SPATIAL MARKET INTEGRATION OF THE SOYBEAN INDUSTRY
IN HANOI PROVINCE, VIETNAM

Thị trường đầu tương theo không gian tại Hà Nội, Việt Nam

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TÓM TÁT


Từ khóa: Đầu tương, hiệu quả giá, hội nhập thị trường.

SUMMARY

Soybean cultivation in the North of Vietnam plays an important role as a source of the household income and renders higher economic return than other crops in recent years. Studying on market integration of the soybean industry will be significant in improving livelihood and marketing issues for soybean growers. The study analyzes the market efficiency of the soybean industry in selected areas in Ha Noi province. The data were gathered through personal interviews of 100 soybean growers and 40 traders in Thuong Tin district, Ha Noi province. The time-series data on soybean prices at the farm, wholesale and retail levels for the last 12 years covering the years 1997 to 2008 were collected and analyzed for spatial price efficiency. The test on price information transmitted across different market levels (farm - wholesale markets level) from the farm (producers in Phu Xuyen district) to the designated reference markets (in Ha Noi city) was done by using the Ravallion model. The test results for market integration revealed a pronounced lack of market integration at the farm level and wholesale market in Hanoi city. This is attributed to long distance travel and limited information between the two markets. The results also showed that the majority of the soybean growers could not meet the right quantity and quality of soybean required by the market due to limited supply of quality seeds and high incidence of pests and diseases.

Key words: Market integration, price efficiency, soybean.
1. INTRODUCTION

Soybean cultivation plays an important role as a source of household income and gives higher economic return than other crops (Lai, 1993). As a result of expansion in Hanoi City, Ha Tay province has been merged to Ha Noi since August 2008. The major soybean growing areas in Ha Noi are Ung Hoa, Phu Xuyen and My Duc districts. According to Mr. Chien who has been engaged in soybean cultivation for a long time, soybean production would bring gains amounting to 13-14 million VND per hectare within three months. This is more than double as compared to the income derived from rice farming. Moreover, there is an advantage in marketing soybean domestically because Vietnam is a net importer of soybean for feed and human food from other countries in the world. This means that soybean growers have great opportunities in order to meet the local demand.

The government and the private sector are giving their contribution to uplift the level of research and development on soybean industry. However, most of the research efforts are focused on the production side such as the development of technologies to minimize losses and increasing researches on irrigation and extension services. Despite these efforts, however, it is rather unfortunate that soybean growers and some stakeholders could not improve their economic well-being. Ha Noi province is the main soybean production area in the North of Vietnam where soybean has become a vital crop in augmenting household income. However, stakeholders in the soybean industry claim of low benefit due to several problems and constraints encountered in soybean production, storage and marketing (Lai, 1993). Moreover, no study has been done yet in Vietnam regarding the marketing efficiency of the soybean industry.

The study of marketing efficiency of soybean is important to both the government and producers in Vietnam. From the government policy perspective, marketing efficiency implies an efficient alternative to marketing interventions, such as price stabilization policies. For growers, it provides a reliable forecast of spot prices in the future and allows soybean growers to effectively manage their risks during the production and marketing processes. Aulton (1997) showed that future markets played the most effective role in risk management and price stabilization policies and it should be efficiently managed (Aulton et al., 1997).

Moreover, the informational content of future prices has important implications on the resource allocation decision of stakeholders in the supply chain (Sheldon, 1987).

The study aims to (1) evaluate the pricing efficiency of soybean in selected research sites; (2) identify and analyze the problems/constraints faced by growers and traders in the soybean industry; (3) and make policy recommendations to improve the marketing efficiency of the soybean industry.

