

CHAPTER 2

Literature Review

2.1 Introduction

In the first chapter of this thesis, the specific literature about horticulture sector, grapes production and system of innovation (especially: Regional Innovation System) in the context of Maharashtra has not been discussed. But, this chapter engages in discussing the wide range of literature on particular aspect of horticulture sector (especially grapes production in Maharashtra) and regional innovation system. The literature review essential for this research topic has been discussed here. There is increasing number of literature on grapes production in Maharashtra written from the perspective of science, technology and innovation. In spite of that there is a lack of literature drawing correlation with horticulture sector especially, grapes production and regional innovation system. Most of the literature is written on horticulture as well as grapes production and regional innovation perspective, as a different perspective as compared to the study of an economical, political and environmental etc., but the quantity of literature not available correlates RIS with grapes is very less.

The study has focused on the co-relation between regional innovation system and horticulture especially, grapes production. It also focuses on how regional innovation system is playing a vital role in the grapes production in Maharashtra. This research would prove to be beneficial for society and for academia, because very less research work has been done.

The literature review has been divided into three parts;

- Agriculture Sector
 - 1) Horticulture
 - 2) Grapes production
 - 3) Wine production
 - 4) Technology in grapes and wine in Maharashtra, India
- Innovation Systems
 - 1) National innovation system

2) Regional innovation system

- Co-related with above

At first, it is necessary to mention here some essential specifications of this study. This study mainly focuses on the grapes production in Nashik District, Maharashtra. Grapes production is one of the parts of horticulture sector and horticultural sector is one of the sub sectors of agriculture. Firstly, here I have done a review of literature related to agriculture sector which is very necessary for framing this study further. Following is some of the essential literature review related to agriculture.

Dwivedy (2011) in this paper tries to understand the transition in the way of agricultural practices from traditional to commercial in developing countries particularly Indian agriculture. Author has understood the transition through the review of literature. Mostly, literature has been mentioned in this paper from historical perspective. But after the changes in the agricultural practices there were some problems. In this paper, the author discusses some of the developmental challenges faced by the Indian agriculture sector in particular and developing nations in general - illiteracy, poor socio-economic conditions, lack of technical knowledge and awareness, small land holdings, modernization leading to barren land and disasters leading to rural poverty, weather-dependent farming systems, low per capita income, underdeveloped physical infrastructures, etc. Author has suggested some solutions to the above mentioned problems. If we see a half-full tumbler and understand that water is not a problem but a solution to our problem i.e. by innovative ways of farming which give good results with scanty water and innovative ways to conserve soil and water, then we can move forward on a sustainable path of development and remove rural deprivation.

Sengupta and Sonwani (2012) discuss the importance of agriculture sector in Indian economy. It is one of the largest private enterprises in India and it is a source of livelihood for almost two third of the rural population. It is a good workforce for people residing in rural areas in the country. Indian agriculture provides employment to 65% of the labour force, accounts for about 27% of GDP, contributes 21% of total exports and raw material to several industries. The livestock sector contributes an estimated 8.4% to the country's GDP and 35.85% of the agricultural output.

Therefore if agriculture goes wrong, it will be really bad for the economy as the falling of agricultural growth not only affects employment but GDP too (thus increasing poverty). Authors have also mentioned some issues related to ecological (like; soil fertility, water, biodiversity, health & pollution, land use pattern and climate) and social sustainability. The development cannot be sustainable unless it reduces poverty. But traditional farming was also driven by the upper caste and wealth oriented people. The rich and higher castes benefitted more, while the poor and lower castes are left out. Sustainable agriculture attempts to ensure equal participation which recognizes the voice and speech of every people. Therefore government must find ways to enable the poor people from rural areas to get benefited from agriculture development.

Salunkhe and Deshmush (2012) try to understand the importance of subsidies in the development of Indian agricultural sector. The authors are of the opinion that for purchasing of farming inputs like; fertilizers, seeds, irrigation, water and electricity etc. subsidies play an essential role. Subsidies can be distributed on the merit, income-level and social group etc. The main argument of the authors in this paper is that the subsidies play a vital role in the process of agriculture development. They believe that the agriculture subsidies are integral part of the farmer's life in India. They also play very initial role in agriculture sector in every country. Every year Government of India spends a lot of money for various agriculture subsidies for the growth of agriculture sector. But they do not mention how it is benefited for the development of agriculture sector in India. On the other hand, authors in this paper discuss government's policy of agriculture. But they do not discuss the process of policy implication. India's government policies are not properly implemented. The policies are often poor and there is delay in policy implementation in India. Whatever the government schemes, policies and subsidies are; the poor farmers (small, medium) do not get their benefits. It is only the large scale farmers who get benefited from such policies. Authors have tried to mention advantages of government policy and schemes but they do not mention disadvantages of policy implication, which may be called government report.

Dev (2012) discusses the engagement/role of small and medium farmers in the Indian economy. The contribution of agriculture in gross domestic product (GDP) is now

around one sixth; it provides employment to 56% of the Indian workforce. And also, the forward and backward linkage affects of agriculture growth increases the income in the non-agriculture sector. The structural reforms and stabilization policies introduced in India in 1991 initially focused on industry, tax reforms, foreign trade and investment, banking and capital markets. The economic reforms did not include any specific package specifically designed for agriculture. The objective of this paper is to examine the issues and challenges of small holding agriculture in achieving agricultural growth, food security and livelihoods in India. The following are some of the challenges like: social groups, land issues, low level of formal education and skills, credit and indebtedness, impact of climate change water problems and diversification risk and vulnerability etc. In this paper author mentions some opportunities for small holding agriculture; in spite of above challenges, there are many technological and institutional innovations which can enable marginal and small farmers to raise agricultural productivity and increase incomes through diversification and high value agriculture.

Basant (1987) has tried to mention the inverse relationship between farm size and labour use in the year 1950. For writing this research paper the writer has done some recent literature survey in India. After the literature review, it was clearly understood that the farm size and irrigation are still found to be inversely related in the majority of the cases. It also mentioned some evidence to suggest that the inverse relationship between farm size and labour use, observed earlier is disappearing with the advent of the new technology. This paper has also mentioned the impact of high yielding variety (HYV) technology (irrigation, seeds and chemical fertilisers) and mechanical inputs (tractors, combine harvesters and etc) on employments which are reviewed separately for total crop production over the year and for individual crops. An attempt is made to identify the impact on labour use according to the size of holding, its composition (male/female, family/hired) and seasonality. The most important argument of this paper is how new employment has been divided between the landless and those with asset base, and between different groups of farmers is crucial in terms of the ultimate objectives of an antipoverty rural development strategy through productive absorption of manpower.

Namara, Hanjra et al (2010), have discussed about the importance of water in livelihoods. This paper is discussing particularly the case for many countries in Asia, the Middle East, and North Africa. 850 million rural poor are primarily engaged in the agriculture related activities. Poverty was the central issue that this paper emphasised. Authors say; improved agricultural water management can contribute to poverty reduction. Along with, this paper also mentions some pathways for reduction of poverty. Such as the, access to reliable water improves production and productivity, enhances employment opportunities and stabilizes income and consumption. It may contribute into nutritional status, health, societal equity and environment, etc. According to authors, understanding and enabling changes in how improvements in water management can reduce poverty are the most important policy and research challenges for the coming decades. This paper also discusses about the both irrigation types such as small-scale irrigation and large-scale irrigation.

Howale, Ghadage et al (2015) discusses the diverse agriculture climatic conditions in the state of Maharashtra. According to the author climatic conditions are suitable for the cultivation of a wide range of crops and a progressive farming community. In this paper author discusses the status or conditions of agriculture sector. The author also found some problems that Maharashtra agriculture sector is still facing. such as, lack of water which is very dangerous for agriculture, lack of knowledge about the new agriculture technologies that help in increasing crops production. For writing this paper author has done field survey in Maharashtra. After the field survey it clearly understands that the farmers are not getting benefits of advanced fertilizers and due to the shortage of funds they are unable to use them. Maximum farmers of western Maharashtra are facing a problem of drought and irrigation system. Mainly cash-crops are grown in agriculture like banana, grapes, Thompson seedless grapes, Alphonso mangoes, onions and long stem cut flowers etc.

Paul et al. (2012) in this article discusses about the availability of groundwater as well as rainfall. There is also a significant talk about different irrigation systems which are popular in India. It may be a window for providing the opportunities to supplement the groundwater resources, and their possible impacts of agriculture systems in India. According to Shah (2009), majority of the countries possess a much better and improved dependence of groundwater utilization with provisions of additional wet

season and dry season irrigation. During low rainfall years, groundwater is mainly relied upon for irrigation purpose. These studies specifically target the observation by Groundwater Surveys and Development Agency (GSDA) according to which the groundwater availability is far lower than the available irrigation area.

