

Chapter 5

Grapes and Pomegranate Value Chains



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5.1 Introduction

Horticulture has grown in size and importance within the agriculture landscape of the country. Horticulture production doubled from 191 million tonnes in 2006–07 to nearly 300 million tonnes in 2016–17. In fact, by 2015–16, production of horticulture crops was higher than that of food grains. Further, production of fruit crops as a proportion of horticulture crops increased from 29.5% in 2001–02 to 31.5% in 2015–16 (Fig. 5.1).

Within horticulture crops, grapes and pomegranates are very high-value fruit crops. Grape cultivation in the world, as also in India, is distinct from other horticulture crops in the sense that grape is a super-speciality science crop. The entire production protocol of grapes, right from plantation to pruning to spraying and harvesting, has been decoded scientifically. Grape farmers across the globe follow region-specific protocols for cultivating particular varieties of grapes. India cultivates table grapes which are consumed as fresh grapes. In India, grape cultivation is largely practised in Maharashtra, Karnataka, Andhra Pradesh and Telangana. However, in terms of acreage, production as well as exports, the contribution of Maharashtra is indomitable. Around 76% of acreage and 80% of the production of grapes are concentrated in Maharashtra, making it the definitive vineyard of India.

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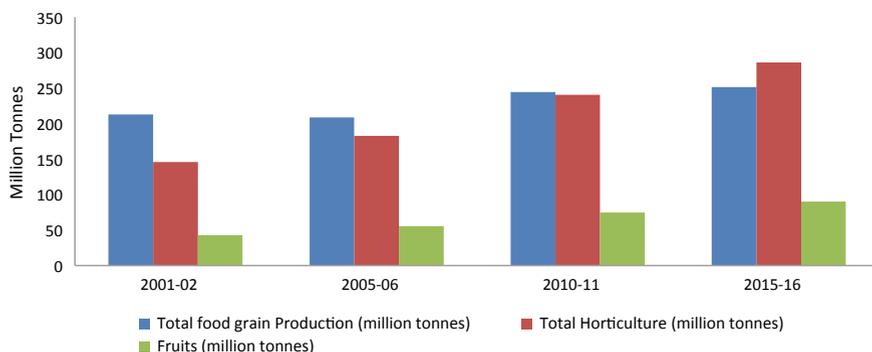


Fig. 5.1 Production of food grains, horticulture crops and fruits in India for selected years. *Source* NHB (2018a, b)

While climatic and soil conditions partly explain why Maharashtra dominates in grape production, there is also an underlying socio-economic story that potentially explains why grape cultivation flourished in Maharashtra the way it did. The *Maharashtra Rajya Draksha Bagayatdar Sangh (MRDBS)* or the Grape Growers Association of Maharashtra State, which was formed in 1958, did much of the ground work in terms of creating an information network among scientific minded farmers. Later, another organization ‘Mahagrapes’, set up in 1991 in partnership between grape farmer co-operatives and the Government of Maharashtra became the post-harvest and export management arm of the grape farmers (Nikam et al. 2014). The proactive presence of Mahagrapes led to evolution of grape value chains, linking the science-driven grape cultivation in Maharashtra to business-driven retail chain models throughout the world (NCPAH, n.d.).

The story of the pomegranate is slightly different. After the drought of 1972 in Maharashtra, farmers tried experimenting with different drought-resistant crops. Recognizing its potential to utilize wastelands and to augment the income of small and marginal farmers in water scarce areas, the Government of Maharashtra created incentive schemes for pomegranate farming. In 1981–82, the state government declared the Capital Subsidy Scheme for several horticulture crops. In 1991, the Employment Guarantee Scheme (EGS) was linked with horticulture. Pomegranates were covered under both the schemes, given the immense potential of the shrub to grow in coarse, poor-quality soil and with limited water resources.

In response to the schemes, acreage under pomegranates in Maharashtra increased multi-fold. Today, around 65% of the total area under pomegranates and 70% of the production are concentrated in Maharashtra.

Among the top 5 fruits of Maharashtra, 36% and 12% of the value is accounted for by grapes and pomegranates, respectively (Fig. 5.2).

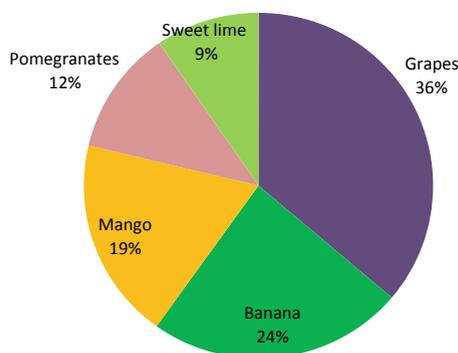


Fig. 5.2 Share of grapes and pomegranates in the value of top 5 fruits in Maharashtra (2013–14).
Source NHB (2018a, b)

In this study, we analyze various aspects of the grape value chain (GVC henceforth) and the pomegranate value chain (PVC henceforth). Given the dominant position of Maharashtra in production of both the crops, the study focuses on the development of the value chains from Maharashtra. The analysis of the value chains is presented in terms of competitiveness, inclusiveness, scalability, sustainability and access to finance (CISS-F).

5.2 Overview of Grape and Pomegranate Economy

5.2.1 Grape

Global Overview

Viticulture is globally recognized as high-value agriculture (HVA) (Fig. 5.3). Grapes are consumed fresh (table grapes), dried (raisins) or in the form of pressed products (wine, juice, jellies, etc.). Value chains for table grapes, raisins and wine grapes are extremely different from each other.

Together with China and Turkey, India is one of the biggest producers of table grapes in the world (Fig. 5.4).

Global production of table grapes almost doubled from 15 million MT in 2000 to 27 million MT in 2014 (FAO-OIV Focus 2016). Notable increments in production of table grapes were observed in China, India, Turkey, Egypt, Uzbekistan, Brazil and Peru. Global consumption of table grapes has also doubled between 2000 to 2014, mostly led by a consumption boom in the Asian economies (Fig. 5.5).

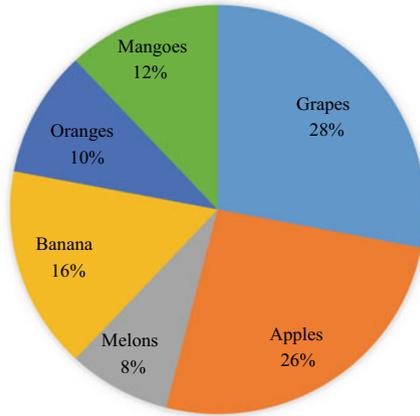


Fig. 5.3 Share (%) of grapes in value of top 6 globally traded fruits in 2018. *Source* Compiled from FAOSTAT (2018a)

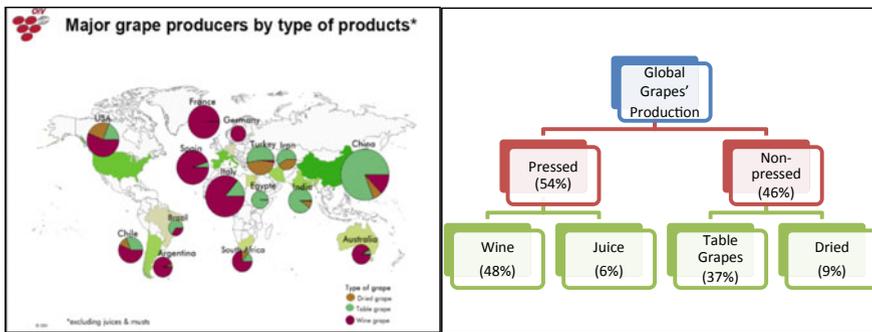


Fig. 5.4 Major grape producers in the world and share of table grapes, wine grapes and raisins in the total global production of grapes. *Source* OIV (2016)

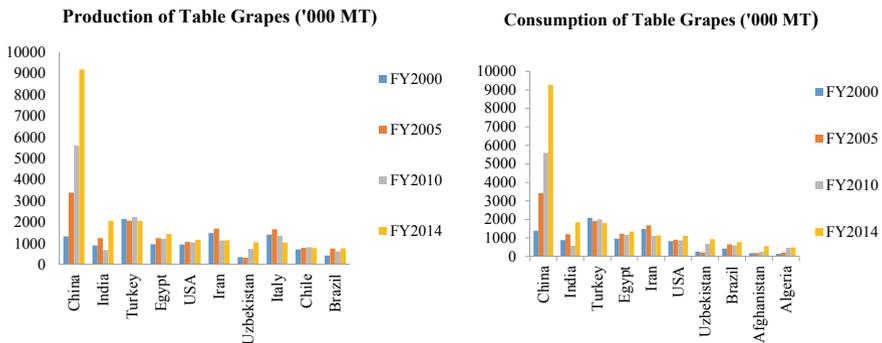


Fig. 5.5 Bi-decadal snapshot of production and consumption of table grapes in select countries ('000 MT). *Source* Compiled from FAO—OIV (2016)

Domestic Overview

India is the second largest producer of table grapes in the world. Within India, around 77% of the production consists of table grapes (Fig. 5.6a).

Thompson Seedless is the most popularly sown variety in India, followed by Bangalore Blue and Anab-e-Shahi (Fig. 5.6b).

In India, grapes are cultivated in Maharashtra, Karnataka, Punjab, Tamil Nadu and Andhra Pradesh. Acreage under vines in India has more than tripled from 45,000 hectares (ha) in 2000–01 to 140,000 ha in 2017–18. In the same time period, production of grapes in India increased from 1.06 MMT to 2.91 MMT in 2017–18 (Fig. 5.7).

2009 and 2010 have been the crisis years for Indian grapes. Based on steady growth in the past seven years, farmers increased acreage under grapes in 2009. However, as monsoons failed in the 2009 kharif season, drought affected the crop substantially. Further, downy mildew affected the crop and production of grapes fell drastically in that year in Maharashtra. Later, unseasonal rains destroyed much of the crop in November 2010. According to the FAO-OIV Focus (2016), the productivity of Indian grapes at about 30 MT per hectare has been consistently one of the highest in the world.

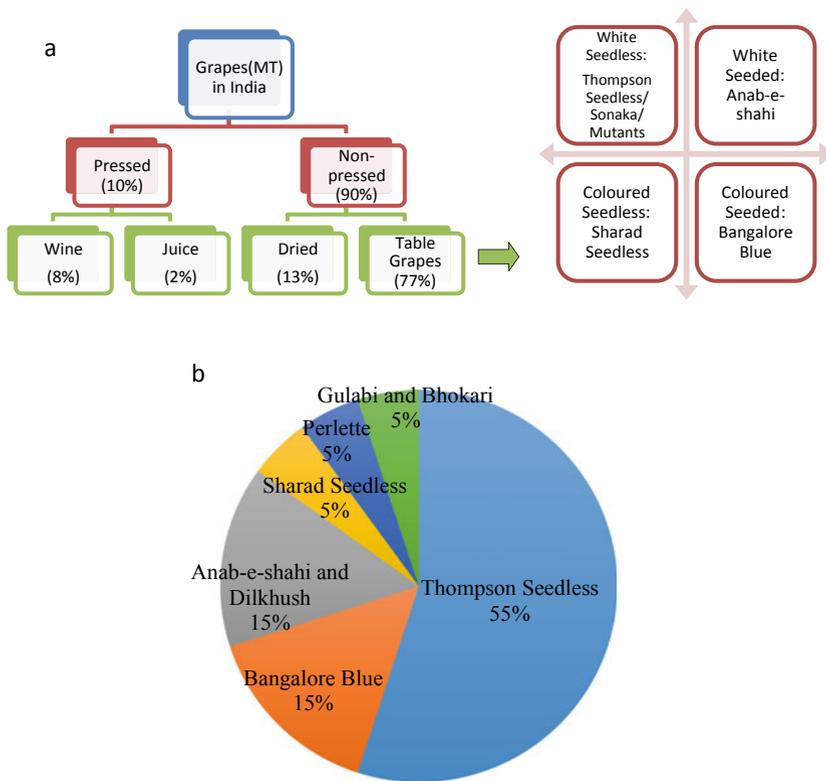


Fig. 5.6 a Share of table grapes, wine grapes and raisins to the total production of grapes in India (2014) and major grape varieties in India. *Source* KIIs with Grape Growers Association; indicative figures. **b** Distribution of area under dominant grape varieties in India. *Source* Hindu (2020)

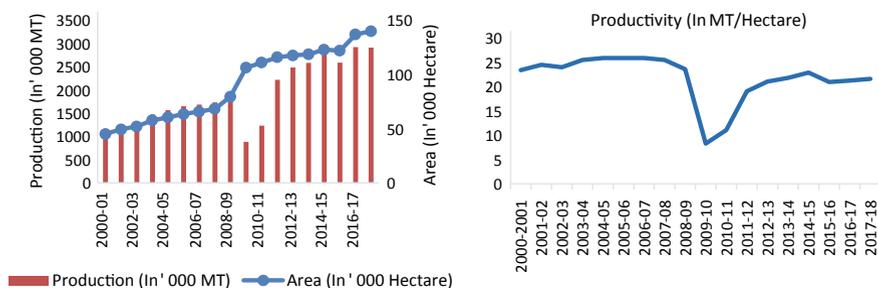


Fig. 5.7 Area ('000 ha) and production ('000 MT) of table grapes in India from 2000–01 to 2017–18. Source NHB (2018a, b)

Trade Pattern of Grapes

The doubling of production and consumption globally from 2000 to 2014, has not been matched by a doubling of exports. This is largely due to the fact that table grapes are mostly consumed at source countries. However, due to rapid strides in technology adoption in harvesting, packaging, storage and quicker transportation, exports of table grapes increased from 2.9 million MT to about 4.2 million MT, i.e. by around 50% during the above period. It is interesting to note that the biggest producers of table grapes do not feature among the biggest exporters of the commodity (Table 5.1).

China, India and Egypt normally consume a majority part of the produce domestically. On the other hand, producer countries such as Chile, Peru and South Africa export nearly the entire produce. The export–production ratio for Chile is as high as 94% (Fig. 5.8).

