Flower Farming and Flower Marketing in West Bengal : A Study of Efficiency and Sustainability

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[***Abstract:*** For diversification in agriculture, one of the areas that have emerged as a fast growing sector recently in West Bengal is floriculture. In an attempt to examine empirically the relative efficiency between commercial traditional floriculture and its competing main field crops – Paddy, Jute, Potato, Wheat, Groundnut, Mustard, this paper observes that the economic efficiency related to both individual flower crop farming and mixed crop farming of all categories maintaince high economic efficiency for farms provided that selections of crops are made properly. This study does not imply an orderly marketing system for some categories of major commercial flower crops - rose, tuberose and bel - produced in alluvial zone in West Bengal, because the farmer - producers' interest for fair price of these flowers is not supported to their growers during lean season. While examining the efficiency of flower marketing system, this paper does not support that the flower market in alluvial zone of West Bengal is efficient in nature, but, in general, marketing efficiency decreases with the increase in number of market intermediaries in a marketing channel.]

Keywords: Productivity, Profitability, Output-input ratio, Technical Efficiency, Marketing Margin, Marketing Channel, Modified Marketing Efficiency.

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Floriculture has emerged as a fast growing sector recently in West Bengal for diversification, employment generation and value addition in the primary sector. West Bengal is a potential state blessed with highly conducive agro- climatic conditions for floriculture. Though the history of growing flowers and ornamental plants is too old, the commercial trade on these have generated recently for potential diversification, employment generation and value addition in the primary sector. These have been made possible for the boost of its exports[1], recent expansion of joint ventures by corporate sectors for exemption from custom duties on imported plant materials, reduction of duties on materials for green house, high subsidy on airfreight etc. due to impact of economic reform (1991-92), trade liberalization and global impact within the framework of WTO. Following these reforms, West Bengal has started commercial farming on a large scale from the mid 90's of the last century. As per the data available from the Directorate of Food Processing Industries and Horticulture, Government of West Bengal (Government of West Bengal, 2001 and 2004), it is observed that the area under flower crop in West Bengal was 9.8 thousand hectares in 1996-97, but in 2002-03, it stood at 17.33 thousand hectares, registering around 9.80 per cent increase of compound growth rate per annum between 1996-97 and 2002-03, whereas production growth was around 16.54 per cent during that period (Table A and Figure A). But the commercial flower farming is restricted to certain districts of the state (Government of West Bengal, 2001): 5 districts – Mednapore, Howrah, Nadia, 24 Parganas (North), 24 Parganas (South) – mainly produce commercial flower crops in West Bengal in alluvial zone and Darjeeling district produces commercial flower crops in Hill Zone. The traditional commercial flower crops in alluvial zone are, mainly, rose, tuberose, gladiolus, marigold, jui, bel, and chrysanthemum. But the flower farming and marketing in alluvial zone and hill zone of West Bengal have hardly been studied. A study of flower farming conducted by Rahim and Sarkar (1997), based on two Blocks in Mednapore district, under alluvial zone of West Bengal, reveals that flower crops like tuberose, marigold, rose, gladiolus are more productive and profitable than that of the main field corps like paddy and potato. The study of flower farming and flower marketing in India is also very limited. A considerable empirical study that throws some light on this area relating to production and productivity is a combined study along with other horticulture crops, such as fruits, vegetables. Most of the limited studies on floriculture (Singh et al, 1997; Bal and Bal, 1997; Alagumani et al., 1997; Sharma and Vaidya, 1998; Satya, 1999; Goyal, 1999; Gangaiah, 2001; Vaidya, 2002) reveals higher productivity and/or higher profitability of some important commercial flower crops like rose, tuberose, chrysanthemum, corssandra, gladiolus, mullai, pitchi, jasmine, kakaratan (madras malli) orchid compared with the production of main field crops like paddy, jute, potato, sugarcane, cotton and groundnut. This paper, thus, studies the relative efficiency and profitability between commercial traditional flower crops and their competing field crops, examines the cost of production of flower crop with their seasonal market prices based on the empirical study on sample farms which are dominated by marginal and small farms under alluvial zone of West Bengal. It also examines the extent of marketing efficiency of different commercial flower crops and the relative efficiency of their marketing channels in alluvial zone of West Bengal based on price spread and marketing margin among different market intermediaries in two marketing channels.

The rest of the paper is divided into five sections. Section II deals with the conceptual issues related to efficiency of farms and the efficiency of marketing system that have emerged in the literature. Section III presents the data and methodology employed for our empirical exercise. In Section IV empirical results have come to light. Conclusions and policy implications in the light of our empirical results are contained in Section V.

II

Economic efficiency is the state of economy in which no one can be made better off without someone being made worse off. Since high level of economic efficiency and productivity growth are desirable goals of any economy, therefore, it is important to define and measure efficiency and productivity in ways that respect economic theory and provide useful information to policy makers.

The literature on frontier production and cost function and the calculation of efficiency measures begins with Farrell (1957). He defines efficiency as the ability of a production organization to produce a good at minimum cost. Efficiency (or more appropriately productive efficiency) is viewed by him as a relative concept, which is measured as a deviation from best performance in a representative peer group. He dichotomized efficiency into two parts, namely, Technical efficiency and Allocative efficiency.

The empirical estimation of production functions had started long before Farrrell's Paper, essentially around 1928 with the papers of Cobb and Douglas (1928). Until the 1950s production function were used, largely, as devices for studying the functional distribution of income between capital and labour at the macro economic level. The origins of empirical analysis of microeconomic production structures were more reasonably identified with the work of Dean (1951), Johnson (1959) and Nerlove (1963). But all these focus on costs rather than production per se, although Nerlove, following on Samuelson (1938) highlighted the relationship between the two. Nevertheless, the empirical attention to production functions at disaggregated levels has been a fairly recently developed literature(Hildebrand and lieu (1965).

In the empirical literature production and cost were developed largely independently of the discourse on production frontier; Least squares, or some variant, were used routinely to pass a function through the middle of a cloud of points, and residuals of both signs were, as in other areas of study, not singled out for special treatment, given a name and face as it were (Greene 1993, P.69). But a basic argument has been made that these averaging estimators were estimating the “average” rather than “best practice” technology, but this just rationalizes the least squares techniques after the fact. Farrell’s Arguments make an intellectual basis for redirecting attention from the production function specifically to the deviations from that function and respecifics the regression and the techniques accordingly.

Two types of measurement of technical efficiency are proposed by Farrell- output augmenting orientation and input conserving orientation. Output based measure is computed as the ratio of actual output obtained from a given vector of inputs to maximum possible output achievable from the same input vector. An input based measure is calculated as the ratio of best practice input usage to actual input, holding output constant. A decision making unit is said to achieve allocative efficiency in production of a given level of output if it could allocate the factors of production at a given set of factor prices in such a way as the marginal rate of substitution between two factors becomes equal to their factor price ratio. The allocative, or price, component refers to the ability to combine inputs and outputs in optimal proportion in the light of prevailing prices.

Two types of Frontier Production Function (FPF), namely deterministic and stochastic, are employed for computing technical efficiency. A deterministic FPF envisages a deterministic optimal relationship between input and output, unaffected by random events and statistical noise such as measurement error. Thus, in the deterministic FPF models, the actual level of output of a firm is assumed to lie below the frontier only due to the existence of technical inefficiency in the production process of a firm. In reality, however, random events like machine or equipment failures, product defects and supply bottlenecks in addition to measurement error do occur frequently, which often affect the optimality planned output of a firm. Consequently, the ex ante output of a firm becomes, instead of fixed number, a random variable. This led to the conceptualization of stochastic FPF in which the optimal relationship between inputs and output is considered to be stochastic, rather than deterministic. The stochastic FPF thus attributes the shortfall in a firm’s observed output from the corresponding point in the frontier to the technical inefficiency as well as to the random events and statistical noise.

