

Original Research Article

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Analysis of Structure, Conduct and Performance of Vegetable Seed Market: Case Study in Belagavi District of Karnataka, India

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A B S T R A C T

The commercial horticulture industry in Karnataka has experienced remarkable growth in the last decade and it continues to grow. The Karnataka vegetable market is majorly controlled by the private vegetable seed producing companies. The focus of the study, therefore, was to analyse the structure, conduct and performance of the vegetable seed market in the Belagavi District of Karnataka in order to elucidate the performance of the marketing system before any interventions are made to change the existing conditions. The data for the study was sourced from the primary sources. The study employed descriptive statistics, HHI to determine the degree of market concentration in the study area. 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 company with the highest total is termed as the benchmark. The results of the study showed that the HHI was 1817.92, 6049.47, 3994.08 and 3402.14 for tomato, cabbage, green chilli and cabbage respectively, indicating a moderate to highly concentrated market hence an oligopoly market structure. Distribution depth was measured as most important factor to study the performance of vegetable seed companies.

Keywords

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Introduction

The structure-conduct-performance (SCP) approach - based exclusively upon neoclassical theory - has long been central to the study of industrial economics. SCP postulates causal relationships between the

structure of a market, the conduct of firms in that market and their economic performance. It has frequently been used to provide the theoretical justification for industry policy. A typical area is competition policy. Here SCP has provided the rationale for measures intended to modify (or to prevent) the

development of market structures likely to promote behaviour and performance detrimental to the market interest. Market structure comprised of size, design and number of firms in the industry like number of dealers, distributors, retailers, customers, products and price range. The market concentration would be the major indicator of market structure. In the present the market concentration was estimated using the Herschman-Herfindal Index as found in many earlier literatures on market structure. Generally, market conduct can be assessed by studying the composition of products, promotion activities, pricing mechanism and distribution strategies. However, in the present market conduct was attempted using major promotional activities undertaken by the cabbage seed companies. It is having well accepted that degree of concentration and performance are inversely related. Thus, firms in more concentrated industries will earn higher profits than firms operating in less concentrated industries, irrespective of their efficiency. To meet the increasing demand for high yielding and hybrids seeds, the stable growth in seed industry assumed to be prerequisite and seed would continue to be a vital component for decades to come. The organized seed industry of the country has been just forty years old. Yet, its growth has been phenomenal. India is one of the few countries where the seed sector is already reasonably advanced. The private seed industry is no more confined to just production and marketing of seed. It has as well acquired technological strength to cater to the varietal needs of tomorrow.

Materials and Methods

The methodology consists of the details of the description of the study area, the sampling procedure, the nature and sources of data and analytical techniques employed. The methodology chapter is discussed under the

following sub-heads.

Description of the study area and sampling procedure

Location and the study area

Belagavi District

The districts were selected as vegetables are extensively cultivated in these districts.

The city of Belagavi is the district headquarters in North Karnataka. It is also called as the second capital for the state of Karnataka, as it houses the Suvarna Vidhana soudha. According to the 2011 census of India, it has a population of 4,778,439 of which 24.03 per cent live in urban areas, making it the second most populous district in Karnataka (out of 30), after Bangalore. The district has an area of 13,415 square kilometers, and is bounded on the west and north by Maharashtra state, on the northeast by Bijapur district, on the east by Bagalkote district, on the southeast by Gadag District, on the south by Dharwad District and Uttara Kannada district, and on the southwest by the state of Goa. Geographically, located 15° 23 and 16°58 North latitude 74° 05 and 75°28 East longitude. Agriculture is the main income resource of the district and Agro and Food Processing Sectors are prominent for investment. Sericulture is gaining prominence in the district with nearly 481.90 hectares under mulberry cultivation.

The district has been divided into 10 taluks for administration purpose. They are: Athani, Bailhongal, Belgaum, Chickodi, Gokak, Hukkeri, Khanapur, Raibag, Ramdurga and Soundatti. The soils of the district are three types: black, red and laterite soil. The mean temperature of the district is 785.9 mm. The district has the fifth place in forest area among the districts of the state, sharing 6.28 per cent of land under forest.