India emerged as one of the top 10 exporters of grapes in value terms in calendar year 2016. In 2006–07, India exported 85,000 MT of grapes, whereas in 2017–18, Indian exports of grapes had risen nearly 2.5 times and stood at 260,000 MT. From 2006–07 to 2017–18, the value of exports of table grapes from India had risen 4 times from 73 million USD to 302 million USD (Fig. 5.9).

In calendar year 2016, the major importers of grapes from India were Netherlands, UK, Russian Federation, UAE, Germany, Saudi Arabia, Thailand and Bangladesh (Fig. 5.10).

Chile, Peru and South Africa compete for market space with India in similar destinations from January to April. While they produce coloured varieties, they are also exporters of Thompson Seedless variety of grapes. These countries are the toughest export competitors for the grape exporters from India.

Table 5.1 Top producers, consumers, exporters and importers of table grapes (2014)

Producers	Consumers	Exporters	Importers
<ul style="list-style-type: none"> •China •India •Turkey •Egypt •USA 	<ul style="list-style-type: none"> •China •India •Turkey •Egypt •Iran 	<ul style="list-style-type: none"> •Chile •Italy •USA •Netherlands •Peru •South Africa 	<ul style="list-style-type: none"> •USA •Netherlands •Germany •Russian Federation •UK

Source FAO-OIV (2016)

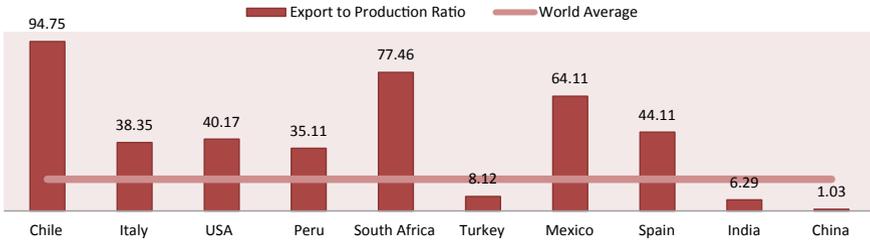


Fig. 5.8 Export-to-production ratio for table grapes for top 10 table grape-producing countries (2014). *Source* Compiled from FAO—OIV (2016)

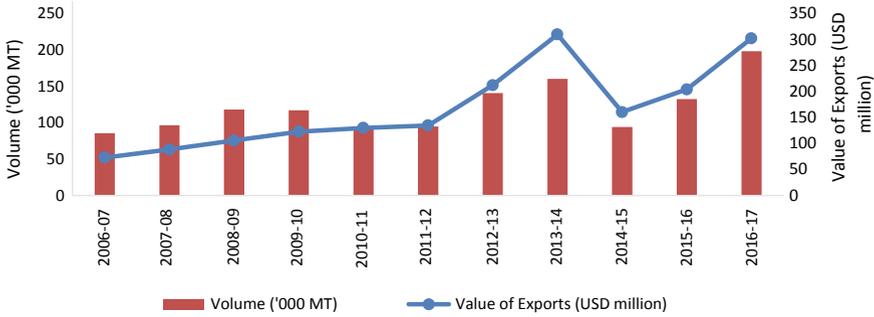
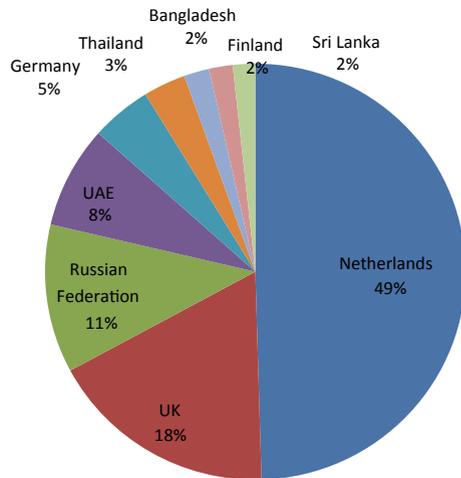


Fig. 5.9 Exports of grapes ('000 MT) from India from 2006–07 to 2016–17. *Source* NHB (2018a, b)

Fig. 5.10 Share of value on grape exports from India in 2016. *Source* FAOSTAT (2018b)



Export Crisis in 2010–11 and 2011–12

Grape exports (MT) showed a sharp dip in the year 2010–11 and in 2011–12 before rising in 2012–13. From March to May 2010, supermarket chains in EU rejected Indian grape exports citing residues of chlormequat chloride (Iihocin), a growth regulator, in excess of the prescribed maximum residue limits (MRLs) (Jamwal 2015). Even as landed grape exports from India were randomly tested for the presence of the said chemical, grape prices received by Indian exporters dropped massively. Many traders had to sell grapes to agents in Rotterdam at throwaway prices. Exporting firms experienced a huge reduction in their margins; some firms claim that they moved into negative margins for that year. Farmers, who had extended credit to such firms in turn, faced the problem of non-receipt of outstanding payment at their end. Informal estimates suggest that at least 20% of the total loss was borne by the farmers, whereas 80% was borne by the exporting firms. Thus, FY 2010 was a catastrophic year for the entire value chain.

5.2.2 Pomegranate

Global Overview

Pomegranate cultivation traditionally belongs to Central Asia, but is now practised throughout the world (Fig. 5.11).

The biggest producers of pomegranates are India, Iran, China, Israel, Afghanistan, Iraq, Turkey, Egypt, Morocco, Tunisia, Uzbekistan, Azerbaijan, Spain and the



Fig. 5.11 Map of pomegranate-producing countries in the world. Source <https://geology.com/world/world-map.shtml> indicative map constructed by authors

Table 5.2 Production of pomegranates ('000 MT) in major producing countries (2014)

Country	Production ('000 MT)
India	1345
Iran	790
Turkey	320
Spain	45

Source Compiled from NHB (2018a, b), Ebrahimi (2015), Ikinci et al. (2018), Bartual et al. (2015)

USA (Table 5.2). Pomegranate production also commenced in Brazil, Peru, Argentina and South Africa during the last decade.

Domestic Overview

Traditional states for pomegranate cultivation are Maharashtra, Karnataka, Andhra Pradesh and Gujarat, though cultivation is also practised in Himachal Pradesh, Rajasthan and Madhya Pradesh. The main cultivars produced in India are Bhagwa, Ganesh, Arakta and Ruby. Of these, Bhagwa is seen to be the most stable variety for Indian conditions and has become the biggest commercially produced and exported variety from India.

The acreage under pomegranates increased from 120,000 hectares in 2006–07 to 224,000 hectares in 2017–18. In the same time period, the production increased from 0.84 MMT to 2.6 MMT (Fig. 5.12).

While the area under pomegranates has less than doubled in the past decade, the production has nearly tripled in the same time. This tells us about the encouraging increase in productivity of Indian pomegranates between 2006–07 and 2017–18 from about 7.2 MT per hectare to about 12 MT per hectare. However, the yields in Maharashtra, and especially those in Nashik, are much higher at about 17 tonnes per

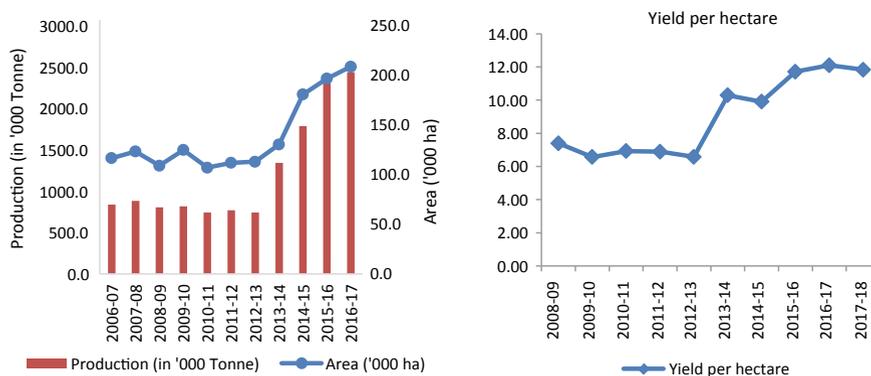


Fig. 5.12 Area ('000 ha) and production ('000 MT) of pomegranates in India (2006–07 to 2016–17). Source NHB (2018a, b)

hectare. According to KIIs, the yields from precision farming techniques tend to be as high as 25 MT per hectare in Maharashtra.

Trade Pattern of Pomegranate

As in the case of grapes, producer countries such as India and Iran are not the largest exporters and export just about 3.8% and 1.8% of their production, respectively (Fig. 5.13).

Turkey is heavily export-oriented and exports more than half of its production. South Africa, Peru and Chile too have a sharp export focus and are already making their mark in the lucrative European markets (Salgado 2017). The major importers of pomegranates are Europe, Middle East, Russia and Asian regions. In particular, the European Union (EU), which offers highest average prices for pomegranates, is perceived to be a lucrative market for pomegranates.

In the northern hemisphere, pomegranates are cultivated from September to January, whereas the southern hemisphere season extends from March to May (Fig. 5.14). There is a supply gap in the months between these seasons. Indian

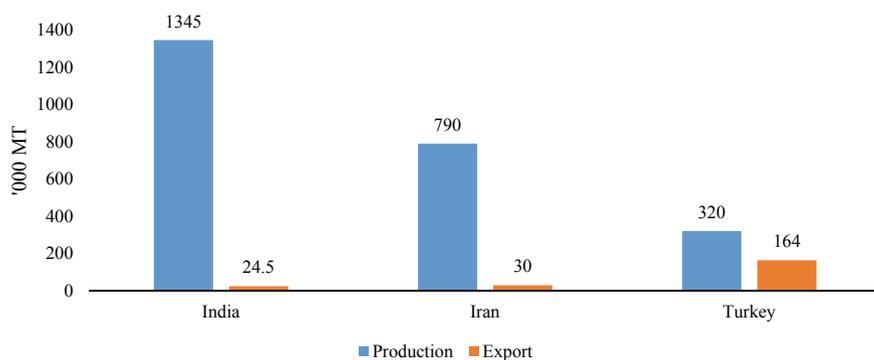


Fig. 5.13 Export and production of pomegranates from India, Iran and Turkey (2014). *Source* NHB (2018a, b), Ebrahimi (2015), İkinci et al. (2018)

	J	F	M	A	M	J	J	A	S	O	N	D
Turkey												
Iran												
India												
Chile												
Egypt												
Spain												
Israel												
Peru												
Argentina												

Fig. 5.14 Export window for pomegranates from different countries. *Source* Compiled from NHB (2018a, b), Ebrahimi (2015), İkinci et al. (2018), Bartual et al. (2015), CBI n.d

pomegranates are exported in the perfect window from January to March, when there is no competition from other countries.

Exports of pomegranates from India show a steady increase. The volume of pomegranate exports has more than doubled in the past decade from 21,670 MT in 2006–07 to nearly 50,000 MT in 2016–17. In the same time frame, the value of Indian pomegranate exports to all destinations has quadrupled from USD 18 million to USD 74 million (Fig. 5.15).

About 43% of Indian pomegranates (volume terms) are sold to the UAE, whereas only 4% of pomegranate volumes are sold to the EU. However, in value terms, UAE is the top export destination, accounting for 57% of the value of export.

Bangladesh, which is the second largest destination for Indian pomegranates in volume terms, is the fourth largest destination in value terms (Fig. 5.16). This again indicates that exports to Bangladesh are not highly remunerative.

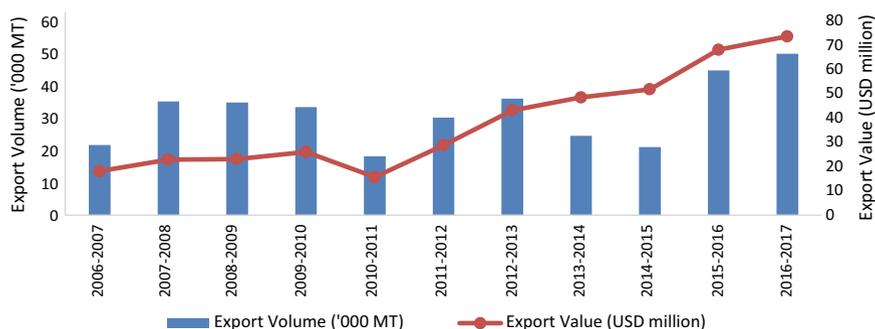


Fig. 5.15 Exports of pomegranates (volume '000 MT and value USD million) from India from 2006–07 to 2016–17. *Source* APEDA (2018a)

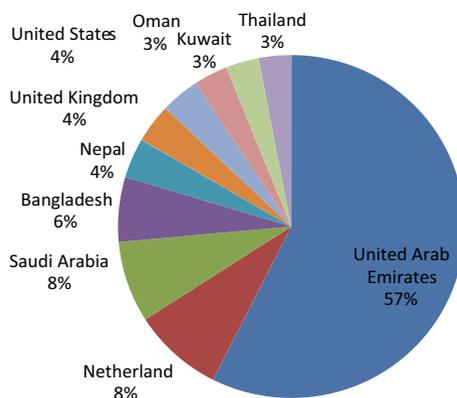


Fig. 5.16 Major export destinations for Indian pomegranates in value terms (TE 2018–19). *Source* APEDA (2018a)

5.3 Competitiveness

One of the central themes of the study is to evaluate whether the grapes and pomegranate value chains are competitive, which is assessed at two levels:

- International competitiveness using nominal protection coefficient (NPC)
- Domestic competitiveness by estimating what percentage of the consumer’s rupee actually reaches the farmer.

5.3.1 International Competitiveness

Processes in the Export Value Chains of Grapes and Pomegranates

Processes in the export value chain can be broadly classified as quality check, movement of produce, shipping to export destination and final settlement of payments (Fig. 5.17).

