



# International Journal of Multidisciplinary Research and Development



IJMRD 2014; 1(7): 205-210  
www.allsubjectjournal.com  
Received: 14-11-2014  
Accepted: 04-12-2014  
e-ISSN: 2349-4182  
p-ISSN: 2349-5979

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## **Studies on Marketing Efficiency of Agricultural Products in India: A Critical Evaluation**

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#### **Abstract**

This paper attempts to make a critical evaluation of the studies made on marketing efficiency of agricultural products in India. This study highlights the limitations of the studies on marketing efficiency of agricultural products in India and makes an outline for further research on this topic. In most of these studies two distinct approaches have been adopted: (1) an analysis of marketing margin at various stages of movement of a farm product from producers to the final consumers, and (2) an analysis of the functioning of the market using structure – conduct – performance framework. Modern marketing system is often based on complex multistage framework. The study concludes that efficiency of the agricultural markets cannot be judged solely by the structure conduct performance framework (correlation coefficient and cointegration analysis) or by the marketing margin analysis. It needs to be backed up some additional evidences of competitive conditions like low inter-market price differentials, possibility of inter-market trade etc. For more dependable and uncontroversial assessment of the functioning of market both the methods must be used simultaneously.

**Keywords:** Marketing Efficiency, Agriculture

#### **1. Introduction**

A well-organised network of agricultural markets easily accessible to all the widely scattered producers will help to overcome the difficulty that the agricultural sector faces because of the fixed locations of the farms. There are other reasons as well for paying special attention to the marketing of agricultural produce. Relatively greater perish-ability of agricultural produce reduces the bargaining power of the producers. The smaller disposal of agricultural produce of small size of farms, which is common feature of the underdeveloped countries leads to higher cost of marketing per unit of crop. Yearly variation in crop production, especially those resulting in glut may also result in financial loss to the farmers if adequate marketing facilities are not available.

An efficient marketing system is essential for developing and also maximizing returns from agricultural production. In this regard Abott (1967) has pointed out that an efficient market acts as bridge between the producer and consumer. It is through the market that production pattern is changed according to the requirements of the consumers. Efficient marketing (including efficient pricing) is desirable in and of itself because it leads to maximize welfare from the given output. When pricing is efficient, shortages and surpluses will not exist in different areas of the country at the same time or at different times of the year in the same area. (Cumminngs Jr. R.W., 1967).

Since marketing efficiency is the crux of agricultural marketing it is more important for a developing economy like India. This paper attempts to make a critical evaluation of the studies made on marketing efficiency of agricultural products in India. This study highlights the limitations of the studies on marketing efficiency of agricultural products in India and makes an outline for further research on this topic.

#### **2. Marketing Efficiency – Definition and Measurement**

Marketing efficiency is defined in several ways. According to Acharya and Agarwal (1987), the concept of marketing is so broad and dynamic that no single definition encompasses all of its theoretical and practical implications. Clark (1954) defines marketing efficiency as having the three components; the effectiveness with which a marketing function or service is performed, the cost at which the service is performed and the effect of this cost and the method of performing the service on production and consumption.

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According to Jasdanwalla (1966) marketing efficiency can be broadly defined as the effectiveness or competence with which a structure performs its designated functions. In distribution it may pertain to technical competence or economic efficiency. Technical efficiency relates to such matters as mechanization of individual work process. To be technically efficient a marketing structure would have to utilize the best method available for every marketing job and to use these methods with maximum effectiveness.

Economic efficiency on the other hand implies realization of maximum output from the given resources. Alternatively it is the minimization of the amount of inputs required for given output of goods and services. It involves the elimination of wastes, high costs and exploitative profits. The principal means of ensuring this elimination is pressure of competition (Jasdanwalla, 1966).

Khols (1980) defines marketing efficiency as the ratio of market output or satisfaction to marketing input or cost of resources. An increase in this ratio represents increased efficiency and a decrease denotes low efficiency.