2. METHODOLOGY

Both primary and secondary data were used in the study. Two communes, namely, Chuyen My and Hong Thai in Phu Xuyen district, Ha Noi province were selected as study areas because they are the major soybean producers. Chuyen My commune, located next to Ung Hoa district, is a major soybean producing area in Phu Xuyen district. It is close to Phu Xuyen town and near to the Highway No.1 (Figure 1). Hong Thai commune is larger than Chuyen My, located in the eastern part of Phu Xuyen district and borders with Hung Yen province where the traffic system is favorable. Located along the Red River, the agricultural land in this commune is yearly deposited with silts from the Red river (Figure 1). Hence, Hong Thai has an advantage in developing its agricultural production. Primary data covering 2008-2009 cropping season were collected through personal interviews of 100 soybean growers and 40 traders using prepared questionnaires. Secondary data were taken from various sources such as previous studies, reports and bulletins on soybean production and distribution by Ministry of Agriculture and Rural Development (MARD), General Statistics Office (GSO), and Phu Xuyen Department of Agriculture and Rural Development. Time-series data on soybean production, prices at the farm, wholesale and retail levels for the last 12 years covering the years 1997 to 2008 were obtained from the Government Bureau of Agriculture and Management District, Regional Offices, Hanoi Statistics Department, Import & Export Department, and published and unpublished reports and documents.

Statistical methods applied to the analysis of commodity market integration have shown a marketed shift from the classical static price correlation technique to a dynamic modeling of spatial price differentials (Ravallion, 1986). To find
out whether soybean market is spatially price efficient or inefficient and to what degree is to test for market integration using two approaches: the Ravallion model and the Index of Market Connection (IMC) (Lantican et al., 2006).

Ravallion (1986) developed this model to determine the speed and degree of market integration. The first equation refers to the integration of market from farm to wholesale levels. The second model is the integration of market from wholesale to retail levels in some reference markets. Local market (at the farm) was identified during the survey. The Phu Xuyen town is the wholesale market because there are many traders located in this town. They play an important role in marketing practice of soybean in the district. Hanoi city, which is the main commercial and trading center in Ha Noi province, is the reference market for the soybean grown in Phu Xuyen district. The Ravallion model as modified by Timmer (1987) is given by:

$$FP_t = a_0 + a_1(FP_{t-1} + a_2(WP_{t-1} - WP_{t-1}) + a_3 WP_{t-1} + a_4 DS + \epsilon_t)$$ (1)

where:
- $FP_t$ = soybean farmgate price at time $t$ (VND/kg)
- $FP_{t-1}$ = soybean farmgate price lagged one month (VND/kg)
- $WP_t$ = soybean wholesale price at time $t$ (VND/kg)
- $WP_{t-1}$ = soybean wholesale price in the reference market lagged one month (VND/kg)
- $DS$ = dummy variable for season (1 if winter; 0 if summer); and
- $\epsilon_t$ = error term

$$WP_t = b_0 + b_1 WP_{t-1} + b_2(RP_t - WP_{t-1}) + b_3 WP_{t-1} + b_4 DS + \epsilon_t$$ (2)

where:
- $WP_t$ = soybean wholesale price at time $t$ (VND/kg)
- $WP_{t-1}$ = soybean wholesale price lagged one month (VND/kg)
- $RP_t$ = soybean retail price in the reference market at time $t$ (VND/kg)
- $RP_{t-1}$ = soybean retail price in the reference market lagged one month (VND/kg)
- $DS$ = dummy variable for season (1 if winter; 0 if summer); and
- $\epsilon_t$ = error term

The estimated coefficients $a_2$ and $b_2$ ($WP_t - WP_{t-1}$) and ($RP_t - RP_{t-1}$) measure the extent to which general economic condition affecting the reference market price level is being transmitted to the local market (Ravallion, 1986). In some studies, $a_2$ and $b_2$ measure the degree to which price changes in the central market is transmitted to the regional markets. These parameters measure the long-run market integration with a value expected to be equal or close to 1. Otherwise, if $a_2 = b_2 = 1$, then price changes in the reference market are fully transmitted to the local market in absolute terms. Estimated coefficients $a_1$, $b_1$, $a_3$ and $b_3$ reflect the relative contribution of the local and market price history to the formation of current price levels.