Sampling procedure

Convenient sampling technique was adopted for selection of the study area. Accordingly, the study was conducted in Karnataka state. Belgavi district was purposively selected for the study area. The vegetables, like tomato, cabbage, green chilli and brinjal were selected based on the highest area and production in this district. A total of 15 dealers, 15 nurseries were selected randomly and 16 distributors were selected purposively from each district for this study.

Nature and sources of data

Primary data was used in this study. Primary data were collected from the dealers, nurserymen and distributors related to sales volumes, marketing aspects like, promotion measures adopted by the different vegetable seed firms, the importance they attached to different sales promotion measures adopted by different firms and the constraints faced in the vegetable seed business were collected from the 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, coordinational 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 100², 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

These are used to describe the basic features of the data gathered from various sources. The measures like averages, ratios and percentages were used in the study. Average and percentage analysis was adopted to examine sales promotion measures.

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.

Dealers Width:

$$\frac{\text{Number of dealers of a particular company}}{\text{Total number of distributors}}$$

Dealers depth:

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

Distribution Depth:

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

Distribution Width:

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

Push-pull Index:

$$\frac{\text{Average push volume}}{\text{Average pull volume}}$$

Results and Discussion

The results of the investigation are discussed in the light of plausible reasons from the field survey. The discussion are presented under the following

Market structure of vegetables seed business in Belagavi district

District vegetables sales volume per cent shares of different seed companies are presented in Table 1.1.

Tomato

SunAgro and US Agri seeds companies had the equal share in market to the extent of 25.48 per cent each, followed by Rasi seeds

and Syngenta companies. The Sun Agro and US Agri Seeds hybrids are S-85 and US-800, these had high keeping quality, firmness in fruits, uniform in size and prove less to disease and pest attack. Whereas, Rasi Seeds (Ryna) and Syngenta (1057) hybrids were had less firmness and susceptible to disease and pest. Herfindal Index was 1,817.92 which indicated moderate concentration in the tomato seeds market in the district.

Cabbage

It was observed from the table that Semnies seed company had largest market share of 76.92 per cent. Semnies hybrid "Saint" had good keeping quality, one cabbage was suitable for one family and if there is no market rate for cabbage then farmers can keep the cabbage for more than a week in the field without harvest. Mahyco and Tokita Seeds hybrids are Mahyco-118 and Green Rock, these two hybrids did not have keeping quality and these two hybrids were introduced recently so the awareness of these two hybrids was less. Welcome seeds hybrid "Annji" which also not suitable for keeping for long time. Herfindal Index was 6,049.47 which indicate very high degree of concentration in the cabbage seed market. It directly suggested that in cabbage seed market there is no stiff competition.

Green chilli

In green chilli seed market Tanindo seeds had the majority of market share of 57.69 per cent (Table 1.1). Tanindo Seeds hybrid "Siri" is has high yielding crop with maximum fruit length and uniform size. Because of this reason traders in the market preferred this hybrid. Whereas, Nangwoo bio seeds (Tara), Syngenta (1900) and Semnies (Sitara) hybrids fruits were not uniform size and also not had better fruit length. Harfindal Index was 3,994.08 which depicted high degree of market concentration in green chilli seed

market. In other words, there were two major companies leading the market during study period.

Brinjal

It could be observed from the table that Mahyco seeds company had captured a major share of the market to the extent of 49.32 per cent, followed by semnies. The Mahyco hybrid "Super-10" has attractive colour, shape and good keeping quality, it has more branch which leads to more numbers of fruits and it has less vegetative growth. Whereas, Semnies hybrid "Manjre" was less attractive in colour because of dark colour and number of thorns was more. The East-West company hybrid "Meghana" was introduced recently in the market so the awareness was least among the farmers and Rasi Seeds hybrid "Druva" is non thorny, which was least preferred in the Belagavi market. Herfindal Index was 3,161.94 which parlayed high degree of concentration in the brinjal market.