An efficient market must transmit the benefits of any innovation that may take place in marketing service to the producers as well to consumers in the form of reduction in money costs. Presence of competition can only ensure this. Therefore competitiveness is substituted for efficiency in market studies. In most of these studies two distinct approaches have been adopted:- (1) an analysis of marketing margin at various stages of movement of a farm product from producers to the final consumers, and (2) an analysis of the functioning of the market using structure – conduct – performance framework. Modern marketing system is often based on complex multistage framework. A detailed marketing margin study aims at estimating the difference between the cost of and the receipts from handling the commodity at every stage. This difference should not exceed the normal return for the service by the respective stages to fulfill the conditions of efficiency. The second approach is based on an identification of competitive market and efficient market. It therefore substitutes a test of competitiveness for the test of efficiency. Textbook conditions of competitiveness are admittedly difficult to apply in practice. To obviate these difficulties a framework is used comprising three simple concepts – market structure, market conduct and market performance. With the help of the time series price data inter-market price correlation coefficients are often computed to indicate the degree of market integration. High correlation coefficients reveal close correspondence among markets, which is regarded as an index of efficiency. It establishes real or potential allocation of supply among markets in response to demand in such a fashion as to ensure price movements in different markets in union, removing a chance of excess profit in any market and fulfilling an important condition of competition.

### 3. An Overview of Marketing Studies in India

A fairly large number of studies have attempted to analyse various facets of agricultural marketing in India. Most of studies relate to one particular region of the country and to a single or few crops only. This is nothing unusual. In a country with India's size and diversity intra and interregional variation and inter-commodity variations are significant.

Perhaps I.D. Mahendru (1937) did the earliest study of market integration in India. His study was based on the fortnightly wholesale prices of wheat for six months at four

important markets in Punjab. He used the degree of correlation between prices in spatially separated markets as an indicator of the existence of the degree of market relationship. In that study correlation coefficient ranged between 0.43 and 0.86.

Cummings (1964) studied the pricing efficiency of wheat in Khanna market of Punjab. Correlations between monthly prices of Khanna, Delhi, five other markets of Punjab (Abohar, Ludhiana, Barnala, Karanl and Patiala) and two markets of Uttar Pradesh (Agra and Kanpur) were observed. The three criteria of pricing efficiency identified by Cummings were that prices reflect demand and supply conditions that seasonal differences not consistently exceed storage cost and that on the average price differences among markets not exceed storage cost.

Seasonal prices though exceeded storage costs for some months it did not exceed consistently and the price differences between markets were less than transportation costs. There was no evidence of collusion among traders. Thus Cummings summarized – “given the marketing environment for wheat in India, the wheat price tended to move toward to move achievable under pure competition”.

Uma Lele (1967) also studied the efficiency of market structure for different food grains. She chose three types of food grains from three different states – rice for the state of West Bengal, wheat for Punjab and Jowar for Maharashtra. She selected five primary markets in the heart of food grain surplus area where transactions at the wholesale level take place directly between the cultivator and the wholesaler. One terminal market, a major urban consuming center that receives a significant portion of the supplies from primary markets was selected for study of price relation over time and space.

Lele laid down the similar criteria like Cummings for efficient marketing. For efficient market the price differences in two spatially separated markets must be less than or equal to transport cost between the two. Lele like Mahendru and Cummings used the correlation coefficient as an indicator of marketing efficiency. She concluded that private trade in three major food grains “operates efficiently within the technological and policy confines” and hence “the scarce governmental resources should be allocated to areas where private resources are not likely to flow abundantly”. Lele admitted, “even if market is highly efficient, it may have certain unacceptable features”. But disappointingly enough she did not examine whether the different food grains in the country had these or other unacceptable features.

Jasdanwalla (1966) studied the marketing efficiency of agricultural crops in Rajkot district. She restricted her field investigation to the study of groundnut and cotton only, the major crops entering the market. She followed the same type of reasoning as Cummings to judge the efficiency of agricultural markets. Multiple regression equations, correlation coefficients and other measures of association were computed.

Jasdanwalla found that a number of facilities were available for satisfactory marketing in the region and the cultivators were not constrained by restrictive influences. She found that there was a close relationship between groundnut oil and groundnut prices. There was a strong relationship between prices spatially and a close integration between terminal market centers and upcountry markets. She concluded that the requirements of perfectly competitive and efficient marketing are satisfied in the district concerned.