Two alternative techniques are employed in the construction of frontier production function, viz., mathematical programming and econometric technique. The main advantage of using mathematical programming technique vis-a vis econometric technique is that it does not impose any explicit functional form (e.g. Cobb-Douglus) on production function to be estimated. However, the chief limitation of this technique is that it can estimate only deterministic frontier and produces ‘estimates’ which have no statistical properties such as standard errors or ratios etc. On the contrary, the econometric approach is capable of estimating deterministic as well as stochastic frontiers and provides estimates with statistical properties. This paper uses stochastic or econometric frontier production function approach to examine the relative economic efficiency between flower farming and its competing main field crop farming of sample farms.

In the area of marketing, the marketing system is considered to be efficient if the goods move from producers to the consumers at the minimum cost consistent with the provision of the services and consumers' desires or otherwise. The total margin includes (a) The cost involved in moving the product from the point of production to the point of consumption (b) the profiles of the various market functionaries involved in moving the produce from the initial point of production to the ultimate consumer. If a higher magnitude of marketing margin is not adequately shared by the actual producers, the greater is the inefficiency in the system and vice-versa. Competitions plays a key role in minimizing wastes and help to avoid concentration of wealth with few traders. Conditions of marketing efficiency in marketing are best satisfied by perfectly competitive conditions. The closer the actual conditions to perfect competition, the stronger would be the possibilities for minimizing wastes and exploitation and the greater the tendency for a uniform price to prevail over the entire market area. As a matter of fact marketing efficiency of all commodities continues to be important aspect in any economy and can help to avoid concentration of wealth with few traders.

The studies on marketing margin and cost are important, as they reveal many facets of marketing and the price structure as well as efficiency of the system. The magnitude of margin relative to the price of product indicates the efficiency of the marketing system. The larger the margin of intermediaries in percentage of farm harvest price and also of retail price, greater is the inefficiency in the marketing system or lesser competitive marketing organization is and vice versa. Both in earlier and in recent studies[2], the extent of price spread between producers' price and consumers' price of the same commodity have been employed extensively as a better indicator of marketing efficiency of marketing system. The study examines the efficiency of marketing system of flowers in the alluvial zone of West Bengal based on price spread and marketing margin among different market intermediaries in two important marketing channels .It is important to mention that efficient marketing system is very essential for accelerating production because it influence farmers' decision in allocating area under a particular crop in a particular time period.

III

The empirical findings of this study are based on secondary source from a published book entitled "A Survey on Present Status of Floriculture in West Bengal" by the Department of Floriculture and Landscaping, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia West Bengal. The survey was conducted by Roychowdhury (2000) in five districts of West Bengal – Mednapore, Howrah, Nadia, North 24 Parganas, South 24 Parganas – in 1998-99 taking 120 block in five districts and five growers in each block. Total sample households, which were selected by random sampling technique, were 100 in number. For selecting block, the following two criteria were identified: a) Blocks with the highest concentration of flower cultivation, b) Blocks with highest acreage under flowers among all the blocks of the district. The survey was also carried out in six important flower markets – Mallikghat or Jagannathghat wholesale flower market in Howrah, Deulia in Mednapore, Dhantala in Nadia, Thakurnagore in North 24 Parganas, New Market and College Street market in Calcutta – under the sample area.

In order to study the different aspects of flower farming and flower marketing under our study, tabular analysis, proportions, averages etc. have been used. Economic efficiency is measured by comparing output and input values. With quantities only technical efficiency can be calculated, while with quantities and prices economic efficiency can be calculated(Lovell, 1996: 6). Defining and measuring economic efficiency requires the specification of an economic objective and information of market prices(Lovell, 1996: 14). In order to measure economic efficiency the revenue maximization problem is solved separately for each household in the sample. The constrained maximization problem of a household who desire to maximize total revenue is subjected to the constraints imposed by fixed inputs supplies in physical terms(Handerson and Quandt, 1980: 95). But as the unit of measurement for both physical inputs and physical outputs of all commodities under our study are not same(e.g. quintals, number), we use physical unit of inputs in monetary terms for measuring economic efficiency of different crops rotation-wise cultivated by sample farms (per acre per annum) under our study. This paper uses Cobb-Douglas stochastic frontier production function approach in order to estimate economic efficiency. It is said that the extent by which a farm lies below its production frontier which sets the limit to the range of maximum obtainable output is regarded as a measure of inefficiency under frontier production function approach (Neogi and Ghose, 1998: M19). We measure economic efficiency of NTFPs following Aigner et al. (1977) and Meeusen and Broeck(1977) under the stochastic frontier production function, which is popularly known as 'composite error' model with cross-sectional data. The advantage of stochastic frontier over the deterministic frontier is that farm-specific efficiency and random error effect can be separated. We have specified a C-D type stochastic frontier production function in order to estimate the level of economic efficiency. The C-D functional form is generally preferred because of its well-known advantages. Kopp and Smith(1980), and Krishna and Sahota(1991) suggest that functional specification has very little impact on measuring efficiency(Banik, 1994:73). Krishna and Sahota find that Translog and C-D forms yield similar results in respect of productivity and efficiency(ibid:73). However, in order to measure economic efficiency of farm under C-D stochastic frontier production function we take two independent variables-X_1, variable cost; X2, fixed cost. A stochastic frontier model can be written as

$$\mathbf{Y_i = \mathit{f}(X_i , \beta) \exp(V_i - U_i)}$$

taking logarithm

$$\text{In } \mathbf{Y_i} = \text{In } \boldsymbol{\beta_o} + \boldsymbol{\beta_1} \text{ In } \mathbf{X_i + V_i - U_i}$$

Y_i = total revenue(in Rs.)

X_{1i} = total variable cost(in Rs.); X_{2i} total fixed cost(in Rs.)

V_i = a symmetrical random variable and i.i.d.N(0, σ_v^2)

U_i = non-negative, one-sided random variable and i.i.d. with a half-normal distribution [$U_i \sim |N(0, \sigma_u^2)|$]. The density functions of U and V can respectively be written as

$$f_U(U) = \frac{1}{\sqrt{\frac{1}{2}\pi}} \frac{1}{\sigma_U} \exp\left(- \frac{U^2}{2\sigma_U{}^2} \right) \qquad U \leq 0$$

= 0 otherwise

$$f_V(V) = \frac{1}{\sqrt{2\pi}} \frac{1}{\sigma_V} \exp\left(- \frac{V^2}{2\sigma_V{}^2} \right) \qquad -\infty \leq V \leq \infty$$

As a distribution of the error terms, we assume that V_i follows the normal distribution and U_i follows the half-normal distribution $|N(0, \sigma_u^2)|$, then the log likelihood function is

$$\ell(\alpha, \beta, \sigma, \lambda) = -N \ln \sigma - \text{constant} + \sum_i \left[In\Phi\left(\frac{-\varepsilon_i \lambda}{\sigma}\right) - \frac{1}{2}\left(\frac{\varepsilon_i}{\sigma}\right)^2 \right]$$

where $\varepsilon_i = V_i - U_i$, $\lambda = \sigma_u / \sigma_v$, $\sigma^2 = \sigma_v^2 + \sigma_u^2$, $\Phi(.)$ = cumulative distribution function(cdf) of the standard normal distribution.