Timmer (1987) suggested that an index of market connectedness (IMC) which is defined as the ratio of the lagged local market coefficient to the lagged reference market coefficient can also be used to check the results of the market integration test. Therefore, the formula $IMC_{wr} = a_1/a_3$ and $IMC_{wr} = b_1/b_3$ where $IMC_{wr}$ refers to IMC of farm to wholesale, while $IMC_{wr}$ corresponds to IMC wholesale to retail in some markets. The estimated IMC with value of less than one is an indication of short-run market integration.

The pricing system adopted by the soybean growers and traders was analyzed in the present study. The focus of analysis covered the basis of setting prices, who sets the price, terms of payment and sources of price information. Analysis of the pricing system supported the findings on the degree of market integration.

3. REVIEW OF LITERATURE

According to Barrett (2001), price efficiency is a part of market efficiency which is the attainment of equilibrium while market integration involves tradability. On this note, market efficiency is much stronger than market integration. It requires not only firm-level profit maximization but also perfectly competitive long-run market equilibrium, in which there are no incentives for entry. There are many approaches that could be used to test the market efficiency. Bressler and King (1970) suggested that two dimensions can be used in measuring the marketing efficiency of a particular industry. These are the pricing and technical/productive efficiency. Other study on marketing efficiency also cited two dimensions. First, prices must incorporate all available information in order to maximize welfare gains summed from consumer and producer surpluses,
Spatial market integration of the soybean industry in Ha Noi province, Vietnam

McLean (1970) in his study on the marketing efficiency of plums industry in the United States revealed that year to year price fluctuation will be a serious problem. Some producers interpret this as a signal to increase production by planting substantially more plums in the orchards. This increase in production further serves to depress prices in later years. Conversely, during the period when bumper crop prices are inevitably low, some producers see this as a signal to cut back on production, which again serves to drive up prices in the long run. Consequently, fluctuations in prices are not always a function of demand and supply condition only, but also by the faulty working of the price system.

Hagedorn et al. (2005) investigated the marketing performance of Illinois farmers in corn and soybeans from 1973 to 2003 using USDA price received data. They found out that performance falls in the middle-third of the price range in most years for both corn and soybeans. Nevertheless, the average marketing performance of Illinois farmers was about $5 to $10/acre below market benchmarks in the majority of comparisons.

Hugar and Hiremath (1984) evaluated marketing efficiency by using the marketing margin, price received by the producer, marketing cost and profit share of traders. Mohamed (2005) stated that marketing cost would measure the extent of marketing services performed. If the services are numerous and varied, the cost will also be higher. Since, marketing margin is a measure of the market power of the intermediaries, the larger their number and strength, the larger would be their marketing margin.

4. RESULTS AND DISCUSSION

4.1. General characteristics of Phu Xuyen district

Location and natural resource endowment

Phu Xuyen district, a major soybean cultivation area belongs to Ha Noi province, formerly known as Ha Tay province. It is located along the National Highway No.1, 60 km from Hanoi center to the South. This district, lies on 20°31'-21°17′ North latitudes and 105°17′-106°00′ East longitudes. It is an important transportation axis linking south such as Ha Noi and Hoa Binh. The western border of Phu Xuyen is adjacent to Thanh Oai district. The eastern border of the district is contiguous to Hung Yen province. On the other hand, northern and north-eastern borders are neighboring to Ha Noi City, the capital of Vietnam (Figure 1).

Figure 1. Map of the selected communes as study areas (yellow color), Phu Xuyen district, Ha Noi province, Vietnam

and second, marketing costs must exclude rents (HUA, 2004). Pricing efficiency, marketing efficiency, and market equilibrium are all related to efficiency and welfare. Barrett et al., (2002) stated that if market integration is defined on the basis of zero marginal profit equilibrium, then it can say something about efficiency and welfare.

Brorsen and Anderson (2005) analyzed the marketing performance of Oklahoma wheat farmers for the period 1992-2001 using transaction data from three elevators across the state. Results of the study showed that nearly two-thirds of market transactions are in the top half of the price range for a crop. Average marketing performance of Oklahoma farmers was about equal to or above the market benchmarks considered in the study.

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Soybean production

The area cultivated with soybean in winter season was 3,794 m², higher than that in summer season (2,048 m²). This is attributed to the higher availability of land in winter, although the hectare yield in summer was higher. Between the two groups, soybean production and yield for the group with storage were higher than that without storage (Table 1).