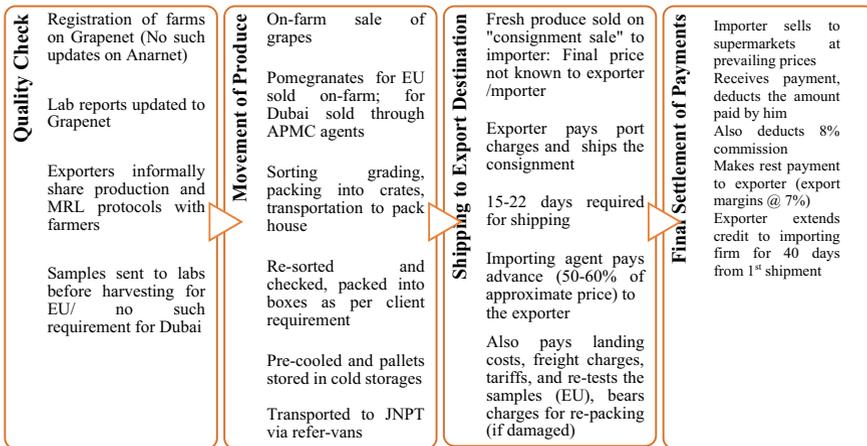


Fig. 5.17 Major processes in the export value chains. Source Authors’ illustration



Fig. 5.18 Price-Risk interaction between major actants in the value chain. *Source* Authors' illustration

Figure 5.18 summarizes the price risk interaction between major actants in the value chain. Since the farmers get a fixed price for the produce, they do not bear a price risk. But since exporters enter a consignment sale vis-a-vis importer, they bear a price risk. While the farmer is technically free from price risk, he may still experience some risk due to the procedure of the financial transaction between him and the exporting firm. For grapes, the farmer receives 60% down payment from the exporter and gives 40% credit to the exporter. For pomegranates, he may receive only 50% or lesser down payment. Thus, the farmer carries the risk of non-payment by the exporter firm. The exporter carries price risk as well as risk of non-payment by importer.

Nominal Protection Coefficients (NPCs) for Grapes

Table 5.3 shows that India has a dominant position in production, but the export volumes are very restricted. The export performance of relatively new producers such as Peru is impressive due to the export of niche varieties. India specializes only in the production of white Thompson Seedless grapes. However, the world demands coloured varieties. Aggressive research in order to support stable, coloured varieties in India is needed, which could then increase our export prices as well as the volume of grape exports.

Table 5.3 Comparison of production and exports of table grapes in India and other grape-producing countries

Variables and ranks (2014)	China	India	Turkey	Egypt	USA	Italy	Chile	Peru	South Africa
Production ('000 MT)	9187	2059	2056	1442	1166	1038	776	330	280
Rank	1	2	3	4	5	7	8	10	11
Exports ('000 MT)	126	137	258	114	445	448	732	266	263
Rank	12	11	6	14	3	2	1	4	5

Source OIV-FAO (2016)

We next examine competitiveness of Indian grapes through the NPCs, for which we construct a series on international reference price for Indian grapes and domestic price of the grapes based on the paper by Saini and Gulati (2017). Unit values (UVs henceforth) of grapes are used as a proxy for fob prices. The UVs for grape export were calculated for every year (2006–07 to 2016–17) using the export data maintained by Agriculture and Processed Food Products Export Development Authority (APEDA).

The UVs so calculated were next adjusted for port handling charges, trader margins, transport costs (Jawaharlal Nehru Port Trust (JNPT) to Nashik), packaging costs, labour costs and quality differential to work out the adjusted border prices at the level of the wholesale market. While the data on port handling charges was sourced from JNPT, the estimates for other adjustments were developed through primary interviews with traders. The trader bears the costs of packaging, pre-cooling, transporting and marketing the produce which is equal to around 30% of the farm gate price (FGP). The present design of the grape value chain is such that traders normally derive around (7–8)% of (FGP + costs) as their margin.

We consider the average wholesale prices prevailing at Nashik during the harvest months (January to March) as a proxy for domestic prices of grapes. Using the domestic prices and adjusted border prices, the NPCs for Indian grape exports under the exportable hypothesis have been worked out between 2006–07 and 2016–17 (Annexure 5.1). An NPC value of less than 1 signifies exportability of the commodity.

Grapes have been export competitive in the period between 2006–07 and 2016–17. Indian grape exports have become more competitive in the period after 2011–12, as indicated by a structural break in 2011–12 (Fig. 5.19).

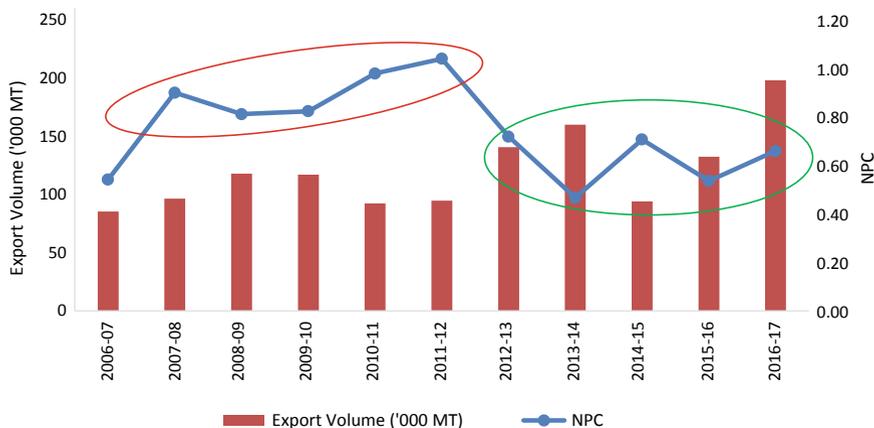


Fig. 5.19 NPC for Indian grapes and exports ('000 MT) from 2006–07 to 2016–17. *Source* APEDA (2018a), NHB (2018a, b) and authors' compilations

Explaining the Structural Break

In 2010–11, supermarkets in EU rejected consignments of Indian grapes and Indian exporters sold grapes at distress prices. In the same year, domestic inflation implied that the prices of all agricultural commodities including grapes rose sharply. The NPC increased from 0.82 in 2009–10 to 0.98 in 2010–11. Some of the produce was diverted to local domestic markets, and hence the export volumes fell.

The pessimism continued well into 2011–12. European markets remained edgy. Higher costs of compliance and fear of rejection prevailed. The NPC breached the value 1 and rose to a record level of 1.04. Export volumes remained low. It is only in 2012–13 that the recovery started. New technologies were adopted in Maharashtra. Traceability and MRL management from GrapeNet further increased the competitiveness of grapes from India. Food inflation also reduced domestically in the same financial year, and the NPC fell to a comfortable value of 0.66, indicating higher export competitiveness.

Grapes Export Value Chain: Price Escalation in Grapes from Farm gate to Consumer

What share of the international retail value does the farmer in Nashik earn? We construct an indicative cost chart for the export value chain for grapes from farmer–exporter–importer–supermarket–consumer to identify the same.

The export GVC in India is compressed and fairly efficient. The farmer gets 70% of the fob prices in India and 51% of the retail prices abroad (Fig. 5.20).

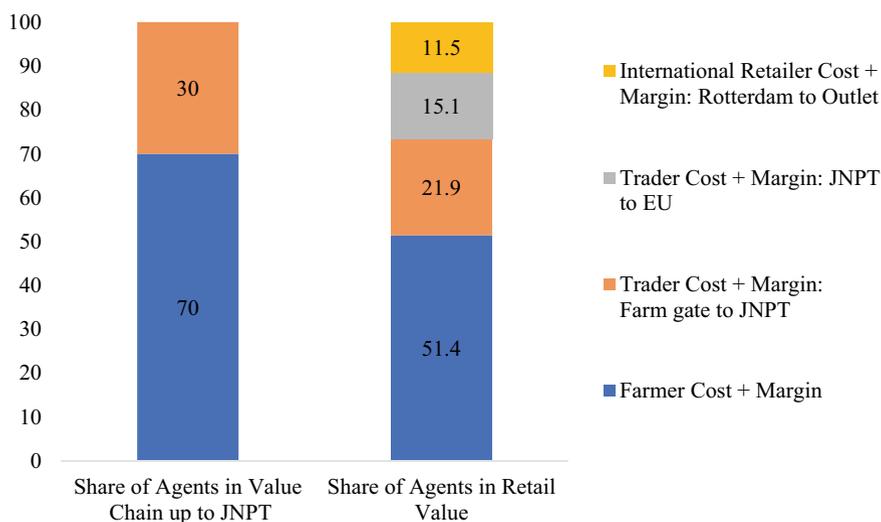


Fig. 5.20 Comparison of share of agents in value chain up to JNPT and value chain up to international retail consumer. *Source* KIIs, authors' compilation

Nominal Protection Coefficient for Pomegranates

Pomegranates are sold on consignment sale and not on fixed prices. This implies that the final value of the transaction is not fully determined when the pomegranates are exported. The exporter gets 50% advance of the expected value of the consignment; rest is paid after the retailer makes the final payment. According to the All-India Pomegranate Growers' Federation, APEDA data underestimates the UVs since it records only the advance value of the consignment. The final consignment value feeds into the Bank Realization Certificate (BRC) of the exporter. The BRCs are then submitted to the DGCIS in a hard copy format. To the extent that BRC data is not integrated with the data submitted by the exporter at the time of shipping, there is underestimation of the actual export value of Indian pomegranates.

The extent of underestimation in value of exports as per APEDA data is severe up to 2012–13. Hence, we carry out the analysis of international competitiveness of Indian pomegranates from 2013–14 to 2016–17 only (Fig. 5.21). The calculations show that pomegranates, with an average NPC value of 0.92, have been export competitive from 2013–14 to 2016–17 (Annexure 5.2).

We next construct an indicative cost chart for the export PVC from farmer–exporter–importer–supermarket–consumer to identify the share of farmers in the export value chain.

Not only are Indian pomegranates competitive, but the farmers are well integrated in the PVC. The farmer gets 80% of the fob prices in India and 54.6% of the retail prices abroad (Fig. 5.22). The export PVC demonstrated above has only 5 players, viz. farmer, exporter, importer, supermarket and consumer in the EU. Thus, it is compressed and fairly efficient. However, higher share of pomegranates (43% of volumes) is exported to Dubai. Importing firms in Dubai also sell the produce to other local agents, thereby increasing the number of players in the value chain. More are the number of players, less compressed is the value chain and the farmer gets lesser share in the retail value of the produce.

The prices of pomegranates in the EU normally exceed the prices in Dubai by at least 40%. Further, Indian exports to the EU are normally to supermarket agents and are fairly compressed. Hence, it is logical to conclude that the pomegranate farmer in India would stand to get a higher share of the value in the exports to the EU.

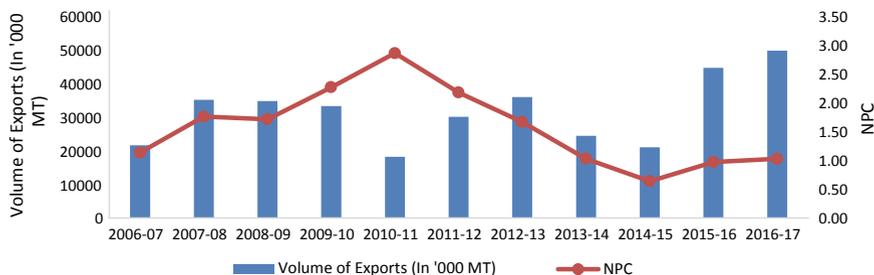


Fig. 5.21 NPC for Indian pomegranates and exports ('000 MT) from 2006–07 to 2016–17. *Source* APEDA (2018a), authors' calculations

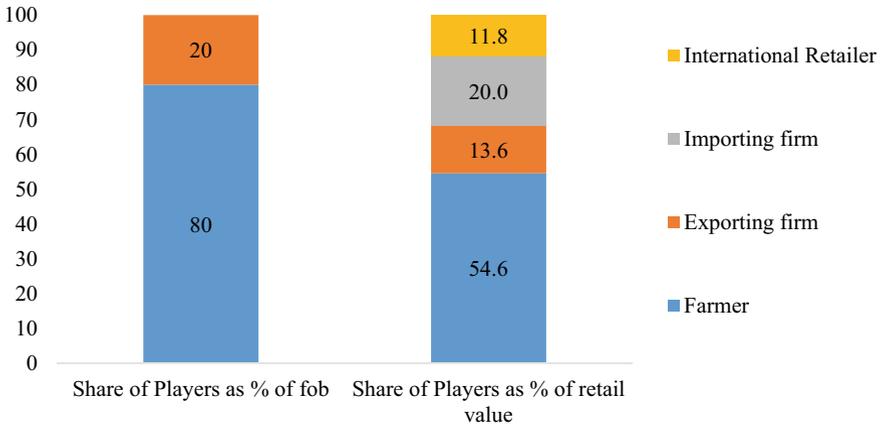


Fig. 5.22 Comparison of share of agents in value chain up to JNPT and value chain up to international retail consumer. *Source* KIIs

5.3.2 Domestic Price Formation

Processes in the Domestic Value Chains

Nashik and Solapur districts are traditional hubs of grapes and pomegranates production in Maharashtra. Whereas grapes are mostly sold on farm, pomegranates are auctioned by the local *arthiyas* or commission agents to traders and agents from North India. Figure 5.23 depicts the domestic value chains from Maharashtra to other parts of India.

Of the grapes and pomegranates that are available for the domestic market, the best produce is normally purchased by traders from Kolkata. Once the produce reaches Kolkata, it is then re-packed and exported to Bangladesh and Nepal. Thus, part of the domestic demand for fresh produce is actually demand for exports to neighbouring



Fig. 5.23 Domestic value chain of grapes and pomegranates. *Source* Indicative map constructed using qgis

countries in the north and east from Kolkata. KIIs with farmers in Nashik revealed that within domestic trade, around 15% of the grapes and pomegranates are purchased by traders from Kolkata (most of these are best quality fruits), whereas traders from Delhi and Bihar purchase 15% and 60% of the produce, respectively. The produce sold to Delhi and Bihar markets is of a mixed quality. The rest 10% of the produce is sold to markets in Mumbai and Pune.

Efficiency of Grape Value Chain

Figure 5.24 explains the domestic movement of grapes and pomegranates from Nashik to the northern markets in India. Here is an indicative cost chart to understand how the price of grapes escalates from the farm at Nashik to the retail customer in New Delhi.