Koundouri (2006) in this article mainly focuses on the diffusion of irrigation technology, taking into account its accessibility to farmers. This article focuses on the critical importance of irrigation technology in development of agriculture sector, via laying stress on the farm adoption of irrigation technologies utilizing the engineering notion of irrigation water efficiency as defined by Whittlesey. The technological adoption models proposed by Griliches (1957) in his pioneering work on adoption of hybrid corn in the United States has focussed on the study of farmer's decisions to adopt technological innovations which ultimately took agriculture to a different direction. Along with this, this article also sheds light on the adoption of new water protection irrigation technologies that can be used for better production and risk management.

Muruganantham (2009), in this paper particularly discusses about the problem of water scarcity in India. In the period from 1960 - 1980, 70% of population was dependent on agriculture in India. As per the authors, the main reason for the low coverage of irrigation was poor water use efficiency under the conventional methods of irrigation. The argument reveals as to how the adoption of micro irrigation technique is important in today's water scarce situation. But the successful adoption of micro irrigation technology is dependent on socio-economic and psychological characteristics of the farmer along with other situational factors. This article mainly focuses on micro irrigation technology as well as technological innovation in agriculture sector.

Kumbhare and Sen (2008) have tried to analyze the economic growth through infrastructure development in rural areas that will lead to improvement in agriculture sector. This includes the fertilizers, seeds, irrigation, technology and appropriate price realization etc. As per the paper, Rural Infrastructure Development Fund (RIDF) covers activities related to rural development projects including rural roads and

infrastructure for rural education and public health institutions, small, medium major irrigation, irrigation wells, drinking water, soil conservation, watershed development etc. This paper does an evaluation of RIDF supported irrigation projects in certain states of India to find out the relationship between investment and economic growth. It concludes that although benefits received by the users in these states is high, there is a need of better asset management, functioning and co-ordination of activities by various state actors involved in the projects.

Smith, Avila et al (2004), have tried to analyse linkages between farmers' organizations and agricultural research institutions. But that time, the agriculture and agricultural research sector had been faced with complex challenges and changing development agenda. The main challenges were growing population and decreasing agricultural production. For the agriculture development there are different types of paradigm shifts such as technology transfer. There was an approach where technologies developed in developed countries were transferred for possible application by developing-country farmers who had no input into its development.

Scientists develop technologies which are then passed to be utilized by farmers. This technology developed without having any communication with farmers and without giving the proper heed to the problems they are facing. There is a need to work across stakeholder groups and engage civil society organizations such as farmers and their associations, relevant NGOs, private sector groups such as processors, commodity and input traders, and other relevant civil society groups. There is a need to have an effective designing and sustainable linkages between farmers and research organisations. As indicated earlier, farmers are continuously experimenting to improve their productivity, using both traditional and modern technologies available to them. They are therefore natural partners of scientific community, researchers and we need to develop sustainable approaches and strategies that will bring the two key stakeholders closer and develop functional linkages between them.

Accordingly a central role of demand-driven agricultural research and innovation system is to provide effective solutions or responses to the major constraints of agricultural and rural development, such as those related to policy and institutional issues, those related to technical production/productivity enhancement and resource

management/ utilization, and those related to social and economic problems, such as access to land, water, and other required inputs.

Dandekar and Naravade (2013), in their paper discuss the problem of water scarcity, and they have tried to mention the reason of the arising water problems in Maharashtra. First reason is the lack of water management in Maharashtra. There is a lack of maintenance of irrigation infrastructure, and the lack of political will to put the canal network in place, siltation and water logging and a water intensive crop regime. Along with this, the author says that there are allegations of a massive scam in the execution of irrigation projects. This article has discussed about the water scarcity as well as the lack of irrigation systems in Maharashtra. Authors have tried to critically analyse the disappearing waters in Maharashtra, and also discussed on the irrigation related issue as well as policy level. This article reflects the state of affairs of irrigation systems in Maharashtra.

Pandey (2015) in this paper discusses the dependency of Indian agriculture on uncertain rains. Besides this, it also mentions the experiences of some farmers related to agricultural production risks, marketing risks related to different crops enterprises and for different agro-climatic regions and areas. Author has tried to mention the importance of crop insurance scheme which is an alternative option to manage agricultural yield loss by the farmers. The crop insurance helps in protecting farmers against the variations in yield resulting from uncertainty of practically all natural factors beyond their control such as rainfall (drought or excess rainfall), flood, hails, other weather variables (temperature, sunlight, wind), pest infestation, etc. in this paper has discussed about the following insurance schemes in India.

- **First Ever-Individual Approach Scheme (FEIAS):** this scheme was introduced in 1972-73 in Gujarat state for the H-4 cotton production. After that this scheme included potato, wheat, groundnut and gram and it was implemented in the states of Maharashtra, Gujarat, Andhra Pradesh, Tamilnadu, Karnataka and West Bengal.

- **Pilot Crop Insurance Scheme (PCIS)** was introduced in the year 1979. The scheme was based on “Area Approach”. The scheme covered cereals, millets, oilseeds, cotton, potato and gram.
- **Comprehensive Crop Insurance Scheme (CCIS)** was introduced with effect from 01-04-1985 by the Government of India with the active participation of State Governments.
- **Sookha Suraksha Kavach (SSK)**: this scheme was specially designed for Rajasthan to cover 23 districts and popular and widely grown crops like guar, bajra, maize, jowar, soybean and groundnut.
- **National Agricultural Insurance Scheme (NAIS)** has been introduced in the country from Rabi 1999-2000 with keeping in view the demands of states for improving scope and contents of crop. Author has deeply discussed about the above mentioned schemes in this paper.

According to Sodal (n. d.), Maharashtra state economy has a deep dependence on the agriculture sector. Therefore, he suggests that water saving is very essential and perhaps most important in the context of growing population as well as the rapidly mounting water scarcity. Significant light has also been thrown on the available policy reforms, technological and managerial intervention, capacity building of personnel as well as institutions, and a stronger public awareness campaign so as to promote the participation of agricultural functionaries. There is also a considerable illustrative discussion on the critical and deeply influencing roles of modern agriculture and irrigation practices in alleviation of rural poverty.

This paper also discusses about the climate and rainfall, its distribution and usage, accessibility of surface water resources and the status of irrigation management in Maharashtra as well as research and development (R&D) avenues available for the sustainable growth of any sector. The works and coordinated efforts of three main organizations have been summarized in the current article that includes namely; the 1) Water and Land Management Institute (WALMI), Aurangabad, established in 1980, which works on the application of technology and practices and making the best use of land and water resources and to build a better capacity and taskforce of irrigation personnel as well as farmers; 2) Maharashtra Engineering Research Institute (MERI),

Nashik, which was established in 1959, is one of the premiere institutes devoted to research in water resources, engineering as well as various disciplines of civil engineering. 3) Directorate of Irrigation Research and Development (DIRD), Pune established in 1969, especially for carrying out R&D works in irrigation and drainage. The supportive role of many NGOs for solving the water problems of agriculture has also been discussed in this article with emphasis on irrigation being stated as a key component for the growth of agricultural sector.

Johnson (2013), watershed management is most important for semi dry and rural areas in India due to increase in the demand of various natural resources, especially for irrigation related problems of the agriculture sector. A major part of the Indian population lives in rural areas and is dependent on agriculture related activities. This article highlights the impact of watershed management on the ground water as well as irrigation potential. The role of ground water in irrigation system is extremely important; therefore currently water management is indispensable for the agriculture sector as well as any sector. This article brings out the impacts of these treatments on land and water related benefits to farmers. The use of watershed development appears to benefit farmers in the groundwater recharge, preventing soil and water erosion. Along with this, the article also mentions, how it is helpful for changes in cropping pattern and productivity and the role of Non-Governmental Organizations (NGO), Banks, and Government of India in the watershed management for the agriculture sector.

Kumar, Narayanamoorthy and et al (2009), discussed two types of irrigation systems one is ground water irrigation and second surface irrigation. During the period of 2009 to 2002, authors have mentioned in this article some issues related to irrigation systems in India. The first issue is concerning energy rationing versus unlimited power supply. According to Shah et al (2008), predicted somewhere else that 18-20 hours of power supply to agriculture in the Gujarat. That time, it is benefited for increasing the agricultural crop production. This article discusses the two major regions of Gujarat, the alluvial central Gujarat and alluvial parts of south Gujarat. Gujarat has been witnessing good monsoon for the last four years and the state has done good banking of groundwater through check dams. There are some irrigation related schemes such as the Mahi and Ukai-Kakrapar. In this article, the authors have

mentioned positive side related to irrigation systems in Gujarat, such as lack of adequate investments for new schemes (Planning Commission 2008), droughts and increasing diversion of water from reservoirs to urban areas. As well as these regions contribute very significantly to India's well irrigation.

