



Research Article

STUDY OF MARKET STRUCTURE AND PERFORMANCE OF VEGETABLE SEEDS IN HAVERI DISTRICT OF KARNATAKA

RAJ STEPHAN*, NAIK A.D. AND NAIK B.K.

Department of Agribusiness Management, University of Agricultural Sciences Dharwad, Karnataka, India.

*Corresponding Author: Email-stephanbidar@gmail.com

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Abstract- The study was carried out with two purposes. The first objective included the market structure of vegetable seeds; study the market performance of vegetable seeds. Convenient sampling technique was adopted for this study. Haveri district of Karnataka was selected and structured questionnaires administered to dealers, nurserymen and distributors. Four vegetables namely; tomato, cabbage, green chilli and brinjal was selected for study. For each crop four vegetable seed companies were selected based on higher market sales volume. Descriptive statistics and Herschman-Herfindal index model were used for analyzing the objectives. From the Herschman-Herfindal index, which determined the level of concentration in relation to the structure of the selected vegetable seeds in the market, there was high market concentration in all the selected vegetable seed market in the district. Which suggest that it is very difficult for new firms to enter in the selected vegetable seeds market in district. To know the market performance, Sixteen parameters were devised during the study those are ranging from product display to distributors depth. Each company was ranked on 1 to 5 scales. A comparison on individual parameter was done and the overall performance of each of the company was calculated with help of a grid. With respect to market performance of tomato, cabbage, green chilli and brinjal; Rasi seeds, Semini, Beejo Sheetal and Rasi seeds were shown higher performance during the study period.

Keywords- Market, Market structure, Market concentration, Market performance

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Introduction

Vegetables are so common in human diet that a meal without a vegetable is supposed to be incomplete in any part of the world. China is the world's largest producer of vegetables and which accounts for about 49 per cent of the world's production of vegetables. These are grown in about 6 million hectares forming 3 per cent of the total cropped area. Though the vegetable requirement is 300g/day/person as recommended by dietician, we are able to meet about 1/9th of that requirement only. India grows the largest number of vegetables from temperate to humid tropics and from sea-level to snowline [1]. Therefore, a planned development in the field of vegetable production will not only improve the nutritional requirement for masses but can also meet the challenge of adequate food supply to the growing population in India. The limited cultivable area can be best utilized for growing vegetables, which are known to give higher yields per unit area. Vegetable growing being labour intensive can substantially increase employment avenues too. Our country is gifted with a wide range of agro-climatic conditions, which enables the production of vegetables throughout the year in one part of the country or the other and then maintaining a continuous supply of fresh vegetables. These off season vegetables are in great demand in home market as well as in the neighbouring Gulf countries [2].

India is the second largest producer of vegetables in the world and it accounts for about 15 per cent of the world's production of vegetables. The current production level is over 90 MT and the total area under vegetable cultivation is around 6.2 million hectares, which is about 3 per cent of the total area under cultivation in the country. Potato, tomato, onion, cabbage and cauliflower account for around 60 per cent of the total vegetable production in the country. [3] Vegetables including root and tuber crops occupy an important place in diversification of agriculture and

have played pivotal role in food and nutritional security of ever growing population of our country. In India, more than 40 kinds of vegetables belonging to different groups are being cultivated and these include solanaceous, cucurbitaceous, leguminous, cruciferous (Cole crops), root crops and leafy vegetables. Major vegetable crops grown in India are tomato, onion, brinjal, cabbage, cauliflower, okra and peas. Significant achievements have been obtained in terms of production, which has increased to 93.9 million tones during 2000-01 from 58.5 million tones during 1991-92 [4].

Materials and Methods

Sampling procedure

Pilot survey has taken for selection of vegetables; tomato, cabbage, green chilli and brinjal. Where, companies get better margins in these vegetables seed business.

Convenient sampling technique was adopted for this study. Accordingly, Haveri district of Karnataka was selected for the study. 4 companies were selected purposively for each vegetable based on the highest sales volume. Four distributors (purposively), 15 dealers and 15 nurseries were selected randomly for each crop.

Nature and sources of data

Primary data was used for this study. The data pertaining to sales volumes, push-pull index, dealers depth, dealers width, distributors width and distributors depth were corrected from the vegetable seeds distributors. The data related to vegetable seed companies, product display, problem solving, transportation

facility, work force, payment habits, time period of dealing, promptness in delivery, appropriating schemes, account settlement, cordial nature, product quality, push and pull volume of sales and constraints related to vegetable seed business were collected from the dealers and nurseries, for the period of 2015-16. The data were collected with the help of pretested structured schedules. Adequate care was taken at the time of data collection to elicit accurate information from the respondents.