Here a producer faces own stochastic frontier $f(X_i , \beta) \exp(V_i)$; a deterministic part $f(X_i , \beta)$ common to all producers and a producer-specific part $\exp(U_i)$. Thus, economic efficiency is given by

$$\mathbf{EEi} = \frac{f(X_i , \beta) \exp(V_i - U_i)}{f(X_i , \beta) \exp(V_i)} = \exp(-U_i) \; ; \qquad 0 < EEi \leq 1$$

Y_i achieves its maximum value of $f(X_i , \beta) \exp(V_i)$ and $EE_i = 1$, if $U_i = 0$. Otherwise $U_i \neq 0$ provides the shortfall of observed value from the maximum potential value. The above equation is estimated by the maximum likelihood (ML) method. Although the residual components U_i and V_i are not observed directly, the inefficiency component U_i must be observed indirectly. As a solution for the problem, Jondrow et al. (1982) present the point estimator of U_i i.e. $E[U_i/\varepsilon_i]$, given $\varepsilon_i = \ln Y_i - (\ln \beta_o + \beta_1 \ln X_i)$ $= V_i - U_i$. Once the point estimate of U_i i.e. $E[Ui/\varepsilon_i]$ is obtained, the economic efficiency of each farm can be obtained from

$$\mathbf{EE_i = \exp(-U_i) = \exp\{-E[U_i/\varepsilon_i]\} = 1 - E[U_i/\varepsilon_i]}$$

where $\mathbf{E[Ui/\varepsilon i]} = \frac{\sigma\lambda}{1+\lambda^2}\left[\frac{\phi(\varepsilon_i\lambda/\sigma)}{1-\Phi(\varepsilon_i\lambda/\sigma)} - \frac{\varepsilon_i\lambda}{\sigma}\right]$. Note $\phi(.)$ is the density function of the standard normal distribution. The mean efficiency or the mathematical expectation of the farm-specific efficiencies can be calculated for given distributional assumptions for the inefficiency effects. The mean economic efficiency can be defined by

$$\textbf{Mean EE} = E(\exp\{-E[U_i/\varepsilon_i]\}) = E\{1 - E[U_i/\varepsilon_i]\}$$

Economic Efficiency takes the values between zero and one ($0 < EE_i \leq 1$). Ideally, one can treat farms with efficiency score equal to unity as efficient farms.

The major constraints, among others[3], of these secondary data are that the data relating to price spread, marketing cost and marketing margin among different marketing agents for two important channels except others are available. These make difficulties for researchers to represent data in standard econometric analysis. However , for comparing the marketing efficiency of different crops related to two marketing channels under our study, the following methods are used.

1. Producer's share in consumer's price (in percentage) for each channel = $\frac{P_P}{P_C} \times 100$, where P_P is the net price received by the producer and P_C is the price paid by the consumer.

2. Share of middlemen's profit in consumer's price (in percentage) for each channel = $\frac{T_\Pi}{P_C} \times 100$, where T_Π is the middlemen's profit.

3. Marketing efficiency of individual flower crop for each marketing channel is calculated with the measure of modified marketing efficiency (Sundaravaradarajan and Jahanmohan, 2002; Agro Economic Research, 2003). Modified Marketing Efficiency (MME) = $P_P/(MC+MM)$, where MC is the marketing cost and MM is the marketing margin.

IV

Production:

As regards the distribution of farms according to size group, Table 1 reveals that flower farming in the sample area is dominated by marginal and small farms. Out of the total sample, 68 per cent farms are marginal, 21 per cent, small and 11 per cent are medium in size and there is no any large farm in the sample. As regards area, production and productivity in real terms of different flower crops, Table 2 shows that with regard to the area of cultivation, tuberose and rose are the major flower crops in the sample. About 70 per cent of total area is cultivated by these two crops, the contribution of tuberose and rose being 38.79 per cent and 31.22 per cent respectively. As the unit of measurement of production of different flower crops are not same, the comparison of productivity (output per acre of land) between different flower crops cannot clearly be discerned. However, as to the unit of measurement in number within three flower crops – rose, gladiolus and chrysanthemum, chrysanthemum has the highest productivity followed by gladiolus and rose. Out of the remaining four types of flower crops measured in quintals, marigold has the highest productivity followed by tuberose, bel and jui.

The comparative study regarding output-input ratio between flower crops and main field-crops grown by sample farmers indicates that the output-input ratio of all flower crops except gladiolus are observed to be higher than that of their competing field crops like groundnut, potato, boro paddy, aman paddy, jute, mustard and wheat (Table-3). But since the unit of measurement of three types of flower crop (rose, gladiolus and chrysanthemum), which are measured in number, are not same with that of the remaining crops, the comparative study relating to output-input ratio between flower crops and field crops should be judged among those crops which are measured by the same unit. However, the comparative study of output-input ratio between flower crops and its competing field crops for the same unit of measurement(quintal) shows that the flower crops have higher output-input ratio than their competing field crops.

In order to judge the relative profitability in monetary terms, the crop-rotation-wise net return (Rs.) per acre per annum have been worked out for flower crops and their main competing field crops (Table-4). Inasmuch as the unit of measurement of different crops is not same in physical terms, the comparative study seems to be relevant in monetary terms. According to that estimate, the net return (Rs.) per acre per annum of flower farming is found to be higher than that of any combined farming within field crops rotation-wise cultivated by sample farms for the same year. Within the flower farming, gladiolus has the highest net return (Rs.) per acre per annum followed by Chrysanthemum, Rose, Marigold+Marigold[4], Tuberose, Jui, Bel and Marigold. The appraisal of the net return (Rs.) per acre per annum of flower crop farming among the sample farms, however, is in conformity with the finding of the average yield per acre (in physical term) per annum (Table-2) and that of the output-input ratio per annum (Table-3). Turning to the mixed crop farming between flower crop and field crop, Table-4 also shows that both flower crops and main field crop farming over an agricultural year to the same unit of land per acre per annum yield high net return (Rs.) as compared with the mixed farming within the main field crops for the same year. It is important to mention that the sample farmers of this study produce only marigold, a flower crop, and groundnut or aman paddy(field crop) in the same plot of land in an agricultural year. However, the result is very striking: the net return (Rs.) per acre per annum is considerably higher for the mixed farming between flower crop (marigold) and field crop(groundnut or Aman paddy) on the same plot of land than that of any of the mixed farming within main field crops on the same plot of land for the same agricultural year.

The maximum likelihood (ML) estimation of Cobb–Douglas stochastic production frontier function and economic efficiency effect model of sample farms for Rotation wise crop per acre per annum is presented in Table 5.It shows that the explanatory variable X_1 (variable cost in Rs) is positive and statistically significant, whereas X_2 (Fixed cost in Rs) is negative and insignificant. The significant likelihood ratio (LR=20.914) implies high 'Goodness of fit' of the regression plane to the sample observation. Regarding economic efficiency which is defined as the ability of a production organization to produce a good at a minimum cost relative to other farms, Table 6 dose not support that crops yielding higher net return (in Rs) per acre per annum represented in Table 4,usually possess the higher economic efficiency because the measurement of productive efficiency / economic efficiency is a relative concept, measured as a deviation from best performance in representative peer group based on optimization behavior of minimum (e.g. cost) or maximum (e.g. production) attainment. For example Aman Paddy +Groundnut, a mixed crop farming maintains a lower level of net return (in Rs) per acre, per annum (Table4) but it succeeds in getting higher level of economic efficiency .As regards individual crop farming related to flower crop, farms attain higher level of efficiency in an agricultural year per acre for all individual crop farming except rose (71.58), although the latter maintains a higher level of net economic return (in Rs.) per acre per annum. Gladiolus has the highest level of economic efficiency (98.77) of all farming categories –individual farming or mixed farming. Turning to mixed farming all mixed crop framings are highly efficient for farms except Jute + Mustard and Jute + Wheat. More importantly, although Jute farming, when cultivated rotation wise either with mustered or with wheat, possesses the lowest level of efficiency of all, it (jute farming) becomes highly when it is cultivated with potato. So, rotation wise selection of cropping pattern is an important issue of economic efficiency for farms.