The domestic GVC is a non-compressed value chain. Price escalations from the farm gate to the retail consumer are driven by the number of traders and markets involved in the value chain. Despite the non-compressed nature of the domestic GVC, it is observed that the farmer gets 56% of the wholesale price and 43% of the final consumer’s rupee (Fig. 5.25).

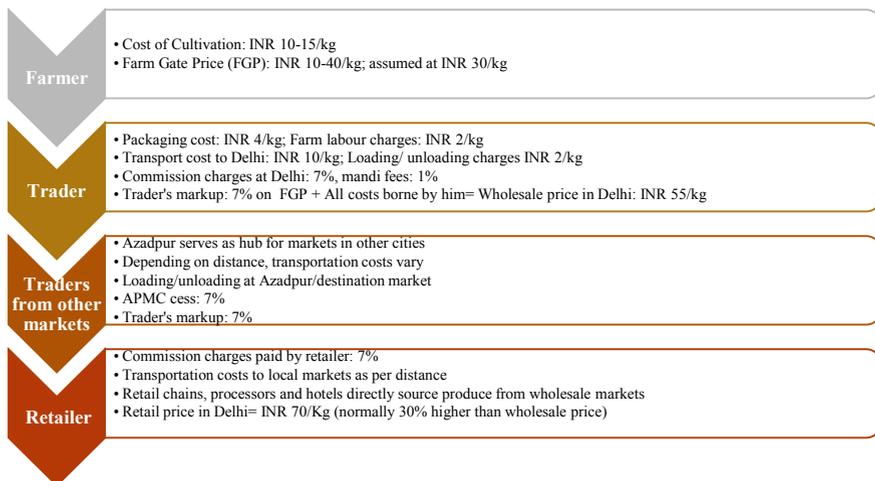


Fig. 5.24 Indicative cost chart of domestic value chain (Nashik to Azadpur *Mandi*, New Delhi) for grapes for 2015–16. *Source* KIIs

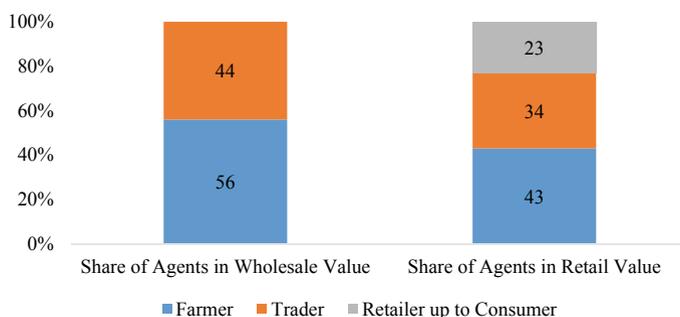


Fig. 5.25 Share of actants in wholesale and retail value in domestic grape value chain. *Source* KIIs

Efficiency of Pomegranate Value Chain

Here is an indicative cost chart to understand how the price of pomegranates escalates from the farm in Nashik to the retail consumer in New Delhi (Figs. 5.26 and 5.27).

Within the PVC, it is seen that the farmer gets about 45% of the final consumer’s rupee.

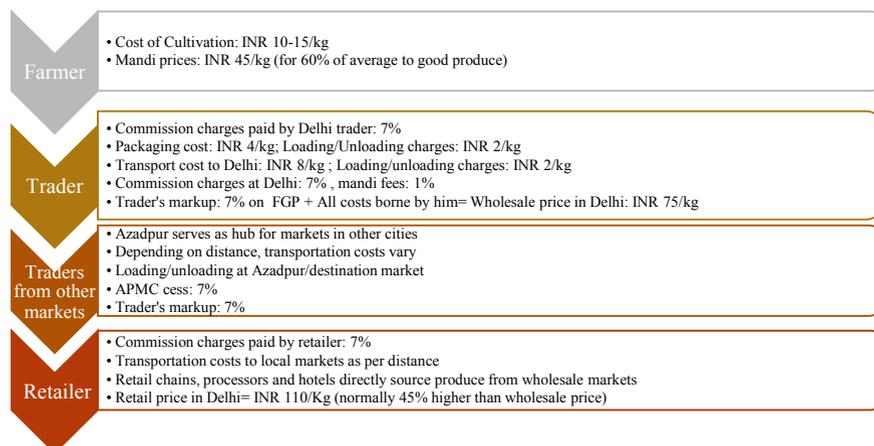


Fig. 5.26 Indicative cost chart of domestic value chain (Nashik to Azadpur *Mandi*, New Delhi) for pomegranates for 2015–16. *Source* KIIs



Fig. 5.27 Share of actants in wholesale and retail value in domestic pomegranate value chain. Source KIIs

5.4 Inclusiveness

5.4.1 *Inclusiveness of Small Farmers in Production and Marketing*

Do small farmers participate in the production and marketing of grapes and pomegranates in India? Do the value chains show the presence of small exporters, agents and traders, or is it dominated only by big players? These issues are examined in this section.

It is a known fact in Indian viticulture that high yields of table variety grapes are associated with small farms. This is because of the micromanagement that grapes demand as a crop. Every production activity from pruning, spraying, thinning, application of fertilizers and harvesting has to be done in a specific manner within a specific time frame. In that sense, grape is a handcrafted commodity. Farmers, together with their family and trusted aides, have to personally look into the production protocols, without which the success rate is doomed. Hence, there is a natural deterrent to expand beyond a certain limit and one finds predominance of small grape farmers in Maharashtra. Data suggests that about 67.8% of grape farmers are small and marginal owning less than 2 hectares of land (Agriculture Census 2015–16) (Fig. 5.28).

- The MRDBS created production protocols for farms even as small as 1 acre onwards. Most importantly, it created confidence among small farmers through peer group interactions and through knowledge sharing platforms.
- The MRDBS encouraged the small farmers to visit various *mandis* to see which grape varieties have demand in various markets. Gradually, farmers started getting much more aware about which varieties could sell at what prices, across the country. One finds that domestic agents/traders visit small and big farmers alike for sourcing grapes and that the small farmer negotiates a price which is equal to the big farmer.

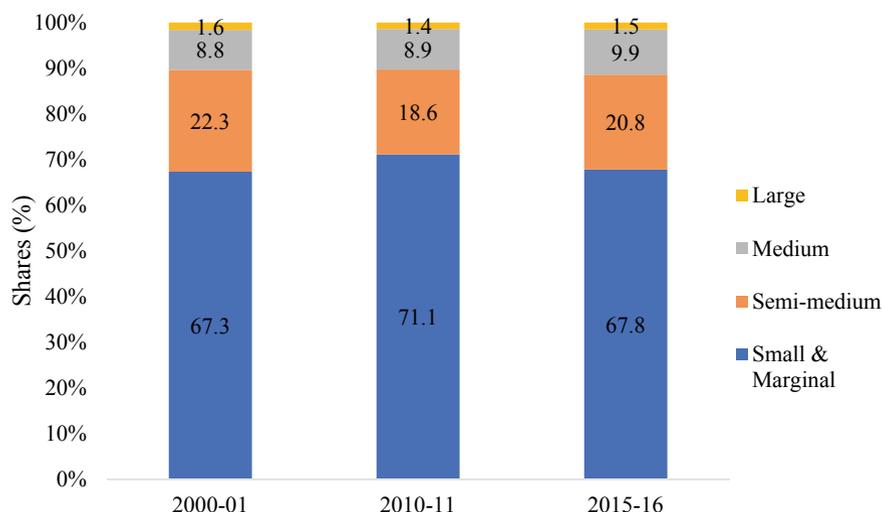


Fig. 5.28 Percentage of marginal and small, semi-medium, medium and large farmers in grape cultivation. *Source* Agriculture census, various issues

- The institutional support in Nashik has ensured that even small farmers are bold, market savvy and tech savvy. They are aware that it is their penchant for precision farming that leads to low rejections and high prices in the EU. Thus, they confidently negotiate the prices even in the export GVC.

Like grapes, pomegranate farming in Maharashtra is dominated by small and marginal land holdings. Nearly 69.2% of pomegranate farmers were marginal and small in 2015–16, which is slightly lower than 70.9% in 2010–11 and much higher than 57.4% in 2000–01 (Fig. 5.29).

The following factors have created a huge opportunity for small farmers to participate in pomegranate production in Maharashtra.

- Pomegranate farming has become quite popular among the smallholders of Maharashtra due to the low resource demands of this commodity. As compared to grapes, it is less intensive in terms of consumption of inputs and has the potential of giving fairly high returns, just like the grape crop. Hence, pomegranates are referred to as the poor man's grapes in Maharashtra.
- Since the pomegranate shrubs are spaced apart in the farm, it also allows the possibility of intercropping, adding to the overall income and importantly to cash flow of farmers across the year.
- The Government of Maharashtra linked the Employment Guarantee Scheme (EGS) with pomegranate farming in 1991. This move helped many small farmers to reduce costs and resolve the issue of farm labour.
- Pomegranates, once harvested, are taken to the APMC markets, from where they are auctioned by the local *arthiyas*. Selling pomegranates in the APMC markets has two benefits from the small farmers' perspective; one, the farmer sells the produce to a known agent and gets immediate payment, and two, the farmer

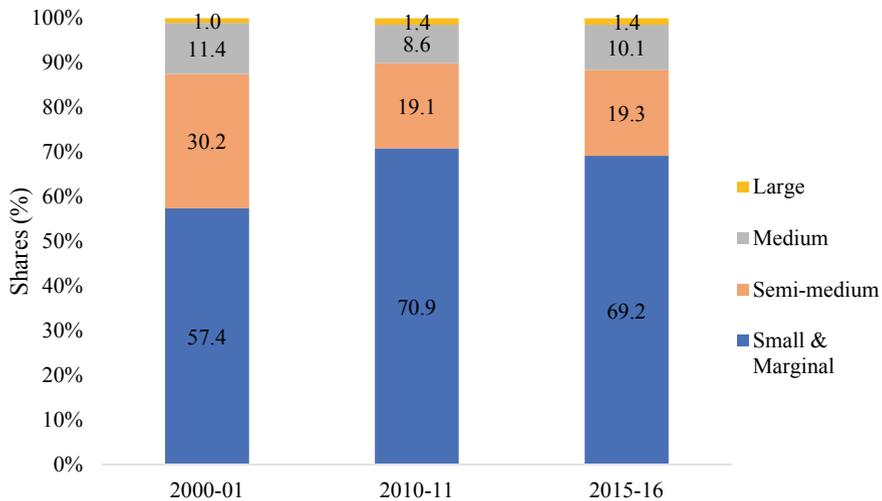


Fig. 5.29 Percentage of marginal and small, semi-medium, medium and large holdings in pomegranate cultivation. *Source* Agriculture census, various issues

himself witnesses the price discovery process for the produce. Thus, the marketing chain for pomegranates is fairly inclusive for the small farmer. However, certain issues do seem to affect the fairness of the marketing process in the PVC.

- The Maharashtra Government waived off the commission (6%) and market fees (1%) for the farmers vide Ordinance no. 15 dated 5 July 2016 (DoM 2016). The *arthiya*, who facilitates the market transaction between the farmer and the trader, now charges 6% commission to the trader and not to the farmer. The 1% market fee is also charged to the trader and not to the farmer. This apparently farmer-friendly reform has created issues in its wake, as is explained below.
- Since the traders now have to pay the price as well as the commission and market fees to the *arthiya*, they have cartelized to lower the prices for the produce. Thus, the gross amount that they pay to the *arthiya* has remained more or less the same, whereas the prices received by the farmers have fallen.
- Secondly, the *arthiyas* also charge INR 20 per crate as labour and calling out/auctioning charges to the farmers. The farmers have no bargaining power to protest against this charge and pay INR 20 per crate to the *arthiyas*. A full crate typically weighs 22 kg. The farmer receives payment only for 19 kg; the weight of the empty crate is 2 kg, and it is assumed that 1 kg per crate will be damaged. Now, the problem is that whether the pomegranates are sold at INR 80 per kg or whether they are sold at INR 10 per kg, the farmer necessarily has to bear a fixed cost of INR 20 per crate. Since the farmer pays a fixed charge and not an ad valorem rate per crate, the payment has become a regressive tax on the farmer.

5.4.2 Inclusiveness in Post-harvest Management

Small export firms dominate both the GVC and PVC (Fig. 5.30). Most of the export firms are proprietary concerns, partnership concerns or private limited firms. KIIs reveal that there was a huge influx of corporate players such as ITC, Kalyani Agro Exports, Deepak Fertilisers and Petrochemicals Corporation Ltd., Mahindra Shubh-labh Services Ltd. (MSSL) and Seven Star Fruits Pvt. Ltd. (Subsidiary of Mahyco) in exports of fresh grapes in the 1990s and 2000s. Some of them eventually diversified into pomegranates. However, many of these could not sustain their business.

There were two major issues which led to the exit of corporate firms between 2010 and 2017. The first issue was that of creating a network vis-a-vis farmer who would be able to supply export quality pomegranates. The companies used to hire salaried agents with know-how in the local markets of Nashik and Solapur, but these turned out to be high-cost resources. The second issue is that quick decision-making and agility in marketing decisions is needed to keep pace with highly volatile markets for fresh produce. The hierarchical structures in corporate bodies do not allow for that kind of agility, and hence, it became difficult to sustain the revenues.

The small export firms typically try to reduce their fixed costs. Thus, many of them do not own pack houses, cold storages and refer vans, but rather lease in these facilities on rent. The cold storages in Nashik are also mostly owned by farmers and small proprietary concerns or private limited companies. In that sense, this part of the value chain too is quite inclusive.

Of course, the market is dynamic. Many of the firms that started out with very small businesses have increased their turnover and employment over a period of time. Several companies have expanded and now have their own pack houses and cold storage facilities. Thus, consolidation of capacities has commenced within the value chains.

