

## CHAPTER 7

### Conclusion and Findings

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To sum up, the study has tried to sought out that agriculture sector is a key sector for generating employment opportunities for the larger population especially rural population of Maharashtra. This sector is one of the main contributors to increase economic growth. It is dependent on various sub-sectors such as irrigation, seeds, equipments, fertilisers, pesticides, animal husbandry and horticulture sector. However, the study dealt only grapes' production and its uses for wine making. India is the second largest country for production of fruits and vegetables in the world and also reached highest growth in rice, wheat, pulses and oil seeds. Over the history of the human settlements on the earth, agriculture was transformed in tune with the growing population and its challenging needs, and innovation has been quite remarkable since the end of the World War Second. India had produced many technologies in various sectors, also some technological innovation in horticulture sector after the golden revolution (Dastagiri, 2014). It was started in the years 1991-2003 in India, and mostly focused on research and development (R&D), as well as technology transfer related to the horticulture sector, irrigation sector and seeds etc.

The study finds out that there are nine states in India which are producing grapes'. But in comparison Maharashtra produces two varieties one is table grapes (popular varieties, Sonaka, Ganesh, Manik Chaman and Thompson seedless etc.) and second is Wine grapes (Cabernet Sauvignon, Merlot, Shiraz, Zinfandel, Pinot Noir, Cabernet Franc, Pinotage, Sauvignon Blanc, Chardonnay and Chenin Blanc).

The demands of Indian table grapes production have increased in the foreign countries. There it could be said that, it is benefited for creating new markets in other countries. These markets may help for making a strong impact or development in Indian economy. Further, in terms of horticultural crops production, Maharashtra is considered to be an important state in the country. Maharashtra was the leading state for grapes production in

the year 2016. Because of its environment, irrigation system, climate, soil, suitable temperature for grapes production and also government plays a vital role in the process of grapes cultivation. Another important thing is that research and development, industries, companies and universities are playing a crucial role which is understood after the field survey, annual reports as well as on bases of literature. Therefore, the study has tried to focus on the role of some research and development, industries, companies and universities. Grapes production has been an established commercial crop in Maharashtra. The state is the largest producer of grapes and pomegranates in the country. Most of the horticultural crops (especially grapes production) produced in Maharashtra, India are labour intensive and provide substantial employment not only in production process but also in transportation, processing and other marketing activities. But there are major channels of marketing such as commission of agents or contractors and consumer for local and distant markets. But in the grapes cultivating process there are some problems or diseases which are harmful for increasing grapes production such as climates, water management, money and diseases; Anthracnose, Downy Mildew, Powdery mildew and Rust etc.

In this connection the study highlighted on the role of regional innovation systems in the grapes production methods and its uses for wine making. To understand the methods of grapes cultivation a survey of farmers from three Talukas of Nashik districts such as, Nashik, Niphad and Dindori from each taluka four villages and in each village eleven or twelve farmers were randomly selected. The impact of the grapes that results from the network of these determinants spread over various districts has been gauged by interactions with Nashik, Niphad and Dindori Talukas farmers. There farmers are mostly using drip irrigation technology for the cultivation of grapes. After analysing the primary data, it was assumed that most of the policies and schemes implemented by the government bodies for horticulture (grapes) purposes have not approached the farmers. Most of the farmers of such areas are not aware of these scheme and policy (for example, National Cooperative Development Corporation, Post Harvest Management Schemes, National Horticulture Board Scheme, National Agricultural Cooperative Marketing Federation, Ministry of Food Processing Industries schemes, Establishment of Marketing

Infrastructure for fruits, National Mission on Micro Irrigation, Artificial Recharge to Ground Water through dugwells, Accelerated Irrigation Benefit Programme and Market Information Service scheme for fruit Crops) which determine the weak linkages between the formal bodies and farmers. One of the constraints regarding the policies and scheme is that, it takes a long time for a farmer to get enlisted under scheme. Farmers were reported that, it takes months/year to achieve such scheme for producing grapes. Moreover, the money under the subsidised schemes does not come to them in full amount and they have to make their own investments also. The farmers, who have good relations with the politicians and government servants, get such facilities easily and the small farmers with less than 2.5 acres land (poor) farmers remain still helpless. The farmers have reported that the government bodies are not focussing on such problems. Also some of them were satisfied with such little distribution of schemes rather than nothing. The formal bodies like universities and R&D centres linked with the horticulture system reported that the funding from government for scheme and projects is not sufficient to cope up with the problems. If the funding is increased, the R&D regarding the grapes processes will get improved. The technology transfer and diffusion will get rapid support to farmers; thereby helping in improvement of the grapes production.