Thus as long as farmers' objective are to maximize net return (in Rs.) per unit of land per annum, individual flower crop farming or mixed farming between flower crop and field crop have a complete advantage over the mixed crop farming within the field crops among the sample farms for the same year. But from the standpoint of economic efficiency both individual flower crop farming and mixed crop farming of all categories maintain high economic efficiency for farms provided that selection of crops is made properly. This might lead to a strong favorable implication of potential diversification in agriculture indicating high value addition and increase in employment within the primary sector.

Hence a related query is: does producers of flower crops receive positive net profit in both the seasons- lean and peak, although producers of all flower crops receive positive net profit annually (i.e. combining all seasons together) Table 7, based on the published survey report of Roychoudhury (2000), reveals that no stable market price is observed throughout the year 1997-98 for the same type of flower in the same market as well as in the different markets. Price becomes higher during peak season when the demand for flower is very high. The peak season usually comes during puja, ceremonial occasions, national festivals, social occasions, community festivals etc. The market price for different type of flowers is different in both the seasons. The month of peak season for all types of flowers are not same; rather it varies over types of flowers. The similarity is that during peak season of any type of flower, the market price of it is high compared with lean season and the average cost of production per unit (in Rs.) Of the same type of flower does not vary across seasons for the same year. What is the most interesting is that the market price of rose, tuberose and bel during their lean season is lower than their per unit of cost of production (in Rs.) indicating that the producers of these crops incur loss (or negative net profit) during lean season. But market price of any type of flower is very high in relation to its per unit cost during the peak season. It implies that the producer of all types of flowers might receive positive net profit per unit during peak season. Hence the relevant issue is: why do the producers of rose, tuberose and bel engage in production of these types of flowers during lean season when their market price is less than their cost of production per unit (in Rs.)? Unlike field crops like paddy, jute, wheat, the plants of these types of flowers last for some seasons. So, the producers of these types of flower have to carry on their production process during lean season also despite the price per unit (in Rs.) of these types of flower is less than their respective unit cost of production. Moreover, the land used for flower crop for any season cannot usually be used for production of field crops to other season for the same agricultural year because of the time constraint and maturity period of these two crops does not act as an alternative between each other in this area .But the farms producing rose, tuberose and bel do not use all factors of production except land with their full capacity during lean season . Regarding the cost of production, although Roychoudhury (2000) divided variable cost and fixed cost of production of flower into 21 items (Roychoudhury, 1998: 13) and 3 items respectively, he did not explicitly mention the cost (in Rs.) of items which producers were unable to recover during lean season. Variable cost in Roychoudhury's work can be divided into two parts – operating cost (cost of fertilizer, chemicals, hired human labour, transport cost etc.) and capital cost (interest on the use of variable capital, like, hired power tiller, hired pump-set, hired sprayer etc.). Fixed cost includes land revenue, imputed interest on own land and interest on fixed capital. We may set up the profit-maximizing problem of the producer of flower in Kuhn Tucker form.

In keeping with the results of Table7, we assume that during lean season, price of flower is so low that the producer of commercial flower cannot recover the total variable cost of production. He incurs loss a part of variable cost (e.g. operating cost) during lean season and produces flower crop less than his full capacity. On the contrary, during peak season price per unit of flower is so high that the producer gets abnormal profit and so he produces flower in accordance with his full capacity. We also assume that all farms share the economies and diseconomies of production equally.

Let us consider that a profit maximizing farm facing given prices P_1 in the peak season and P_2 in the lean season. Output during peak and low seasons are O_1 and O_2 respectively. The maximum output level is Y, this being produced only in the peak season (i.e. $Y=O_1$), but output during lean season is less than maximum output ($O_2 < Y$). Annual operating costs are given by C (O_1, O_2) and annual capital costs are K (Y). We also assume that Y, O_1, O_2 >0. It is assumed that all farms enjoy economics or diseconomies equally. It can be shown that lean season prices will just cover marginal operating cost, and peak season prices will exceed marginal operating cost by an amount equal to marginal capital cost.

The profit-maximizing farm desires to

Maximize $\prod = P_1O_1 + P_1O_2 - C\ (O_1, O_2) - K\ (Y)$

Subject to $O_1 \leq Y$ (multiplier λ_1)

$O_2 \leq Y$ (multiplier λ_2)

The revenue function is assumed to be concave in the non-negative orthant and differentiable. The cost function is assumed to be convex in the non-negative orthant and differentiable for the maximization problem of the farm. The appropriate Lagrange function is

$$L = P_1O_1 + P_2O_2 - C(O_1, O_2) - K(Y) + \lambda_1 (Y - O_1) + \lambda_2 (Y - O_2)$$

and the Kuhn - Tucker conditions are:

$$\frac{\delta L}{\delta O_1} = P_1 - C_1 - \lambda_1 \leq 0 \quad O_1 \geq 0 \text{ and } O_1\frac{\delta L}{\delta O_1} = 0 \text{..(1)}$$

$$\frac{\delta L}{\delta O_2} = P_2 - C_2 - \lambda_2 \leq 0 \quad O_2 \geq 0 \text{ and } O_2\frac{\delta L}{\delta O_2} = 0 \text{ ....(2)}$$

$$\frac{\delta L}{\delta Y} = -K'(Y) + \lambda_1 + \lambda_2 \leq 0 \quad Y \geq 0 \text{ and } Y\frac{\delta L}{\delta Y} = 0 \text{ ....(3)}$$

$$\frac{\delta L}{\delta \lambda_1} = Y - O_1 \geq 0 \quad \lambda_1 \geq 0 \text{ and } \lambda_1\frac{\delta L}{\delta \lambda_1} = 0 \text{ ....(4)}$$

$$\frac{\delta L}{\delta \lambda_2} = Y - O_2 \geq 0 \quad \lambda_2 \geq 0 \text{ and } \lambda_2\frac{\delta L}{\delta \lambda_2} = 0 \text{ ....(5)}$$

Since $0_2 < Y$, the Kuhn-Tucker theorem gives $\lambda_2 = 0$

Hence (2) => $P_2 = C_2$

and (3) => $\lambda_1 = K'(Y)$

So (1) => $P_1 = C_1 + K'(Y)$

Here, the sufficient conditions will be stated directly in terms of concavity and convexity. And, in fact, these concepts will be applied not only in the objective function but to the constraint function as well. Both the conditions are satisfied. Hence, the Kuhn-Tucker maximum conditions will be necessary and sufficient for a maximum.

This study does not imply an orderly marketing system for some categories of major commercial flower crops - rose, tuberose and bel - produced in alluvial zone in West Bengal, because the farmer - producers' interest for fair price of these flowers is not supported to their growers' during lean season. The producer of these types of flowers incur loss during lean season because the market price (in Rs.) of these crops is lower than their per unit (in Rs.) cost of production.

Marketing:

Marketing of a farm commodity[5] and marketing efficiency influence farmers' decision in allocating area under a particular crop in a particular time period. A commodity having higher profit margin or higher producer's share in percentage also influences farmers' decision. It is because of the farmer-producer's interest for fair price for his produce. A fair price for a produce might be assured through an orderly marketing system. Thus the efficient marketing system is very essential for accelerating production of a particular commodity for a particular time period. At the same time, marketing efficiency depends to a large extent on the structure and organisation of the market. Among the six important flower markets under our study, Mallikghat is the biggest wholesale flower market in Kolkata. Even it is the largest wholesale flower market in the whole Eastern India (Roychowdhury, 2000:24), because the major portion of all types of commercial flower crops are regularly traded from this metropolitan market. The average daily market arrival of flowers (in quintal) at Mallikghat Market ranges between 699 quintal and 1478 quintal during lean and peak seasons respectively (Ibid:6). Inter-state, intra-state and inter-country trades of flowers are executed from this metropolitan market. Although the other five markets under our study are local, these are also important flower markets within the respective area because large volume of marketing business of flower crops under the respective districts/metropolitan area are executed from these local markets (Ibid:21-35).

