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## **Strengthening Backward and Forward Linkages in Horticulture: Some Successful Initiatives**

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### **Abstract**

Indian horticulture sector is constrained by low productivity, high cost of production, huge post-harvest losses, inefficient supply chain and poor market intelligence. The present paper has brought forward two case studies of SAFAL Market and Namdhari Fresh which have been successful in over-coming the constraints that horticulture sector is facing in India for fresh fruits and vegetables. Some new marketing initiatives along with the existing supply chain inefficiencies have been highlighted to help formulate strategy and policy to achieve the much-desired second green revolution through horticulture growth.

### **Introduction**

The increasing share of high-value commodities in the consumption basket of the households, higher incomes and urbanization, changing lifestyles, market integration and trade liberalization at global level have led to an increase in the demand for horticultural products in India. It is believed that the horticulture sector can be promoted as a means of agro-diversification for the second green revolution in India, providing the much-needed impetus to the growth of agricultural sector, through increase in trade, income and employment generation. Horticultural development had not been a priority area in India until the post-1993 period, when focused attention was given to horticultural development through enhancement in plan allocations and knowledge-based technology. Later in 2005-06, the setting up of the National Horticulture Mission by Government of India, promoted this sector on a larger scale. The Foreign Trade Policy 2004-09 also emphasized on boosting

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agricultural exports, and recognising that growth and promotion of exports of horticultural products was important for the country.

The Indian horticulture sector is facing severe constraints such as low crop productivity, limited irrigation facilities and underdeveloped infrastructure support like cold storages, markets, roads, transportation facilities, etc. There are heavy losses in post-harvest management, resulting in low productivity per unit area and high cost of production. In this context, the present paper has brought forward two case studies—one of SAFAL Market and the other of Namdhari Fresh (located around Bangalore) who have tried to overcome these constraints in the horticulture sector, with success. These cases have been able to bridge the gap between farmers and consumers by establishing an efficient supply chain in both backward and forward linkages. It has highlighted the structure and functioning of their supply chain, forward and backward linkages, and achievements and constraints of these two cases. Prior to discussing these case studies, the paper has presented the trends in the horticulture sector and has emphasized on the need of developing such models for making horticulture sector the engine of an evergreen revolution in India.

### **Trends in Horticulture Sector**

India has experienced a considerable degree of crop diversification in terms of changes in the area under various crops since the Green Revolution, which was largely in favour of foodgrains, to meet the objectives of self-sufficiency and food security in the country. During the past one decade, the shift in cropping pattern has been more towards the horticulture sector and commercial crops like cotton. Agricultural diversification is an important instrument for economic growth and it largely depends on the opportunities and responsiveness of farmers to technological breakthrough, consumer demand, government policy, trade arrangements and development of irrigation, roads, and other infrastructure (Kumar and Mittal, 2003). Changes in the cropping patterns are the evidences of these factor responses. The observed diversification away from foodgrains — rice, coarse cereals and pulses — is evident. The overall decline in area under foodgrains during the past one-and-a-half decades is very close to the magnitude of increase in area under horticulture<sup>2</sup>. The change in cropping pattern from foodgrains to horticulture has been illustrated in Figure 1.

Within the horticulture sector, the shift in total area under fruits and vegetables is 44.75 per cent. On the production front, fruits and vegetables together are the major contributors to total horticulture production. As shown

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<sup>2</sup>Horticulture includes fruits, vegetables, plantation crops, spices and flowers.

in Figure 2, vegetable production has been almost constant during the past one-and-a-half decades, with only a slight decline during the past few years. Fruits have shown a constant linear increase in production, while an almost constant trend has been observed in the production of plantation crops, spices and flowers during this period.