The socio-economic impact of innovation that results from the network of these determinants spread over various districts has been gauged by interacting with 134 farmers from three taluka (Nashik, Niphad and Dindori) of Nashik District in Maharashtra. The farmers were questioned about the impact of technological innovation with regard to their preferences and practices for using certain innovations as well as the role of the components/determinants of the horticulture innovation system mentioned in this study which helps the farmers to gain familiarity with the innovations. While trying to find answers to such questions, some interesting facts and figures about the farmers have been acquired which were seen in the study.

The grapes production is vital to the well being of the farmers in these three taluka. Along with, it is significant in local, state, national, and international level for the development of economic condition. Regarding the impact of grapes production on the

farmer's income in the three taluka, formal bodies have also come into action. The field survey has mainly tried to seek out the main activities of the government for the development of grapes in these three taluka. For example, how they help the development of grapes in these taluka. Another crucial issue mentioned about the technological innovation (and its diffusion) in the agriculture sector with regard to grapes facilities in these taluka. The overall assessment is that after grapes cultivation annual income of farmers has increased. Nashik district has the most favourable physiographic conditions that suit the grape cultivation. This has been very well exploited by the farmers of Niphad, Dindori and Nashik, talukas. The farmers' awareness is in understanding the requirements of international business and export qualities of their production also. District has been rightly called the grapes hub of Maharashtra as well as our country.

There are some schemes for instance drip irrigation technology and objective of these scheme is that it gives flexibility to the state in taking need based interventions that also includes infrastructure development for increasing production and productivity in grapes. In this scheme, the main focus has been on water resource development and management. This scheme is playing a vital role in the horticulture sector for increasing the grapes production. Nashik, Niphad and Dindori taluka larger farmers get benefit of this scheme. But still poor farmers do not get benefit of this scheme, it's not the issue of land size; the main issue is that they are denied government schemes and for getting the benefits of any schemes of government there are many problems faced by small farmers. That's why small farmers do not apply for any government schemes in the case of Nashik district (Field Survey, 2016-17). The farmers are not satisfied with the government schemes. According to farmers, government had provided subsidy based on land size. Those farmers who have more land were given the benefit of the government scheme with 20% subsidy, but the farmers who have less than 2.5 acres of land did not get the benefit. During the survey, the fact that SC/ST peoples have no more land and they are working in the others' land as landless labourers resulted in less change in socio-cultural aspects. Therefore, it may be said that there have not been significant changes in socio-culture of landless labourer as compared to landlords.

The field survey experience also hinted that the middleman's share in consumer's amount is high. It was interesting to know that they even did not know the real middleman that purchased their product. This was all due to poor marketing and less organised marketing system. Nobody knew that in what price second middleman purchased his produce. There should be formation of farmers cooperative which can boost their marketing channels. In the field survey, another serious problem observed which they indicated was related to cheating by agents. Agents were running to disappear with grapes growers' money by selling their production. But the problem they now face is, that the middlemen purchase their product on one price which is fixed by negotiation, but ultimately offer them lower price after selling the product. Thus agents are not trust worthy. That is why some of the farmers suggested to government to ban these types of agents. Farmers also shared the problem about time period of giving money (on credit) by the banks to grapes growers. Grapes growers face the problems of getting bank money at right time. Hence due to fungibility of money, it is misused. Interestingly one of the grape growers used the word lucky draw for grape farming indicating that profit is not sure in this fruit crop.

Therefore, the study is concerned with the current position of grapes production and its uses in Nashik district of Maharashtra and the role of main components of regional innovation system in the grapes production. In the regional innovation systems, the components are university, industrial enterprise, public research institutes and various organisations. Using this conceptual framework, it provides an idea that the horticulture sector (grapes production) is getting consolidated by the role of these components in Maharashtra.

The main purpose of the study reflects on the grapes production in Maharashtra, the study considers RIS as including activities and organisations within the state. The term RIS is appropriate however because government of Maharashtra is making policies and oversee patents, regulatory, institutions, budgets for R&D, the creation and operation of organisations and firms, etc. In this study, we have tried to provide information of the empirical equivalents of the theoretical concepts of regional innovation system.

