.

4.43 Large

(1). Cauliflower.

$$Y = 100.3977 + 32.1930X_1 + 4.9181X_2 - 0.2697X_3 + 0.1222X_4 - 27.0486X_5 - 1.8920X_6 - 6.8707X_7$$

(18.3178) (15.3529) (0.4183) (2.5621)
*
(9.1471) (1.7018) (0.3586)

$$R^2 = 0.6902$$

* Significant at 5% probability level.

** Highly significant at 1% probability level.

The functions shows that about 69% of variance in the yield of cauliflower was explained by the seven explanatory variables. The variables like X_1 and X_2 though not significant has positive contribution where as the contribution of other factors were not positive and X_5 (fertilizer) exhibited negative productivity though significant at 5% probability level.

(2) Cabbage

$$Y = 4861.7256 + (-1445.3271)X_1 + 14.425X_2 + (-0.0096)X_3 + (-0.5192)X_4 + 0.4208X_5 + 1431.995X_6 + 0.1100X_7$$

(846.577) (42.2943) (0.3522) (0.4025)
(0.5246) (857.02) (0.4208)

$$R^2 = 0.5510$$

* Significant at 5% probability level.

** Highly significant at 1% probability level.

Here none of the regression coefficients were significant the negative productivity was noticed in case of land, bullock labour and manure indicating excessive utilisation of these resources. The other variables were having positive contribution though not significant.

The above function shows that in productivity of land except in case of cabbage in the large farm was quite conspicuous indicating increasing productivity in these two crops. The bullock labour utilisation was excessive in almost all cases except in case of cauliflower in marginal and small farms. So from the above observation one cannot accept the hypothesis that the productivity of resources in all size of farms remains the same in both the crops.

4.5 RETURN TO SCALE

The sum of elasticity coefficients of each function indicate return to scale with assumption that all the relevant factors have been included in the models and all these are applied in similar proportion which exist in the original production. The sum of elasticity coefficient was greater than one in cauliflower in small and large farm and in cabbage in case of marginal and large

farms.

In rest of the other cases return to scale was in the vicinity of one which indicate constant return to scale. On the above findings it can be deduced that the production of cole crops is not neutral to scale so the hypothesis is accepted.

4.6 PRICE SPREAD AND MARKETING CHANNELS FOR CAULIFLOWER AND CABBAGE

The difference between price spread by the consumer and the price receipt by the producer for an equivalent quantity of product is known as price spread. It appeared from the study that in the movement of cauliflower and cabbage from the producer to ultimate consumer mainly three important marketing channels are operating in the study area.

MARKETING CHANNEL - I : Producer --- Village Peopari --- Consumer.

MARKETING CHANNEL - II : Producer --- Wholeseller --- Retailer --- Consumer.

MARKETING CHANNEL - III : Producer --- Traider --- Wholeseller --- Retailer --- Consumer.

Data pertaining to marketing cost marketing margin of different intermediaries and producer share of marketing channel - I, channel - II and channel - III of cauliflower and cabbage are given in table 4.61, 4.62, 4.63, 4.64, 4.65, and 4.66 respectively. It was observed in marketing channel - I that the producer

Table 4.61 Price spread on the Marketing of Cculliflower (100 heads) from the level of producer in village Mugabhanga to the consumer at Gopalpur and Pratapnagari through marketing channel-I

Particulars	Marketing cost and margins in (Rs)	% share in consumer's (Rupees)
Net Price received by the producer	165	62.3
Cost incurred by the producer	-	-
Producer sale price/ village Beopari's purchasing price	165	
Cost incurred by the village beopari		
(a) Cost of 4 gunnybags for packing of 100 heads @ 5/-	20	
(b) Labour charge for putting, loading and unloading	10	
(c) transportation charge to hat	10	
(d) Total cost	40	15.10
Beopari's Margin	60	22.6
Beopari sale price/ consumer's perchage price	265	100

Table 4.62 Price spread in marketing of Cabbage (100 heads) from the level of producer in village Gopalpur to consumer at Pratapnagari Hat through marketing channel-I.