According to Mitra (1998), in Maharashtra there has been considerable increase in the irrigated area in the last four decades. In the 7th Five-Year Plan, the state had achieved irrigation potential of 43,80,000 hectares comprising 19,86,000 hectares under major and medium irrigation schemes and 23,94,000 hectares under minor irrigation schemes. The irrigation projects (major, medium and minor) have played a vital role in Maharashtra. The aim of the project is to reduce the water scarcity problems in drought prone areas of Maharashtra. Unfortunately, the performance of this sector has been far from satisfactory. The author has also mentioned that the poor state of maintenance is largely due to paucity of funds available with the state government. Also low water rates and their poor recovery are responsible for the system inefficiency. This article has focused on the Irrigation development source wise and major crop in Maharashtra. Authors have mentioned irrigation development in the 7th five year plan and also discussed the policy implementation.

Lewis and Alexander (2008), elaborate the basic information of grafting for fruits and nut trees in the practical way. Basically, from the beginnings of horticulture, growers have tried to improve their orchards and gardens by choosing and keeping the productive or desirable trees. At first, there were merely stands of seedling trees, either natural or planted. Each tree was different from the others, as usually happens when plants are grown by sexually produced seeds.

Eventually growers discovered how to make almost exact copies of their superior plants. One way is by taking cuttings. Put simply, the cut part of a shoot from the original plant and stick it into the ground where it grows some roots. Another way is by grafting. Once again, you cut a part of the shoot from the original superior plant. In grafting, this part is called the scion. Authors also discuss the essential tools for grafting which is necessary for grafting any type of fruit plants. Some of the basic tools of grafting are given as follows.

- Secateurs for making rough preliminary cuts

- A very sharp knife for making the grafting cuts
- Some suitable binding material, such as plastic budding tape
- Some wound sealant, or scion covers, such as small plastic bags

There are two types of basic concepts/information for grafting such as the grafting cut and scion wood.

Budding techniques

- 1) T-budding
- 2) Chip budding
- 3) Patch budding
- 4) V-budding

Grafting techniques

- 1) Splice or whip graft
- 2) Wedge or cleft graft
- 3) Whip and tongue graft
 - 1) Matching scion and rootstock
- 4) Smaller scion on a larger rootstock
 - 1) Bark graft
 - 2) Side graft
 - 3) Approach graft

Rath (2003), the paper tries to understand how the rural labour market can take advantage of the availability of organised high-wage work, resulting in poverty alleviation. Author has done field survey for writing this paper in the Narayangao area in Junnar taluka in Maharashtra. In this paper, author has discussed '*globalisation*' in the horticultural sector in India and how it has affected the poorer section of people who depend on agricultural labour for their livelihood. Another thing discussed in this paper is the changed nature of their work that was brought about as a result of globalisation. One more vital thing mentioned in this paper is that '*liberalisation*' as a process that allows farmers to think outside the box of planned production and marketing, is leading to the '*industrialisation*' of agriculture. This paper gains

importance in the light of the central place given to agricultural produce in the '*export import policy*' of the government of India.

Thamizhselvan and Murugan (2012) focus on the market and facilities related problems of horticulture sector (special grapes production) in India. Such as, Lack of investment required wine production, technical expertise and professional skill workers, various marketing and distribution networks. Quality challenges of wine compared to the other countries, like- France and Italy, because of soil condition, climate and varieties of grapes.

Suryawanshi, Niketh et al (2016) tries to understand the importance and knowledge about uses of bio-pesticides from grape growers in Maharashtra. For writing this paper, authors have selected three Tehsils viz. Baramati, Indapur and Junnar of Pune district to collecting data. The data was collected through the primary study. A total of 120 respondents were selected. The results of the study showed that maximum number of respondents had medium level of knowledge in the use of bio-pesticides to control pests and diseases. There was a significant difference noticed in high and low level of knowledge about use of bio-pesticides. Also, authors have discussed about the uses of flea beetle, *Metarhizium anisopliae*, *Verticillium lecanii*, *V lecanii* and *Hirsutella thompsoni* in the process of grapes production. Along with, in this paper they have mentioned the percentage of respondents' knowledge about it.

Chand (1996), in this paper talks about the ecologically fragile (weak) and poor economic conditions of the hilly regions which are located in Hindu Kush Himalayan ranges. These regions are showing symptoms of rapid ecological and natural resources degradation since the last few years. It not only affects on the socio-economic level of the hill people but also threat them to sustainable livelihood. This paper also investigates about the impacts of the expansion of area under fruits and vegetables in Himachal Pradesh and attempts to provide an appropriate perspective for formulating a policy for horticulture in the region. The negative impact, like damage to forest wealth to meet packing cases and staking requirement stems largely due to the lack of will to tackle these and due to wrong and vested policy.

Kamble, Kolambkar et al (2014) has been talking about the popular grapes varieties in Marathwada region of Maharashtra in the year 2011- 2012 such as, Thompson seedless, Tas-A-Ganesh, Sonaka, Manik-chaman, Sharad seedless and Cheemasahebi, which is glowering in Marathwada. Out of the all varieties, the share of Thompson seedless variety was 60 per cent. Grapes are growing also in other states of India likes Karnataka, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Delhi, Punjab, Haryana and Rajasthan. But Maharashtra has contributed more than 63 per cent in the country's total production of grape. It is one of the commercially important fruit crops in India. It is helpful for the development of Indian economy. Authors have selected Latur and Osmanabad districts for the study because of maximum area under grape cultivation. Data is collected through the survey method of economic investigation. A specially designed questionnaire for getting the information on cost of cultivation, financial feasibility and other related aspects was used. Authors also mention some problems faced by cultivators of grapes, which were non availability of labour in time, followed by non-availability of fertilizers, credit and pesticides reported by 100,94,90, 74 per cent growers, respectively.

Shroff and Kajale (2008) discuss the role of Maharashtra government in horticulture sector. Basically, Maharashtra agriculture sector is mainly rainfed, this causes the low value cereal crops of agriculture production. Maharashtra has only 16 percent irrigated land. After the Golden revolution (1991-2003) government is promoting horticulture sector because a variety of fruits (grape, orange, cashew nut and pomegranate, etc) and vegetables (cabbage, carro, tomato, brinjal, onion, fenugreek, lady's finger, radish, etc) can be grown in different agro-climatic zones of the state. These types of fruits and vegetables are growing in limited areas/districts of Maharashtra, like Nashik, Sangli, Satara, Ahmednagar and Pune, etc. Therefore, Maharashtra government has been providing some schemes and programme employment guarantee scheme (EGS) for the purpose of increasing production of fruits and vegetables in other areas. Authors also discuss the current status of horticulture sector of Maharashtra in this paper. The state has four state agricultural universities and four colleges of horticulture. It has three national research centers (grapes, citrus and onions). Further, it also has infrastructure for floriculture industry in the form of greenhouses, pre-cooling units, cold storage units and reefer vans. The state also has crop-based farmer organisations such as grape growers' associations

which provide technical consultancy to farmers. There are also 1600 registered fruit nurseries in the state which play a vital role in the development of horticulture production.

It is clearly understood through this paper; that there are many changes in the production of fruits and vegetables after the golden revolution. Along with, in this paper authors have given some policy suggestion like; most of the fruits and vegetables cultivated are not suitable for processing, being mostly household varieties. It is therefore necessary to provide quality seeds and planting material to farmers along with extension services so as to improve productivity and quality of the produce. Post-harvest technology must be developed and strengthened so as to increase the shelf-life of the horticultural produce. In this paper, authors also mention some challenges related to horticultural sector of Maharashtra such as, marketing of the produce, very high levels of wastage and value loss, water constraints, inadequate infrastructure in airports and quality control to meet export standards.