Product promotion measures adopted by vegetable seed companies in Belagavi District

Tomato

Results showed that Syngenta did not consider distribution of calendars and dealers meetings would result more awareness among dealers. Likewise, US Agri seeds in the case of distribution of calendars in the district during the study period.

Sun Agro had conducted the highest number of farmers meetings (54.05%) among four companies and pointed out that this promotional measure helped them to create awareness of their product. All the four companies were actively involved in promotional activities in the district on tomato crop (Table 1.2).

Cabbage

Belagavi district has more potential for cabbage seed business as a result all the four companies conducted all the eight promotional measures in the district. Seminis and Mahyco companies considered, displaying the banners, posters and distributing the calendars create more awareness among both farmers and dealers. Seminis alone conducted 43.48 and 47.62 per cent of the farmers meetings and jeep campaigns performed in the district during the study period (Table 1.3).

Green chilli

A total of 8,500 posters and 230 banners were displayed in the district for chilli seed promotion and 40 per cent of calendars were distributed by Seminis alone, thinking that this would create more awareness among dealers. Similarly, 42.86 per cent of dealers meetings were conducted by Tanindo seed company. Syngenta did not hold any dealers meetings or distribute calendars as promotional activities in the district during the study period (Table 1.4).

Overall performance of different vegetable seed companies on selected parameters in Belagavi district

Tomato

It was observed from the results in Table 1.6, that the product quality and dealers width of SunAgro seeds was foremost, because the SunAgro hybrid "S-85" had high keeping quality, firmness in fruits, uniformity in fruits and less prone to disease and pest attack. Rasi and SunAgro seeds provided better appropriating schemes like visits to capital city and company production plants to dealers and nurserymen which formed interest to push the product in the district and other two

close competitors were found to have lesser push-pull index. In the case of payment habits, time period of dealing and promptness in delivery of US Agri seeds was prime because the US Agri seeds clears the account once a year, the company employee meets the dealers and nurserymen well in advance of sowing season and make agreement of delivery time and quantity which helped them in promptness in delivery as well. Overall, SunAgro seeds had highest performance, followed by US Agri, Rasi seeds and Syngenta seeds in the district with respect to tomato seed marketing.

Cabbage

Seminis seeds demonstrated highest performance in terms of product quality, account settlement, payment habits, promptness in delivery, dealers width, dealers depth and distribution depth (Table 1.7). The company had come up with a hybrid, "Saint" which had good keeping quality, suitable sized head for family consumption and if there is no market rate for cabbage then farmers can keep the cabbage for more than a week in the field without harvest. Seminis seeds had more pull volume as compared to other close competitors. The product display of Tokita seed portrayed least score because the heads were not attractive in nature. Seminis seeds gave more importance to display of product image of cabbage heads which look attractive and thought of family sized cabbage heads. The workforce and payment habits of Tokita seed gained very low score because the company sales officer was not an agricultural graduate and payment were to be done on the weekly basis to the work force which so it created difficulties among dealers and nurserymen. It may be concluded that overall performance of Seminis seeds was upmost, followed by Welcome seeds, Mahyco seeds and Tokita seeds during study period in the district.

Green chilli

It was evident from the Table 1.8 that the account settlement, promptness in delivery, product quality and distribution depth were higher for Tandindo seeds company. The Tandindo hybrid “Siri” had high yielding ability with maximum fruit length and uniform size. Because of this reason, traders in the market preferred this hybrid and it was only in this district the company had

awareness among dealers and nurserymen. The Nangwoo bio seeds sales officer is working from past twelve years in the same company and he had good contact with the dealers and nurserymen which made better dealer’s width of Nangwoo seeds better than its competitors in the district. In contrast to this, Nangwoo seeds had less problem solving scores in the district because he was the only company employee in the entire district which inhibited him in attending problems.