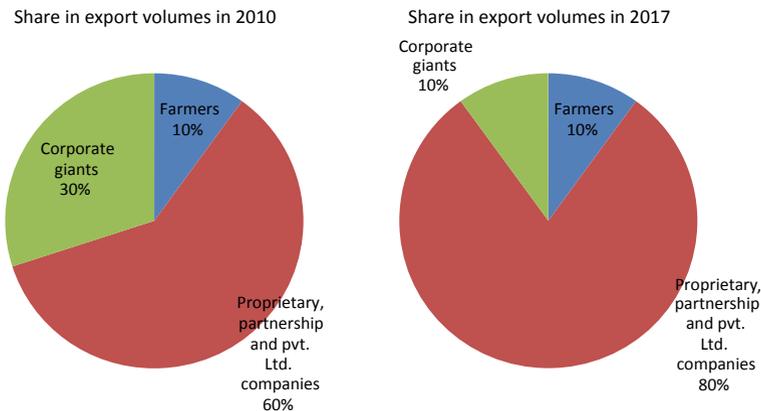


Fig. 5.30 Share of grapes and pomegranates exported by Farmers Private Ltd. Companies and corporate entities in 2010 and 2017. *Source* KIIs

5.5 Sustainability

It is observed that both GVC and PVC are efficient; i.e. farmers get a fairly high share in the respective retail prices. In addition to being competitive and inclusive, it is important to ensure that value chains are both financially and environmentally sustainable in order to achieve the desired scale effect.

5.5.1 Financial Sustainability

Under a set of assumptions regarding price levels, yields and costs (Annexures 5.3 and 5.4), we calculate the net returns accruing to the export-oriented and domestically oriented grape and pomegranate farmers. Accounting rates of return measure the profits or the returns over initial costs. The internal rate of return (IRR) is the compound rate of return for the investment annualized over the life of the project. Returns calculated under the business as usual (BAU) scenario are given in Table 5.4.

IRRs for export-oriented vineyards and orchards are much higher than the IRRs from domestic value chains. There is a zero internal rate of return associated with domestically oriented pomegranate farming, once the imputed costs of family labour and other costs are included. Clearly, the positive accounting rates of returns are a mirage.

Table 5.4 Rates of return accruing to export-oriented and domestically oriented grape and pomegranate farmers under BAU

S. No.	Rates of return	Export-oriented grape farmer (%)	Domestically oriented grape farmer (%)	Export-oriented pomegranate farmer (%)	Domestically oriented pomegranate farmer (%)
I	Accounting rate of return (per annum over recurring costs)	159	215	207	84
II	Internal rate of return of project (over A2)	70	51	144	55
III	Internal rate of return of project (over A2 + FL)	45	25	77	0
IV	Internal rate of return of project (over C2)	30	6	40	0

Source KIIs and authors' calculations

Export value chains for both crops are highly remunerative. However, there are challenges that do not allow the players in the value chains to reach full potential.

- Export firms normally give an advance payment of (50–60)% to the farmers. Farmers carry the risk of exporters not paying the outstanding balance. In fact, this has been a pinching issue for most farmers in Nashik.
- Lack of new and coloured varieties has led to Indian grapes receiving low prices in international markets.
- Pomegranate farming is mostly practised in the drought-prone areas of Maharashtra. Pomegranates are drought resistant, but they need water at specific growth stages such as flowering and fruit bearing. Climate change has brought about higher incidence of droughts in Maharashtra, and this has caused the economics of pomegranate farming to change.

We examine the sensitivity of accounting rates of returns of grape and pomegranate exporting farmers to various challenges mentioned above (Tables 5.5 and 5.6).

- The analysis indicates that farmers are highly vulnerable to the risk of default by exporters. This highlights the need for credit guarantee or risk mitigation mechanism, which is explained in the section on policy suggestions.
- Grape-exporting farmers from India have decoded production of Thompson Seedless perfectly and boast some of the highest yields in the world too. According to FAO-OIV Focus (2016), Indian grapes had a productivity of 21.23 MT/ha, which was the third highest in the world. However, expertise and efficiency have not translated into high prices. This is because the global demand has moved to coloured varieties and India lacks the research base with which to cultivate these. It is quite evident that for the GVC to be sustainable and grow in future, a switch to new varieties is imperative.
- Climate change is here to stay, and it affects the economics of horticulture fairly significantly. Yet, it is observed that insurance products such as those under the

Table 5.5 Accounting rate of returns to export-oriented grape farmers under various sensitivity scenarios

S. No.	Scenarios	Description	ARR (%)	Inference
1	BAU	Yield @ 10 tonnes; 60% sold at INR 70; 30% sold at INR 50; 10% yield is damaged	159	ARR indicates high lucrative business
2	Exporters give down payment of 60% and do not pay the rest amount	Most commonly encountered issue within the GVC	55	Reduces profit sharply: need for credit guarantee
3	New variety	Assuming INR 250,000 cost per acre	171	New varieties can change the game completely

Source Authors' calculations

Table 5.6 Indicative revenues, costs and rate of returns to export-oriented pomegranate farmers under various sensitivity scenarios

S. No.	Scenarios	Description	ARR (%)	Inference
1	BAU	Yield @ 8 tonnes; 60% sold at INR 60; 30% tonnes sold at INR 40; 10% yield is damaged	207	Highly remunerative and lucrative business
2	Risk of non-return	50% credit extended to exporter is not recovered	54	Profits reduce to a fourth of BAU: need for credit guarantee
3	Drought: water supplied by tankers	Yield maintained @ 8 MT; 40% sold at INR 60; 50% MT sold at INR 40; 10% yield is damaged	76	Indicates vulnerability of pomegranate farming to availability of water

Source Authors' calculations

Weather Based Crop Insurance Scheme (WBCIS) that can provide some risk mitigation to high-value horticulture are still in a nascent stage.

5.5.2 Environmental Sustainability

Water

Water and sunshine are the two key ingredients that make Indian grapes and pomegranates sweet. From the perspective of water, grapes are environmentally sustainable. Almost all the vineyards are on drip irrigation systems, which ensure efficient use of water. Pomegranates too are water-friendly crops and can be cultivated in drought-prone areas quite successfully. This is because pomegranates survive dry spells without water up to 3–4 weeks quite well. The pomegranate shrub is fairly hardy and has a high level of adaptability to high heat. It is a climate-resilient crop and is extremely suitable for cultivators in the drought-prone districts of Maharashtra. As per estimates of NRC, grapes and pomegranates require 200 L and 180 L of water per kg of crop, respectively. The world average for rice is 4000 L per kg of crop.

However, there are specific times when grapes and pomegranates are very sensitive to availability of water. For example, once the flowering phase of the shrub starts in pomegranates, regular irrigation is a key to fruition and to large size of fruits. If the water is not available at that time of the plant growth cycle, it can destroy the crop completely. See Table 5.6 for financial sensitivity of pomegranate farming to droughts.

Fertilizers and Pesticides

Grape vine in tropical area needs intense inputs as well as precise timing of the application of fertilizers, pesticides and growth hormones. As per APEDA guidelines, grape exports were sensitive to MRLs for 97 chemicals (as in 2006). By 2017, growers

had to watch MRL for 200 chemicals. Even though grapes require heavy but regulated usage of chemical molecules, these are never used indiscriminately. This is because of the potential impact it can cause on MRL levels contributing to increased possibility of rejection of exports. The culture of MRL sensitivity in the export chain has had a positive effect on the domestic grape production as well.

However, there is indiscriminate use of chemical molecules in pomegranate farming. Though hardy, pomegranates are susceptible to various diseases and pests such as bacterial blight leaf spots, i.e. oily spot (*Telya*) and nodal blight, *Cercospora* leaf spots, *alternaria* leaf spots, *Phytophthora* blight, wilt, sucking pests such as thrips and root knot nematode. Various fertilizers and pesticides are recommended by the ICAR for different stages of growth of the orchard. However, excessive usage of both is found among the pomegranate cultivators. One factor that contributes to the issue is genuine lack of education among the pomegranate growers. The other factor is that pomegranates are mostly sold domestically or to residue non-sensitive export markets such as Dubai and Bangladesh. Thus, the culture of MRL sensitivity has not yet set in the PVC.

5.6 Scalability

Cultivation of grapes as well as pomegranates is a capital decision since the orchards have a life of 10 to 15 years. Grape vines and pomegranate orchards require substantial infrastructure in terms of trellises, drip irrigation systems, etc. Scaling up needs ability and willingness of family members and trusted aides working on the farm.

These factors indicate that grapes and pomegranates are inherently not very scalable. Nevertheless, acreage, production and exports of grapes have increased tremendously in the past 10 years.

5.6.1 Scalability Within GVC

Production of grapes in India increased from 1.06 million MT in 2000–01 to 2.9 million MT in 2017–18, thereby exhibiting an average growth rate of about 5% per annum (Fig. 5.31). In India, the yield of table grapes is already very high and there is limited scope for further increase. Thus, the increment in production has been driven by increment in acreage.

Although the highly lucrative GVC is scalable, it is not replicable across other Indian states. Thus, the scalability in grape acreage has remained restricted to Maharashtra and, to a lesser extent, Karnataka. Even within Maharashtra, the increase in acreage has been mostly confined to Nashik (Fig. 5.32). Thus, the GVC has not witnessed any replicability even within Maharashtra.

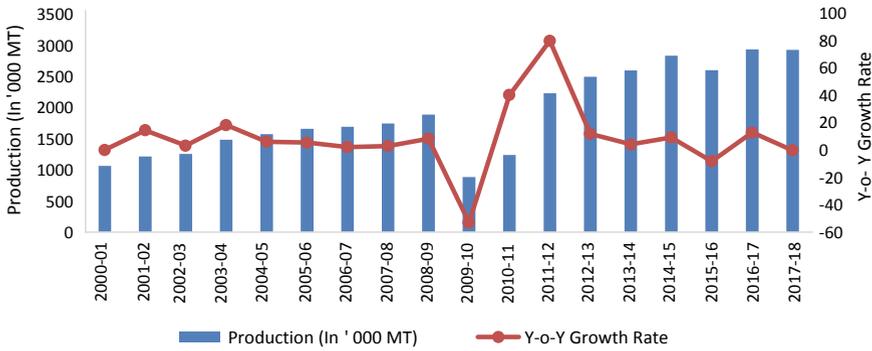


Fig. 5.31 Production of grapes ('000 MT) and Y-o-Y growth rate of production in India from 2000–01 to 2017–18. *Source* NHB (2018a, b)

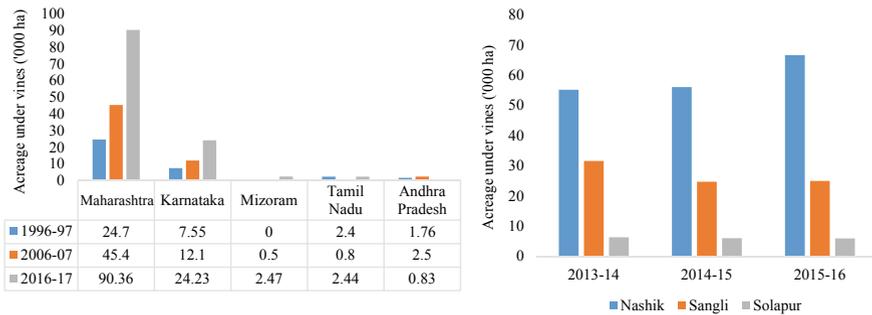


Fig. 5.32 Area under grapes ('000 ha) in select States and in select Districts in Maharashtra. *Source* NHB (2018a, b). *Note* *AP data in 2016–17 compiled as the summation of acres under grapes in AP and Telangana

5.6.2 Scalability Within PVC

Both area and production of pomegranate production were stagnating between 2006–07 and 2012–13 and showed significant increase from 2013–14 onwards explained by a number of factors (Fig. 5.33).

- Though the scale-up in area and production was seen only after 2012–13, the story of why pomegranates emerged as a popular horticulture crop in India starts earlier. Before 2012–13, 80% of the pomegranate production was concentrated in Maharashtra. Pomegranate prices witnessed a continuous rise from 2007 to 2008 onwards. Drought conditions in Maharashtra together with the notorious oily spot bacterial blight created a huge supply shock in 2009 and 2010. At the same time, rise in incomes created huge demand for fresh fruits and vegetables, driving prices higher.

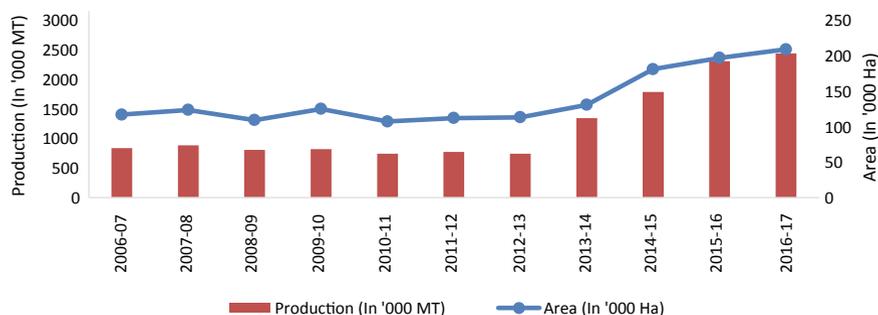


Fig. 5.33 Area ('000 ha) and production ('000 MT) of pomegranates in India (2006–07 to 2016–17). Source NHB (2018a, b)

- High domestic prices created renewed interest in the potential of pomegranates. Acreage under pomegranates started increasing in Gujarat, which had already started experimenting with pomegranate cultivation.
- Perhaps, an important breakthrough in the story came from Jain Irrigation, which started offering sturdier pomegranate cultivation options with the planting material being supported by tissue culture (Fig. 5.34). New development of tissue culture helped standardization of the production protocols, leading to higher output after 2012–13. Apart from planting material, Jain Irrigation also offered support products and services such as drip, pruning technology and fertigation that led to assured yields and profits. Almost all states started offering increased subsidies on drip irrigation systems, which further incentivized cultivation of the crop.
- This technical breakthrough from Jain Irrigation facilitated new expansion, especially in Gujarat. Rajasthan, which hosts ideal climatic and soil conditions for pomegranates, but had never ventured into pomegranates before, started experimenting with pomegranate production. Thus, the increase in acreage after 2012–13 was very rapid in states outside Maharashtra.

