MARKET INTEGRATION AND PRICE FLUCTUATION OF MANDARIN ORANGE IN NEPALESE MARKET

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ABSTRACT

A study on market integration and price fluctuation of mandarin orange in Nepalese market was carried out in the year 2000. The wholesale price models estimated for selected markets showed significant increase in price overtime. There was distinct seasonal effect on wholesale prices of mandarin orange. The wholesale market of Kathmandu and Butwal was highly integrated in terms of price formation. Similarly, Narayangarh market was integrated with Damauli, Hetauda and Butwal.

Key words: price behaviour, seasonal effect, trend, marketing

INTRODUCTION

In buying and selling, entitlement changes several times and at each step a price must be decided upon (Kohls and Uhl, 1990). Price is the economic signal that acts as the incentives for the producers as well as the traders. It has a very important role in marketing process. The price of mandarin orange in Nepalese market is highly volatile. Being perishable in nature and lack of storage facility, farmers have not been able to store fruits for longer period. Due to the lack of knowledge on market price and its behaviour, generally farmers are forced to sell their produce early at lower prices.

One of the problems often expressed by the citrus growers was the fluctuation in the availability of markets as well as market prices that resulted in heavy exploitation by the businessmen. Producers do not take risk that involve past the farm gate but agribusiness firms do it (Rhodes, 1987). So, traders have high influence on price fixation than the producers. One of the factors that affect the citrus business is the extent of integration of the market. If the market is of totally dispersed type and is characterized by the non-integrated market channel, the marketing system tend to have non existence of leadership in the system and open market competition tend to prevail. Despite the fact that farmers are attracted to mandarin orange cultivation and there are numerous issues associated with the citrus industry. One of the crucial issues in mandarin orange marketing is the unpredictable market price behaviour in various markets and lack of clear picture of the forces associated with. This article attempts to analyse the market integration and price variation of orange in selected markets and the forces for such variations.

METHODOLOGY

This study is based on the mandarin oranges produced in Manakamana of Gorkha district and Bandipur of Tanahun dsitrict. The major produce flowing to the terminal markets Narayangarh, Pokhara and Kathmandu were selected for the price analysis. Various secondary data were also used.

The wholesale prices of mandarin in Narayangarh and Pokhara markets were analysed to study the price behaviour. The trend and seasonal fluctuation of price of mandarin was analysed to understand the relationship between the price and the seasonal effects. The specification of the pricing model for selected markets is discussed hereunder. The expected theoretical model for the price of orange due to change in time is given by:

Per unit price of mandarin orange $= f$(Time, Season)

The price was expected to have the linear relationship with the time and season so the linear functional form for price of orange can be written as:

$$P_t = a + b_1 T_t + b_2 S_2 + b_3 S_3 + u_t$$

Where, P_t = Price of orange during the period t
T_t = Serial number assigned to the tth period
S_2 = Dummy of season 2
S_3 = Dummy of season 3
u_t = Disturbance term
a = Constant
b_1, b_2 and b_3 are regression coefficients

The time period was divided into three seasons namely season 1 (mid September-mid November), season 2 (mid November-mid January) and season 3 (mid January- mid April). Season 1 is the early harvesting period of Nepali mandarin, season 2 is the main harvesting period and season 3 is after the finishing of Nepalese product. Indian mandarin replaces the local mandarin in season 3. Season 1 was taken as control variable in the above mentioned model. Ordinary least square technique was used to estimate the unknown parameters a and bs.

A single market can not determine the price of orange. Hence, price series correlation between the two markets was estimated to see the effect of one market on another market. The simple correlation coefficient for the prices of orange was estimated in pair wise for different markets by the formula;

$$r = \frac{\Sigma (P_{1i} - P_1{}') (P_{2i} - P_2{}')}{\sqrt{\{\Sigma (P_{1i} - P_1{}')^2 (P_{2i} - P_2{}')^2\}}}$$

Where,
r = Simple correlation coefficient
P_{1i} = Price of mandarin in first market at ith point of time

P_{2i} = Price of mandarin in second market at ith point of time

P_{1i}' = Mean of prices in first market

P_{2i}' = Mean of prices in second market

Intra-year pricing efficiency in mandarin orange was measured by analyzing the following relationship.

$$P_{t+1} - P_t = S$$

Where, P_t = Price of orange in period t

P_{t+1} = Price of orange in period t+1

S = Storage cost for one period including the profit margin and the interest charges on the value of the produce stored

In a price-efficient market, the relationship $P_{t+1} - P_t = S$ should hold good (Acharya and Agarwal, 1994).

RESULTS AND DISCUSSIONS

Like in other agricultural commodities, the changes in price of mandarin orange are associated with the passage of time. Though time is considered an important factor to affect price, it is simply a proxy that may represent many things such as change in taste and preference over time, change in technology and so on. The spatial and temporal price behaviours of mandarin orange in selected markets are discussed here.