Analytical tools and techniques employed

Herfindahl-Hirschman Index

The Herfindahl index is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. It is named after economists Orris C. Herfindahl and Albert O. Hirschman it is also known as Herfindahl-Hirschman Index, or HHI. An increase in the HHI generally indicates a decrease in competition and an increase of market power, whereas decreases indicate the opposite. The major benefit of the HHI index is to measure the concentration ratio.

Computation

The HHI is calculated from the following formula:

$$H = \sum_{i=1}^N s_i^2$$

Where s_i is the market share of firm i in the market and N is the number of firms.

The Herfindahl-Hirschman Index (H) ranges from zero to one, where N is the number of firms in the market. Equivalently, if per cent is used as whole numbers, viz., 75 instead of 0.75, the index can range up to 100^2 , or 10,000.

Interpretation of values:

- HHI index below 0.01 (or 100) indicates a highly competitive index.
- HHI index below 0.15 (or 1,500) indicates a concentrated index.
- HHI index between 0.15 to 0.25 (or 1,500 to 2,500) indicates moderate concentration.
- HHI index above 0.25 (above 2,500) indicates high degree of concentration.

A small index indicates a competitive industry with no dominant players. If all firms have an equal share the reciprocal of the index shows the number of firms in the industry. When firms have unequal shares, the reciprocal of the index indicates the "equivalent" number of firms in the industry.

Descriptive statistics

The descriptive research was conducted for analyzing the distribution network of vegetable seed companies and for benchmarking the existing distribution network. The distribution network of vegetable seed companies and benchmarking the existing distribution network, a convenient sampling method was used to identify the respondents including distributors, dealers, nurserymen and company representatives. Benchmarking of the distribution network of different seed companies was done on the basis of sixteen parameters. These parameters were; number of product display, problem solving, transportation facility, work force, payment habits, time period of dealing, promptness in delivery, appropriating schemes, account settlement, co-ordinal nature, product quality, push pull index, dealers width, dealers depth, distributors width and distributors depth. Weighted mean was calculated for parameters of the distribution system and was used for knowing the overall performance of each company with the help of a grid. The weights were assigned to different parameters after proper classification according to their importance and deep discussion with company personnel and dealers. Points awarded to each parameter were multiplied with the respective weightage and the sum was calculated for individual companies. The company with the highest total is termed as the benchmark and was considered to have the best distribution system.

$$\text{Dealers width} = \frac{\text{Number of dealers of a particular company}}{\text{Total number of dealers}}$$

$$\text{Dealers depth} = \frac{\text{Company's sales volume through dealers (in kg)}}{\text{Total sales volume of all dealers (in kg)}}$$

$$\text{Distribution depth} = \frac{\text{Companies sales volume through distributors (in kg)}}{\text{Total sales volume of all distributors (in kg)}}$$

$$\text{Distribution width} = \frac{\text{Number of distributors of a particular company}}{\text{Total number of distributors}}$$

$$\text{Push-pull index} = \frac{\text{Average push volume (in kg)}}{\text{Average pull volume (in kg)}}$$

Results and Discussion

The survey was conducted to know the number of seed companies operating and level of market concentration in the study area. Later a pre-tested schedule was prepared and different company employees and distributors were inquired about sales volume of vegetable seeds for four selected crops viz., tomato, cabbage, green chilli and brinjal. Based on that market share of different vegetable seeds companies in the districts were obtained and calculated by using Harfindal-Hirschman Index (HHI).

Market Structure

Economists evaluate the degree of "concentration" in analyzing market structure and assessing its impact on market conduct and performance. Market concentration is the major factor considered to know the structure of the market. Market concentration is a function of the number of firms and their respective shares of the total sales in a market. Alternative terms are industry concentration and seller concentration.

Market structure of vegetable seed business in Haveri district

Tomato

The sales volume per cent share of different seed companies are presented in [Table-1]. It could be observed from the Table that around 61.30 per cent of the market share of tomato seed had been captured by the Rasi seeds company. The other competitors like US Agri seeds and Mahyco seeds companies had the share of 17.51 per cent each. Harfindal Index was 4,383.13 which indicated high degree of market concentration in tomato seed market. The reason behind higher tomato seed sales for Rasi seeds compared to other hybrid tomatoes seeds offered by competitors could be Rasi seeds have a hybrid "Shivum", which has keeping quality, attractive colour, shape and size and higher yield.