A large number of market intermediaries[6] in the flower markets include different traders like aratdars(paikars), local(secondary) wholesalers, wholesalers, retailers and exporters or outside traders. There are 12 marketing channels of flower crops identified in the study area (Fig.1). This paper limits its study on first two marketing channels-Channel 1 (Producer → Paikar/Arathdar → Wholesaler → Secondary (Local) Wholesaler → Retailer → Consumer) and Channel 2 (Producer → Paikar (Aratdar) → Wholesaler → Retailer → Consumer) for non-availability of data for other marketing channels.

In order to examine the efficiency of marketing system between two marketing channels — channel 1 and channel 2, the price spread of flower crops between different marketing agents within each marketing channel has been studied. The study of price spread of flowers not only ascertains the actual price at the various stages of marketing channels, but also represents the cost incurred in the process of movement of the produce from farmer to consumer and margin of various intermediaries. Tables-8 and 9 represent price spread and marketing margin of sample flower crops in Channels-I and II respectively. They show costs and profit margins at different stages of marketing agents in both the channels. As to profit margin received by different market intermediaries in each channel, though no clear pattern is discernable, the retailer is the highest recipient of profit margin of all market intermediaries in both the channels. The other notable feature is that producers' profit margin are usually lower than the profit margin of most of the market intermediaries for all crops except rose in both the channels. Thus, out of total profit margin in each flower crop for both the channels, the major portion of profit margin of consumers' rupee are appropriated by market intermediaries. As regards the break-up of cost component of marketing margin of sample flower crop, Tables-10 and 11 show that the cost of labour is the most important component of marketing cost, followed by packaging cost and transport cost in both the channels. The cost structure of the remaining items — meal and tiffin charge, marketing tax and other commission, storage and maintainance, spoilage — are not so important as the cost of labour under each marketing channel. The cost structure of each of the remaining items do not differ much among one another within each channel.

The extent of marketing efficiency based on price spread and marketing margin under each marketing channel is examined by three expressions — modified marketing efficiency index, producer's share in consumer's rupee and trader's profit margin in consumer's rupee (Table-12). In the case of modified marketing efficiency index it is said that higher the numerical value, higher is the marketing efficiency and vice-versa.Higher the percentage of producer's share in consumer's rupee (or lower the trader's margin in consumer's rupee) in most cases yields higher (lower) efficiency of marketing and vice-versa. The notable difference is observed for gladiolus which shows that despite a considerable higher percentage of producer's share in consumer's rupee, the level of MME is very lower for both the channels. However among the different flower crops in each channel, producer's share in consumer's rupee is the highest in the case of rose. Similarly, the MME is also observed to be the highest for rose. A comparative study between two channels reveals that the percentage of producer's share in consumers rupee for all flowers is higher for Channal-2. It implies that the percentage of trader's profit margin in consumers' rupee for all flower crops is lower in Channel-2 and out of different flowers in each channel, trader's profit margin in consumer's rupee is the lowest for rose. Thus considering all expressions of marketing efficiency, Channel-2 is found to be more efficient than Channel-1 and marketing of rose is more efficient than any other flower crop under our study. This study, however, does not support that the flower market in alluvial zone of West Bengal is efficient in nature, but, in general, marketing efficiency decreases with the increase in number of market intermediaries in a marketing channel. This study also suggest that flower crops with higher economic efficiency is usually observed to attain lower modified marketing efficiency or higher trader's margin in consumer's rupee and it implies that traders take the advantage of gaining relatively higher profit margin of those flower crops which have higher economic efficiency.

V

This paper, based on the empirical evidence of flower farming and the structure of its marketing system, reveals some important phenomena. In the case of production of flower crops which are dominated by marginal and small farms, there is a clear indication that output-input ratio of flower cultivation are considerably higher than that of their competing main field crops like boro paddy, aman paddy, groundnut, potato, jute, wheat and mustard. Also, the net return (Rs.) per acre per annum of individual flower crop farming or mixed farming between flower crops and their competing main field crops in the same unit of land per year is more profitable than that of mixed farming within the main-field crops and so the former has a complete advantage over the latter. But from the standpoint of economic efficiency both individual flower crop farming and mixed crop farming of all categories maintain high economic efficiency for farms provided that selections of crops are made properly. This might lead to a strong favorable implication of potential diversification in the area of agriculture for increasing income and employment in the primary sector of the state. But as the overwhelming majority of the flower farms are marginal and small in size, to boost up floriculture production as well as export to a great extent, different floriculture operations should be commercialised so that it may run like an industry and farms of different sizes may able to enjoy the economics of large scale production. To this end, the use of modern agricultural technology by technical experts in this field, expansion of institutional lending facilities to the flower growers and genuine propagative plant materials for high quality of production should also be provided to the flower growers.

In the area of marketing system of flower crop, although Channel-II is observed to be more efficient for greater share of its producers' in consumers' rupee compared with Channel-I and, in general, marketing efficiency decreases with the increase of number of intermediaries in a marketing channel, high price spread is the common phenomena, mainly, because of concentration of market powers in the hands of market intermediaries who have the main role in this situation. This study also suggest that flower crops with higher economic efficiency is usually observed to attain lower modified marketing efficiency or higher trader's margin and consumer's rupee and it implies that traders take the advantage of gaining relatively higher profit margin of those flower crops which have higher economic efficiency. More importantly, the considerable major profit margin of consumers' rupee for all flower crops in both the channels are appropriated by the market intermediaries/middlemen. This does not indicate that the trade market of flower crop within the state is efficient in nature. But efficient marketing system is very essential for accelerating production in this area, because efficient marketing system makes higher producers' profit in consumers' rupee which influence farmers' decision in allocating area under a particular crop in a particular time period. Therefore, more competition in the trade of traditional flower crops are to be introduced. Mini and small assembling centres may be established in private or cooperative sectors in flower producing areas, which will save the cost of transportation in assembling labour charges and distribution phases.

This study does not imply an orderly marketing system for some categories of major commercial flower crops - rose, tuberose and bel - produced in alluvial zone in West Bengal, because the farmer - producers' interest for fair price of these flowers is not supported to their growers during lean season. The producer of these types of flowers incur loss during lean season because the market price (in Rs.) of these crops is lower than their per unit (in Rs.) cost of production. However, the need for fair price to the producer of these types of flowers is necessary for accelerating their production. So, emphasis should be given for adequate storage facilities and the expansion of inter-state, intra-state and inter-country trade \of these flowers, particularly, during lean season when producers of these crops bear loss Co-operative marketing system can be encouraged in this regard. Above all, remunerative prices should be assured to the flower growers during lean reason of these crops, otherwise, the desired growth of flower production as well as momentum of flower trade will be diminished gradually.

NOTES

1. India is mainly the exporter of cut-flower in the overseas market. Although India's contribution of flower crop in the world trade market is insignificant (below 1 per cent of world trade), the export earnings (in Rs.) has increased from 5.13 lakhs in 1970-71 to 123.12 lakhs in 2000-01 or 165.86 lakhs in 2002-03.