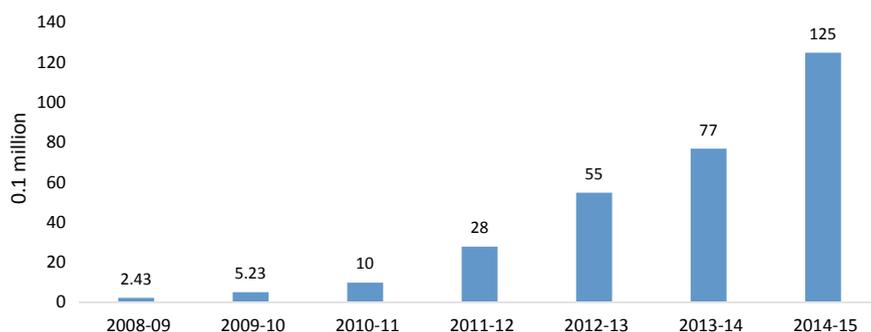


Fig. 5.34 Tissue Culture based Pomegranate Plants sold by Jain Irrigation (0.1 millions) from 2008–09 to 2014–15. Source Jain Irrigation, n.d.

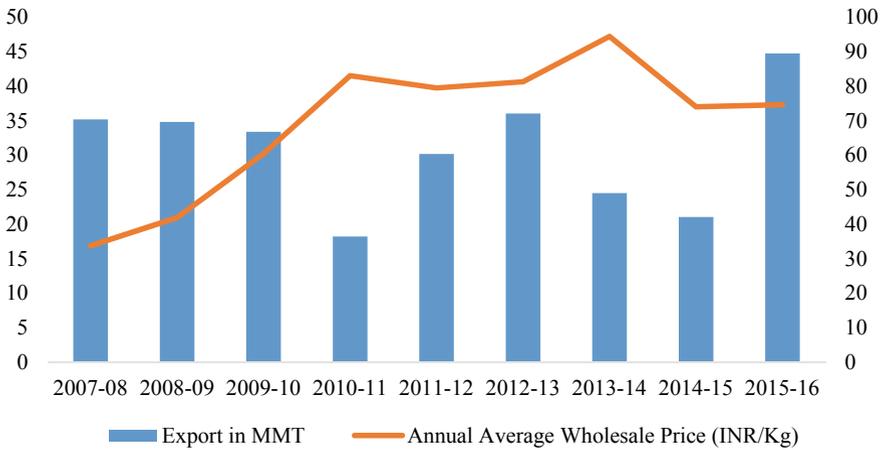


Fig. 5.35 Annual average wholesale price and export volumes of pomegranates in India: 2007–08 to 2015–16. *Source* NHB (2018a, b), APEDA (2018a)

The scalability in pomegranate exports is evident from the increase in volume as well as value of exports from India. Figure 5.35 indicates that pomegranate exports fell sharply in 2010. The oily spot, which manifests itself as a black spot on the skin of the pomegranate, reduced exportability of Indian pomegranates. Indian grapes were rejected in the EU markets citing non-compliance with pesticide residue levels. This caused a domino effect on the pomegranate export market as well and led to a reduction in pomegranate exports. The domestic price inflation between 2009 and 2011 implied higher prices for pomegranates, which further reduced export volumes. In general, there is a negative correlation coefficient between domestic prices and export volumes of Indian pomegranates (Fig. 5.35).

India is one of the most lucrative markets for pomegranates, and pomegranates fetch a highly remunerative price, domestically. Thus, any increase in domestic prices affects export volumes very sharply as the producers simply prefer to sell in the domestic markets. In fact, Indian prices are a key determinant of export volumes of pomegranates.

5.6.3 Scalability and Product Diversification: Experiments with Raisins and Arils

The theories expounding firm behaviour often refer to economies of scale and economies of scope. Scale economies refer to reducing average costs by producing higher volumes of a particular product. Economies of scope refer to a reduction in costs by producing a greater number of related products. The firm sells multiple related products to the consumer and thus exploits maximum mileage from spending

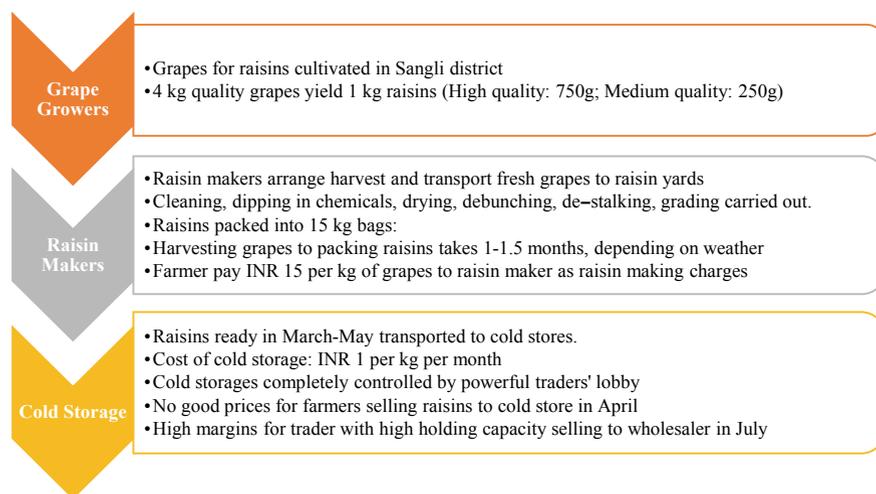


Fig. 5.36 Process map from grape to raisin. *Source* KII

a rupee in reaching out to consumers. It also exploits economies in terms of know-how, credit, raw materials and manpower. In other words, economies of scope allow the firm to scale up horizontally across different related products.

Raisins

The grape economy is a sector where one witnesses economies of scope, plentifully. Globally, 9%, and in India, around 13% of the grape production is processed into raisins. Raisins are a high-value, non-perishable product and hence an attractive business proposition to most grape growers.

In India, Sangli district, with its unique geography, is the major production hub of raisins. The grape season starts early in the region, due to which the raisin making process gets a head start. Hot weather with hot and dry winds from mid-March offers ideal conditions to dry table grapes with 22-degree brix into raisins. The grape to raisin value chain in Sangli is summarized in Fig. 5.36.

When the raisins are ready by March, farmers are in need of money. However, both the demand and price of raisins increase closer to the festive season in August (Fig. 5.37).¹ Farmers do not have holding capacity to await payments for another 3 months. Also, storing the raisins without cold storages is risky since raisins are susceptible to moulds. Cold storages in Nashik are owned by the strong trader lobbies. Very often, farmers enter into a distress sale of raisins at low prices in April itself. Thus, the farmers unfortunately do not partake in the value added in the raisin value chain in a big way.

¹ We created a price index for raisins to understand the movements in prices compared to March, for which value of index = 100. The index was created based on wholesale price data on raisins for 2016–17 and 2017–18.

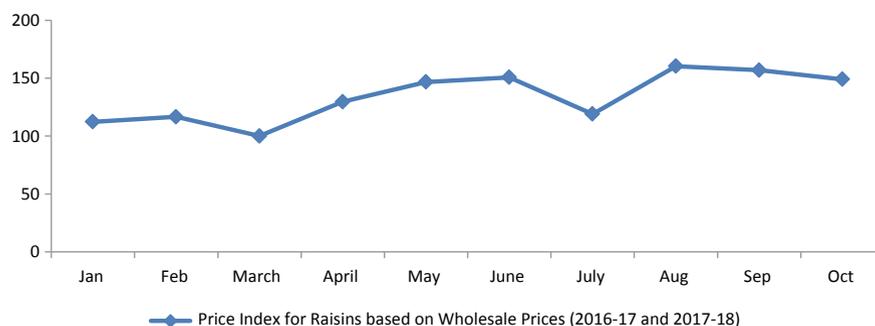


Fig. 5.37 Price index for raisins based on wholesale prices: 2016–17 and 2017–18. *Source* Agmark (2018), authors' calculations

Table 5.7 Price escalation from grapes to raisins: 2018

Players in raisin value chain	Cost + margins (INR)	Price escalation
Grape grower (4 kg of grapes) @ INR 20 per kg	80	
Raisin maker (4 kg of grapes) @ INR 15 per kg	60	140
Cold storage cost for 1 kg raisins for 4 months	4	144
Distress sale by farmers to traders in April (INR 170/kg good quality and INR 120 bad quality)		157.5
Accounting profits to farmers (INR)		13.5
Accounting rate of returns to farmers (%)		9.3
Sale by traders to wholesalers of 750 gm high-quality raisin in July		168.75
Sale by traders to wholesalers of 250 gm low-quality raisin in July		40
Total wholesale value of raisins per kg		208.75
Accounting profits to traders (INR)		51.25
Accounting rate of returns to traders (%)		32.5

Source KIIs and authors' compilation

The calculations show that the raisin value chain is not as efficient as the GVC; a large part of the value of raisins accrues to the trader and not to the farmer (Table 5.7).

Arils (Pomegranate Seeds)

Even though production and exports of pomegranates have scaled up tremendously, the scope economies within the PVC have been limited. Very few firms exporting pomegranates have diversified into selling arils, i.e. pomegranate seeds. There is a huge demand for arils, internationally. The price of 1 kg of aril is nearly 5 times higher than the price of 1 kg of pomegranate. However, the technology for exporting arils is still in its nascent stage. Pomegranates have to be de-seeded, and the arils

have to be sorted carefully, taking care not to break the seeds. If the seeds break, it can potentially start off a fermentation process that destroys the entire consignment. Hence, sorted and graded arils are immediately frozen. The consignment is extremely thermo-sensitive due to the delicate nature of the frozen arils. The packaged arils have to be necessarily flown to EU; the success rate of shipping the aril punnets has been very low. Alternative packaging options are not yet available to ship the consignments to the EU and/or to Dubai, at low costs.

Very few companies (Sahyadri, Chitale Agro, Frestrop, Jain Irrigation, Aarvee Farm Products, Drona Farmers, SAM Agro, etc.) have successfully exported arils thus far. KIIs reveal the most important challenge is lack of continuous power supply in many states. Companies require generator backup, which leads to an increase in production cost.

The other important challenge has been the logistics. Frozen arils are necessarily flown to export destinations and need a seamless facility in terms of cold chain from farm to international consumer. Mumbai air cargo terminal has only 4 work stations for perishable air cargo clearance. This leads to undue delay for clearing the cargo, which impacts the quality of the consignment. Further, pallet scanners are not available at Mumbai, due to which the boxes carrying the aril punnets are unloaded at the clearance station and loaded again, thereafter. This additional handling of the cargo adversely affects the quality of the delicate packaged arils.

5.7 Access to Finance

Access to finance is a critical component for developing value chains, wherein all the stakeholders including farmers are able to access affordable finance. Here, we examine whether farmers, especially the small and marginal farmers, have access to finance at affordable interest rates. We also examine the existing subsidy schemes offered to the farmers as well as to other stakeholders in the GVC and PVC.

5.7.1 Farmers' Access to Finance

In Nashik, our interactions with farmers revealed that crop loans are easily available for farmers, provided there is no default on crop loans taken in the preceding year. Table 5.8 summarizes the interest rates available for crop loans for grapes and pomegranates from nationalized banks.

However, the main problem experienced by farmers is availing land development loans or term loans. Farmers require credit for activities such as preparation of land, installing trellises, preparing pits, staking the new shrubs, buying sprayers or other implements and equipment. However, while sanctioning this loan, banks are reluctant to carry out valuation and accept farm land as collateral. Primary Agriculture Credit Societies (PACs) were good sources to avail term loan credit for the farmer, but after

Table 5.8 Interest rate schedule for crop loans taken for grape and pomegranate farming in Nashik in nationalized banks

Amount of crop loan	Rate of interest charged by nationalized bank (%)
Less than INR 100,000	0
INR 100,000–INR 300,000	4
INR 300,000–INR 700,000	7
More than INR 700,000	11

Source KIIs with farmers and banks at Nashik

the demonetization in November 2016, most societies have either become defunct or stopped their lending activities. The small farmer is left with no other option but to avail credit from the local moneylender or *Savkar* at an interest rate of (5 to 7)% per month.

The other source of lending for the farmer is the *arthiya*, which is mostly available to experienced and well-off farmers, they know and trust. The smallest farmers are not privy to the loan facilities from the *arthiyas*.

Subsidy schemes are available for grape and pomegranate cultivation from National Horticulture Mission (NHM) as well as National Horticulture Board (NHB). These are implemented by the Horticulture Division of Agriculture Department, Government of Maharashtra. The NHM subsidies are available only for those farmers with less than 5 acres of land. The subsidy is only given for drip irrigation and vineyard and/or orchard plantation. But there is inadequate provision towards assistance for buying equipment such as sprayers and pumps. Further, there is an online procedure to avail of the NHM subsidy, which is found to be a deterrent by small farmers.

NHB subsidies are given to loanee farmers only. For example, a farmer avails a term loan for an orchard plantation. Once the project is complete, a joint inspection is done by the NHB and the bank, following which the subsidy is disbursed.

NHB and NHM subsidy norms assume annual production costs of grape farming to be INR 70,000 per acre and pomegranate farming to be INR 60,000 per acre, which are inadequate. Our KIIs with farmers reveal the annual production costs to be as high as INR 100,000 for domestically oriented farmers and INR 150,000 for farmers catering to the export markets.

5.7.2 *Financial Risk Mitigation for Grape and Pomegranate Growers*

Grape and pomegranate farmers typically extend a credit of about 50% of the total value to the exporter or to the domestic trader. The farmer bears the risk of the exporting firm/trader not paying the outstanding balance to the farmer.

The sensitivity analysis reveals that non-return of credit severely reduces profits of the farmers. Within the GVC, the accounting rates of return fall from 159% to 55% if 40% of the due amount is not returned, while within the PVC, they reduce from 207%

to 54% if 50% of the due amount is not returned (See Tables 5.5 and 5.6). In fact, non payment of outstanding balance by exporting firms and traders has become a serious issue affecting the livelihood of grape farmers in the Nashik belt. There have been several instances of the exporting firms and domestic traders disappearing without paying the farmers, which severely threatens the income security of the farmers.