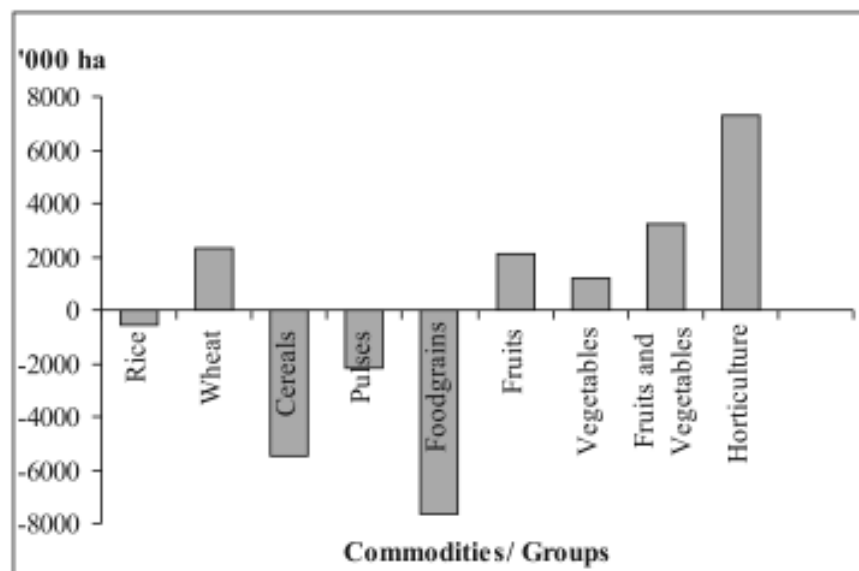


Figure 1. Changes in cropping pattern, 1990-2004

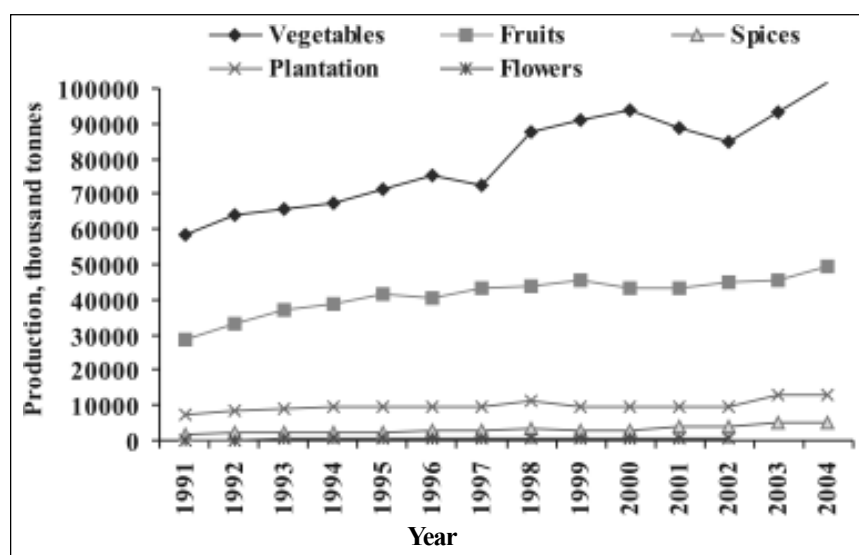


Figure 2. Production trends in horticultural crops in India: 1991-2004

The growth rates in area and production of fruits and vegetables over the period 1990-91 to 2004-05 and sub-periods of the five years, viz. 1990-95, 1995-2000 and 2000-04 have been shown in Table 1. A perusal of this table reveals that the rate of area growth which was 3.28 per cent per year in 1990-95, increased to 6.67 per cent per year in the period 2000-04. However, production trends in fruits have depicted a negative growth, from 9.43 per cent per year in the initial period to 3.32 per cent per year during 2000-04. It was because of the declining productivity of fruits. The area under vegetables has increased at the rate of 3.15 per cent per annum during 1995-2000, which later declined to 1.82 per cent per year. A similar trend was observed in production of vegetables. Overall, area growths per annum have been 3.38 per cent and 2.10 per cent for fruits and vegetables, respectively during the period 1990-2004, while growth rates in their respective production have been 3.06 per cent and 3.95 per cent.

**Table 1. Average annual rates of growth in area and production of fruits and vegetables in India: 1990-2004**

(Unit: per cent per annum)

Period	Fruits		Vegetables	
	Area	Production	Area	Production
1990-95	3.28	9.43	-1.00	4.67
1995-00	2.58	1.62	3.15	6.22
2000-04	6.67	3.32	1.82	2.08
1990-04	3.38	3.06	2.10	3.95

India exports fruits and vegetables in both fresh and processed forms. The volumes of their export have seen a rise since 1990. India's exports of fruits in quantity terms increased from 102 thousand tonnes in 1991 to 488 thousand tonnes in 2004 and in value terms, this increase was from Rs 348 crore in 1991 to Rs 3,404 crore in 2004. Thus, export in quantity increased by more than 4-fold and in value by 10-fold during the past 15 years (Mittal, 2007). Major destinations of Indian fruits and vegetable are Bangladesh, UK, Saudi Arabia, Nepal, UAE, Malaysia, Singapore and Saudi Arabia. India is the second largest producer of fruits and vegetables in the world, but has only a small share in their global exports. To emerge as a major horticultural commodities exporting nation, India will have to produce enough marketable surplus. For this, along with following efficient and good agricultural practices, more area would have to be shifted towards horticultural crops with simultaneous rise in their productivity.