2. Earlier studies are of Joshi and Sharma (1979),Mirchandrani and Hiranandari (1965), Chauhan and Sing(1973), Singh, Verma and Agarwal(1974), Desai(1979), Thakur(1974) etc. Recent studies are of Sunaresaun et.al(2000),Acharya and Agarwal (1994) etc.

3. An important limitation was related to the data of cost of production. Although Roychowdhury (2000) divided variable cost and fixed cost of production of crops into 21 items and 3 items (Ibid) respectively, he did not present those data separately. The cost of items (both real and monetary terms) of a crop was published in an aggregate form. Variable cost in Roychowdhury's work can be divided into two parts – operating cost(cost of fertilizer, chemicals, hired human labour, transport cost etc.) and capital cost(interest on the use of variable capital, like hired power tiller, hired pump-set, hired sprayer etc.). Fixed cost includes land revenue, imputed interest on own land and interest on fixed capital .The other important shortcoming of this secondary data was that the data of marketing cost and marketing margin of different marketing agents within each marketing channel were available in an aggregate form of all seasons without the data of their seasonal variation- lean season and peak season .

4. Marigold is cultivated twice at the same plot of land within one year.

5. The American Marketing Association has defined marketing as the performance of business activities that direct the flow of goods and services from producer to consumer or final user. The point of production (the farm or ranch) is the basic source of supply in agricultural

marketing. The process of marketing begins at that point(the farm or ranch) and continues until a consumer buys the product at the retail counter or until it is purchased as a raw material for another production phase. Thus marketing consists of those efforts that effect transfer of ownership and that creates time, place and form utility to commodities. By the creation of these utilities, marketers are productive and add value to raw agricultural commodities that consumers want by the creation of these utilities (Lowell, 1994; 310-11).

6. Market intermediaries(middlemen) of flower crops direct the flow of goods from producers to consumers or final users and receive market margin with the performance of their business activities. Paikar, in principle, buys from whoever will sell from the point of production (the farm or ranch), which is the basic sources of supply. He gathers up the different qualities of flowers at a particular place within the flower growing areas and further sell those to different types of market middlemen- secondary (local) wholesaler, wholesaler, retailer. The kind of “forward contract” (dadan) to the flower growers is sometimes practiced by paikars. Secondary (local) wholesalers or wholesalers are not related to this “forward contract” with the flower growers; nor does an individual local wholesalers or wholesalers, unlike paikar, execute his business activities with all types of available flowers at a time. Local wholesalers perform their business activities within their residential areas, whereas wholesalers (usually called market wholesalers) execute their business activities for any flower producing areas to markets in towns with higher volume of goods (both real and monetary terms) compared with local wholesalers. Retailers’ business are basically related to consumer or final users. Inter-state or inter-country business activities are executed by exporters/outside traders.

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Table A: Area (in thousand hectares) and Production (in thousand metric tonnes) of Flower Crop in West Bengal during 1996-97 and 2002-03.

Year	Area (in thousand hectares)	Production (in thousand metric tonnes)
1996-97	9.80	53.90
1997-98	10.00	58.00
1998-99	10.50	62.95
1999-00	11.05	68.75
2000-01	13.50	98.98
2001-02	13.87	103.95
2002-03	17.33	131.24

Figure A: Area (in thousand hectares) and Production (in thousand metric tonnes) of Flower Crop in West Bengal during 1996-97 and 2002-03.

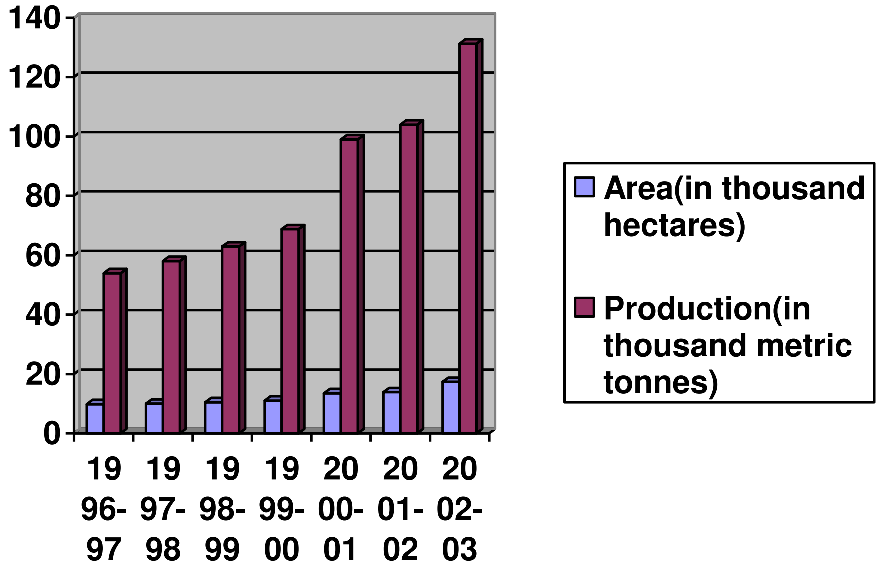


Table 1: Size Distribution of Sample Farms in Sample Blocks.

Name of Block	Marginal	Small	Medium	Large
Panskura I	2	2	1	–
Panskura II	3	1	1	–
Daspur I	3	1	1	–
Daspur II	4	1	–	–
Tamluk II	4	1	–	–
Ghatal	3	1	1	–
Ranaghat I	2	2	1	–
Ranaghat II	2	2	1	–
Krishnanagore II	3	1	1	–
Haringhata	5	–	–	–
Chakdah	4	1	–	–
Bagnan I	3	1	–	–
Bagnan II	2	2	1	–
Uluberia I	3	1	1	–
Uluberia II	5	–	1	–
Shyampur II	5	–	–	–
Rajarhat	3	2	–	–
Gaighata	4	1	–	–
Deganga	5	–	–	–
Bhangar	3	1	1	–
Total	**68 (68)**	**21 (21)**	**11 (11)**	**–**

Figures within brackets represent percentage.
Source : (Roychowdhury, 2000).

Table 2: Area, Production and Productivity of Flowers (in real terms)

Name of the Flower	Area (acre)	Production (Unit)	Productivity
Rose	20.38 (31.22)	1975042 (No.)$^{+}$	9910.79
Tuberose	25.2 (38.79)	774.03 (Qt.)*	30.5699
Bel	5.75 (8.81)	142.89 (Qt.)*	24.8504
Jui	4.86 (7.45)	97.73 (Qt.)*	20.1091
Marigold	4.87 (7.46)	400.75 (Qt.)*	82.2895
Gladiolus	2.64 (4.04)	132378 (No.)$^{+}$	50143.18
Chrysanthemum	1.45 (2.22)	265014 (No.)$^{+}$	182768.28

Figures within brackets represent percentage. + and * denote number and quintal respectively.
Source : (Roychowdhury, 2000).

Table 3: Output-Input Ratio of Different Crops (Flowers & Main Field Crops)

Name of the Crop	Output-Input Ratio
1. Rose	1.44
2. Tuberose	1.47
3. Bel	1.43
4. Jui	1.44
5. Marigold	1.48
6. Gladiolus	1.29
7. Chrysanthemum	1.39
8. Aman Paddy	1.20
9. Boro Paddy	1.25
10. Wheat	1.11
11. Potato	1.30
12. Mustard	1.14
13. Groundnut	1.35
14. Jute	1.07

Source : (Roychowdhury, 2000).

Table 4 : **Crop Rotation-wise Net Return (Rs.) in Sample Farms Per Acre Per Annum**

(in Rs.)