Cabbage

It was observed from the results in [Table-1] that Harfindal Index of cabbage seed market was 4,070.59, which signified high degree of market concentration. Semin is seeds hybrid got the highest market share in cabbage seeds as compared to other competitors and had the highest share of 61 per cent, followed by Ankur seeds, Mahyco seeds and Welcome seeds. Reason behind more area coverage of "Saint" hybrid of Semin is seeds could be its attractive head as compared to other hybrids as well uniformity in size and good keeping quality.

Green chilli

Market concentration in green chilli seed market was very high and Beejo Sheetal company had the majority of market share [Table-1]. Herfindal Index was 4,5475.11 which suggest that it is very difficult for new firms to enter in the green chilli seed market. Beejo Sheetal hybrid "BSS 414" had major share in Haveri market as compare to other chilli hybrids offered by competitors such as Seminis seeds's "Sitara", Sungro seeds's "S-16" and Mahyco seeds's "Teja-4". The BSS 414 has more fruit bearing habit, tolerance to chilli leaf curl virus, and is also used

as both green and dry chilli. Besides, it has good keeping quality, attractive colour and size, and higher pungency rate.

Brinjal

Around 73.53 per cent of the market share brinjal seed market is captured by Rasi seeds company [Table-1]. Harfindal Index was 5,692.19 which indicated high degree of market concentration in brinjal seed market. In other words, there was no stiff competition among companies to capture the market. "Dhruva" hybrid of Rasi seeds stood at first position compared to other competitors hybrids such as Mahyco seeds "Super-10" and East-West seeds's "Lalith". Probably reason is that "Dhruva" has more fruit bearing habit, attractive size, colour and good keeping quality. Apart from that "Dhruva" has higher pest tolerance to shoot and fruit borer compare to offerings.

Table-1 Market share of vegetable seed companies in Haveri District

Sl. No.	Crop	Seed companies and hybrid	Market (% share)	HHI	Market Concentration
1	Tomato	Rasi seeds (Shivam)	61.30	4,383.13	High degree of concentration
		US Agri seeds (US-800)	17.51		
		Mahyco seeds (Bio-90)	17.51		
		Bio seeds (303)	3.50		
		Others 8 companies	0.18		
2	Cabbage	Seminis seeds (Saint)	61.30	4,070.59	High degree of concentration
		Welcome seeds (Annaji)	7.66		
		Mahyco seeds (118)	9.98		
		Ankur seeds (Manasa)	9.98		
		Noble seeds seeds	7.09		
		Others 6 companies	3.83		
3	Green chilli	Beejosheetal (BSS-414)	64.36	4,575.11	High degree of concentration
		Sungro seeds (S16)	11.92		
		Mahyco seeds (Teja-4)	4.88		
		Seminis seeds (Sitara)	16.26		
		Tanindo	1.56		
		Others 6 companies	1.02		
4	Brinjal	Mahyco seeds (Super10)	14.71	5,692.19	High degree of concentration
		Rasi seeds (Dhruva)	73.53		
		Beejosheetal (Darpan)	5.88		
		East-West (Lalith)	5.88		

HHI: Herfindahal-Hirschman Index

Overall performance of different vegetable seed companies in Haveri district

Tomato

In the case of push-pull index, Rasi seeds and Bio seeds had shown more pull volume. Even though Bio seeds hybrid "Bio-90" was not best hybrid but the awareness among farmers was high. While, US Agri seeds and Mahyco seeds depicted high push volume among dealers and nurserymen, because both these companies have better appropriating schemes [Table-2] than Rasi seeds. US Agri seeds maintained its dealers on the basis of weekly payments. Hence, US Agri seeds had less reach to its dealers and nurserymen as compared to its close competitors. Distribution width and distribution depth of Rasi seeds were foremost which entail that Rasi seeds had additional number of distributors and highest sales volume. The company had released a hybrid "Shivam" which had high acceptance level in Haveri market because of its good keeping quality. Overall the performance of Rasi seeds was upmost followed by Mahyco seeds, Bio seeds and US Agri seeds.