Singh and Mathur (2008) mention the changes of horticulture production in India specially Maharashtra. Authors evaluate the growth of agriculture sector from 8th five year plan to 10th Plans. It is clearly understood through the paper that the gross domestic product (GDP) growth rate of agriculture sector was declined. But, in the 11th plan it was observed to be 5.7 and 6.6 percent annum during the 11th plan. Because, in this period government concentrated more on the horticultural production in particular fruits and vegetables production, and the government also provided suitable facilities for poor farmers. The 11th plan redefined horticulture as “science of growing and management of fruits, vegetables including tubers, ornamental, medicinal and aromatic crops, spices and plantation crops”. Authors mention budget allocation during the period of fourth to tenth plan in crores. It also mentions export values of horticulture production during the periods of 1995-96 to 2006-07. The growth and variability of area, production and yield of major horticultural sub-sectors indicates that substantial growth has occurred in the areas of all the sub-sectors during the entire period.

Mohanty, Rout et al (2015) makes an attempt to present wine production related issues and challenges in India. Likes, amount of investment required, lack of technical

expertise and also the professional skills, and various marketing and distribution networks. Another challenges of quality of wine compared to the other countries like France and Italy, because of soil type, climate and varieties of grapes and clones of grapes and viticulture which even obstacles the popularization of Indian wine tourism in international tourism map.

Wine making is old tradition of India; it can be dated back to the ancient history, but there are very few players who come forefront in the wine tourism sectors. Therefore it is not sought after as there are many impeding factors like accessibility, amenities, cost and product knowledge and lack of awareness of promoting wine tour as the holiday vacation.

Jadhav (2013), discusses the common problems of Indian horticulture sector (grapes production). The Indian horticulture sector is suffering a lot due to some manmade, natural, technical and economical reasons.

Kamble, Kolambkar and et al (2014) in this paper have tried to mention some popular varieties of grapes which are cultivated in Maharashtra state such as, Thompson seedless, Sonaka, Tas-A-Ganesh, Sharad seedless, Manik –chaman and Cheemasahebi. But Thompson seedless grape variety share was more than other varieties of grapes in Maharashtra. The fruits and vegetables play a vital role in the nutritional security and grape is one of them. The state of Maharashtra contributed more than 63 per cent in the country's total grapes production. Grape is one of the commercially important fruit crops in India. Maharashtra ranks first in grapes production, Nashik, Sangli, Satara, Ahmednagar, Pune and Solapur districts are the main grapes growing districts in Maharashtra. But, in this paper authors have focused only on Latur and Osmanabad districts of Marathwada region of Maharashtra, because of maximum area under grape cultivation. Authors have done survey for writing this paper. After completion of the survey it is understood that there are some problems which grapes growers are facing.

Table No. 2.1 Problems in Production of Grape Cultivation (N = 30)

Sr. No.	Particulars	No.	Percentages
1	Non-availability of fertilizer in time	28	94
2	Non-availability of labour in time	30	100
3	High cost of pesticides	22	74
4	High wage rate of labour	28	94
5	Non-availability of adequate credit in time	27	90
6	Inadequate credit supply by the financial in situation	28	94

Source: Kamble, S. H., Kolambkar, R.A., et al (2014)

Mitra (2003) has discussed the usage of grapes for making honey, crushes, jams and wine. The author has talked about two districts in Maharashtra such as Nashik and Sangli. There are 20,000 hectares of vineyards where more than one lakh tons of grapes grow in a year. Basically, this paper has focused on wine production. This sector can be of great help for employment as well as for earnings. Author has tried to mention the basic information about the legal process of licenses for buying wine. There are some things like fees, silver plating of the utensils to be used in the bars compulsory, fire license to be procured before starting off with the operations and pest control to be done regularly, etc. This paper also discusses the problems related to wine such as, markets, scarcity of water could be accounted for as the chief cause responsible for the wine industry as the grape cultivation suffers from unseasonal rains and inadequate help by the government authorities as far as promoting this industry is concerned. Author also talks about Maharashtra grape policy 2001.

Gade (2015), this paper has attempted to study the prospect of grape wine cultivation in India. Commercially, Grape is one of the most important fruits and tropical, sub-tropical fruit. It can be grown in a wide range of climatic condition. India is the 9th largest grape producing country in the world with the production of 2689910 tones, which make a share of 3.88 per cent of total production of grape in the world. 91 countries are growing grapes in the world. Basically in this paper author has tried to mention the grape wine cultivation that includes area under the grape cultivation, production and productivity of India. In the world there are more than one thousand different varieties of grapes. Author has called grape as the “*queen*” of fruits in this paper. Also in this paper, author has discussed the feature of grapes such as semi-translucent flesh encased by a smooth skin. It is fairly a good source of minerals like calcium, phosphorus, iron and vitamins like B1 and B2. Grape wine cultivation is

largely controlled by the economic conditions prevailing in any country. Maharashtra is the leading grapes producing state in India.

Gade (2015) has discussed the growth of wine industries in Sangli district, Maharashtra. For writing this paper author has done field work in Sangli district. In this district there are 17 wineries and the production capacity is over the 208 million gallons of wine per year. The district is second largest wine producer in the state. But this paper mostly concentrates in Tasgaon, Palus, and Miraj tahsil. These Tehsils have good climatic conditions which are suitable for grape production and agricultural development. The government has also set up a specialized state of the art wine park in 142 acre at Palus, 30 km from Sangli city, which produces one of the best quality grapes in the world. Krishna Valley Wine Park is an international quality wine institute which has been set up in association with Bharati Vidyapeeth. This institute also carries out research for wine manufacturing. Currently there are 17 wine industries. The following tables have indicated the tahsil wise wineries and wine production capacities.

Table No. 2.2 Tahsil wise Distribution of Wineries in Sangli District

Sr. No	Tahsil	No. of wineries	% of location	Capacity in Liter	% of Capacity
1	Walwa	01	5.88	30000	1.44
2	Kadegaon	01	5.88	90000	4.32
3	Tasgaon	05	29.41	895000	43.02
4	Palus	06	35.29	645000	31.00
5	Miraj	04	23.52	420000	20.28
	Total	17	100 %	2080000	100 %

Table No 2.3 Wine Productions in Sangli District 2003-04 to 2012-13

Year	Wine production (Liter)	Growth rate (%)
2003-04	100000	00
2004-05	197150	97.12
2005-06	234000	18.69
2006-07	225650	-3.56
2007-08	399500	77.04
2008-09	589850	47.64
2009-10	641000	8.67
2010-11	178500	-72
2011-12	189100	5.93
2012-13	38760	-79.50

If we can observe the above table it becomes clear that the wine production of Sangli district is continuously increasing from 2003 to 2009-10 but after that, wine production has decreased continuously, due to insufficient market, increased production cost and unfavourable government policies. According to the author, there is a need to formulate a suitable strategy and strengthening of infrastructure facilities related to the same.

Mahajan, Jadhav et al (2009) has discussed about the waste water from the wine producing industries in Maharashtra which affects the irrigated area. These types of problems have been creating two distinct representative situations: the vintage and non vintage season of the year. Authors have described the successful operation of various medium and small scale plants in India for the treatment of grape processing and wine distilleries. This paper also discusses the characteristics of waste water which is highly variable in terms of pollutants and tends to become odorous upon standing. The major pollutant present in the winery waste water is Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD) and Total Dissolved Solid (TDS), etc. But, now-a-days, in Maharashtra wine industries are increasing and investment also has increased by 32.80 % in the financial year 2007-08, against Rs 247.71 crores in the previous year. That time Maharashtra had 58 wineries and total investment in these wineries was around Rs 328.97 crores. Authors have focused only on Nashik district in Maharashtra for this study. There are 30 winery industries in Nashik and today it has emerged as the wine capital of India. After the Maharashtra grape processing industrial policy in (2001) there are grape wine industry got a big boost. The climate is also favourable for both, grape growing and wine making. In this paper authors have done a physico-chemical analysis of winery waste water irrigated soil during vintage and non vintage season also. After the analysis the authors have concluded that, higher pollution load is observed in vintage season than non vintage season for winery wastewater effluent, pond waste water and for wastewater irrigated soil.

Hinge, Angadi et al (2013) have discussed the adoption of new technologies which is helpful for the development of grape wine production in Maharashtra. In India, Maharashtra ranked first in wine grape cultivation during the year 2007. Maharashtra is one of the important states of India growing different varieties of wine grape. Grape

wine production has grown in some districts of Maharashtra such as Buldhana, Nashik, Sangli, Pune, Osmanabad, Solapur, Latur and Ahmadnagar districts. The government of Maharashtra has been trying to introduce several promotional activities all over the state to increase area under wine grape cultivation. The government has been providing some technologies for getting maximum benefits to wine grape growers. But growers are not following all the recommended technologies because of the lack of training by government to the farmers. Authors have selected one hundred and sixty wine grape growers to the understand adopters of recommended technologies in Nashik and Pune districts of Maharashtra. After data analysis it is clearly understood that 39.37 per cent of the wine grape growers had medium level of adoption, followed by 31.25 and 29.37 per cent of the respondents belonging to high and low adoption categories, respectively.