### **Constraints in Development of Horticulture Sector**

Major constraints in production and marketing of fresh fruits and vegetables are non-availability of good quality seeds, inadequate irrigation, lack of soil testing facilities and extension staff (Kumar and Pal, 2004). Inefficiency in pest management, low/ non-availability of credit, high cost of production, lack of information, huge post-harvest losses, lack of infrastructure like roads, cold storage, adequate space, poor market intelligence, high transportation cost, etc. are the other constraints. Several research initiatives and considerable investments have resulted in the growth of supply of fresh fruits and vegetables during the past decade, but still a lot more needs to be done. Higher resource allocation for agricultural research and infrastructure development are essential to reduce post-harvest losses and increase per-unit productivity and per capita availability of fruits and vegetables in the country. The other constraints faced by the horticulture sector are related to timely delivery, grading, packaging, quality control, market infrastructure, agro-processing plants, marketing credit, proper pricing, standardization of weights and measures, poor access to market information, and low and declining productivity. India can be a market leader in the agricultural sector for horticultural produce if its markets function properly. In this context, the biggest challenge Indian agricultural sector faces is the inefficiency in the supply chain.

In the existing traditional system of wholesale marketing, the commission agents and traders dominate the supply chain and are the major price setters, and most of the times, farmers have to depend on them for credit. Small farmers lack marketing power, and have low share in the final consumer price. Since the produce is marketed through the commission agents, there is no incentive for its quality. The wholesale markets are poorly designed with non-existent of infrastructure for packing, grading, sorting and cold storing.

The supply chain needs to build a long term-relation between retailers and farmers for procurement and providing extension services regarding use of inputs, production technology, information on harvesting, prices, pre-cooling, grading, sorting, packaging and on-farm sorting. There is a strong need of government interventions in removing infrastructural constraints like setting up of distribution centres, cold chains, roads to the markets, etc. Ensuring quality and quantity of the produce to the stores is another basic requirement for the smooth functioning of supply chain. Setting up of an alternative terminal market by SAFAL Market has illustrated it successfully.

It is believed that a single gateway to the regulated markets would save time and improve efficiency. Vertical coordination of farmers through

cooperatives, contract farming and retail chains would facilitate better delivery of output, reduce market risk, provide better infrastructure, attract more public investment, acquire better extension services, and would create awareness regarding prevailing and new technologies. Its multiplier effect would help in increasing income, output and employment (Birthal *et al.*, 2007). A number of big corporate houses like Reliance, ITC, Aditya Birla Group, Godrej, and Bharti have entered into the retail marketing of fresh fruits and vegetables. Some of the retail and wholesale stores are already under operations by the brand names of 'Reliance Fresh', 'Choupal Fresh', 'Namdhari Fresh', etc. ITC, Metro and Adani Fresh are expected to enter into the wholesaling of these products. Exports of fresh fruits and vegetables are being done with EUREPGAP certification by Namdhari Fresh. These new initiatives are trying to strengthen the supply chain. At present, the horticulture supply chain has multi-layered marketing channels and lack in market infrastructure. To improve efficiency, proper integration of post-harvest technology into marketing supply-chain is crucial. Cultivable waste of about 24-40 per cent is reported because of inefficient management. Thirty per cent of India's fruit and vegetable produce is wasted because of lack of cold chain. On the policy front, there is a need to integrate agricultural markets and supply chains. Amendment in the APMC Act will remove the restriction on direct procurement from the farmers and would improve efficiency of the supply chain.

### **Some Successful Cases**

Two case studies discussed in this section show, how certain models have helped in managing the constraints of infrastructure, credit availability and extension services and have built up a smooth supply chain.