The main objective of the study made by K. Subbarao (1978) was to examine the economic efficiency of the existing paddy/rice marketing system in West Godavari district of Andhra Pradesh in 1968. He also evaluated the impact of public intervention in marketing. Subbarao also made a close correspondence between a perfect and efficient market. But he stressed that efficiency in the marketing system cannot be judged merely by competitive prices it generates but by the degree to which it responds to the needs of overall growth and distributive justice. In a competitive market the undesirable features may be present – the competitive prices may be far above or below the cost of production due to storage or surplus. The competitive price may also have adverse effect on the growth of non-agricultural sector or on intersectoral income distribution. He enquired whether the rice/paddy marketing system in West Godavari district complied with the norms as described above.

Subbarao adopted both the market structure approach and marketing margin approach methodology. Multiple regression analysis was performed with the prices received by sample farmers as dependent variables and total output produced, storage capacity, sources of borrowing, time of sale and level of infrastructure development as independent variables. Subbarao found that there was considerable interpersonal variation in prices received among sample farmers. Small farmers suffered losses due to various imperfections in the marketing system. Underdeveloped infrastructure was the most important source of such losses. He concluded that horizontal integration of wholesale markets did not ensure competitive prices to the farmers. In villages characterised by low level of infrastructure development coupled with low staying power of farmers, competitive forces were weakened thus provided opportunities to millers to make abnormal profit.

Prof. D.S. Thakur (1974) made a study with the objectives to analyse the operational efficiency and to evaluate the pricing efficiency of food grain markets for bajra, jowar, paddy and wheat in Mehsana, Kaira and Surat districts of Gujarat. He studied the pricing efficiency of marketing system by analyzing (1) price trends of different markets, (2) market integration and (3) price spread in the marketing channels. The trends in wholesale prices of selected food grain commodities for the period 1965-66 to 1970-71 in different markets were analysed through regression analysis. The trends in wholesale prices of food grain commodities were not similar in all markets. There was a wide variation in the trends in prices of same commodity in different markets.

To determine the pricing efficiency market integration was judged by calculating correlation coefficients between wholesale prices in these markets. Price series correlations did not remain high between most of the markets. The interrelation between wholesale price movements of bajra, jowar and paddy in some markets were very low and even negative. Thus he concluded that the food grain marketing system on the whole was not efficient. The reason was the presence of few traders in most of the markets who might agree through mutual understanding and outright collusion to avoid price competition.

Thakur (1971) also studied the pricing efficiency in Indian apple market in Kotgarh and Kotkah in Mahasu and Kulu and Nagar areas of Kulu valley of Himachal Pradesh using the same methodology as described above. Pricing efficiency was examined by the analysis of marketing margins and the price spread. His study revealed that marketing system for

apple was fairly integrated so far as inter market price movements were concerned. It was also observed that traders' profit accounted for a large proportion off price paid by the consumers, which is a symptom of inefficiency.

Jagdish Prasad (1980) undertook a study to examine the operational and distributive efficiency of farmer's share in consumer's rupee of two important food grains namely rice and wheat in regulated markets in North Bihar. Prasad identified principal marketing channels for rice and wheat in Muzaffarpur market. He took the farmer's share in the consumer's rupee as one indicator of efficiency of marketing system. The operational efficiency (E) of the farmer's share was computed by the ratio between the price received by the farmers and total price spread. The total price spread is the difference between the price paid by the ultimate consumer and the price received by the farmer. For distributive efficiency operational efficiency can be measured separately for each group of farmers and then standardized by dividing each E by the sum of the Es.

Prasad found that the majority of small and marginal farmers sold their produce at the village level to the village merchants and itinerant traders due to smaller marketable surplus, lack of organisation and holding capacity. But the majority of medium and large farmers sold their produce at urban market center and obtained higher prices. He suggested in order to promote efficient grain trade and optimal price to farmers as well as to increase agricultural output there might be an organization of farmers particularly marginal and small farmers which would provide the marketing facilities. Financial help need to be provided to small and marginal farmers.