Export Credit Guarantee Corporation (ECGC)

Farmers need a risk mitigation mechanism in order to hedge this risk. This risk mitigation mechanism could be simply in the form of a scheme modelled along the lines of the Export Credit Guarantee Corporation (ECGC). The ECGC exists to help exporters hedge risk of non-repayment by importing firms. ECGC basically creates a profile of the credit worthiness of the import firms and issues advisories on the maximum line of credit that could be prudentially offered to the import firm based on its assessment. It insures the exporter firm for credit given up to the limits recommended as per its assessment. Thus, the ECGC has essentially created an insurance model to hedge the exporter against risk of non-payment by the importer. Such products are needed while dealing with new import firms as also in dealing with relatively unknown markets such as Russia. Following are some of the schemes of the ECGC which could be effectively applied to FPOs/FPCs:

Small Exporter's Policy (SEP): This is one of the standard products offered by ECGC. See ECGC (n.d.^a). It covers the exporter for multiple risks. These include risk of insolvency of buyer and political risks such as occurrence of war between export and import countries. It is issued to exporters whose anticipated export turnover for the period of one year does not exceed INR 50 million.

Buyer Exposure Policy: The Buyer Exposure Policy is to insure exporters having a large number of shipments to a particular buyer with simplified procedure and rationalized premium. See ECGC (n.d.^b). An exporter can choose to obtain exposure-based cover on a selected buyer. The cover would be against commercial and political risks, as outlined in the Small Exporters' Policy.

However, there is simply no advisory that creates a credit rating of the different export firms and domestic traders to help the farmer assess the risk involved in the transactions. Obviously, no insurance products have been developed in this space at all. Thus, it is extremely important to create formal advisory services which can assess the credit worthiness of all actants within the value chain. It is also important to design insurance products to help the actants hedge risks while dealing with other actants in the respective value chains.

In 2017–18, as per APEDA (2018a), the total value of grape and pomegranate exports stood at INR 19.59 billion and INR 5.53 billion, respectively. Our calculations suggest that the grape and pomegranate farmers get 71% and 80% of the fob value of exports, respectively. This implies that around INR 18.33 billion would be the total value accruing to the farmers from the export value chains. Credit extended to the export firms would be around INR 9 billion. This is the value at risk (VAR) due to the current absence of a risk-hedging intermediation within the export value chain.

Around INR 17 billion accrue to the farmers from the domestic trade, of which the credit extended, stands at about INR 8.5 billion. This is the VAR to the farmer from the domestic operations.

5.7.3 Access to Finance for Intermediaries

Exporter firms buy the produce on spot sale at the farms itself. This produce is then taken to pack houses with pre-cooling and cold storage facilities; these are generally leased in by the exporters. A few export firms have their own pre-cooling and cold storage facilities. Nashik has a cold storage capacity of about 70,000 MT. However, many of these facilities (approximately 30%) were created during the 1990s, were largely created in response to the emerging trend in grape export and are in urgent need for upgradation. This implies that about 25,000 MT capacity needs urgent renovation. This translates into a credit demand for about INR 2.5 billion just for creation of cold storages within Nashik.

The All-India Pomegranate Growers' Association claims that the current cold storage facility at Solapur (mostly utilized for pomegranates) stands at 1000 MT but needs to be rapidly upgraded to about 5000 MT by 2024–25. The new food trade regime demands accreditation of pack houses. As demand escalates, creation of modernized pack houses will be imperative to sustain the growth of pomegranate value chain. The total investment requirement in Solapur for creation of accredited pack houses up to 2024–25 is about INR 500 million.

Given the increment in acreage under pomegranates in other districts in Maharashtra as well as in other states such as Gujarat, Madhya Pradesh and Rajasthan, credit will be required to facilitate cold storage creation as well as upgradation in all the pomegranate-producing regions.

The NHB gives 40% credit-linked capital subsidy for construction and/or modernization of existing cold storages. A number of schemes and subsidies for post-harvest management (PHM) are available from APEDA. The Maharashtra State Agriculture Marketing Board (MSAMB) is the nodal agency for implementation of APEDA schemes in Maharashtra. Assistance under the schemes is available for registered exporters, FPOs, and central and state agencies. The major heads for the schemes are export infrastructure development, quality development and market development.

Details of assistance under the schemes are given in Table 5.9.

APEDA gives assistance for infrastructure development such as cold storages, pack house facilities and pre-shipment treatment facilities. However, APEDA gives assistance only when the exporter gets the necessary clearances from the banks and multiple government departments. Multiple inspections and clearances add to the time and transaction cost involved in obtaining the assistance from APEDA. Thus, the main constraint faced by stakeholders is lack of a single window for all clearances. The other issue faced is that the scheme only provides assistance for creation of capital assets, but lack of working capital often makes the capital asset defunct.

Table 5.9 Assistance provided by APEDA for PHM under various schemes: 2018

Schemes	Components	Maximum assistance
Export infrastructure development	Cold storage, pack house facilities, pre-shipment treatment facilities such as vapour heat treatment, hot water dip treatment and some basic processing facilities such as screening, sensors and filth/metal detectors	INR 10 million
Quality development	1. Implementation and certification of quality and food safety management for all APEDA-scheduled products	40% of cost of equipment s.t. maximum limit of INR 400,000 per individual beneficiary
	2. Procuring handheld devices (HHDs) for capturing farm-level coordinates for traceability systems	
	3. Testing of water, soil, residues of agrochemicals, pesticides, etc.	INR 5000 per sample
	4. Upgradation of APEDA-recognized laboratories	40% of cost of equipment s.t. maximum limit of INR 7.5 million
	5. APEDA registered exporters for in-house laboratory equipment	40% of cost of equipment s.t. maximum limit of INR 2.5 million
Market development	1. New market development, feasibility studies	40% of cost of equipment s.t. maximum limit of INR 1 million per beneficiary
	2. Trial shipment for produce	40% of cost of equipment s.t. maximum limit of INR 0.5 million per container
	3. Registration of brand/IPR outside India	40% of cost of equipment s.t. maximum limit of INR 2 million per container

Source APEDA (2018b)

Exporters face another credit constraint due to the peculiar nature of the consignment sale, wherein the final price is not known to either party until the final realization of the sale. Exporting firms receive only (40–60)% payment as advance from the importing firms, and the remaining payment is done almost 40 days after the produce is shipped.

Exporters need working capital for carrying out the expenses related to packaging, pre-cooling, transport, labour, etc. Typically, banks sanction working capital loans only against the advance payment mentioned in the export order and hence the available working capital is not enough to cover all the expenses incurred by the

exporting firms. According to the industry norm, working capital of INR 100,000 is required to export a consignment of 1 MT. The working capital loans are usually sanctioned by commercial banks at about 12% interest.

5.7.4 Access to Finance for FPOs/FPCs

Promotion of FPOs or FPCs specializing in grapes and/or pomegranates could be immensely beneficial in strengthening the value chains and empowering farmers to earn higher prices. The FPCs can enable minimizing the pre and post-harvest costs, access to expert know-how as well as reduced costs in terms of chemical molecules required for grape and pomegranate cultivation.

Sahyadri Farmers Producer Company Limited has emerged as a success story, and its journey is worth studying to understand how FPCs/FPOs can benefit farmers. It is the largest FPC in India which started its operations with 10 marginal grape growers in 2004 in Nashik. The case of Sahyadri FPC Ltd. which formally registered as a FPC in 2011, is an interesting case of competitiveness, inclusiveness, sustainability and scalability. The company imports soluble fertilizers and other inputs for its members and thus acts as an aggregator. The growth in all vineyards is tracked online, and harvest is planned as per maturity of vineyards, storage capacities and demand schedules. Sahyadri farmers are able to save nearly INR 20,000 per acre, and the members claim that their exportable output is 7 tonnes per acre as compared to the Nashik average of 6 tonnes per acre. All activities such as production, pruning and spraying on farms of all 1000 plus members of Sahyadri are planned in the same weeks. These are tracked on special digital apps, helping the members to adhere to production protocols gainfully.

Given the need to increase cold storage capacity in Solapur from 1000 to 5000 MT over the next 5 years, such capacity expansion can be undertaken and financed through FPOs or FPCs. However, a common problem observed is that infrastructure created is often unused due to the unavailability of working capital at affordable interest rates. Hence, once FPOs/FPCs are rated on the commercial sustainability of their venture, access to finance for creating cold storages or pack houses can be enhanced through matching equity grant schemes.

Box 5.1: Sahyadri Farmer Producer Company Ltd: A Case of Competitiveness, Inclusiveness, Sustainability and Scalability

<p style="text-align: center;">Competitiveness</p> <ol style="list-style-type: none"> 1. Common sourcing of inputs mean lower cost 2. Standardized production protocols lead to higher yields and lower rejections 3. Contract with international breeder company to cultivate 3 patented varieties in 2017. 	<p style="text-align: center;">Inclusiveness</p> <ol style="list-style-type: none"> 1. Growth from 10 marginal farmers in 2004 to 1000 small farmers in 2011 2. Buys paddy from tribals (in Surgana, Dang, etc.) who work on grape farms of FPC members
<p>Sahyadri Farmer Producer Company Ltd.</p>	
<p style="text-align: center;">Sustainability</p> <ol style="list-style-type: none"> 1. High profits due to low input, storage and marketing costs 2. High prices due to brand recognition 3. BAU accounting profits: 159% (non-members), 207% (members) 	<p style="text-align: center;">Scalability</p> <ol style="list-style-type: none"> 1. Number of products and markets increased over time 2. Fresh grapes exports increased from 4 containers in 2004 to 160 in 2010 to 1458 in 2019 3. Operates own cold stores, pack house and machinery 4. Piloted aril production in 2018

Box 5.2: Innovative Practices and their impact at Sahyadri FPC Ltd.

- Common schedule for pruning, spraying, harvesting, etc., for all member farms.
- Online tracking of vineyards: harvest planned as per maturity of vineyards, storage capacities and demand schedules: There is a saving of nearly INR 20,000 in costs per acre, and the members claim that their exportable output is 7 MT per acre as compared to a Nashik average of 6 MT per acre.
- Automated weather stations (AWSs) and Agromet advisories.
- Accounting profits of members show a remarkable jump from 159% to 207% on joining the FPC.
- Cultivating three new varieties for an international breeder company. FPC to pay a 5% royalty on the entire exports of the patented varieties from India.

5.8 Policy Recommendations

Studying the grape and pomegranate value chains using the CISS-F framework has put forth very interesting insights and important policy implications. This section discusses key policy reforms that can help strengthen both the grape and pomegranate

value chains by overcoming the challenges and leveraging the opportunities. As demand for high-value commodities increases both domestically and globally, India is very well positioned to cater to both these markets. It will be critical to ensure that the economic benefits of such market expansion are shared equitably with the primary producers to live up to the vision of inclusive growth.

Diversity in Variety of Grapes and Pomegranate that have Remunerative Markets

Lack of varieties is one of the major issues faced by grape as well as pomegranate farmers. The international grapes market heavily favours new varieties, and the secret of success for grape growers in Peru and Chile is their penchant for export varieties. Indian grape farmers from Nashik have nearly 70% share in the global market for Thompson Seedless. However, this is not so much due to cost competitiveness of Indian grape growers. This is primarily because grape growers from competing countries such as South Africa, Chile and Peru have started rapidly harvesting coloured, patented varieties. For India to take advantage of a fairly diversified global grape market, cultivation of those varieties needs to be promoted. Thus, there is a need for aggressive research (to be carried out at NRC Grapes) so as to breed coloured varieties that are amenable to cultivation in Indian soil, topography and weather conditions.

For pomegranates, India exports the cultivar *Bhagwa* only. This is the most popular variety consumed in the domestic market. While the cultivar has stabilized quite well, it is optimally sized at 250 g. The EU and Gulf markets price the bigger fruits of size 350 g at a premium of at least around 20% over the regular size of 250 g. The farmers can earn a higher premium if the same variety of *Bhagwa*, with higher optimum fruit size, could be researched and developed.

Aggressive research backup, education and extension have to be strengthened by the government for sustaining the profit momentum within the export value chains of grapes and pomegranates.

Improved Access to Finance in the Value Chain (Norms, Coverage and Actual Coverage of Credit/Subsidies)

Credit is given by almost every player to the next actant in the grape value chain. Thus, farmers give credit to the exporters and/or domestic traders and the exporters in turn give credit to the import firms. Chances of non-return of the credit extended can play havoc with the economics of grape and pomegranate farming.

Despite, Export Credit Guarantee Corporation (ECGC) of India providing insurance to exporters to hedge risks, it is found that the grape- and pomegranate-exporting firms do not avail such insurance.

It is critical to design formal advisory services which can assess the credit worthiness of all actants within the value chain. Also, creation of insurance instruments to help the actants hedge risks associated with price volatility, non-payment, etc., is relevant. An entity could be designed on same lines as the ECGC to cater to the needs of the domestic agriculture markets. ECGC is a central government organization which offers guarantees against default on payment by the importing firms. With a small fee, ECGC gives information on the credit score of importing firms.

Hence, small exporters can take informed decisions on how much credit to extend to their importing counterparts.

This kind of a scheme is also needed for domestic markets as well, especially under the framework of the new marketing laws, which allow farmers to trade with any other PAN card holding entity in India. If credit scores of buyers can be created and provided to farmers, it will help the farmers to take an informed decision on extending credit to the buyers. As has been mentioned earlier, farmers extend credit to exporters as well as domestic traders and hence are vulnerable to a risk of default by these parties. Our calculations show that the value at risk (VAR) due to non-availability of insurance products stands at INR 17.5 billion within the grape and pomegranate value chains alone.

This entity would also be a logical plug-in to the e-NAM design. NHB and NHM subsidy norms assume annual production costs of grape farming to be INR 70,000 per acre and pomegranate farming to be INR 60,000 per acre, which is inadequate. Subsidy norms fixed by government agencies should reflect field realities accurately.