#### **Case Study 1: SAFAL Market**

##### **Structure and Functioning**

To modernize the marketing of horticulture produce, an alternative system was introduced by the National Dairy Development Board (NDDB). This is a terminal wholesale market that operates parallel to, and in addition to, the present system of four wholesale markets in Bangalore. This market was setup to introduce a transparent and efficient platform for sale and purchase of horticultural produce by connecting growers through Growers' Associations with farmers and wholesale buyers in various markets across the country (SAFAL website). This model involves establishment of an alternative marketing structure that provides incentives for quality and productivity, thereby improving farmers' income. Through this approach, an

increased integration is expected between growers, wholesalers and retailers into the market system. SAFAL Market operates outside the purview of the APMC Act and the Government of Karnataka is the first state government to amend the Agricultural Produce Marketing (Regulation) Act to enable NDDB to own and operate such a market.

The SAFAL Market is an establishment with an auction facility through clock auction; backward linkage through farmer associations; and forward linkage in the form of cash and carry semi-wholesale and retail stores. SAFAL Market as a terminal market is capable of handling approximately 1,600 tonnes of fresh fruits and vegetables per day at full capacity, catering to about 30 per cent of the estimated demand of Bangalore (Chengappa and Nagaraj, 2005). The market infrastructure has facilities of cold storage, grading, sorting and distribution.

### **Backward and Forward Linkages**

The market is supported by 250 Horticultural Farmers' Associations organized throughout India with more than 20,000 members. These farmers' associations are linked to 40 collection centres that are equipped to meet the specific or special requirements of buyers, in terms of quality control, packaging and weighing. Individual growers are being trained on quality management and are provided extension services. Logistics support in terms of packaging and transportation of produce is also arranged on behalf of the growers on pre-fixed charges. More than 200 varieties and qualities of fresh fruits and vegetables are sourced in SAFAL Market. The farmers are made aware about the demand of the produce in advance by the procurement department of SAFAL and this ensures a consistent supply of produce in line with its quantity and quality specifications. Farmers as well as the wholesale purchasers have to register themselves with SAFAL Market on a very nominal charge and become its member, to involve themselves with the daily transactions. This enables the SAFAL management to have a chain of consistent suppliers and buyers and also in planning of their future demand.

Farmers' cost on marketing of their produce through the collection centres of SAFAL has been found to reduce by almost half. A traditional commission agent was charging them 8-10 per cent of the selling price, while the handling charges at SAFAL Market are only 4.25 per cent (Chengappa and Nagaraj, 2005). Farmers are given payment for their produce on weekly basis through an account payee cheque. Farmers selling their produce to SAFAL could realize 10-15 per cent higher profit than that through the traditional channel (Chengappa and Nagaraj, 2005). The gains were through proper weighing



of produce, low transaction cost, less input cost, efficient transportation, less wastage, right price and extension services. Farmers were found ready to supply even more than the indent given by SAFAL. Farmers had appreciation for the technical service rendered by the SAFAL.

On the forward linkages side, wholesalers participate in auctions at the Auction Market Complex or can even bid using Remote Electronic System. The auction takes place in two parallel set-ups of clock auction halls. Wholesalers find it an added advantage in coming to the SAFAL terminal market, where all the produce is auctioned at the same place rather than at fragmented four product-specific wholesale markets in Bangalore. Although the SAFAL Market is located very far from the city and auction takes place early in the morning, the purchasers find themselves in advantage dealing through SAFAL terminal market. Forward linkage is carried out through 10 to 12 cash and carry stores, owned by the auction market and constructed at strategic locations in the city to cater to the requirements of the local retailers. Four distribution centres at the Auction Market Complex cater to the requirements of the large institutional buyers. Cold storage facility is also available for the wholesalers and other market users on payment basis. Incentives to the wholesalers are assured in terms of availability of quantity and quality of fresh fruits and vegetables, graded and quality checked in wholesaler/retailer - friendly packs for easy handling and transport. The state-of-the-art fruit ripening facility, assured quick and efficient despatch of produce per auction and online wholesale price information of all items in major markets are also made available at the SAFAL Market to help buyers and suppliers in their decision-making.

### **Benefits and Constraints**

The SAFAL Market, by and large, has helped in establishing a smooth supply chain involving the producer, wholesaler and consumer. But, there are still certain constraints which, if taken care of, will further strengthen the SAFAL Market model and provide a good example to be repeated in other parts of the country.