The grape wine growers are not giving more response to technologies because of their lack of knowledge and another important fact is that there is a tendency of people to adopt only those practices, which they feel are simple, involve low cost and are effective in getting good yield. Along with it, this paper mentions some basic problems related to wine grape production such as technical problems, labour shortage, high cost of plant protection chemicals, fertilizers and planting material, irregular supply of electricity for irrigation, lack of information about government schemes and subsidies and insurance support etc.

Table No. 2.4 Problems as Perceived by the Wine Grape Growers

No.	Problems as perceived by the wine grape growers	Respondents (n=160)	
		Frequency	Percentage
1	Technical problems	-	-
	Inadequate guidance regarding improved technology	137	86.62
	Increased resistance of pests and diseases to plant protection chemicals	120	75.00
	Labour shortage	71	44.37
	Non availability of manures / fertilizers in time	43	26.87
	Replacement of variety is very difficult	07	04.37
2	Problems related to the inputs	-	-
	High cost of planting material	160	100
	High cost of plant protection chemicals	142	88.75
	High cost of fertilizers	132	82.50
	High initial cost of establishment	117	73.12
	High cost of labour	46	28.75

3	Financial problems	-	-
	Insufficient credit	53	33.12
	Very high rate of interest	51	31.87
	Inadequate guidance on credit availability to farmers	04	02.50
	Complex, lengthy and rigid procedure of bank finance	02	01.25
4	Marketing problems	-	-
	Delayed cash payment	19	11.87
	Wineries are far away	02	01.25
5	General problems	-	-
	Irregular supply of electricity for irrigation	160	100
	Lack of information about government schemes and subsidies	72	45.00
	Lack of insurance support	41	25.62

Source: Hinge, Angadi et al (2013)

Kakade et al (2011), tries to mention basic information of wine making process and also authors has been talking about the importance of grape in the wine making process. 32 winery units were selected for the case study and analyses by keeping in view of economic aspects; the present study has been undertaken. Basically, grape wine is a health drink resulting from complete alcoholic fermentation of grape, either exclusively by natural micro - flora of grapes and uninstalled product. According to the authors, in the world about 80 per cent of grape produce can be used for wine making followed by that of 10 per cent for raisin making and only 10 per cent for table purpose. Current scenario indicates that table-wine accounts for 85 per cent of market and expensive varieties of vintage wine accounts for 15 per cent. Wine production unit is capital intensive and it has capacity from 0.50 lakh litres to more than 7 lakh litres per annum. Availability of raw material is from the beginning of February to end of March. The produced juice can be stored for wine making. Wine production is agri-business and producer must know the costs, returns and profits from the business.

2.2 Innovation Systems

Andrea's (2009) book has been divided into two parts. In the first part, the innovation networks in economic has been mentioned. Further, this part has been divided into six sub-parts; the second part deals with innovation networks in complex theories. It has also been divided into ten sub-parts. The following aspects have been deeply discussed in this book. In the first chapter, the author discusses the explicit networks as

well as the processes by which scientists have attempted to understand innovation in economic systems. These processes are embedded in a longer tradition of the exchange of ideas between physics and economics. The author draws a line between the traditional approaches to self organization theory in physics and the approaches of modern network theory. Another important point discussed in this book is the rise of network theory. And it also discusses the influence of geography on collaboration networks in science and by this thematizes again interaction network.

This book also analyses inter- regional collaboration both within countries and between countries. The book also discusses the systems of innovation. Frank Beckenbach has discussed the evolution and dynamics of networks in regional innovation systems (RIS). Along with this, the book gives a thought to the multiplex network relations between market relation and hierarchy relation. According to Andreas, today knowledge is based on economics. Further, the author has mentioned the modelling of innovation network. Other points that have been mentioned in this book are the market relationships, innovation process and diffusion.

The second part of this book focuses on the complex network as well as introduces the social scientist's concern with social networks. According to Aghion, economists widely agree on technological change and innovation being the main component of economic growth. This book has been focusing on the different scenarios about the propagation of innovation in regular as well as in heterogeneous pattern of connectivity and innovation processes in socioeconomic contexts. The book mostly contains the social economics, sociology, physics and system of innovation context.

Hekkert, Suurs et al (2007), this article mainly focuses on the innovation systems (IS) and has defined innovation processes. Also, the paper has various components of the innovation system, such as increasing the speed of innovation is important, since innovation is a key determinant for long term economic growth and development. The authors also explain that the concept of innovation system is a very useful heuristic framework. However, it suffers from two major flaws. The first is too static and the second lacks sufficient attention for the micro level. Along with this, it focuses on the most important processes that need to take place in innovation systems to lead successfully to technology development and diffusion.

This paper has also discussed about the technological change and innovation systems and about the function of innovation systems such as, the entrepreneurial activities, knowledge development, knowledge diffusion through networks, guidance of the search, market formation, resource mobilization and creation of legitimacy/counteract resistance to change. The article also mentions some literature related to innovation systems along with further development of the functions of innovation systems approach, based on both theoretical and empirical research into the dynamics of innovation systems processes at macro and micro level, as well as policy research into the implications for policy makers, policy concepts and instruments, which is necessary to improve the rigor and usefulness of this approach according to authors.

Carlsson (2002), in this article discusses innovation systems such as national innovation system, regional innovation system, sectoral innovation system and technological innovation system. All the innovation systems have involved creation (new), diffusion, and use of knowledge. According to Carlsson, systems are made up of components, relationships, and attributes and the components are the operating parts of a system such as the individuals, business firms, university, research institute, public policy.

Sternberg and Arndt (2001), examines the determinants of innovation behaviour in European firms that are predominantly small and medium in size. The aim is to assess the absolute as well as relative impact on innovation behaviour of firm specific (i.e., internal) factors on the one hand and region-specific characteristics on the other. Two hypotheses are advanced and tested. The first is contrary in part to some recent literature on regional and national innovation systems-firm-specific determinants of innovation are more important than either region-specific or external factors. The second hypothesis is that in high-tech regions dominated by a small number of very large firms, the innovation behaviour of the smaller firms is more strongly influenced by regional factors than by factors internal to the firm. Whereas the first hypothesis is confirmed by the empirical results presented here, the second is not. Because firm-level innovation determinants are of great importance in the European regions investigated in this study, we suggest that local innovation policy should focus more on the specific needs of small- and medium-sized enterprises (SMEs) in particular regions than on improving regional conditions for innovation in general.

Swanson (1994), articulated theory of innovation that offers a especially promising route for developing our understanding of the relationship of information systems to the larger business. The basic concept and theory of organizational innovation applies in laying the foundations for theory of information system (IS) innovation. These foundations propose the idea of typology of information innovation system which deals inclusively with overall innovation in business. The further including posits contextual structure for information innovation system diffusion among organizations which deals with information system in the larger business and environment aspects. It also includes different types of specific propositions about the patterns of information innovation system (adoption, evolution and diffusion). Here interestingly, he evaluated data of information centre (IC), administration, and material requirements planning (MRP).

Galli and Teubal (n. d.), profound changes are taking place in the world economy and in the innovation systems of countries. The main influencing trends could be summarized by the terms globalization, liberalization, dematerialization, and technological revolution. Their joint effects have been the enhanced uncertainty and turbulence felt in the world economic system since the 1973 crisis and the gradual emergence of a different rationale for production and innovation. The techno-economic mass production paradigm of the past is gradually giving way in an increasing number of sectors to a new paradigm characterized by flexible manufacturing and the pervasive effects of the cluster of the so-called information technologies (IT) (Freeman and Perez, 1988; Piore and Sabel, 1984; Womak et al., 1990), based on the convergence of microelectronics, computers and telecommunications. This chapter deals with paradigmatic changes and structural adjustments of national systems of innovation (NSI) and related economic policies. In the past, structural changes in the organization of science and technology (S&T) have been associated with paradigmatic transitions in order to best fit the features of new emerging and dominating technologies.