Strengthening Logistics to Enhance Marketability

Exporter firms buy the produce on spot sale at the farms. This produce is then taken to pack houses with pre-cooling and cold storage facilities. Nashik has a cold storage capacity of about 70,000 MT. New multi-facility cold facilities that can be accredited as export safe are required at Nashik, Solapur as well as Sangli. Other grape- and/or pomegranate-producing states such as Gujarat, Madhya Pradesh and Rajasthan also need cold stores to be developed. If dedicated cold storage facilities for grapes and pomegranates could be developed in Bihar or Delhi, the farmers in Maharashtra can also access the more remote and fairly remunerative markets of Jammu and Assam.

There are a number of inadequacies in the logistics chain that do not allow products such as arils to be exported easily. Limited number of clearance stations at Mumbai Cargo Terminal, lack of pallet scanners and multiple handling of the produce lead to product damage and rejection of the consignment. It puts exports into jeopardy. These facilities need to be provided so as to smooth out the rough edges connected to aril exports.

Strengthening Institutions such as FPOs/FPCs

Farmers in Sangli often have to sell off raisins to the traders at unremunerative prices. The reason is that raisins require cold storage and these are largely controlled by raisin traders. FPC-promoted cold chains could be an effective solution to help farmers earn remunerative prices and make raisin value chains more inclusive for small and marginal farmers.

FPC membership has also improved the rates of returns experienced by small farmers sharply. Well-managed, professional FPCs might well evolve to be the best business models for grape and pomegranate value chains.

Both grapes and pomegranates are high-value commodities and have robust markets for fresh and value-added products. For small and marginal farmers to access these domestic and global markets, FPCs can play a large enabling role. Aggregation of input and service requirement of farmers can help reduce costs of production.

Technology solutions for better value addition and meeting stringent quality standards can be organized and made more affordable to the farmers. Professionally managed FPCs can help strengthen existing value chains and ensure that these are inclusive of small and marginal farmers.

States like Karnataka, Andhra Pradesh, Tamil Nadu, Punjab and Haryana have favourable agro-climatic conditions that support vineyards. A cluster-based approach could be adopted in these states to promote grape cultivation through handholding of farmers, bringing in the right package of practices and providing the required institutional support. The demonstrated success of grape cultivation and marketing in Maharashtra can be shared with potential states to boost grape cultivation in the country.

Addressing Issues related to Climate Change

Climate change has been impacting the profitability of grape as well as pomegranate cultivation for the farmers. Particularly, it affects pomegranate production more, because standardized production protocols are not yet developed. Thus, farmers are not aware of the right technology solutions that can help them address issues related to a drought or a very cold spell. They cannot anticipate the onset of diseases due to changes in weather conditions well in advance to control crop damage. On the contrary, grape farmers are aware and better equipped with the technology solutions and have been able to face climate uncertainties relatively better. Hence, there is need for considerable research in designing production protocols for pomegranates to help farmers cope with production uncertainties related to weather, environment and diseases.

For grapes as well as pomegranates, if water is not available at the right time, it affects the yield as well as quality of produce. Farmers suffer losses as they are unable to sell in the export market and are forced to sell in the domestic market. Although farmers are quite vulnerable to the adversities arising out of climate change, insurance instruments to help them hedge against production and price risks are still in a nascent stage. Farmer awareness regarding such products is also quite low. Hence, there is need for making such insurance available to the farmers and promote greater awareness among them about the benefits of availing such risk mitigation measures.

Norms for Reporting Data Pertaining to Export of Horticulture Produce

According to the export firms interviewed during field visit, the importing firm normally pays only 50% of the expected consignment sale value to the exporter on the day of shipping. The importing agent normally credits the rest of the amount to the exporter's account after about 15 days after the consignment reaches the retailer. On the day of shipping, the exporter does not know the final value that he will receive (that depends on the price movements in the next month) for the consignment. Hence, he only submits a proforma invoice as a part of the documentation required by APEDA. The proforma invoice carries details of the value of the consignment as received by the exporter on the day of shipping as well as details of the volume of the consignment shipped. However, the value received by the exporter on the day of shipping the consignment is only (50–60)% of the actual value that he eventually receives.

APEDA maintains data on only proforma invoices submitted by the exporters and not on the actual value received by them eventually. To the extent that the values entered in the proforma invoices are understated, this implies that calculations of unit values based on APEDA data are also underestimated.

The value eventually received by the exporter is entered on the Bank Realization Certificate (BRC) which is part of the documents submitted to the DGCIS, based on which the DGCIS releases the MEIS subsidies. It is of vital importance that the DGCIS data be integrated with the APEDA database, so that the actual value of grape exports from India is recorded correctly.

Grapes and pomegranates are extremely high-value horticulture products with well-established value chains. The domestic as well as export value chains have shown robust performance despite the presence of several challenges and policy gaps. The study creates an understanding of different actants within the value chain through the CISS-F lens and comes out with suitable policy interventions that can help better the performance of the value chains.

Annexures

Annexure 5.1: Calculation of NPC for Indian Grape Exports

Year	UV1	UV2 = UV1 less port handling	UV3 = UV2 less 7% trader margin	UV4 = UV3 less 32% packing, labour, pre-cooling, transport, marketing costs	UV5 = UV4 adjusted 10% for quality	Av wholesale prices (3 months)	NPC
2006-07	35.13	34.63	32.37	24.52	22.29	12.10	0.54
2007-08	32.78	32.28	30.17	22.85	20.78	18.73	0.90
2008-09	31.07	30.57	28.57	21.64	19.68	15.99	0.81
2009-10	36.74	36.24	33.87	25.66	23.32	19.23	0.82
2010-11	42.30	41.80	39.07	29.60	26.90	26.38	0.98
2011-12	54.48	53.98	50.45	38.22	34.74	36.18	1.04
2012-13	69.67	69.17	64.64	48.97	44.52	32.06	0.72
2013-14	89.67	89.17	83.34	63.14	57.40	26.85	0.47
2014-15	103.07	102.57	95.86	72.62	66.02	46.75	0.71
2015-16	102.70	102.20	95.51	72.36	65.78	35.32	0.54
2016-17	89.77	89.27	83.43	63.21	57.46	37.97	0.66

Source: NHB (2018a, b); APEDA (2018a) and Authors' calculations

Annexure 5.2: Calculation of NPCs for Indian Pomegranate Exports

Year	UV1	UV2 = UV1 less port handling	UV3 = UV2 less 7% trader margin	UV4 = UV3 less 16% packing, labour, pre -cooling, transport, marketing costs	Av wholesale prices (3 months)	NPC
2006-07	36.72	36.22	33.85	27.3	31.04	1.14
2007-08	25.93	25.43	23.76	19.16	33.75	1.76
2008-09	32.93	32.43	30.3	24.44	41.92	1.72
2009-10	35.79	35.29	32.98	26.6	60.42	2.27
2010-11	38.96	38.46	35.94	28.99	83.01	2.86
2011-12	48.83	48.33	45.17	36.42	79.43	2.18
2012-13	65.09	64.59	60.36	48.68	81.23	1.67
2013-14	121.9	121.4	113.46	91.5	94.35	1.03
2014-15	153.97	153.47	143.43	115.67	73.98	0.64
2015-16	102.27	101.77	95.11	76.7	74.55	0.97
2016-17	98.58	98.08	91.66	73.92	75.92	1.03

Source: NHB (2018a, b); APEDA (2018a) and Authors' calculations

Annexure 5.3: Business as Usual Scenario and Sensitivity Analysis for Grapes

Assumptions for constructing BAU financial estimates for the export-oriented farmer with 1 acre of land under grapes:

- Precision farming for grape yields about 10 MT per acre.
- Around 60% is exported; 30% is sold on domestic markets and 10% damaged.
- FGP for export quality fruit = INR 70 per kg; FGP for domestic market = INR 50 per kg.
- Cost of establishment of the vineyard and maintenance of the same for the first two years (drip, land preparation for the plantation, trellises and stakes, planting material, implements such as sprayers) stand at INR 500,000 in 2018.
- The annual production cost (A2) after second year of operations is INR 220,000.
- Imputed cost of family labour is assumed to be INR 120,000 per annum. Rental value of 1 acre land is valued at INR 50,000 per acre in Nashik. Further, the opportunity cost of fixed capital (INR 500,000) at 8% is INR 40,000 per year. Since almost all sales are carried out on farm, there are no marketing costs for the farmer.

Indicative revenues, costs and rate of returns to export-oriented grape farmers under BAU scenario

S. No.	Indicative revenues and costs (INR)	
1	Revenues—exports	420,000
2	Revenues—domestic	150,000
3	Cost of cultivation (A2) after two years of establishment	220,000
4	Net profit per annum	350,000
5	Capital cost	500,000
6	Life of project	10 years
I	Accounting rate of return (per annum over recurring costs)	159%
II	Internal rate of return of project (over A2)	70%
III	Internal rate of return of project (over A2 + FL)	45%
IV	Internal rate of return of project (over C2)	30%

Source KIIs and authors' calculations

Assumptions for constructing BAU financial estimates for the domestically oriented farmer with 1 acre of land under grapes:

- Yield is 12 MT per acre (grape yields on domestic-oriented farms are higher than export-oriented farms).
- 10% lost in damages, and rest sold at INR 35 per kg.
- The cost of establishment of the vineyard and maintenance of the same for the first two years stands at INR 500,000 in 2018.
- The annual production cost (A2) after second year of operations is INR 120,000 for a one-acre grape plantation. The imputed value of family labour is assumed to be INR 100,000 per annum. Rental value of 1 acre land is INR 50,000 per acre in Nashik. Further, the opportunity cost of fixed capital (INR 500,000) at 8% is INR 40,000 per year. Since almost all sales are carried out on farm, there are no marketing costs for the farmer.

Indicative revenues, costs and rate of returns to domestically oriented grape farmers under BAU scenario

S. No.	Indicative revenues and costs (INR)	
1	Revenues—exports	0
2	Revenues—domestic	378,000
3	Cost of cultivation (A2) after two years of establishment	120,000
4	Net profit	258,000
5	Capital cost	500,000
6	Life of project	10 years
I	Accounting rate of return (per annum over recurring costs)	215%

(continued)

(continued)

S. No.	Indicative revenues and costs (INR)	
II	Internal rate of return of project (over A2)	51%
III	Internal rate of return of project (over A2 + FL)	25%
IV	Internal rate of return of project (over C2)	6%

Source: KIIs and authors' calculations

Annexure 5.4: Business as Usual Scenario and Sensitivity Analysis for Pomegranate

Assumptions for constructing BAU financial estimates for the export-oriented farmer with 1 acre of land under pomegranates:

- The farmer practises precision farming techniques which yields about 8 MT per acre. The export is oriented to Gulf markets.
- Around 60% of the yield is of export quality. Around 30% of the produce is sold on domestic markets, and about 10% is damaged.
- FGP for export quality fruit = INR 60 per kg; FGP for domestic market = INR 40 per kg.
- The cost of establishment of the pomegranate orchard and maintenance of the same for the first two years (drip, land preparation for the plantation, pits, planting material, stakes, implements such as sprayers) stand at INR 180,000 in 2018.
- The annual production cost (A2) is INR 125,000. Imputed cost of family labour is assumed to be INR 120,000 per annum. Rental value of 1 acre land is INR 50,000 per acre in Nashik. Further, the opportunity cost of fixed capital (INR 180,000) at 8% is INR 14,400 per year.

Indicative revenues, costs and rates of return to export-oriented pomegranate farmers under BAU

Indicative costs and revenues (INR)		
1	Revenues—exports	252,000
2	Revenues—domestic	96,000
3	Cost of cultivation (A2) after two years of establishment	125,000
4	Net profit per annum	223,000
5	Capital cost	180,000
6	Life of project	10 years
I	Accounting rate of return (per annum over recurring costs)	207%
II	Internal rate of return of project (over A2)	144%

(continued)

(continued)

Indicative costs and revenues (INR)		
III	Internal rate of return of project (over A2 + FL)	77%
IV	Internal rate of return of project (over C2)	40%

Source KIIs and authors' calculations

Assumptions for constructing BAU financial estimates for the domestically oriented farmer with 1 acre of land under pomegranates:

- Yield is 7 MT. (Without precision farming techniques, pomegranate yields vary from 6 to 10 MT per acre, assuming water availability.)
- 60% of the produce is of good quality; price in APMC market is INR 40.30% sold at INR 25 in the domestic *mandi*, and 10% of the produce is damaged.
- The cost of establishment of the pomegranate orchard and maintenance of the same for the first two years stand at INR 180,000 in 2018.
- The annual production cost (A2) after second year of operations is INR 100,000. Imputed cost of family labour is assumed to be INR 100,000 per annum. Rental value of 1 acre land is assumed to be INR 50,000 per acre in Nashik. Further, the opportunity cost of fixed capital (INR 180,000) at 8% is INR 14,400 per year.
- Since pomegranates are necessarily routed through APMCs or *mandis*, there is a cost of marketing incurred by the farmer. The farmers pack the pomegranates in 20 kg crates and transport the pomegranates to the Nashik APMC market by small tempos. The rent for the tempo depends on the actual distance travelled; we assume a rent of INR 30 per crate. The farmer then pays INR 10 per crate as labour charges and also pays INR 20 per crate to the arthiya as auctioning charge. Thus, the farmer bears a cost of around INR 63 per crate.
- Out of an average yield of 7 MT, 90%, i.e. 6.3 MT, is taken across to the APMC *mandi* in crates. Since each crate carries 20 kg, 315 crates are required to carry 6.3 MT to the market. The cost per crate is INR 63. Thus, the domestically oriented farmer bears a marketing cost of INR 19,845.

Indicative revenues, costs and rate of returns to domestically oriented pomegranate farmers under BAU scenario

S. No.	Indicative revenues and costs	
1	Revenues	220,500
2	Cost of cultivation (A2) after two years of establishment	100,000
3	Cost of marketing—315 crates @ INR 63 per crate	19,845
4	Total costs	119,845
5	Net profit per annum	100,655
5	Capital cost	180,000
6	Life of project	10 years

(continued)

(continued)

S. No.	Indicative revenues and costs	
I	Accounting rate of return (per annum over recurring costs)	84%
II	Internal rate of return of project (over A2)	55%
III	Internal rate of return of project (over A2 + FL)	0%
IV	Internal rate of return of project (over C2)	0%

Source KIIs and authors' calculations

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