On the average, 95 percent of soybean production was sold and the remaining 5 percent was used for seed and home consumption such as tofu and soya sauce. The soybean seeds in Phu Xuyen are known for being larger size as compared to other places. The farmers’ greater experience in soybean cultivation explains why they often keep their previous season’s harvest for use as seed for the next cropping season. The grower group with storing soybean had higher volume for sale as compared with the farmers who did not store soybean because of higher soybean production.

4.2. Pricing Efficiency

Spatial price efficiency (Ravallion model)

The test on price information transmitted across different market levels from the farm to the designated reference markets is presented in this section. The tests for market integration at farm – wholesale or farm – retail market level were done by using the Ravallion model. The test results for the market integration at the farm level (i.e., Chuyen My and Hong Thai) and wholesale or retail markets in Hanoi City are discussed in this section.

Farm – Wholesale Level:

1. Farm level in Chuyen My & Hong Thai communes – Wholesale level in Phu Xuyen district, Ha Noi province:

\[ FP_t = a_0 + a_1 FP_{t-1} + a_2 (WP_t - WP_{t-1}) + a_3 WP_{t-1} + a_4 DS + \epsilon_t \]

\[ FP_t = 690.7 + 0.30*FP_{t-1} + 0.62*(WP_t - WP_{t-1}) + 0.49*WP_{t-1} + 380.13*DS \]

2. Farm level in Chuyen My & Hong Thai communes – Wholesale level in Hanoi City, Ha Noi province:

\[ FP_t = b_0 + b_1 FP_{t-1} + b_2 (WP_t - WP_{t-1}) + b_3 WP_{t-1} + b_4 DS + \epsilon_t \]

\[ FP_t = 612.65 + 0.60*FP_{t-1} + 0.86*(WP_t - WP_{t-1}) + 0.23*WP_{t-1} + 436.2*DS \]

Wholesale – Retail Level:

3. Wholesale level in Phu Xuyen district – Retail level in Hanoi City:

\[ WP_t = c_0 + c_1 WP_{t-1} + c_2 (RP_t - RP_{t-1}) + c_3 RP_{t-1} + c_4 DS + \epsilon_t \]

\[ WP_t = 917.80 + 0.52*WP_{t-1} + 0.75*(RP_t - RP_{t-1}) + 0.29*RP_{t-1} + 428.68*DS \]

4. Wholesale level in Hanoi City – Retail price in Hanoi City:

\[ WP_t = d_0 + d_1 WP_{t-1} + d_2 (RP_t - RP_{t-1}) + d_3 RP_{t-1} + d_4 DS + \epsilon_t \]

\[ WP_t = 942.60 + 0.31*WP_{t-1} + 0.83*(RP_t - RP_{t-1}) + 0.52*RP_{t-1} + 504.38*DS \]

The results show a pronounced lack of integration at the farm (Chuyen My & Hong Thai) and wholesale markets in Hanoi City. According to Ravallion model, the estimated coefficients of \( a_2 \) and \( b_2 \) for soybean were less than one and significant at 1 percent probability level indicating a slow price transmission between the farm and wholesale markets such that changes in wholesale prices for soybean have limited impact on farmgate prices. This is attributed to the short distance in geography between the two communes and the wholesale market (Phu Xuyen town market) (Table 2).