Mytelka and Farinelli (2000), emphasize the system of innovation approach is a resurgence of interest in innovation, a characterization of innovation as an interactive process and a re-conceptualization of the firm as a learning organization embedded within a broader institutional context. As a conceptual framework, it lays emphasis on

the interactive process in which enterprises in interaction with each other and supported by institutions and organizations –such as industry associations, R&D, innovation and productivity centres, standard setting bodies, university and vocational training centres, information gathering and analysis services and banking and other financing mechanisms play a key role in bringing new products, new processes and new forms of organization into economic use. From a policy perspective the innovation system approach draws attention to the behaviour of local actors with respect to three key elements in the innovation process: learning, linkage and investment. The innovation system approach also breaks ranks with the traditional view of innovation as a process of radical change at the frontier of an industry. Today, it is increasingly recognized that innovation extends beyond formal research and development (R&D) activities to include continuous improvement in product design and quality, changes in organization and management routines, creativity in marketing and modifications to production processes that bring costs down, increase efficiency and ensure environmental sustainability. Authors explore the sustainability of a process of continuous innovation in clusters based on traditional industries. To develops a typology that distinguishes among clusters in terms of their potential for dynamic change. It provides a brief overview of cases in the developing world in which informal clusters have become more organized and have upgraded production without however sustaining a process of innovation. Further it examines the evolution of production and exports in the furniture cluster in the Herning/Ikast area of Central Jutland (Denmark) and the spectacle frame cluster in the Veneto town of Belluno (Italy) and identifies a number of factors that have contributed to sustained innovation in these two clusters. The concluding section draws out the relevance of these experiences for policy in Brazil.

2.2.1 National Innovation Systems Contexts

Groenewegen and Steen (2006) define national innovation system. The NIS approach gradually replaced linear thinking about innovation by a more holistic system perspective on innovations focusing on the interdependencies among the various agents, organizations and institutions. The various policy studies compare the most important institutions, organizations activities and interactions of public and private actors who play a significant role in innovation process in India. He explained theoretical contributions to NIS sufficiently conceptualized neither institutions

nor the dynamics of NIS over time (Nelson 2002; Malerba 2005). He said that NIS as a layered system with a specific logic based on habits and routines. Not only would such insight show the limitations of copying a benchmark, but also the dynamics of the NIS could be captured by explicitly analyzing the interaction between different institutional layers and such an approach would result in more effective policy recommendations.

Herstatt, Tiwari et al (2008), have found out that the corporate research and development has emerged in recent years in India. After reading this article, it clearly seems indigenous technologies of India are going to join in the global mainstream of innovation. But, on the other hand, in India, there are many hurdles for gaining the speed of innovation, like poor infrastructure and corruption etc. Basically; this paper is helpful for assessment of India's innovation system and its impacts on global economy, particularly in knowledge intensive sectors. India's R&D is in the process of emerging as a major hub for both large and medium-sized multinational companies in various industries. These types of developments are mainly owing to the availability of skilled labour produced in world-class select few institutions India also is a beneficiary of global mobility and exchange of talents, technology and resources as much as the rest of the world. Particularly, developed Western countries have profited from India's export of brain power. Indian government has been also playing a major role in the formation of its innovation system.

Bathelt and Depner (2003), in this paper discuss about the innovation, institution and region, and national and regional innovation systems. Authors pose the question as to whether such production and innovation contexts can be conceptualized as territorial systems. Based on a discussion of the characteristics of social systems, such systems are defined as being capable of self-reproduction through ongoing communication. Further, they are autonomous with respect to the reproduction of their very basic structure. Social systems thus perpetuate and deepen the difference which exists between themselves and their environment. We argue that it makes sense to use this concept to analyse national innovation systems which are characterized by positive feedback loops and reflexive practices between production, institutions, and innovation. As a result this leads to on-going specialization processes within an economy which are different from those of other economies. In contrast, the

conceptualization of regional (subnational) innovation systems appears problematic. At the regional level, it is unlikely that a self-referential system can develop because production and innovation normally depend on national institutions and other external factors that influences to a great extent. Regional production configurations thus do not have the potential to gain and retain structural independence and reproduce themselves.

Godin (2009), analysing the national innovation system a historical perspective. In the late 1980s, a new theoretical framework appeared in science, technology and innovation studies. The framework suggests that the research system's ultimate goal is innovation and that the system is part of a larger system composed of sectors such as university, industry government and their environment also. Most of the authors agree that the framework came from researchers like Freeman, Nelson and Lundvall. In this article, author wants to go further back in time and show what the system approach owes to the organisation for economic co-operation and development (OECD). It is from the early works of 1960s. This article develops the idea that the system approach was fundamental to OECD work, and that, although not using the term NIS as such, the organization considerably influenced the above-mentioned authors. This approach suggests better the origin of rules, culture, institutions and their integration into technological analyses. Innovation is not an autonomous activity but is embedded within the larger society. However, the approach had those institutions, rules, and culture not only contributing to innovation, but almost defined in terms of and devoted to, innovation as commercialization of technological invention. This is one more consequence of the economic approach that has driven science, technology and innovation studies for nearly sixty years.

Lundvall (2007) in this paper, discusses the strength of national innovation system (NIS). It has become very established in a short period of time. And nowadays, it has become widely spread among policy makers as well as among scholars all over the world. Author argue that the key to progress is to get a better understanding of knowledge and learning as the basis for innovation and to understand how different modes of innovation complement each other and find support in the specific national context. It is illustrated that it is necessary both to understand micro-behaviour in the core and understand the wider setting within which the core operates. Along with it,

the author discusses some further developments needed to make the concept relevant and applicable to developing countries. Therefore, here special attention is given to institutions and capabilities supporting learning.

Williams and McGuire (2010), examines the effect of culture on national innovation system and prosperity. Because culture shapes the way people think about and behave in regard to risk, opportunities, and rewards. It should influence the nature of entrepreneurial activity and by extension economic outcomes. Using structural equation, modelling on a sample of 63 countries, authors propose and test a comprehensive explanation of how culture as an umbrella construct, affect innovation and national prosperity. At the national level, authors find that culture does indeed influence economic creativity and also find that innovation implementation explained some of the variation in prosperity across countries. Authors argue that innovative activities are necessary to maintain the technological progress and productivity improvements that generate national prosperity.

In this paper, authors conceptualize how culture matters to national prosperity - namely by facilitating innovation which in turn generates productivity improvements. Authors argue that innovation is a two-stage process, whereby economic creativity precedes innovation implementation. They expect national rates of innovation to be explained by variations in national culture. The thrust of author's argument is that culture affects innovation and national prosperity because it shapes the way members of a national group think about and behave in regard to risk, opportunities, and rewards. Several contributions stem from research. First, it broadens and deepens our understanding of the role national culture plays in facilitating innovative activities. The production of economically useful new knowledge relies on the formal and informal linkages connecting actors within and among research organizations, universities, public research institutions, and the like. These linkages to facilitate knowledge flows may be through e.g., internal R&D programs.

Chris (1995) argues that national and regional innovation systems remain an essential domain of economic analysis. Their importance derives from the networks of relationships which are necessary for any firm to innovate. Whilst international connections are certainly of growing importance the influence of the national

education system, industrial relations, technical and scientific institutions, government policies, cultural traditions and many other national institutions is fundamental. For example Germany, Japan and the former USSR illustrate this point. According to author's recollections, the first person to use the expression national Innovation system was Lundvall and he is also the editor of a highly original and thought provoking book (1992) on this subject. However, as he and his colleagues would be the first to agree (and as Lundvall himself points out) the idea actually goes back at least to Friedrich List's conception of The National System of Political Economy (1841), which might just as well have been called The National System of Innovation. The main concern of List was with the problem of Germany overtaking England and, for underdeveloped countries (as Germany then was in relation to England), he advocated not only protection of infant industries but a broad range of policies designed to accelerate, or to make possible, industrialisation and economic growth. Most of these policies were concerned with learning about new technology and applying it.

Lundvall (1999), in this paper author stresses on theoretical work (National Innovation System) in academia as well as innovative. And its efforts in firms often follow parallel tracks and those quite similar new ideas, concepts and products emerge almost simultaneously, without much direct communication taking place among the parallel efforts. This may also occur in the social sciences in periods when certain ideas are in the air and certain new phenomena and insights become more obvious to analysts. In this paper, author brings out some fundamental similarities and differences between two sets of ideas that overlap in important respects but where we find little cross-referencing. One relates to national business systems (NBS), the other to national innovation systems (NIS). The fact that there are few references between the two, although they deal with related issues, suggests a potential for cross-fertilization.