Table.1 Market share of vegetable seed companies based on their sales volume in Belgavi district

SL. No	Crop	Seed companies	Market (Per cent Share)	HHI	Market Concentration
1	Tomato	Sun Agro	25.48	1,817.92	Moderate concentration
		US Agri seeds	25.48		
		Rasi seeds	12.74		
		Syngenta	12.74		
		Others 7 companies share	23.75		
2	Cabbage	Seminis	76.92	6,049.47	High concentration
		Mahyco seeds	6.41		
		Tokita seeds	6.41		
		Welcome seeds	5.13		
		Others 7 companies share	5.13		
3	Green chilli	Tanindo seeds	57.69	3,994.08	High concentration
		Nangwoo bio seeds	12.82		
		Syngenta	7.69		
		Seminis	60.00		
		Other 5 companies	6.14		
4	Brinjal	East west	6.85	3,402.14	High concentration
		Mahyco seeds	49.32		
		Seminis	21.92		
		Rasi seeds	8.22		
		Other 2 companies	13.70		

HHI: Herfindahal-Hirschman Index

Table.2 Product promotion measures adopted by vegetable seed companies in belagavi district for tomato seed

Sl. No	Promotional Measures	Companies				Total
		Sun Agro	US. Agri	Rasi seeds	Syngenta	
1	No. of field days	10 (27.03)	2 (5.41)	22 (59.46)	3 (8.11)	37 (100.00)
2	No. of posters	2000 (25.64)	1000 (12.82)	2800 (35.90)	2000 (25.64)	7800 (100.00)
3	No. of field demonstration	2 (10.53)	2 (10.53)	10 (52.63)	5 (26.32)	19 (100.00)
4	No. of farmer meeting	20 (54.05)	5 (13.51)	2 (5.41)	10 (27.03)	37 (100.00)
5	No. of dealers meeting	2 (28.57)	1 (14.29)	4 (57.14)	0 (0.00)	7 (100.00)
6	No. of banners	50 (11.63)	30 (6.98)	300 (69.77)	50 (11.63)	430 (100.00)
7	No. of calendar	200 (50.00)	0 (0.00)	200 (50.00)	0 (0.00)	400 (100.00)
8	No. of jeep camp	2 (13.33)	4 (26.67)	8 (53.33)	1 (6.67)	15 (100.00)

Note: figures in parenthesis shows percentages to total

Table.3 Product promotion measures adopted by vegetable seed companies in belagavi district for cabbage seed

Sl. No	Promotional Measures	Companies				Total
		Seminis	Mahyco	Tokita	Wel come	
1	No. of field days	3 (33.33)	2 (22.22)	2 (22.22)	2 (22.22)	9 (100.00)
2	No. of posters	2000 (30.30)	2000 (30.30)	1400 (21.21)	1200 (18.18)	6600 (100.00)
3	No. of field demonstration	2 (20.00)	5 (50.00)	2 (20.00)	1 (10.00)	10 (100.00)
4	No. of farmer meeting	10 (43.48)	5 (21.74)	4 (17.39)	4 (17.39)	23 (100.00)
5	No. of dealers meeting	2 (25.00)	2 (25.00)	3 (37.50)	1 (12.50)	8 (100.00)
6	No. of banners	80 (24.24)	150 (45.45)	50 (15.15)	50 (15.15)	330 (100.00)
7	No. of calendar	150 (33.33)	100 (22.22)	100 (22.22)	100 (22.22)	450 (100.00)
8	No. of jeep camp	10 (47.62)	5 (23.81)	4 (19.05)	2 (9.52)	21 (100.00)

Note: figures in parenthesis shows percentages to total

Table.4 Product promotion measures adopted by vegetable seed companies in belagavi district for green chilli seed