In this study academic literature reviews related to research topic is also done. The portion of literature review is divided into three major parts. Because of it is necessary for this type of (interdisciplinary) study. First is agriculture sector: in this part, reviews are done related to agriculture, horticulture, irrigation sectors, grapes, wine production and the role of technology in grapes and wine in Nashik district, Maharashtra, India. The second part mentions reviews related to innovation systems especially regional innovation system which is selected as theoretical framework for analysing the horticulture sector of Maharashtra. In this part some articles and books are reviewed which relates to the system of innovation and mainly focuses on national and regional innovation system. The third part mentions about co-related literature reviews with the above both parts. There are wide ranges of literature available on particular aspect of horticulture sector (especial grapes and wine production and regional innovation system. But in spite of that there is lack of literature in context of correlation with horticulture sector especial grapes, wine production with regional innovation system. Most of the literature is written on horticulture as well as grapes, wine production and regional innovation perspective, has a different perspective as compared to alone study of socio-economical, political and environmental etc., but there is scarcity of literature co-related to both the above mentioned concepts. This study tries to find out the relationship between regional innovation system and horticulture especially grapes and wine production in Nashik district, Maharashtra. Also, how regional innovation system plays a vital role in the grapes and wine production in Maharashtra. It may mostly benefit the society and academia.

To mention some empirical specification that the objective is to trace the innovations that have taken place in the horticulture sector especially grapes production and the role played by the components to bring about innovations. In order to use RIS framework, region needs to decide which empirical observations can be located. However, for this study there is no specific localised geographical area/region/city which is considered – rather the geographical span of study is spread over many districts. This is because the four universities, five industries/companies, two organisations and other determinants such as institutes and R&D bodies visited during the field work are located across seven

districts. And in order to understand the grapes scenario in the light of RIS, it was necessary to include the various universities, industries, organisations, institutes, and research centres within the survey.

After analysing the field survey data of RIS components, four agriculture universities have done case study during the period of field survey and tried to find out their work which is important for grapes cultivation. The name of universities are; Mahatma Phule Krishi Vidyapeeth, Rahuri, Vasant Rao Naik Marathwada Agricultural University, Parbhani, Maharashtra, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola and Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri. Amongst these only Mahatma Phule Krishi Vidyapeeth, Rahuri is doing research activities related to grapes production and its development. Another three universities are doing research in the area of horticulture and its development. So the overall assessment is that these four universities have played a crucial role in the area of grapes research and development. For instance, these universities are sharing knowledge about the grapes production, research and development on the diseases of grapes plants, grafting on the grapes plants and gives guidance to farmers about the plantation of grapes and also how to take care of the condition.

The industries and companies which are also components of RIS, selected five industries for the case study which are Maharashtra Agro Industries Development Corporation Ltd (MAIDC), Nashik, Jagtap Horticulture Pvt. Ltd. Pune, Jaihind Agro Services A-656, Nashik, Jain Irrigation Industry, Jalgaon, Maharashtra and Sula wine industry, Nashik. These are providing most beneficiary services, tools, technologies, chemicals and pesticides, etc. to grapes cultivators which are most important to taken a high production and research and development centres done research on the requirements of the farmers, environment and diseases of grapes and GARTI is doing a R&D on the wine production. The following centres have been selected for the study such as Maharashtra Rajya Draksha Bagaitdar Sangh, Pune the ICAR-National Research Centre for Grapes under Indian Council of Agricultural Research (ICAR), Pune and Gargi Agriculture Research & Training Institute (GARTI), Nashik. These research and development centres are doing

research on the bases of requirements of the farmers, environment and diseases of grapes and GARTI is doing R&D on the wine production.

With these observations the study has found that the grapes and wine production, is important for increasing the overall income of agriculture sector of Maharashtra, India. The wine production also plays an important role in increasing the total income of India. The grapes and wine production in Maharashtra and India may benefit to strengthen the economic condition of India. In this over all condition, regional innovation systems components plays a very importance role. If academicians, policy makers and government follows regional innovation component, then it could be suitable for linking with each and every component which are playing a vital role in the development process of Indian economy. The components of RIS are inter-linked with each others. The RIS also concentrates on how the socio-economic condition has changed and how RIS is helpful for changing the socio-economic condition of farmers as well as government. RIS is also talking about the technological innovations which are beneficial for in the case of agriculture, horticulture sector and other sector which can be applicable to find out the status of any sectors.