Particulars	Marketing cost and margins in (Rs)	Share in consumer's (Rupees)
Net price received by the producer	235	69.5
Cost incurred by the producer	--	
Producer sale price/ village Beopari's purchase price	235	
Cost incurred by the village Beopari		
(a) Cost of 4 gunnybags for packing of 100 heads @ 5/-	20	
(b) Labour charge for packing, loading and unloading	10	
(c) Transportation charge to hat	8	
(d) Total cost	38	11.3
Beopari's Margin	65	19.2
Beopari's sales price consumer's price	338	100

Table 4.63 Price spread in the marketing of (cauliflower) (100 heads) from the level of producer in village Ielergapentha to the consumer at Bhubaneswar through marketing channel-II.

Particulars	Marketing cost and margins in (Rs)	% share in consumer's (Rupees)
Net price received by the producer	168	45.16
Cost incurred by the producer		
(a). Transportation charges of 4 bags	20	5.4
Whole seller's purchasing price/producer's saling price	188	
Cost incurred by the Whole saler's		
(a) Cost of gunnybags 4 bags @ 5/-	20	
(b) Labour charge of loading and unloading	15	
(c) Transportation charge to Bhubaneswar 4 bags @ 5/-	25	
(d) Storage charges	8	
(e) Octroi charges	12	
(f) Total cost	80	21.5
Whole seller's margin	38	10.2
Whole seller's sales price/ retailer purchasing price	306	
Cost incurred by retailer		
(a) Transportation charge	14	
(b) Labour charges for loading and unloading	8	
Total cost incurred by the retailer	22	5.9
Retailer's margin	44	11.8
Consumer's purchasing price/retailer's sales price	372	100

Table 4.64 Price spread in marketing of cabbage (100 heads) from the level of producer in village (opalpur to consumer of Balugan through marketing channel-II.

Particulars	Marketing cost margins in (Rs)	% Share in consumer's (Rupees)
Net price received by the producer	230	31.5
Cost incurred by the producer		
(a) Transportation charge of 4 bags	20	4.4
(b) Whole sellers purchase price/ producers sale price	250	
4. Cost incurred by whole sellers		
(a) Cost at 4 gunny bags @ 5/-	20	
(b) Labour charge for packing and loading and unloading	12	
(c) transportation charge to Balugan 4 bags @ 5/-	32	
(d) Storage charge	8	
(e) Octrai charges	14	
(f) Total cost	86	19.1
5. Whole seller margin	35	7.7
6. Whole seller sales price/ retailer's purchase price	371	
7. Cost incurred by retailer		
(a) Transportation charge	15	
(b) Charge for loading and unloading	6	
Total cost incurred by retailer	21	4.6
8. Retailer's margin	58	12.7
9. Consumer purchase price/ retailer sales price	450	100

Table 4.65 Price spread in the marketing cabbage (100 heads) for level of producer in village Pratapnagar to consumer of Bhubaneswar through marketing channel-III.

Particulars	marketing cost and margins in (Rs)	% share in consumer's (Rupees)
Net price received by the producer	170	40.9
Cost incurred by the producer		
(a) Transportation	15	3.6
Trader purchase price/ producer sales price	185	
Cost incurred by the trader		
(a) Cost of gunnybags for 4 bags @ 5/-	20	
(b) Labour charge for loading and unloading	15	
(c) Transportation charge to Bhubaneswar	20	
(d) Octroi charge	10	
Total cost	45	15.5
Traders margin	42	10.2
Trader sales price/ whole sales purchase price	292	
Cost incurred by whole sellers		
(a) Labour charge for loading and unloading	8	
(b) Storage charge	10	
Total cost	18	4.3
Whole sellers margin	30	7.3
Wholeseller sales price/ retailer purchase price	340	
Cost incurred by retailer		
(a) Cost of transportation	12	
(b) Cost of labour	8	
Total cost	20	4.8
Margine of the retailer	55	13.3
Trader s sales price/ consumers purchase price	415	100

Table 4.66 Price spread in the marketing cabbage (100 heads) for level of producer in village Mugabhangra to the consumer at Bhubaneswar through marketing channel-III.