Price behaviour of Mandarin in Selected Markets

Price changes are the net results of many forces acting in different directions. Some forces exert an upward pressure on prices while others exert a downward pressure. Prices keep on moving through time, always tending to settle at an ever-changing equilibrium. Price movements and adjustments are like the surface of an ocean, with an infinite number of multi-directional movements, never coming to a standstill or permanent equilibrium (Acharya and Agarwal, 1994).

The wholesale prices of mandarin recorded from September 1999 to April 2000 were used for the analysis of intra-year price movements, specially to estimate the trend and seasonal effects. The wholesale price models estimated for selected markets using OLS technique are presented in Table 1.0. The model 1 represents the wholesale price model of Narayangarh and model 2 represents the wholesale price of Pokhara. The regression output showed that there was a distinct seasonal variation on the price of mandarin. Both the models were found best fitted with a high explanatory power (Adjusted R square > 0.80). Time factor had strong association with price. If we consider the individual price models, the effect of time on price was positive and significant in both Narayangarh and Pokhara. The weekly marginal wholesale price increments in Narayangarh and Pokhara were Rs. 0.488 and Rs. 0.757 per kg of fruits, respectively.

The seasonal variation of various markets under consideration showed a significant wholesale price change. The seasonal effect was distinct and the wholesale price received in season 3

was higher than the average wholesale price received in season 2. Acharya and Agarwal (1994) stated that food grain exhibits seasonal patterns in prices i.e. lower prices during the post-harvest months and higher prices during the pre-harvest or off-seasonal months. Mandarin orange being perishable crop and can be stored only for few months, seasonality in price may also be a common feature.

Table 1: Ordinary least square estimates for wholesale prices of mandarin in Narayangarh and Pokhara.

Variable	Model 1		Model 2	
	Estimated coefficient	p-value	Estimated coefficient	p-value
Constant	9.180 (5.757)	0.000	43.870 (16.063)	0.000
Trend	0.488 (2.133)	0.043	0.757 (2.923)	0.009
Season 2	4.383 (1.744)	0.094	-38.766 (-13.908)	0.000
Season 3	7.941 (1.802)	0.084	-34.604 (-7.495)	0.000
Adj. R^2	0.81		0.91	
F-ratio	39.680	0.000	73.161	0.000
N	28		23	

Note: Figures in the parentheses represent t-stat

The fluctuation of prices leads to an instability in supply. The upward movement of price over time is associated with the storage cost, risk premium, changes in taste and preference and so on. In general, the first lot of fruit produced in Nepal arrive in the market in September and continue until mid January. After January, the Indian mandarin takes over the mandarin market in Nepal. If we see the price trend, the Indian product is fetching better prices than Nepali product as they cover the most off-seasonal periods. The mandarin of Bandipur matures earlier than any other parts of the country and in most cases the harvesting season is November-December. The supply of Nepali product is negligible after mid January.

Supply of mandarin in market is affected by various factors like, maturing habit, keeping quality, post harvest handling, storage and marketing diseases. The storage facility is not available in the production areas. Small sized cellar stores (zero energy) has been established in Manakamana and Bandipur. The cellar store established in Manakamana was not in operation due to the constructional defects. Cold store facilities are available in Kathmandu, Narayangarh and Hetauda. These cold stores were not available for storing local mandarin. But the Nagpure mandarin (Indian product) was stored in the cold store up to 45 days after the arrival in Narayangarh ignoring the harvested date. The reason behind it, as mentioned by the traders and the cold store owners, was the low keeping quality of Nepalese mandarin. Storability is affected by stage of fruit, harvesting procedure and handling of fruits while marketing. It was learnt from the observation that the handling of fruits was not proper in the marketing process. Taking the reference of Nagpure mandarin, storage cost for one week including the interest charges on the value of mandarin was Rs. 0.40 per kg of fruits when

stored in cold store of Narayangarh. The estimated price model showed that the rate at which the weekly price of mandarin in Narayangarh was increased by Rs. 0.488 per Kg. Therefore, on an average, the price change exceeded the storage cost. Temporal price efficiency is realized when the storage cost equals the change in price for a given period (Acharya and Agarwal, 1994). According to the results, there was inefficiency in temporal pricing. However, it is worth noting that the risk premium was not included in storage charge.

As storage opportunity was not available for local mandarin, traders made special arrangement of harvesting considering the market demand. The general trend in the study site was that traders preferred to store in situ. In such case, the contract of harvesting date is highly important. Traders do not bear the cost of in situ storage. In situ storage of mandarin for longer duration increases the possibility of reduced production in succeeding year. Storage trial in various parts of the country showed that mandarin can be stored for more than100 days in cellar store (Ghale *et al.*, 1998; Subedi *et al.*, 1994; Subedi *et al.*, 1997). However, such facility is available only to very few farmers. There is possibility that Nepali mandarin can compete the Indian mandarin, provided the storage facilities are as per the requirements.