Mothe and Paquet (1998), the design of institutions, policies and units of analysis are all predicated upon the ways in which we see the world and explain change. Today, as the pace of change quickens due to technological advancement and growing techno economic interdependences in a series of processes generally referred to as 'globalization', analytic frameworks which emphasize national systems have emerged

to provide a unit of analysis through which to explain these changes and growing interactions. These frameworks have the allure of trying to incorporate the ways in which economies, markets and economic agents actually behave - with particular reference to innovation, knowledge, learning and institutions. Author's purpose in this paper is to raise some questions about the importance of these frameworks from a policy (managerial) and analytic perspective, to outline some limitations of their utility, and to suggest some useful paths for investigation. This will lead to a brief discussion, in our second section, of the origins and orientations of national innovation system. They will offer a critique of the national-system concept from both a transnational and local system level and show the perforated nature of the nation state as a consequence of globalized technology and investment flows, economic turbulence, and deep integration. In this paper, the authors also highlight the main features of a knowledge-dependent, innovation- based economy drawing mainly on recent work in the area of evolutionary economics based on the concepts of networks, relational know-how, and proximity. From this, we will derive some new directions for policy.

Nasierowski and Arcelus (2003), this paper presents a non-parametric approach to the disentanglement of the related effects of efficiency and productivity of a country's technological effort. The ultimate purpose is to identify the extent to which the alleged decrease in the productivity growth of many countries can be explained by differences in efficiency and by differences in its components, namely scale and congestion. The role of moderators in explaining productivity fluctuations is also assessed. In this paper authors examine the proposition that, even if data considerations and market distortions are indeed important reasons in explaining the decline in the impact of R&D upon productivity growth, the modelling used for testing the hypothesis requires substantial modification. This is needed to disentangle the related effects of efficiency and productivity of a country's technological effort. The basic rationale for this position is threefold. First, the overwhelming majority of studies on the subject assume that existing technology exhibits constant returns to scale.

Second, there is a problem related to the existence of two types of efficiency and their interpretations: R&D efficiency and productivity. R&D efficiency is related to usage

of its input/output ratio, while R&D productivity considers the contribution of R&D effort to the national economy. Third, an important distinction not generally made is whether an R&D effort is assessed for the country's ability to generate or to consume technology. The latter is the purview of most countries; the former is practiced by very few. Hence, differences in productivity and efficiency between the two types of economic activity are expected to abound.

Lundvall, Joseph et al (2009) basically, book has been divided into four sub-parts. Therefore, it is necessary to deeply discuss each and every part of this book here. The first part, gives an overview of the current state of the art for research that links innovation systems analysis to economic development. The innovation system is not a purely academic exercise. It is difficult to study economic development without reflecting upon policy. This book might be of the use also for policy makers interested in understanding how to engage in catching- up in the world economy. Is the innovation system a useful concept for understanding and explaining what goes on in a developing country? And can it be used as a tool and framework for designing public policy? This book also tries to specify the conditions, doing so in a dialogue with critiques developed within the community of evolutionary scholars. The important question is how the approach fits into the historical and current trends in development economics. So here, it is necessary to discuss the basic information of innovation systems. The pioneer work on innovation systems by Freeman (1987), Lundvall (1992) and Nelson (1993) operated at the national level. It inspired the work on regional (Asheim and Gertler, 2004), sectoral (Malerba, 1995), technological (Carlsoon and Stankiewicz, 1995) and corporate levels (Granstrand, 2000).

Almost from the beginning, innovation systems research has taken two different perspectives a narrow one, equalling innovation to science and technology and a broader one encompassing learning, innovation and competence building at different levels of aggregation (Lundvall, 2007). These broad and narrow definitions of innovation systems in a developing country context are better understood by considering the Science, Technology and Innovation (STI) and Doing, Using and Interacting (DUI) mode of innovation as articulated by Jensen et al (2007) and Lundvall (2007). Edquist (2004), lists ten such activities/functions/factors influencing innovation; research and development, competence – building, formation of new

product markets, articulation of user needs, activities, financing innovation and consultancy services. The (national, regional and sectoral) innovation system is a focusing device aiming at analysis and understanding processes of innovation (rather than allocation) where agents interact and learn (rather than engage in rational choice). The aim of using this device is to find out which alternative institutional set-ups support strong dynamic performance of a (national/regional) economy or a sector. The basic underlying proposition is that the form and content of organizations, institutions and socio-economic structures that appear as most attractive when we focus upon economic change and agents that learn, will not be the same as when the focus is upon allocation of existing resources on the basis of rational agents. As authors argue that, this proposition is true everywhere but it is not least true in the context of a developing country. Several authors including, Viotti (2002) and Matthews (1999) have argued against the use of the concept 'innovation system' and in favour of the concept 'learning system'. Viotti argues that innovation systems should be reserved for developed countries where the leading firms introduce innovation that are new to the world. In less developed countries incremental innovation, diffusion and learning may take place, but not innovation (*sensu stricto*). He then goes on to make a distinction between active and passive learning system using Korea and Brazil as illustrations.

The informal and formal dimension of innovation system; there is a strong bias in theory as in policy to neglect what appears to be impossible or difficult to measure. The innovation system literature recognizes that in order to create conditions for capability building, there is need for government action. Despite the fact that scholars have long highlighted the importance of socio-economic and political context in which the system is embedded, few attempts have been made to link innovation with the specific needs of developing countries, such as poverty reduction as discussed by Altenburg in the second chapter. The third and fourth chapter has discussed about the challenges by Cozzens, Kaplinsky, Fagerberg and Srholec. Authors try to respond to the critical question of how innovation might contribute to ameliorate or exacerbate poverty and inequality in an increasingly globalized economy. In doing so, they look at how capability building and different forms of innovation (product, process and functional) contribute to different forms of inequality (horizontal, environment, and

firmsize, geographical and so on), their analysis opens a rich research and policy agenda on the relations between innovation, poverty and inequality.

Second part of this discusses the scales in innovation system and also theoretical progress and empirical overview. This part includes not only technological capabilities but also general educational and experience based skills. Innovation system research is also built around the concept of capabilities more specifically, learning, where different agents interact to share and produce new knowledge. For understanding how capabilities are accumulated over time in a system of innovation is a challenge for innovation system research in developing countries. It also looks explicitly at the processes of sectoral innovation system, while raising the question as to what extent the concept of the innovation system needs to be re-conceptualized to respond to the specificities of developing countries.

All parts have special attention to the role of the government and multinational firms in shaping the emergence and development of the different innovation systems. The third part discusses building blocks in innovation systems in developing countries with effects of globalization. Mainly this section explores the mechanisms under which such transfer of knowledge is possible. The last section of this book is devoted to innovation policy in developing countries. Authors have focused on the latter issue and outline some theoretical foundations for institution engineering and policies. The overall aim is to provide guidance for policy makers on where intervention is most needed and to encourage their engagement in policy experimentation.

Alabastro (2006) argues in this paper that the socio-cultural aspects of science and technology have not been given adequate attention. This, I believe, can be traced to how policymakers view S&T (science and technology). Traditionally, the rationale for science and technology policies has largely been based on the economic concept of market failures. Market failures occur when private firms and individuals do not adequately invest in S&T development, particularly R&D (research and development). Under investment by private firms and individuals in science and technology, development is attributed to many reasons. Private firms consider such investments as substantially high and risky, and taking long gestation period. Thus, the market failure view justifies government interventions, primarily to ensure that

scientific and technological outputs, often viewed as public goods and services, are made readily available to the general public. This economic rationale has dominated S&T policymaking processes and in a way crowded out socio-cultural considerations.

Chris (2002), in this paper author suggested that it was from the time of the British industrial revolution in the 18th century that full national system of innovation emerged. Bairoch's (1993) (citation by Chris Freeman) estimate of the widening gap between developing countries and industrialised countries show this gap growing very rapidly this time onwards. How historically, relevance of innovation system to economic growth rates over the last two centuries has affected? Author says innovation is not only limited to the system. The focus is on complementarity between sub-system of society and on models of active learning in catching up economics. It also, discusses variations in rates of growth of economic regions and the extent to which variations may be attributed to innovation systems. The analysis is applied to Britain in 18th century, the United States in the second half of 19th century and the innovation systems of catching up countries in 20th century. Author has discussed that in 17th century in Academies of Science, Royal society; and in 18th century industrial revolution, technical education; in 20th century industrial in-house R&D in all industries were the sources of innovation. The cumulative effect of the theoretical and empirical work has been to highlight more sharply and widely than ever before how really central is the role, in long-term economic growth, of the activities producing qualitative changes in the economy. Technological changes have assumed the primary role by virtue of their being typically the original impulses which tend to initiate other qualitative changes. By the same token, the work has also helped to delineate the very limited usefulness of the (standard) growth theory based on the assumption that these qualitative changes are cost free and exogenously given.