If the government servants perform their duties properly and honestly, and understand their responsibilities without any illegal pressure from the politicians and rich people, they can help the farmers to get the facilities. If the role of the mediators in the supply chain from higher authority is made minimum in case of the money provided to farmers under subsidised scheme, it may bring transparency between the government and farmers.

The one importance thing which is mentioned in this study is the landless labourer issue. It may be a serious issue of agriculture sector because landless labourers also play an important role in the process of (agriculture sector) grapes cultivation. During the field survey of this study the researcher has interacted with some landless labourers who were working in the others farms and Researcher questioned them about their experiences of working as working labourers.

As we have mentioned above about the uses of grapes for wine making, in this study we have also discussed basic information about the wine making process. Sula wine industry is playing a vital role for the wine production in Nashik district of Maharashtra. Today, at international level exports of wine particularly at the hotels, restaurants, and are also exported to Asia, Europe, the United States and Canada from Sula wine industry. The types of wine grapes which are grown in Nashik district Maharashtra are, Shiraz, Cabernet Sauvignon, Merlot, Pinot Noir, Chenin Blanc, Sauvignon Blanc and Chardonnay, etc. And also discusses about the process of wine making in this study. The wine-making process can be divided into four distinct steps and they are; First; Harvesting and crushing grapes, second; Fermenting must third; Ageing the wine and fourth Packaging. Some popular brands name of wine which is being produced in this industry is also mentioned below.

- Red wines
- White wines
- Rose/blush wines
- Sparkling wine
- Sweet Wine or Dessert Wines
- Fortified Wines and etc.

Basically, major wine producing states in India are Maharashtra, Karnataka and Himachal Pradesh. Of these three regions, Maharashtra is the largest producer and consumer of wine. The diversity of soil and climatic conditions in India and in Maharashtra, the soil and climate are suitable for growing grapes. Grape production predominantly comes from Nashik, Satara, Sangli, Ahmed Nagar, Pune and Osmanabad of Maharashtra and the Nandi hills near Bangalore of Karnataka. Maharashtra is the leading state in grapes production and export. Screening of grapes varieties are essential to check the suitability of red and white wine grapes cultivation as these vary with the region. For instance, Shiraz, Cabernet Sauvignon, Pinot Noir, Zinfandel, Merlot, Cabernet Franc and Pinotage are the main red wine grape varieties; Sauvignon Blanc,

Chenin Blanc, Chardonnay and Riesling are the major white wine varieties. The wine quality depends on the stage of grape maturation and is specific for each variety.

The factors affecting the wine quality is wine grapes plant are warm bright days, dry cold night temperature and mild winters under tropical regions. “Terroire” can be defined as basic identity of the wine owing to soil, climate and wine making practices. Variation in weather during ripening of grapes affects quality content year by year. The vinification practices have been modified in accordance with the climatic changes to improve quality of wine to be produced (Leeuwen and Darriet, 2016).

Therefore, government should follows suggestions for improvements; promote farmers for cultivating horticultural crops. Government must be paid an attention on the policy implication and investment. It is because of the fact that such crops have potential in the diversification towards high value agriculture, generate employment, encourage agro-industrial base, provide nutritional security and enhance export earnings, there has been a major policy shift in favour of horticulture. The government of Maharashtra have made special attempts to promote horticulture by providing subsidy to farmers through horticulture linked Employment Guarantee Scheme (EGS) programme. While progress has been made in this direction and the government has undertaken several complementary and supplementary initiatives, this sector has yet to face a number of constraints and challenges as follows.

Proper information of sources of finance should be given to the farmers so that modern technology in agriculture is used. Grape growers should turn towards new modern methods in Grapes production. Government should enhance farmers to use most advanced technologies by giving subsidies, provide new tie-ups through foreign and domestic research. The research and development is required for improving grapes and wine quality in Maharashtra state. There is urgent need for effective transfer of technology within the country to increase production, productivity and to improve quality. Government should take efforts to overcome drought problems in Maharashtra and they should also concentrate on effective irrigation system.

The Government should reduce import duties on wine machinery and raw material. Infrastructure development can be supported by providing soft loans and subsidies for pre-cooling and cold storage facilities. Also the consumer awareness needs to be created for safety risk, quality norms and problems.