<table>
<thead>
<tr>
<th>ITEM</th>
<th>GROUP</th>
<th>Winter</th>
<th>Summer</th>
<th>Winter</th>
<th>Summer</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (kg)</td>
<td>Without Storage</td>
<td>530</td>
<td>304</td>
<td>809</td>
<td>601</td>
<td>695</td>
<td>501</td>
</tr>
<tr>
<td></td>
<td>With Storage</td>
<td>809</td>
<td>601</td>
<td>3,794</td>
<td>2,048</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivation area (m²)</td>
<td>Without Storage</td>
<td>3,346</td>
<td>1,378</td>
<td>4,072</td>
<td>2,354</td>
<td>3,794</td>
<td>2,048</td>
</tr>
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<td></td>
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<td>1,378</td>
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<td>2,354</td>
<td>3,794</td>
<td>2,048</td>
</tr>
<tr>
<td></td>
<td>Both Group</td>
<td>3,346</td>
<td>1,378</td>
<td>4,072</td>
<td>2,354</td>
<td>3,794</td>
<td>2,048</td>
</tr>
<tr>
<td>Yield (kg/ha)</td>
<td>Without Storage</td>
<td>1,584</td>
<td>2,204</td>
<td>1,986</td>
<td>2,551</td>
<td>1,832</td>
<td>2,447</td>
</tr>
<tr>
<td></td>
<td>With Storage</td>
<td>1,584</td>
<td>2,204</td>
<td>1,986</td>
<td>2,551</td>
<td>1,832</td>
<td>2,447</td>
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<tr>
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<td>1,584</td>
<td>2,204</td>
<td>1,986</td>
<td>2,551</td>
<td>1,832</td>
<td>2,447</td>
</tr>
<tr>
<td>Volume sold (kg)</td>
<td>Without Storage</td>
<td>493</td>
<td>288</td>
<td>781</td>
<td>578</td>
<td>664</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>With Storage</td>
<td>493</td>
<td>288</td>
<td>781</td>
<td>578</td>
<td>664</td>
<td>481</td>
</tr>
<tr>
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<td>493</td>
<td>288</td>
<td>781</td>
<td>578</td>
<td>664</td>
<td>481</td>
</tr>
</tbody>
</table>

Table 1. Production, area planted, yield and disposal of soybean by group and by season, 100 soybean growers in Phu Xuyen district, Ha Noi province, Vietnam 2008
In the model of farm–wholesale level, the indicators $a_1$ and $b_1$ measure the effect of the farmgate price lag one month on the current farmgate price. The coefficients $a_2$ and $b_2$ indicate the effect of wholesale price lagged one month on the current farmgate price of soybean. These coefficients registered a significant positive sign for soybean which indicates that farmgate price and wholesale price lagged one month could slowly influence the current farmgate prices in the two communes of Phu Xuyen district. The season variable was significant which indicates that season could affect the farmgate price of soybean grown in Chuyen My & Hong Thai communes. It is a common observation among the grower-respondents that the farmgate prices of soybean are generally higher during the winter season when the supply is limited.

The coefficient $c_2$ and $d_2$ of $(R_P - R_{P_{t-1}})$ for soybean in the model of wholesale-retail level were also less than one and significant, implying a slow price transmission such that a change in the reference market situated in Hanoi City has limited impact on the wholesale price of soybean in Phu Xuyen district. The seasonality and lagged wholesale and retail price variables were also significantly positive. The coefficient of the season variable implies that wholesale prices of soybean are generally greater during the winter season, just in the case of farmgate price (Table 2).

### Index of market connection (IMC)

As depicted in Table 2, the IMC values for farm-wholesale level and wholesale-retail level in Hanoi City was at 2.65 and 1.80, respectively. These results demonstrate a weak market integration between Chuyen My & Hong Thai communes and Hanoi City. The high cost of transportation between the two markets explains this weak market integration (5 to 10 percent of transport losses). In contrast, the IMC value at the farm-wholesale level in Phu Xuyen town (0.61) and the wholesale-retail level in Hanoi City (0.59) were less than one, which suggests a higher degree of market integration in the short run at these market level. As the two communes are located near Phu Xuyen town, any changes in the wholesale and retail markets can be relayed back to the market participants.