D.K. Chatterjee and Dr. K. Bhattacharya (1985) enquired into the spatial and inter-seasonal pricing efficiency of rice marketing system in Burdwan district of West Bengal for two agricultural years 1980-81 and 1981-82. They took correlation coefficient as an indicator of market integration. They found high correlation coefficients in most of the cases. They felt it necessary for accessing actual market performance the analysis of market performance must be backed up by the analysis of spatial price differential and transportation cost. They concluded that the rice marketing system in Burdwan district had not been working in an efficient manner in the period studied.

In the study "Spatial Pricing Efficiency in Groundnut Markets in Tamil Nadu" D. Jayaraj (1992) analysed the correlation coefficient of wholesale prices for ten market centers of South and North Arcot districts of Tamil Nadu for nine years (1975-76 to 1983-84). But homogeneous secular and long-term trend present in the time may increase the value of zero order correlation coefficients. Thus Jayraj again correlated the price series (residuals) after eliminating the seasonal and time trends. He found that price transmission was instantaneous and efficient.

To avoid the methodological limitations of bivariate correlation method Palaskas T.B. and Harriss –White B. (1993) proposed a new method based on Engle and Granger cointegration test for evaluating market integration. They made their study on the basis of weekly price data related to rice, potato and mustard collected from three market places in Burdwan district in West Bengal for the period from November 1988 to August 1990. The Augmented Dicky-Fuller (ADF) test of cointegration are used to examine whether prices in the peripheral markets and the prices in central market are co-integrated. The ADF results showed

that price of rice, potato and oil of the peripheral market and price in the central markets were co-integrated with a few exceptions. The speed of adjustment i.e. the speed at which the price of potato in the central and peripheral markets approach their equilibrium point was higher in potato market than between central and peripheral markets of rice and mustard. Palaskas and Harriss-White used weekly data for the period of less than three years. But cointegration is a long run concept and test of cointegration requires long span of data.

Nasrudden and Subramanian (1995) attempted to study the price adjustment between oils and oilseeds. They estimated the price relationship at two stages: (i) vertical integration – integration of seed price to price of its oil and oilcake and (ii) horizontal integration – integration between price of different oils.

They used Koyck's distributed lag model for its superiority over correlation analysis. Koyck's basic model is:

$$P_{it} = \alpha + \beta_0 P_{jt-1} + \dots + \beta_k P_{jt-k} + u_t$$

$P_{it}$  is the price of  $i$ th oil/oilseed in  $t$ -th period and  $\alpha$  and  $\beta$  are parameters. The horizontal and vertical integration of oils and oilseeds were tested with following equations

$$P_{it} = \alpha + \beta_0 P_{jt} + \lambda P_{it-1} + v_t$$

$$P_{ist} = \alpha + \beta_0 P_{it} + \mu P_{ict} + \lambda P_{ist-1} + v_t$$

where  $P_{it}$  is the price of  $i$ th oil on the  $t$ -th day,  $P_{jt}$  is the price of  $j$ th on  $t$ -th day,  $P_{it-1}$  is the price of  $i$ th oil on  $t-1$  day.  $P_{ist}$  is the price of  $i$ -th oilseed on  $t$ -th day,  $P_{ist-1}$  is the price of  $i$ th oilseed on  $t-1$  day.  $P_{ict}$  is the price of  $i$ th oilcake on  $t$ -th day.

For horizontal integration the Durbin –Watson 'h' statistic for each oil was within the accepted level and  $R^2$  ranged between 0.74 and 0.92. The result shows that groundnut oil influenced the prices of all other oils except castor oil. All oil prices interacted within a short period for its price adjustment. So the Bombay market for oils and oilseeds is well integrated with the characteristics of perfect market condition. The study revealed that the assumption of complete oil price integration could not be fully accepted. The vertical integration in oilseed price was much quicker as compared to horizontal integration in oil prices. The characteristics of perfect market condition were shown by its quick adjustment of price changes.