Crop/Crop Rotation	Total Revenue	Total Cost*	Net Revenue
Rose	36460	16904	19556
Tuberose	26722	10902	15820
Bel	26412	11572	14840
Jui	27650	12461	15189
Marigold	14441	5111	9330
Gladiolus	55201	12303	42898
Chrysanthemum	42840	15128	27712
Marigold + Marigold	28883	10223	18660
Aman Paddy + Marigold	18135	7520	10615
Marigold + Groundnut	19527	7562	11965
Jute + Marigold	18260	8324	9936
Aman Paddy + Boro Paddy	9600	5708	3892
Aman Paddy + Boro Paddy + Groundnut	14687	8160	6527
Aman Paddy + Groundnut	8780	4859	3921
Aman Paddy + Potato	12864	6849	6015
Groundnut + Aman Paddy + Wheat	11164	6647	4517
Groundnut + Aman Paddy + Mustard	11270	6698	4572
Jute + Mustard	6308	5051	1257
Jute + Wheat	6203	5001	1202
Jute + Potato	12988	7653	5335
Total	**20419.75**	**8731.80**	**11687.95**

Total cost of production includes an aggregate of fixed and variable costs. Variable cost includes operating cost – cost on plant materials, oilcake, neemcake, bonemeal, fertilizers (nitrogenous, phosphatic, pottassic), plant protection chemicals, other chemicals- and capital cost (interest on the use of variable capital, hired power tiller, hired pump set, hired sprayer etc.). Fixed cost includes land revenue, imputed interest on own land and interest on fixed capital. The data related to cost of different items (both real and monetary terms) of a crop was published in an aggregate form (Roychowdhury, 2000).

Table 5: **Maximum Likelihood (ML) Estimate of Cobb-Douglas Stochastic Frontier Production Function and Economic Efficiency Effect Model of Sample Farms Rotation wise Crop Per Acre Per Annum**

Dependent Variable : In Y	
Explanatory Variable	Coefficients
Constant	2.8349
	(2.0986)
In X1	1.0539*
	(0.1104)
In X2	-0.2164
	(0.2586)
Variance Parameters	
	3.3020*
	(10.1759)
	0.3143
	(1.4263)
	0.0905
	0.0083
Log Likelihood Function	7.3583

Notes: Values within Parentheses indicate the standard errors
* Significant at the 1 percent level.

Table 6: Crop Rotation wise Economic Efficiency of Sample Farms Per Acre Per Annum

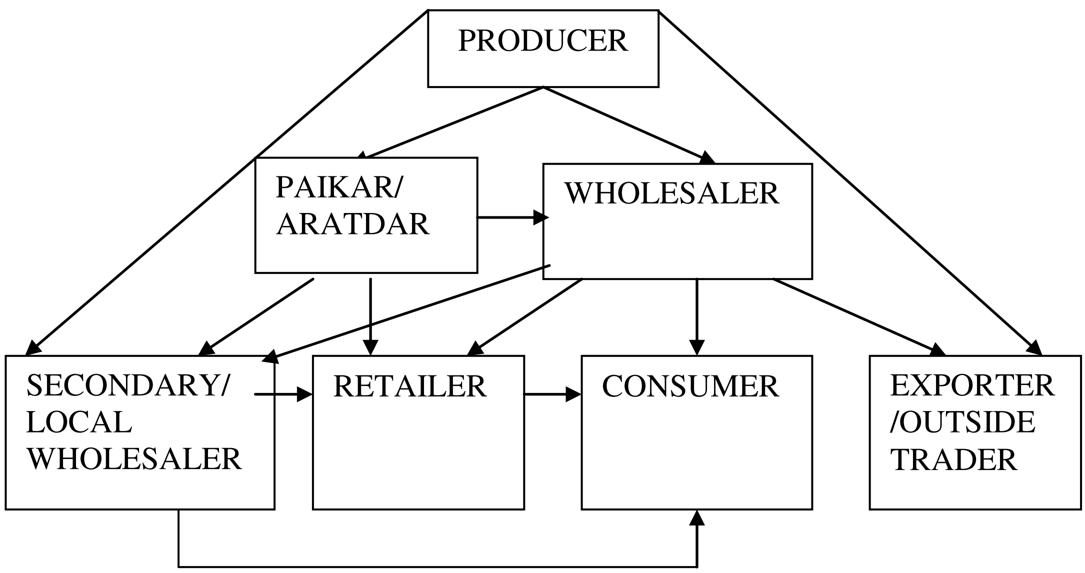
Crop/Crop Rotation	Economic Efficiency (%)
Rose	71.58
Tuberose	94.18
Bel	97.58
Jui	88.57
Marigold	95.05
Gladilus	98.77
Chrysanthemum	0.9545
Marigold+Marigold	88.23
Aman Paddy+Marigold	94.94
Marigold+Groundnut	96.08
Jute+Marigold	93.58
Aman Paddy+Boro Paddy	94.02
Aman Paddy+ Boro Paddy+Groundnut	95.19
Aman Paddy+ Grondnut	94.78
Aman Paddy+Potato	98.34
Groundnut+Aman Paddy+ Wheat	96.32
Groundnut+Aman Paddy+Mustard	96.23
Jute+ Mustard	67.50
Jute+Wheat	68.01
Jute+Potato	97.63
Mean Technical Efficiency	86.38

Table 7: **Cost of production (per unit) and market price of 5 major types of flower produced in 5 major flower producing districts, West Bengal**

K.G./Unit in Rs.

Type of Flower and Unit of Measurement	Cost of production		Market Price (Unit/K.G.)	
	(Per Unit)	(Per Kg)	Lean	Season
Rose (Unit)	0.45	-	0.25	0.85
Tuberose (K.G.)	-	11.07	10.00	25.00
Bel (K.G.)	-	14.00	12.50	35.00
Jui (K.G.)	-	17.33	25.00	40.00
Marigold (K.G.)	-	2.38	7.00	12.00

Figure 1: Flow Chart of Marketing Channels identified in Marketing System in Alluvial zone of West Bengal



1. Producer – Paikar – Wholesaler – Secondary Wholesaler – Retailer – Consumer
2. Producer – Paikar – Wholesaler – Retailer – Consumer
3. Producer – Paikar – Wholesaler – Consumer
4. Producer – Paikar – Local Wholesaler – Retailer – Consumer
5. Producer – Paikar – Retailer – Consumer
6. Producer – Wholesaler – Consumer
7. Producer – Wholesaler – Retailer – Consumer
8. Producer – Wholesaler – Local Wholesaler – Retailer – Consumer
9. Producer – Wholesaler Exporter/Outside Trader
10. Producer – Local Wholesaler – Retailer – Consumer
11. Producer – Local Wholesaler – Consumer
12. Producer – Exporter/Outside Trader

Source : (Roychowdhury, 2000).

Table 8: Price Spread and Marketing Margin (including Marketing Cost) of Sample Flower Crops in Channel – I.

Traders level & its marketing factors	Rose (100 flowers)	Tuberose (Kg)	Bel (Kg)	Jui (Kg)	Marigold (Kg)	Gladiolus (Dozen Spike)	Chrysanthemum (Dozen flowers)
Producer's Level							
Cost of production	45.00	11.07	14.00	17.33	2.38	17.76	4.68
Producer's Profit	21.00	4.71	5.98	7.55	1.13	3.00	0.84
Paikar's Level							
Cost of Marketing	10.38	3.57	4.39	4.52	3.30	3.28	2.83
Paiker's Profit	8.34	4.52	6.90	7.24	3.56	2.98	2.76
Wholesaler's Level							
Cost of Marketing	6.19	2.40	2.79	3.06	2.21	2.02	2.02
Wholesaler's Profit	9.52	5.27	8.20	9.43	3.08	3.12	4.16
Secondary Wholesaler's Level							
Cost of Marketing	6.38	2.48	2.94	3.05	2.15	2.12	1.99
Secondary Wholesaler's Profit	19.76	6.52	8.75	10.12	3.38	3.52	5.38
Retailer's Level							
Cost of Marketing	5.12	1.67	2.18	2.26	1.58	1.67	1.566
Retailer's Profit	12.30	8.76	10.04	11.75	5.12	6.78	6.12
Price paid by Consumer	134.00	50.97	66.17	76.31	27.89	46.25	32.34
Marketing Margin + Marketing Cost	68.00	35.19	46.19	51.43	24.38	25.49	26.82

Source : (Roychowdhury, 2000).