Sl. No	Promotional Measures	Companies				Total
		Tanindo	Nangwoo bio seeds	Syngenta	Seminis	
1	No. of field days	2 (15.38)	5 (38.46)	3 (23.08)	3 (23.08)	13 (100.00)
2	No. of posters	2500 (29.41)	2000 (23.53)	2000 (23.53)	2000 (23.53)	8500 (100.00)
3	No. of field demonstration	5 (29.41)	5 (29.41)	5 (29.41)	2 (11.76)	17 (100.00)
4	No. of farmer meeting	10 (22.22)	15 (33.33)	10 (22.22)	10 (22.22)	45 (100.00)
5	No. of dealers meeting	3 (42.86)	2 (28.57)	0 (0.00)	2 (28.57)	7 (100.00)
6	No. of banners	50 (21.74)	50 (21.74)	50 (21.74)	80 (34.78)	230 (100.00)
7	No. of calendar	200 (40.00)	150 (30.00)	0 (0.00)	150 (30.00)	500 (100.00)
8	No. of jeep camp	5 (23.81)	5 (23.81)	1 (4.76)	10 (47.62)	21 (100.00)

Note: figures in parenthesis shows percentages to total

Table.5 Product promotion measures adopted by vegetable seed companies in belagavi district for brinjal seed

Sl. No	Promotional Measures	Companies				Total
		East-West	Mahyco	Seminis	Rasi seeds	
1	No. of field days	3 (60.0)	0 (0.0)	2 (40.0)	0 (0.0)	5 (100.00)
2	No. of posters	0 (0.0)	1300 (46.4)	1500 (53.6)	0 (0.0)	2800 (100.00)
3	No. of field demonstration	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (100.00)
4	No. of farmer meeting	3 (25.0)	3 (25.0)	6 (50.0)	0 (0.0)	12 (100.00)
5	No. of dealers meeting	0 (0.0)	2 (50.0)	2 (50.0)	0 (0.0)	4 (100.00)
6	No. of banners	0 (0.0)	50 (62.5)	30 (37.5)	0 (0.0)	80 (100.00)
7	No. of calendar	200 (44.4)	100 (22.2)	150 (33.3)	0 (0.0)	450 (100.00)
8	No. of jeep camp	0 (0.0)	4 (40.0)	6 (60.0)	0 (0.0)	10 (100.00)

Note: figures in parenthesis shows percentages to total

Table.6 Grid showing the overall performance scores of Tomato seed companies on selected parameters in Belagavi district

Sl. No	Parameters	weightage	Companies			
			Sun Agro	US. Agri	Rasi seeds	Syngenta
1	Product display	5	3	3	3	3
2	Problem solving	5	4	3	4	2
3	Transportation facility	5	3	3	3	2
4	Work force	5	3	3	3	2
5	Payment habits	5	4	4	4	3
6	Time period of dealing	5	3	4	3	3
7	Promptness in delivery	5	3	4	3	3
8	Appropriating schemes	5	4	3	4	3
9	Account settlement	5	3	2	3	3
10	Coordinal nature	5	3	3	3	2
11	Product quality	7	5	3	3	2
12	Push-pull index	7	3	3	2	3
13	Dealers width	7	5	5	4	4
14	Dealers depth	7	2	3	2	3
15	Distribution width	7	3	3	2	2
16	Distribution depth	15	3	3	2	2
Total		100	336	324	300	273
Rank			I	II	III	IV

Table.7 Grid showing the overall performance scores of cabbage seed companies on selected parameters in Belagavi district

Sl. No	Parameters	weightage	Companies			
			Seminis	Mahyco	Tokita	Wel come
1	Product display	5	3	4	2	3
2	Problem solving	5	4	3	3	3
3	Transportation facility	5	3	4	3	4
4	Work force	5	3	3	3	3
5	Payment habits	5	4	3	3	4
6	Time period of dealing	5	4	3	4	4
7	Promptness in delivery	5	5	5	4	5
8	Appropriating schemes	5	4	3	4	2
9	Account settlement	5	5	3	3	4
10	Coordinal nature	5	3	3	2	4
11	Product quality	7	5	3	3	5
12	Push-pull index	7	4	1	2	3
13	Dealers width	7	5	5	4	4
14	Dealers depth	7	4	2	2	2
15	Distribution width	7	3	3	2	2
16	Distribution depth	15	4	2	2	2
Total		100	397	288	283	322
Rank			I	III	IV	II