In a much more comprehensive study, Jha *et al* (1997) investigated rice and wheat market integration in India involving binary and multivariate cointegration tests based on Engle and Granger (1987), Engle and Yoo (1987) and Goletti – Ravallion (Goletti, 1994; Ravallion 1986) methods. Applying these methods to monthly wholesale prices of rice and wheat for the period from January 1980 to December 1990, they observed that all pairs of prices of rice as well as of wheat are cointegrated. And for the crops all prices taken together are linked in a cointegrating relationship. They concluded that food markets all over India are highly integrated.

Jayashankar and Muraleedharan (2000) made a comparative

study of bamboo and woods market in testing of efficiency of agro-forestry product markets in Palakkad district in Kerala. They identified four channels by which bamboos are delivered from household to final consumers. They observed that total trade margin has increased more than 100 per cent with a unit rise in price. The margin for trader increased higher than that of sub-traders.

They found that traders received 21.6% of the final price and marketing cost was about 26.06%. The margin for traders included the establishment cost, risk, transaction costs, bribes to bureaucracy and it was not seemingly large. The sub-traders were receiving only 4.81% in bamboo trading. The credit relation was limited between trader and sub-trader. They found that the households were getting reasonable remuneration due to the competition between the traders for the product and less number of intermediaries. The main bottlenecks in functioning of the bamboo markets in Kerala were legal restrictions and bureaucratic procedures.

Madhusudan Ghosh (2000) evaluated empirically the spatial integration of rice markets in Bihar, Orissa, Uttar Pradesh and West Bengal. He used the maximum likelihood (ML) method of cointegration developed by Johansen and extended by Johansen and Juselius (1990) to test whether the intra-state and inter-state regional rice markets were integrated. He used the monthly data of wholesale prices of rice quoted in different market centers of four selected states viz. Bihar, Orissa, Uttar Pradesh and West Bengal. The results of his study revealed that though the markets were integrated the law of one price did not hold good. On the basis of the results he argued that there should not be any unnecessary restriction on inter-regional movement of food grains.

Ramakumar (2001) computed the marketing efficiency of each marketing channels by ranking the different performance indicators, which are marketing costs and margins of intermediaries, producer's share in consumer's rupee, rate of return (ratio between marketing margin and marketing cost). He assigned rank for each of the performance indicator. The channel with maximum producer's share of consumer's price will be assigned rank 1 (highest rank). Similarly the channel with minimum marketing cost and marketing margin will be assigned rank 1 for those indicators. Marketing efficiency is estimated by

$$R = \frac{R_i}{N_i}$$

formulating a composite index where  $R_i =$  Sum of ranks in each channel and  $N_i =$  Number of performance indicators. The channel with lowest composite index will be the most efficient channel.

But there are limitations in using such composite index in judging marketing efficiency. In this method equal weights are assigned to all the selected indicators. But in reality different indicators do not have equal importance. The composite index should be interpreted only as a pointer to the efficiency of the channel and not as an index that comprehensively covers the embodied elements.

Kumar and Sharma (2003) studied the functioning of the regulated markets in Haryana for paddy crop with two objectives: (i) to see whether the liberalisation process has improved the efficiency of regulated markets and (ii) to see the structural and pricing efficiency across different farm size groups at the farm gate level. Market integration among wholesale paddy markets was analysed with the help of

cointegration and error correction mechanism. The analysis of market structure and prices at the farm gate level was done with the help of primary data generated by household survey of 400 farmers in two districts of Haryana. They used Johansen's maximum likelihood procedure based on error correction representation which is a powerful test compared to Engle-Granger test. The integration tests were out on the log monthly wholesale prices of coarse paddy in four markets in Haryana for the period of 1978 to 2001. All four markets exhibited long-run relationship.

Multiple regression analysis was made taking the net price (gross price minus cost incurred to market the produce) as dependent variable and value of marketed surplus, net-cropped area, value of aggregate output, total storage investment, distance covered to market the produce and dummies of the time of sale as independent variables. The regression results showed that distance covered to market the produce was most important and significant variable with positive effect on the net price received by the farmers. The value of marketed surplus and value of output also had positive effects. Storage investment and non-institutional loans were not significant. Thus it appeared that though the market was efficient they were not perfectly integrated over space. The methodology used in this study was superior to the other methods used to test market efficiency. Their cointegration analysis was also supplemented by micro level study and regression analysis. In the regression analysis the value of  $R^2$  was quite low. This indicates they must have missed to identify some important variables.