Particulars	marketing cost and margins in (Rs)	% share in consumer's (Rupees)
Net price received by the producer	238	54.7
Cost incurred by the producer		
(a) Transportation	12	2.7
Trader purchase price/ producer sales price	350	
Cost incurred by the trader		
(a) Cost of gunnybags for 4 bags @ 5/-	20	
(b) Labour charge for loading and unloading	10	
(c) Transportation charge to Bhubaneswar	18	
(d) Octroi charge	8	
Total cost	40	12.8
Traders margin	35	8.1
Trader sales price/ whole sales purchase price	340	
Cost incurred by whole sellers		
(a) Labour charge for loading and unloading	6	
(b) Storage charge	6	
Total cost	12	2.8
Whole sellers margin	22	5.12
Wholesaler sales price/ retailer purchase price	370	
Cost incurred by retailer		
(a) Cost of transportation	8	
(b) Cost of labour	6	
Total cost	14	3.3
Margine of the retailer	46	10.5
retailers sales price/ Consumer purchase price	430	100

share in consumer rupee was 62.3, 45.16 in channel - II and 40.9 in channel - III in case of cauliflower. These variations was due to fact that more is the intermediaries in the marketing channels less will be the producer share in the consumer's rupee.

In case of cabbage producer share in consumer's rupee was 69.5, 51.5 and 54.7 in marketing channel - I, channel - II and channel - III respectively in case of cauliflower beopari's margin was 22.6 in channel - I whereas the figure for cabbage was 19.2. The comparison between marketing of cauliflower and cabbage showed that the producer's share in consumer's rupee was higher in case of cabbage than that of cauliflower in channel - I and channel - II whereas the reverse was noticed in channel - III.

Marketing cost, margins and producer share in consumer's rupee of cauliflower and cabbage in different channels have been presented in table 4.67.

It was observed that the producer share in consumer's rupee was declined from 62.3% in channel - I to 30.9% in channel - III whereas there was a increasing trend in marketing cost from 15 - 28% in the above mentioned channel in case of cauliflower. The marketing margin was hovered around 22% in case of cauliflower in channel - I and channel - II. In cabbage the producer share in consumer's rupee was more as compared to cauliflower in all the three channels. The marketing margin was increased from 19.2 in

Table 4.67 Marketing cost, margins and producer's share in marketing of cauliflower and cabbage through different channels.

Particulars	Marketing Channels		
	I	II	III
<u>Cauliflower</u>			
Producer's Share	62.3	45.20	40.9
Marketing cost	15.10	32.8	28.3
Marketing margin	22.6	22.00	30.8
Consumer's price	120	100	100
<u>Cabbage</u>			
Producer's Share	69.5	51.5	54.7
Marketing cost	11.3	28.1	21.6
Marketing margin	19.2	20.4	23.7
Consumer's price	120	100	100

channel - I to 20.4 in channel - II and to 23.7 in channel - III.

The comparison between two crops with respect to marketing cost it was more in cauliflower in all the three channels.

From the above discussion it was observed that the producer shares in consumers rupees was less than 50% in channel - II and channel - II in case of cauliflower and slightly more than 50% in case of cabbage so the hypothesis that the market functionaries get their due share of consumer's rupee according to service rendered was rejected.

CHAPTER - V

*SUMMARY
AND
CONCLUSION*

SUMMARY AND CONCLUSION

The study entitled "Production and Marketing of Cole Crops in Sadar Block of Cuttack District" was undertaken during 1992-93 with six objectives comprising of cost structure, farm income measures, farm efficiency measures, productivity of resources, return to scale and price spread in marketing. Two stage stratified random sampling method was used for selection of sample households viz., 40 marginal farms (less than one hectare), 30 small farms (One - two hectares), 20 large farms more than two hectare). The summary of the findings are given below according to objectives of the study.