Since SAFAL procures only that produce which complies with certain grade standards, farmers depend on the commission agents or local merchants for selling of their remaining produce. Therefore, it is highly desirable that the entire marketed surplus is collected by SAFAL, which will earn it farmers' support in the long-run. Introduction of direct procurement from the field would be an added incentive to farmers. Some farmers have not been able to gain full faith in the working of SAFAL so far, as they believe that if they start transacting through SAFAL, then they might lose the market through

the traditional commission agents and may land themselves in trouble if this initiative fails. Because of better transportation and cold storage facilities, traders prefer to purchase highly perishable commodities from the SAFAL Market while the less perishable commodities (like onion, potato and garlic) are largely procured from the regulated market. Also, locational disadvantage to traders, inconvenient auction timings and grading procedures keep many of the traders away from the SAFAL Market. The biggest challenge is to break the long prevailing and very strong link between farmers and commission agents. If introduction of this system impacts their incomes, it will be even more difficult to de-link them from the supply chain.

The SAFAL Market needs to mobilize large buyers like hostels of educational institutions, community hostels, hospitals, canteens of commercial establishments/ factories and other food retail chains, etc., in and around Bangalore to increase their traded volumes and run at full capacity. This might come through in the next few years once more awareness is generated among the farmers and wholesale buyers. A brand image will help them run the organization on higher volumes. More aggressive setting up of semi-wholesale outlets is needed in and around Bangalore to mobilize small buyers. The existing market outlets of Khadi and Village Industries Commission (KVIC), Horticultural Produce Cooperative Marketing Societies (HOPCOMS), Super Bazaars, etc. should be used rigorously. SAFAL should try to meet the credit needs of buyers as well as farmers, and play a role more than just being a wholesale marketer.

To sum up, the SAFAL Market initiative is an example of improving the supply chain leading to the development of all the stakeholders, with special benefits to the farmers. If the above suggestions are implemented, the possibility of adoption of such a model market will be large and will provide a key to the success of horticulture sector in India. The SAFAL Market in a short span of time has been able to increase integration among growers, wholesalers and retailers into the market system in contrast to the present traditional wholesale markets. The SAFAL Market being a one-stop shop for buyers and sellers of fruits and vegetables, needs to create awareness in both buyers and sellers to congregate at a point.

## **Case Study 2: Namdhari Fresh**

### **Structure and Functioning**

Namdhari Fresh is a part of the Namdhari Seeds, who are the market leader in the Indian vegetable seed industry and are gradually moving towards becoming the market leader in organised retailing of fresh fruits and

vegetables also. Namdhari Fresh gets fruits and vegetables cultivated through contract farming, on their own land and green houses and handle more than thousand tonnes of fresh vegetables and fruits per day at domestic and international markets. Availability of sufficient infrastructure, technical manpower and the applications of advanced technology in production, processing, quality controlling, grading, packaging, storing, transportation, communication and dedicated skilled labourers enable them to meet the international standards.

This unit of Namdhari Seeds was started in the year 2000 with a view to exporting of fresh vegetables and fruits and later, the vision was enhanced to provide a premium quality produce to domestic customers also. Presently, more than 40 different vegetables and fruits are being cultivated by Namdhari Fresh at various productions centres across the country (Namdhari Fresh Website). European standards of good agriculture practices (EUREPGAP) are strictly followed at the production level. Their agri-products are mainly destined to Europe, Australia and the Middle East. Namdhari Fresh is also involved in natural farming to produce and supply 'organic' vegetables and fruits in the international market. To ensure quality, an effective extension team monitors the farms and advises the growers. Namdhari Fresh also performs shelf-life test of the produce under different temperature conditions, and these results will be used to improve the shelf-life of the produce. The packaging section is geared up to hygienic handling of the produce so that the consumers receive a clean, hygienic product. The presence of international airport in Bangalore facilitates them to deliver a quality produce to the international clients in time.

### **Backward and Forward Linkages**

Namdhari Fresh follows the model of contract farming through a strong network of over 2000 farmers and own capital farms in different parts of the country. The procurement of produce from farms in different regions enables them to get a continuous supply of various fruits and vegetables round the year. Complex of Namdhari Fresh is located in a village called Bidadi on the highway connecting Bangalore and Mysore. It enters into a un-written contact with the farmers for cultivation of fruits and vegetables for it. These farmers were earlier engaged in production of rice mainly for self-consumption, and pulses and some oilseeds for marketing and earning income. Merely 5-10 per cent of the total land was being allocated to horticultural produce earlier, but after the contracts with Namdhari, a significant portion of the land is being diversified towards production of fruits and vegetables, with some area for production of staple foods for self-consumption. The members of the farmer's family, especially women,