Basu and Dinda (2003) evaluated empirically the potato market integration of Hooghly district with the help of bivariate price correlation and cointegration test developed by Engle-Granger. They collected the weekly wholesale and retail prices of potato for the period from January 1998 to December 2000 from three market intelligence (MI) centers Champadanga, Tarakeswar and Sheoraphully out of seven MI centers of Hooghly district. Even after removing the seasonality the correlation coefficients were found to be in the range of 0.89 and 0.98. The results implied that the wholesale and retail potato markets in Hooghly district were highly interdependent.

To determine whether a long run relationship existed between the prices of different markets the cointegration test was applied. They took all possible combinations of prices of potato markets to carry out the cointegration test. The potato markets in Hooghly district were shown to be integrated.

Though Basu and Dinda dodged the problem of selecting the central and peripheral markets by taking all possible combination of prices their study involved the limitations of using short span of data. Testing cointegration requires long span of data but they have used the data for three years only. They increased the frequency of data by using the weekly prices. But as noted earlier, Hakkio and Rush (1991) have shown that increasing the frequency of sampled observation for a given period does not significantly change the power of the tests for cointegration. Their study is not comprehensive; out of seven market intelligence centers they used the prices of only three market intelligence centers.

#### 4. Conclusion

The bivariate modeling made in most of the studies described above is heavily criticized by different economists. Harriss (1979) argued that high correlation coefficient may not indicate market integration and perfect competition. The

coefficients may rise during secularly rising prices due to population pressure with effective demand relatively higher to supply. Again, there may not be any trade among the markets but higher correlation may be obtained due to trading relationship of a joint destination market. Monopoly procurement at fixed prices may result in inter-market correlation of 1.0. She said that correlation coefficient is by itself is not an adequate indicator of market integration. It may serve as an indicator of likelihood, given many assumptions of structure and conduct. Ravallion (1986) stated that the time series of prices of two locations which are totally segmented may be synchronously, identically and linearly affected by another variable. Thus a high correlation among variables does not necessarily mean causation. According to Pierce (1977) variables may be functionally related yet uncorrelated (because correlation is a linear relationship only) and they may be correlated yet not causally related (due to a common association of both with a third factor). Ardeni (1989) argued that bivariate correlation analysis ignores the time series properties of price data and the results obtained may be biased and inconsistent.

Bivariate modeling was used in all the studies mentioned above except in studies made by Ghosh (2000) and Kumar and Sharma (2003). The studies made by Palaskas and Harriss-White (1993) and Basu and Dinda (2003) are criticized on the ground that it involved serious methodological defects inherent in the Engle-Granger method of cointegration. In the Engle-Granger procedure the test results may be very sensitive to the variable selected for normalization. The Engle-Granger method does not provide any procedure to test multiple cointegrating vectors when there are three or more variables. The identification of central and peripheral market is necessary for properly conducting the test of market integration using the Engle-Granger cointegration method. Palaskas and Harriss-White identified the central and peripheral markets on the basis of population data, volumes and directions of flow of commodities and modes of transport networks. Thus the method suffers from endogeneity problem because prices are simultaneously determined. The identification of central and peripheral markets may be wrong if the geographical flows of a commodity among spatial markets do not provide strong evidence of spatial direction of price causation. Thus it is prudent to use maximum likelihood method of cointegration given by Johansen and Juselius.

It can be argued that efficiency of the agricultural markets cannot be judged solely by the structure conduct performance framework (correlation coefficient and cointegration analysis) or by the marketing margin analysis. It needs to be backed up some additional evidences of competitive conditions like low inter-market price differentials, possibility of inter-market trade etc. For more dependable and uncontroversial assessment of the functioning of market simultaneous use of both the approaches is necessary. The two approaches of testing the marketing efficiency are not mutually exclusive.

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