6.1 COST STRUCTURE IN PRODUCTION OF CAULIFLOWER AND CABBAGE

1. The total cost per hectare of cauliflower was Rs.30382.59, Rs.25673.01 and Rs. 28038.54 in marginal, small and large size groups respectively whereas the corresponding figures for cabbage were Rs.28313.64, Rs.390068.22 and Rs.35326.03 in different size of farms.
2. Within each size groups per hectare cost of production of cabbage was higher than that of cauliflower except in case of marginal farm.
3. In almost all the size groups the total variable cost constituted more than 50% of the total cost in case of cauliflower and slight less than 50% in case of cabbage.
4. Human labour constituted about 30 - 45% of the total variable cost in each case.

5. The other working capital constituted about 15-33% followed by pesticides, fertilizers and manures.

6. The average total cost of cauliflower was Rs. 1.37 to Rs.1.42 whereas it was Rs.1.55 to Rs.1.62 in case of cabbage in different size groups.

7. The average total cost per hectare declined due to increase in size of holding in both the crops.

6.2 FARM INCOME MEASURES

1. Gross return and net return in all the size of farms were always more from cabbage than cauliflower. The highest net return per hectare (Rs.3073) was enjoyed by small farms in cabbage production and highest amount of Rs.17000 by the marginal farms from cauliflower.

2. The inputed value of family labour was declining due to increase in size of holding in both the crops.

3. With regards to family labour income it was more in cabbage than cauliflower in all the size groups.

4.31 FARM EFFICIENCY MEASURES

1. Gross ratio of cauliflower and cabbage in all the size groups were almost equal but the comparison between both the crops with regard to gross ratio, it was more in case of cauliflower.

2. The operating cost ratio of cauliflower was more as compared to cabbage and it is declined with the greater size

of holdings.

3. The return per family labour of cabbage was the highest (355.23) in case of large farms.

4. Return per worker increased with the increase in size of holdings and it was more in case of cabbage as compared to cauliflower. The highest amount of Rs.158.75 was obtained by the small farm in cabbage.

6.4 PRODUCTIVITY OF FARM RESOURCES

1. It was evident from the function analysis that the productivity of land was quite high and was highly significant in both the crops.

2. The productivity of other resources is appeared to be inconsistent.

3. Negative regression coefficient of bullock labour, human labour and pesticides etc. in most of the size groups in both the crops indicates the over utilisation of these variables.

6.5 RETURN TO SCALE

Increased return to scale was observed in all the cases except in marginal farms for cauliflower and large farms for cabbage production where it was nearly one.

6.6 PRICE SPREAD AND MARKETING CHANNEL FOR CAULIFLOWER AND CABBAGE

MARKETING CHANNEL - I : Producer --- Village Leopari --- Consumer.

MARKETING CHANNEL - II : Producer --- Wholesaler --- Retailer --- Consumer.

MARKETING CHANNEL - III : Producer --- Trader --- Wholeseller --- Retailer --- Consumer.

1. Producer's share in consumer's rupee was less than 50% in channel - II and channel - III in cauliflower but slightly more than 50% in case of cabbage in both the channels.

2. In all the channels marketing cost of cauliflower is higher than cabbage and so also the marketing margin was also more in case of cauliflower as compared to cabbage.

3. It was observed that the marketing cost and margin were increased due to intervention of more intermediaries in the channel.

4. The marketing cost for cabbage was 15-28% and margin between 20-30% in all the channels. Whereas the marketing cost was 11-28% and margin between 19-23% were observed in case of cabbage in different marketing channels.

Cole crops being highly valued capital intensive cash crops further in depth study of the crop is necessary.

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