also get employment at the Namdhari procurement house for carrying out activities like sorting, grading and packaging. The educated youths who were earlier migrating to urban cities in search of jobs, now get employment at the Namdhari Fresh, as per their ability. Besides providing employment, Namdhari extends some social benefits also to the farmers and their families like transportation facilities to children for going to school, heavily subsidised mid-day meals, loans at low interest rate for marriages, etc. Seeds, fertilizers, pesticides and other necessary inputs are also provided by Namdhari at wholesale rates. In the case of crop failure, the farmers are given financial assistance at very low rate of interest. The long-term association of farmers with Namdhari has enabled them to earn sustainable high income and protects them from market fluctuations and risks. Also, diversification to horticulture has empowered them to en-cash the gains that this sector is getting in the economy at present. The improving socio-economic condition of the farmers is encouraging them to work more efficiently and productively.

Namdhari produces several vegetables like ladyfingers, bottle gourd, bitter gourd, brinjal (different varieties), bird-eye chilies, and capsicums (of different colours); fruits such as pineapples, custard apples, Chinese and Australian pears, kiwi fruit, watermelons, Japanese melons, muskmelons, cantaloupes, grapes and Californian plums. Some exotic vegetables are also grown on its farm in Bidadi, these include baby corn, asparagus, zucchini, broccoli, cherry tomatoes, sugar peas, lettuce, etc. If a farmer under the verbal contract betrays and sells his produce to someone outside, then he is debarred and never allowed to deal with Namdhari.

To ensure freshness of the horticultural produce till it reaches the consumer, the company has a strong cold chain network right from the farm gate. The transportation of produce in refrigerated trucks helps in the removal of field heat before transferring it to the pre-cooling room. The grading and packing of produce are done under cool conditions. The packed fruits and vegetables are stored in the cold rooms before being air lifted to the destinations, largely to United Kingdom, The Netherlands, France, Italy, Germany, and other EEC countries as well as Far-East and South East Asian countries. During transit in the air also, the product is stored at lower temperatures. Thus, an uninterrupted cold chain network makes Namdhari Fresh to deliver the quality vegetables with optimum freshness. The whole process is supervised and checked by the trained agricultural graduates. The retail outlets of Namdhari Fresh cater to the demand of organic and non-organic horticultural produce by the domestic consumers. In the retail outlets also, the temperature is maintained at 10 °C in the racks where produce is displayed for sale.

### **Benefits and Constraints**

Namdhari Fresh provides a good example of a successful case, depicting improvement in the socio-economic conditions of the farmers through their sustainable development, rising income levels and more job opportunities. Contract farming, unlike corporate farming, brings farmers into the mainstream of the economy. It reduces their market risks, and enhances supply chain efficiencies by providing both knowledge and material inputs. Farmers associated with Namdhari for a long time have full faith on the system. The products of Namdhari Fresh in the domestic market are often rated as over-priced by the consumers, but Namdharis claim it to be a premium price for the quality of the produce they supply. Namdhari Fresh model operates on a very small scale, and is able to meet the administrative and infrastructural constraints to turn out to be a successful model. If this model is expanded, then the viability of this project would largely depend on the managerial capabilities and development of infrastructural facilities.

### **Conclusions**

To emerge as a major producer of horticultural products, India needs some critical inputs, specially of supply chain management and collaboration among various stake-holders along with efficient vertical and horizontal integrations. The government intervention is required to create a policy environment that will ensure a mutually beneficial relationship between the farmers and organized sector. Along with investment in infrastructure, development of extension activities and linkages with farmers are also important areas where government can play influential roles. SAFAL Market has in a short span of time, increased integration among growers, wholesalers and retailers resulting into a cooperative market system in contrast to present traditional wholesale markets. SAFAL Market is a one-stop shop for buyers and sellers of fruits and vegetables. After the successful trials of SAFAL Market in Bangalore, many state governments have expressed their desire to establish similar markets. Similarly, the Namdhari Fresh model can also be adopted at both government and non-government levels to have an efficient supply chain and economic development of farmers.

Development of horticultural sector should be accompanied by the growth of agro-processing industry. The production strategy should target meeting domestic and export demand of not only fresh products but of the processed products also. There is a need to improve post-harvest operations related to handling, storage and marketing of fresh and processed agri-produce. Volumes saved in post-harvest losses are actually the surpluses generated, without additional cost. This sector needs to be developed as an organized industry and has to be managed collectively by all the stakeholders with farmers as the entrepreneurs.

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