Market integration

An understanding of market integration in term of price formation is an important aspect of market analysis. At any single point in time, the price that will be determined in one market may or may not be independent of that takes place in other markets. The actions of buyers and sellers in a market are always influenced by the price signals received from other markets. Study of a single market in isolation will not have any meaning if one market is associated with the others. In order to examine the extent of market integration in terms of pricing and price formulation, pairwise correlation was calculated and compared between the selected markets. The correlation coefficients calculated using weekly wholesale prices of mandarin orange between pairs of markets, have been presented in Table 2.0.

The correlation coefficient shows the degree of market integration and competition. If the markets are non-integrated, the bivariate correlation coefficient of price movements is expected to be zero (Acharya and Agarwal, 1994). The result showed that the wholesale market of Kathmandu and Butwal were highly integrated in terms of price formation. Similarly, Narayangarh market was integrated with Damauli, Hetauda and Butwal. Except with Pokhara, Butwal was significantly integrated with Kathmandu, Narayangarh, Damauli and Hetauda. The degree to which these markets were integrated in terms of price formation was largely associated with the communication and transportation linkages among these markets. Transportation and communication networks were well developed in the markets under study. These days, having access to frequent transportation as well as telecommunication, traders of two different markets may trade without meeting each other. Many transactions at wholesale level were made through telephone conversation. However, the communication and transportation facilities might not be the major factors. As can be seen, though Pokhara, Kathmandu and Narayangarh had well established networks, the price formations between these markets were relatively independent.

Table 2: **Bivariate correlation coefficients for weekly wholesale prices of mandarin orange between pairs of markets (September 1999 to April 2000)**

Market	Narayangarh	Pokhara	Kathmandu	Damauli	Hetauda	Butwal
Narayangarh	1.00	-0.05	0.35	0.82**	0.70**	0.46*
Pokhara		1.00	0.63	0.89**	-0.01	0.34
Kathmandu			1.00	0.36	0.43	0.92**
Damauli				1.00	0.60**	0.59**
Hetauda					1.00	0.57**
Butwal						1.00

Source: AEC, FORWARD, DADO, Chitwan (1999/2000).
Note: ** Correlation is significant at the 0.01 level
         * Correlation is significant at the 0.05 level

This might be because of sources of supply as the mandarin that came to Narayangarh was different from that that went to Pokhara. Access to supply at local market, hence, may determine the price to prevail. Mandarin producers make up the supply side and the traders in the market make up the buyers' side to establish wholesale mandarin prices. The traders have more power to influence in pricing. They were small in number, on the other hand there were numerous farmers who compete for selling.

The prices of Damauli, Hetauda and Butwal were influenced by the prices in Narayangarh as mandarin oranges were supplied to these markets from Narayangarh. These markets are geographically far from the production areas. The greater the distance between the two locations, the price difference tend to be higher. It was found that mandarin fruits were supplied from surplus market Narayangarh to deficit markets like Hetauda and Butwal during the main season. Whereas, product flow from Damauli to Narayangarh in main season and vice versa in off-season. Pokhara and Damauli were also integrated with each other. The distance between Narayangarh and Damauli is longer than the distance between Damauli and Pokhara. At initial, mandarin oranges flow from Damauli to Pokhara as the harvesting is bit late in Kaski and Syangja.

SUMMARY AND CONCLUSION

The wholesale and retail prices of mandarin recorded from September 1999 to April 2000 were used for the analysis of intra-year price movements, specially to estimate the trend and seasonal effects. The wholesale price models estimated for selected markets showed significant increase in the price over time. There was distinct seasonal effect on wholesale prices of mandarin orange. On an average, the price change exceeded the storage cost implying thereby inefficiency in temporal pricing.

In order to examine the extent of market integration in terms of pricing and price formulation, pair wise correlation coefficient was calculated between the selected markets. The result showed that the wholesale markets of Kathmandu and Butwal were highly integrated in terms of price formation. Similarly, Narayangarh market was integrated with Damauli, Hetauda and Butwal. Except with Pokhara, Butwal was significantly integrated with Kathmandu, Narayangarh, Damauli and Hetauda. The prices of Damauli, Hetauda and Butwal were

influenced by the prices in Narayangarh as mandarin fruits were supplied to these markets from Narayangarh.

Indian mandarins were fetching higher prices in the market without competition during off-season as Nepali products were out of stock due to the lack of storage facility. Therefore, development of storage facility and proper utilization of the available facilities to store Nepali mandarin could be a way to make Nepali mandarin available during off-season. However, the cold store owners complained on low storability of Nepali mandarin. The storability may be increased by improvements in existing post-harvest handling of the produce. Few storage trials were conducted in small scaled cellar stores. At this juncture, further investigation needs to be carried on large scale storage within the country.

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