### Price system

Three methods of price determination were revealed by the soybean grower-respondents. As shown in Figure 2, 45 percent of them claimed that soybean price was set based on the prevailing market price. These growers have access to reliable and timely price information, thus sell their produce in existing market price. About 20 percent of the growers cited that traders set the soybean prices at the farm level. On the other hand, 35 percent of them believed that growers and traders negotiated to arrive at a farmgate price.
Based on prevailing market price | Fixed by buyers (traders) | Negotiated by both parties

Figure 2. Methods of price determination as perceived by soybean growers in Phu Xuyen district, Ha Noi province, Vietnam, 2008

Table 3. Sources of price information accessed by 100 soybean growers in Phu Xuyen district, Ha Noi province, Vietnam, 2008

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NUMBER</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other farmers and neighbors</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Traders</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Mass media</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>News on television</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Companies/Agents</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Extension workers</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*a Some respondents gave multiple answers so the total percentage exceeded 100 percent*

Source of price information

The soybean growers obtained information on the price of soybean from various sources. The majority (82%) of soybean growers got the price information from other farmers and their neighbors. They also derived information from traders (60%), mass media (46%) and news from television (23%). Other sources of price data are from companies and agents (15%), extension workers (12%) and others such as agricultural magazine and prices and market newspaper (5%) (Table 3).

For traders, the selling price of soybean was based on information obtained from companies and agents (100%), news on television (95%), mass media (87%), magazine (80%), other traders (58%), local market (43%), and others such as agricultural magazine and prices and market newspaper (15%). Some traders based the price on their own estimate using margin that covers all their expenses in storing the soybean. Most traders in Phu Xuyen town accessed price information from companies such as feed company, agents and millers as well as mass media. In the case of traders in Hanoi City, companies and agents and news on television served as the main sources of price information (Table 4).
Spatial market integration of the soybean industry in Ha Noi province, Vietnam

Table 4. Sources of price information accessed by traders in Phu Xuyen, Ha Noi province, Vietnam, 2008

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PHU XUYEN TOWN</th>
<th>HANOI CITY</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent(^a)</td>
<td>Number</td>
</tr>
<tr>
<td>Companies/agents</td>
<td>30</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>News on television</td>
<td>28</td>
<td>93</td>
<td>5</td>
</tr>
<tr>
<td>Mass media</td>
<td>30</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Market information magazine</td>
<td>26</td>
<td>87</td>
<td>6</td>
</tr>
<tr>
<td>Other traders</td>
<td>20</td>
<td>67</td>
<td>3</td>
</tr>
<tr>
<td>Local market information</td>
<td>15</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

\(^a\) Some respondents gave multiple answers so the total percentage exceeded 100 percent

4.3. Problems/Constraints in the Soybean Industry

High incidence of pests (i.e., rats, moth and weevils) and diseases was cited as one of the serious problems encountered by both soybean growers and traders interviewed. The majority of growers surveyed in Phu Xuyen district complained about the lack of support from the government that would minimize pests and diseases. With limited knowledge on the correct type and the amount and timing of pesticide application, 82 percent of soybean growers used pesticides without any advice from their agricultural extension officer.

High post-harvest losses were seen as the second most important concern needed to be addressed according to the sample soybean growers. They complained of inadequate technical information on improved and newly developed post-harvest technologies. For example, soybean growers often harvest soybean based only on their past experiences which could be unreliable. Sometimes they harvest too early when seeds are not yet mature or soybean is still of high moisture content. Optimum harvest moisture, which ranges from 13 percent to 15 percent for maximum weight and minimum field losses, is difficult to determine by growers. On the other hand, for the traders, insufficient drying facilities and mechanical threshers are limiting the quantity of soybean sold by them. In particular, inadequate mechanical threshers lead to the dominant practice of manual threshing, which causes high percentage of broken grains and therefore more succumbed to bacterial and fungal infection. In addition, threshing is difficult when the moisture content is 18 percent at harvest.

Most growers in the soybean industry experienced limited access to reliable, accurate and timely information on supply and demand, and price situation at various market levels. This problem is not only true for soybeans but also for other agricultural products in Vietnam at present. Nearly 62 percent of soybean growers argued that they are not well informed of supply and demand situation in the key market centers in Ha Noi province and prevailing market prices.