Cabbage

It was evident from the results that the product quality, dealer width, distribution depth and pull volume of Seminis seeds were prime because of the hybrid "Saint" which had uniform sized attractive head with good keeping quality which resulted in high acceptance level in the district. Hence, Seminis seeds has better reach to its dealers and nurserymen as compared to its close competitors. Promptness in delivery of Mahyco seeds was foremost because the production and packing centre is located within the district. The market acceptance of Seminis seeds was highest, which leads to over confidence among the company employees which led to hindrance in time period dealing. Likewise, Mahyco seeds's sales officer has shifted to another company which led to less cordial nature with dealers and nurserymen during the study period. Distribution width of Ankur seeds and Mahyco seeds was highest because this company had more distributors in the district. Whereas, Ankur seeds procured seeds from different states which caused delay in seed availability due to transportation delay. Seminis and Ankur seeds employed agriculture graduates as sales officers which confirmed better workforce and once in a year account settlement arrangement had led to easy clearance of accounts among dealers and nurserymen. The overall performance of Seminis seeds was the highest followed by Mahyco seeds, Ankur seeds and Welcome seeds [Table-3].

Table-2 Overall performance scores of tomato seed companies in Haveri district

Sl. No.	Parameters	Weight age	Companies			
			Rasi seeds	US. Agri seeds	Mahyco seeds	Bio seeds
1	Product display	5	3	2	4	2
2	Problem solving	5	3	3	3	3
3	Transportation facility	5	4	3	4	2
4	Work force	5	3	3	3	2
5	Payment habits	5	4	4	3	4
6	Time period of dealing	5	4	4	4	3
7	Promptness in delivery	5	5	4	5	3
8	Appropriating schemes	5	2	3	3	3
9	Account settlement	5	5	2	3	3
10	Coordinal nature	5	4	3	3	4
11	Product quality	7	5	3	3	3
12	Push-pull index	7	5	3	4	5
13	Dealers width	7	4	3	4	4
14	Dealers depth	7	3	2	2	2
15	Distribution width	7	4	2	2	2
16	Distribution depth	15	4	2	2	1
Total		100	392	276	310	280
Rank			I	IV	II	III

Green chilli

According to results in [Table-4], it is evident that Beejo Sheetal had maximum pull volume, product quality, distribution depth and dealers depth in the district because of hybrid "BSS 414", which had characteristics like more number of fruit bearing habits, tolerance to chilli leaf curl virus and could be used as both green and red chilli in the study area. Product display of eminis seeds and Mahyco seeds confirmed chilli images, which had more acceptances in the district and might be attractive to dealers and nurserymen. The dealers width of Beejo Sheetal and Seminis seeds were highest and it suggested that these two companies have better reach to their dealers and nurserymen. Sungro seeds failed in provide better schemes like foreign trips and gold schemes like Beejo Sheetal and Seminis seeds, it also affected its push volume during the study period. Mahyco seeds had less dealers width possibly because the selection of dealers was based on the payment habits. Whereas, production and packing centre of Mahyco seeds is located in the district which might led to better transportation facility. The Beejo Sheetal and Mahyco seeds have more number of distributors, which helped them to build more distribution width. Hence, the overall performance of Beejo Sheetal was foremost followed by Seminis seeds, Sungro seeds and Mahyco seeds.

Brinjal

The findings suggested that the Beejo Sheetal and East-West seeds companies had high push volume whereas Rasi seeds had more pull volume because the

hybrid "Dhruva" had good quality, hence it was more accepted in the district, which induced the farmers to pull seeds from dealers and nurserymen in the district. In the case of promptness in delivery, Rasi seeds and Mahyco seeds were foremost, their popular brinjal hybrids were majorly accepted in Haveri, Dharwad and Davangere markets. At the same time these hybrid seeds are available in these district distributors which helped for easy accessibility. The shortage of supply with Haveri district distributors were made good by the distributors of Dharwad and Davangere districts. Dealer width of Mahyco seeds was less as compared to its competitors, which means Mahyco seeds has less reach to its dealers and nurserymen as compared to its close competitors. All the competitors depicted equal distribution width in the district. In case of distribution depth, Rasi seeds outperformed all its competitors. Overall, it could be concluded that Rasi seeds was a leader followed by Mahyco seeds, Beejo Sheetal and East-West seeds company [Table-5].