Table.8 Grid showing the overall performance scores of green chilli seed companies on selected parameters in Belagavi district

Sl.No	Parameters	weightage	Companies			
			Tanindo	Nangwoo bio seeds	Syngenta	Seminis
1	Product display	5	3	2	1	2
2	Problem solving	5	3	1	2	2
3	Transportation facility	5	3	2	3	3
4	Work force	5	3	1	3	2
5	Payment habits	5	3	1	3	3
6	Time period of dealing	5	5	2	3	4
7	Promptness in delivery	5	3	2	3	4
8	Appropriating schemes	5	4	2	3	2
9	Account settlement	5	3	1	3	4
10	Coordinational nature	5	3	2	2	3
11	Product quality	7	4	2	3	4
12	Push-pull index	7	2	2	2	3
13	Dealers width	7	4	5	4	4
14	Dealers depth	7	3	2	2	2
15	Distribution width	7	2	2	2	3
16	Distribution depth	15	4	2	2	2
Total		100	330	215	299	302
Rank			I	IV	III	II

Table.9 Grid showing the overall performance scores of brinjal seed companies on selected parameters in Belagavi district

Sl.No	Parameters	Weightage	Companies			
			Mahyco	Seminis	Rasi seeds	East- west
1	Product display	5	2	2	3	2
2	Problem solving	5	2	2	3	1
3	Transportation facility	5	3	3	3	1
4	Work force	5	2	2	3	1
5	Payment habits	5	3	3	3	2
6	Time period of dealing	5	4	3	3	2
7	Promptness in delivery	5	4	3	3	2
8	Appropriating schemes	5	1	1	3	2
9	Account settlement	5	4	3	3	2
10	Coordinational nature	5	3	3	3	1
11	Product quality	7	4	3	4	2
12	Push-pull index	7	3	2	1	1
13	Dealers width	7	4	4	4	3
14	Dealers depth	7	3	2	2	2
15	Distribution width	7	3	3	1	1
16	Distribution depth	15	3	2	1	1
Total		100	304	253	249	158
Rank			I	II	III	IV

Tandindo seeds had better market acceptance in the district because of its appropriate schemes like gold schemes, local and foreign trips to distributors and nurserymen which helped in improving push volume and quality product helped them in increasing pull volume. Thus, the overall performance of Tanindo seeds was foremost, the followed by Semini's, Syngenta and Nangwoo bio seeds over the period of study.

Brinjal

The product quality of Mahyco seeds was better because of its hybrid "Super-10", which had attractive colour, shape and good keeping quality, it had more branching ability which leads to more numbers of fruits and had less vegetative growth. Because of this reason the dealers width, dealers depth, distributors width and distributors depth were also better. These factors also made impact on push-pull index and induced Mahyco seeds to attain higher achievement, followed by other competitors (Table 1.9). It is interesting to note that the dealer's width was same across Mahyco, Semini's and Rasi seeds, whereas East-West company selected dealers and nurserymen based on the good account settlement ability within the season end. In case of distribution depth, Mahyco seeds gained highest score, followed by Mahyco seeds, Semini's and Rasi seeds. Overall, performance of Mahyco Seeds was foremost, followed by Semini's seeds, Rasi seeds and East-West seeds in the district during the study period.

In conclusion, the study showed no rigid competition among the vegetable seed companies to sell their products as high market concentration was noticed in district across to all the four vegetable crops. This indicates the complications for new firms to come into these markets. Study recommended that vegetable seed companies should develop

vegetable seeds based 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. Where in case of cabbage, high yielding crop with maximum fruit length and uniform size was considered as major factor.

Distribution depth was measured as most important factor to study the performance of vegetable seed companies. Distribution width, dealer's depth and dealer's width were considered as important factors, but were given the lower scores as compared to distribution depth. Different companies indicated different kinds of performance.

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