5. CONCLUSIONS AND RECOMMENDATIONS

Results of the Ravallion model for testing market integration at farm-wholesale level showed a pronounced lack of market integration between the Chuyen My and Hong Thai communes and Hanoi City. For the wholesale-retail level, the market integration was also not evident in the Phu Xuyen district and Hanoi City. A slow price transmission between the farm and wholesale markets which means the changes in wholesale market for soybean has limited impact on farmgate prices evidenced by the estimated coefficients of \(a_2\) and \(b_2\) of \(WP_t - WP_{t-1}\) for soybean less than one.

In the model of farm-wholesale level, the indicators \(a_1\) and \(b_1\), \(a_3\) and \(b_3\) registered a significant positive sign for soybean which indicates that farmgate price and wholesale price lagged one month could slowly influence the current farmgate prices in the two communes of Phu Xuyen district. The season variable was significant which indicates that season could affect the farmgate price of soybean grown in Chuyen My and Hong Thai communes. The coefficients of
wholesale-retail level were also less than one and significant, implying a slow price transmission such that a change in the reference market situated in Hanoi City has limited impact on the wholesale price of soybean in Phu Xuyen district. The season and lagged wholesale and retail price variables were also significantly positive. The coefficient of the season variable implies that wholesale prices of soybean are generally greater during the winter season, just in the case of farmgate price.

Majority (45%) of growers claimed that the soybean price was set based on prevailing market price. About 20 percent of the respondents mentioned that traders could influence the setting of prices at the farm level. On the other hand, 35 percent believed that growers and traders could arrive at the farmgate price through negotiation. Majority (82%) of the soybean growers got the price information from other farmers and their neighbors. They also derived information from traders (60%), mass media (46%) and news from television (23%). Other sources of price data were from companies and agents (15%), extension workers (12%) and others sources such as agricultural magazine, prices and market newspaper (5%). For traders, selling price of soybean was based on information obtained from companies and agents (100%), news on television (95%), mass media (87%), magazine (80%), other traders (58%), local market (43%), and other sources such as agricultural magazines, prices and market newspaper (15%).

The lack of support from the government that would minimize pests and diseases were evident in the study sites. Eighty-two soybean growers used pesticides without any advice from their agricultural extension officer. Post-harvest losses were also important concern needed to be addressed according to the sample soybean growers. On the other hand, for the traders, insufficient dryers and mechanical threshers limit the quantity of soybean sold by them. In particular, the inadequate mechanical threshers lead to the dominant practice of manual threshing, which causes many soybeans to be broken and therefore more susceptible to bacterial and fungal infection. Nearly 62 percent of soybean growers argued that they are not well informed on the supply and demand situation in key market centers in Ha Noi province and the prevailing market prices. Soybean traders with transport facilities complained of high transportation costs in soybean marketing, which limit the delivery of soybeans from major production areas to demand centers in Hanoi City. The increasing fuel prices, inadequate transportation facilities, and high tariffs for motor vehicles have contributed to high transportation costs.

**Policy Directions**

Participation of the private sector in quality seed production. Due to the high cost and limited supply of high quality soybean seeds, soybean growers often reuse seeds from previous cropping season for their next planting. This results to a decline in yield and quality of soybean. Technology transfer from the agricultural extension workers to the private seed growers must be established to encourage the latter in producing high quality seeds. After all, the government should link the seed growers and farmers to guarantee the former with stable market and the latter with high quality seeds for cultivation.

Formation of a strong soybean growers’ association to facilitate the transfer of production and post-harvest technologies. The lack of a strong soybean growers’ association in the study sites limits their access to market information and technologies related to production and marketing and latest, accurate and reliable price information. The local authorities must design and assist farmers in the creation of a strong growers’ association that would address the problems of soybean growers. This would also allow the expansion of soybean hecatrage upon cooperation among growers in the study areas.

Establishment of an effective and efficient market information system. Given the slow price transmission in some markets at the farm-wholesale and wholesale-retail levels, the establishment of an effective and efficient market information system is deemed necessary. The government shall be able to provide update, accurate and reliable market information to soybean growers and traders. The weekly prices obtained from the mass media and news on television should be analyzed focusing on the trends and behavior of price at different market levels. This would properly guide the growers on their cropping schedule and traders on their storage and release of soybean stored for sale in the market.

**REFERENCES**