Table-3 Overall performance scores of cabbage seed companies in Haveri district

Sl. No.	Parameters	Weight age	Companies			
			Seminis seeds	Welcome seeds	Mahyco seeds	Ankur seeds
1	Product display	5	4	3	4	4
2	Problem solving	5	3	3	3	3
3	Transportation facility	5	4	4	4	3
4	Work force	5	4	3	3	4
5	Payment habits	5	4	4	3	3
6	Time period of dealing	5	3	4	4	4
7	Promptness in delivery	5	4	3	5	3
8	Appropriating schemes	5	4	4	4	4
9	Account settlement	5	4	3	3	4
10	Coordinal nature	5	4	4	3	4
11	Product quality	7	5	2	3	2
12	Push-pull index	7	3	2	2	2
13	Dealers width	7	5	4	3	4
14	Dealers depth	7	4	2	2	2
15	Distribution width	7	2	2	3	3
16	Distribution depth	15	4	2	2	2
Total		100	383	274	286	286
Rank			I	IV	II	II

Table-4 Overall performance scores of green chilli seed companies in Haveri district

Sl. No.	Parameters	Weight age	Companies			
			Beejo Sheetal	Sungro seeds	Seminis seeds	Mahyco seeds
1	Product display	5	3	3	4	4
2	Problem solving	5	4	3	3	3
3	Transportation facility	5	3	3	4	4
4	Work force	5	3	3	4	3
5	Payment habits	5	3	3	4	3
6	Time period of dealing	5	3	4	3	4
7	Promptness in delivery	5	3	3	4	5

8	Appropriating schemes	5	4	2	4	3
9	Account settlement	5	3	4	4	3
10	Coordinal nature	5	3	3	4	3
11	Product quality	7	5	4	4	3
12	Push-pull index	7	3	3	3	3
13	Dealers width	7	5	4	5	3
14	Dealers depth	7	3	2	2	2
15	Distribution width	7	3	2	2	3
16	Distribution depth	15	5	2	2	2
Total		100	368	290	332	288
Rank			I	III	II	IV

Table-5 Overall performance scores of brinjal seed companies in Haveri district

Sl. No.	Parameters	Weight age	Companies			
			Mahyco seeds	Rasi seeds	Beejo Sheetal	East-West
1	Product display	5	2	3	3	3
2	Problem solving	5	3	3	4	2
3	Transportation facility	5	3	4	3	2
4	Work force	5	3	3	3	2
5	Payment habits	5	3	4	3	3
6	Time period of dealing	5	4	4	3	3
7	Promptness in delivery	5	3	5	3	3
8	Appropriating schemes	5	4	2	4	4
9	Account settlement	5	4	5	3	3
10	Coordinal nature	5	3	4	3	2
11	Product quality	7	3	5	4	3
12	Push-pull index	7	2	4	1	1
13	Dealers width	7	3	4	4	4
14	Dealers depth	7	2	3	2	2
15	Distribution width	7	2	2	2	2
16	Distribution depth	15	2	4	1	1
Total		100	274	371	266	234
Rank			III	II	I	IV

Conclusion

The study showed no stiff competition among the vegetable seed companies to sell their products as high degree of market concentration was noticed in vegetable seed distribution in all the four vegetable crops. This indicated the difficulties for new firms to enter in all these markets. Study suggested that vegetable seed companies should develop vegetable seeds based on the preferences given by particular market, which are suitable for that particular district's climatic conditions. Firmness, colour and shape of the fruits are the major factors in the case of tomato and brinjal. Whereas, pod length, pungency and dual purpose use of pods in the case green chilli. In case of cabbage, suitability of a cabbage head for a for nuclear family was considered as major factor. The seed production firms need to keep these things in mind. With respect to market performance of tomato, cabbage, green chilli and brinjal seeds firms; Rasi seeds, Seminis, Beejo Sheetal and Rasi seeds were shown higher performance during the study period.

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Author Contributions:

Stephan Raj¹, Ph.D scholar Department of Agribusiness Management. University of Agricultural Sciences Dharwad. This research article is prepared from the Ph.D thesis work.

Dr. A. D. Naik², Associate Professor, Department of Agribusiness Management. University of Agricultural Sciences Dharwad. Major advisor of the research work and assisted in research objectives and methodology.

Dr. B. K. Naik³, Professor, Department of Agribusiness Management. University of Agricultural Sciences Dharwad. Advisory committee member and assisted in analyzing the data.

Abbreviations:

HHI: Herschman-Herfindal index

Kg : Kilograms

Conflict of Interest: None declared

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