Table 9: Price Spread and Marketing Margin (including Marketing cost) of Sample Flowers Crops in Channel – 2.

Traders level & its marketing factors	**Rose (100 flowers)**	**Tuberose (Kg)**	**Bel (Kg)**	**Jui (Kg)**	**Marigold (Kg)**	**Gladiolous (Dozen Spike)**	**Chrysanthemum (Dozen flowers)**
Producer's Level							
Cost of production	45.00	11.07	14.00	17.33	2.38	17.76	4.68
Producer's Profit	21.00	4.71	5.98	7.55	1.13	3.00	0.84
Paikar's Level							
Cost of Marketing	10.38	3.57	4.39	4.52	3.30	3.28	2.83
Paiker's Profit	8.34	4.52	6.90	7.24	3.56	2.98	2.76
Wholesaler's Level							
Cost of Marketing	6.97	2.76	3.02	3.26	2.45	2.45	2.30
Wholesaler's Profit	12.05	8.58	10.00	12.20	4.27	5.64	5.22
Retailer's Level							
Cost of Marketing	5.72	2.34	2.54	2.58	2.15	2.13	2.22
Retailer's Profit	15.65	10.14	14.26	15.50	6.58	8.18	8.92
Price paid by Consumer	125.11	47.69	61.09	70.18	25.82	45.42	29.77
Marketing Margin + Marketing Cost	59.11	31.91	41.11	45.30	22.31	24.66	24.25

Source : (Roychowdhury, 2000).

Table 10: Cost Component of Marketing of Sample Flower Crop in Channel – 1.

I t e m	**Rose**	**Tuberose**	**Bel**	**Jui**	**Marigold**	**Gladiolous**	**Chrysanthemum**
1. Packing	6.07 (8.93)	2.01 (5.71)	2.56 (5.54)	2.76 (5.37)	1.59 (6.52)	2.08 (8.16)	1.99 (7.42)
2. Labour	9.88 (14.53)	3.06 (8.70)	3.68 (7.97)	3.88 (7.54)	2.96 (12.14)	2.57 (10.08)	2.38 (8.87)
3. Meal and Tiffin Charge	1.90 (2.79)	0.86 (2.44)	0.95 (2.05)	1.02 (1.98)	0.78 (3.20)	0.61 (2.39)	0.65 (2.42)
4. Transport	4.23 (6.22)	1.74 (4.95)	2.29 (4.96)	2.29 (4.45)	1.74 (7.14)	1.52 (5.97)	1.27 (4.74)
5. Marketing Tax and Other Commission	1.06 (1.56)	0.69 (1.96)	0.96 (2.08)	0.96 (1.87)	0.69 (2.83)	0.65 (2.55)	0.55 (2.05)
6. Storage and Maintenance	2.34 (3.44)	1.06 (3.01)	0.97 (2.10)	1.04 (2.02)	0.83 (3.40)	0.75 (2.94)	0.97 (3.62)
7. Spoilage	2.60 (3.82)	0.70 (1.99)	0.89 (1.93)	0.94 (1.83)	0.65 (2.67)	0.91 (3.57)	0.59 (2.20)
8. Trader's Profit	39.92 (58.71)	25.07 (71.24)	33.89 (73.37)	38.54 (74.94)	15.14 (62.10)	16.40 (64.34)	18.42 (68.68)
9. Marketing Cost	28.08 (41.29)	10.12 (28.76)	12.30 (26.63)	12.89 (25.06)	9.24 (37.90)	9.09 (35.66)	8.40 (31.32)
10. Marketing Margin and Marketing Cost	68.00 (100.00)	35.19 (100.00)	46.19 (100.00)	51.43 (100.00)	24.38 (100.00)	25.49 (100.00)	26.82 (100.00)

Figures in brackets represent percentage.
Source : (Roychowdhury, 2000).

Table 11: Cost Component of Marketing of Sample Flower Crop in Channel – 2.

I t e m	**Rose**	**Tuberose**	**Bel**	**Jui**	**Marigold**	**Gladiolous**	**Chrysanthemum**
1. Packing	5.17 (8.75)	1.83 (5.73)	2.1 (5.1)	2.23 (4.92)	1.52 (6.81)	1.94 (7.87)	1.80 (7.42)
2. Labour	8.23 (13.92)	2.69 (8.43)	3.05 (7.42)	3.21 (7.09)	2.58 (11.56)	2.27 (9.20)	2.15 (8.86)
3. Meal and Tiffin Charge	1.60 (2.71)	0.78 (2.44)	0.84 (2.04)	0.87 (1.92)	0.73 (3.27)	0.6 (2.56)	0.59 (2.43)
4. Transport	3.41 (5.77)	1.31 (4.10)	1.73 (4.21)	1.73 (3.82)	1.31 (5.87)	1.17 (4.74)	1.11 (4.58)
5. Marketing Tax and Other Commission	0.78 (1.32)	0.49 (1.54)	0.71 (1.73)	0.71 (1.57)	0.49 (2.20)	0.47 (1.91)	0.39 (1.61)
6. Storage and Maintenance	1.82 (3.08)	0.86 (2.70)	0.80 (1.95)	0.84 (1.85)	0.66 (2.96)	0.62 (2.51)	0.53 (2.19)
7. Spoilage	2.06 (3.48)	0.71 (2.23)	0.72 (1.75)	0.77 (1.70)	0.61 (2.74)	0.76 (3.08)	0.78 (3.22)
8. Trader's Profit	36.04 (60.97)	23.24 (74.51)	31.16 (75.80)	34.94 (77.13)	14.41 (64.59)	16.80 (68.13)	16.90 (69.69)
9. Marketing Cost	23.07 (39.03)	7.95 (25.49)	9.95 (24.20)	10.36 (22.87)	7.90 (35.41)	7.86 (31.87)	7.35 (30.31)
10. Marketing Margin And Marketing Cost	59.11 (100.00)	31.19 (100.00)	41.11 (100.00)	45.30 (100.00)	22.31 (100.00)	24.66 (100.00)	24.25 (100.00)

Figures within brackets represent percentage.
Source : (Roychowdhury, 2000).

Table 12: Indicators of Marketing Efficiency in Channel 1 & Channel 2.

Name of Flowers	Producers Share in consumer's rupee (in Percentage)		Trader's Profit margin in consumer's rupee (in Percentage)		Modified Marketing Efficiency	
	Channel – I	Channel – II	Channel – I	Channel - II	Channel – I	Channel - II
1. Rose (100 flower)	49.25	52.75	29.79	28.81	0.31	0.36
2. Tuberose (Kg.)	30.96	33.09	49.19	48.73	0.13	0.15
3. Bel (Kg.)	30.19	32.71	51.22	51.01	0.13	0.15
4. Jui (Kg.)	32.60	35.45	50.50	49.79	0.15	0.17
5. Marigold (Kg.)	12.59	13.59	54.28	55.81	0.05	0.05
6. Gladiolus (Dozen Spikes)	44.89	45.71	35.46	36.99	0.12	0.12
7. Chrysanthemum (Dozen Flowers)	17.07	18.54	56.96	56.77	0.03	0.03

Source : (Roychowdhury, 2000).