Liso (2006) says the economics of innovation and technological change has become one of the most important fields of economics. Since the 1990s a lot of attention has been dedicated, within this field, to systems of innovation and, more specifically, to National Systems of Innovation (NIS). The concept has maintained its strength even in a context of increasing globalisation. The characteristics, on which the scholars who make use of this concept focus from the institutional setup to the role of knowledge, have illustrated. Author believes that Babbage's relevance for this debate

has been demonstrated. They carry out his analysis according to three dimensions: technology per se, the role of institutions and the importance of knowledge. Babbage focused on the English national system of production and innovation, pointing out what its strengths and weaknesses were.

Author pointed that a national system of innovation already existed; however, it needed some intervention and active policy. If a nation wants to keep its advantage over its competitors, particularly in an evolving complex world system, active policies have to be implemented. Babbage indicated explicitly different levels at which action had to be implemented: on the education level, on the R&D level and on the more general institutional level. In such a view, the government becomes both a regulator and a promoter. A systemic view, applied on a national level, characterised by interaction and feedback mechanisms clearly emerges. The features of the English nation of the time were thus analysed, and suggestions on how to keep its position as the world leader were offered, taking as a starting point the need for co-evolution of the production system and its knowledge base. As regards the role of knowledge, economists and policymakers have been stressing its importance on our economies for the last few years, as if this were an aspect that is typical of our own age. It is important to point out that in Babbage's works themes such as technological change, cumulative growth and path dependence were key components. These themes are central in today's research agenda. Both on the methods and the topics Charles Babbage chose to still maintain their usefulness in directing our enquiries on the nature and causes of the wealth of nations.

2.2.2 Regional Innovation Systems Contexts

Edquist (2001) argues about the innovation's weaknesses. First, about the little knowledge related to the determinants of innovation, although this is a weakness of innovation studies in general and not only of the SI approach. Other weakness of the SI approach is that it lacks a theoretical component about the role of the state. To overcome these weaknesses, we need to conduct an empirical study.

Fritsch (2001) has discussed the basic concept of innovation system. Innovation system was introduced only little more than a decade ago. Up to now, the respective research was concentrated on national or sector oriented systems of innovation

leaving the regional dimension largely neglected. Regional systems of innovation would be a relevant category of analysis if innovation processes were shaped by region specific factors. This paper has analysed R&D co-operation of manufacturing establishments in three German regions. Another part of this paper gives a brief overview of hypotheses concerning the relationship between innovation, co-operation and spatial proximity for a division of innovative labour. Most of part of this paper is based on field work. Author has tried to assess the presence of co-operative relationships with different types of partners separately. Such as customers, manufacturing suppliers, other firms and publicly funded research institutions.

Asheim and Coenen (2005) have analysed the importance of different types of Regional Innovation Systems (RIS) of knowledge base various industries in the economy, as the innovation processes of firms are strongly shaped by their specific knowledge base. In this paper, authors have distinguished between two types of knowledge base: analytical and synthetic knowledge. Synthetic knowledge based on novel combination of existing knowledge, 'its incremental innovation' and analytic knowledge is creating of new knowledge and its 'radical innovation'. These types indicate different mixes of tacit and codified knowledge. Tacit knowledge is more concrete on know-how, craft and practical skill and codified knowledge is used only for patents and publications. In this paper, authors have had a discussion on different types of regional innovation systems, five empirical illustrations from a Nordic, Denmark, Sweden and Norway. Authors argue that in terms of innovation policy the regional level often provides a grounded approach embedded in networks of actors acknowledging the importance of the knowledge base of an industry.

Asheim, Grillitsch et al (2015) have discussed the importance of regional innovation system for the academic, policy, competitiveness, dynamic growth and prosperity of regional economies. The RIS concept appeared in the 1990s and has since then attracted widespread interest from scholars and policy makers. Authors have mentioned some research scholars' and policy maker's views on the RIS modal. For instance, Cooke 1992; Cooke and Morgan 1994; Asheim 1995; Asheim and Isaksen 1997; Asheim and Isaksen 2002; Asheim and Gertler 2005; Autio 1998; Cooke 1998; Howells 1999; Cooke 2001; Doloreux 2002. The important argument brought forward in the RIS literature is that different types of regions often face typical systemic

challenges. A distinction has been made between metropolitan agglomerations, old industrial regions and peripheral regions. Agglomerations are usually well endowed with a variety of organisations contributing complementary knowledge to innovation processes such as firms, universities, educational facilities, public innovation support facilities and policy makers. According to authors RIS approach can be widely used as a framework for the design and implementation of regional innovation strategies in many areas of the world. Its appeal relies on the provision of a strong basis for customized, broad-based innovation system policies.

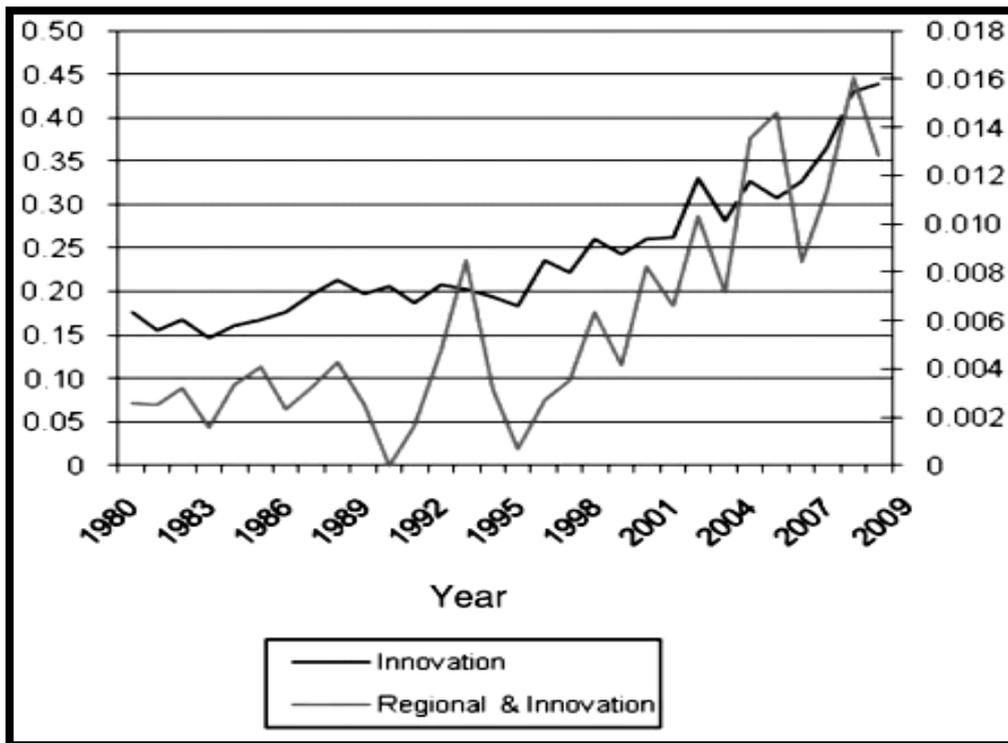
Sharma, Srinivasa et al (2012), try to understand India's innovation systems. Authors have discussed the national and regional innovation systems in this paper. Mainly, paper has been divided into two parts, national and regional level. The first section explores and explains the challenges and opportunities of India's innovation capacity using a semi-structured questionnaire of the practitioners in the national level. The second section of the paper, discusses the regional level clusters formed within India through a mapping of industrial firms, educational, research institutions and innovation parks. National Innovation System (NIS) is leverage points for enhancing innovative performance and overall competitiveness which helps policy makers. This theoretical framework has been helpful for the analysis of innovation and economic growth of developed countries. But it is not helpful for large developing countries due to their heterogeneity in social and political contexts. For writing this paper authors have used structured open-ended questions through face-to-face interviews with funding agencies, business, corporate organizations and educational/research institutions to unravel the inherent challenges (culture, leadership and infrastructure) of India's innovation systems.

Fromhold-Eisebith (2007) basically in this paper author has focused on the innovation theories components 'which emphasises the importance of interaction between actors, institutions and policy element for developed technology-based economic development. Author has marked separate debates on issues related to sectoral, regional, national, international innovation systems for a long time. Also emphasis on systemic approaches to innovation support could be improved by combining the three spatial levels of regional, national, international innovation. Author suggests the scale-bridging ideal type model of a super systemic national policy strategy in this

paper. Central argument of the author is that three levels cannot function independently from each other, but mutually rely on each other's strengths and specific system qualities in order to productively interact. In this aspect; how a division of task between the national and regional levels could be organized and which scale or size of region should be included, it is much more difficult to give viable recommendations. The details of a national super system of innovation (NSSI) strategy must be designed for each nation. The ideal model of a NSSI depicted in this paper may serve as a helpful guideline for that task.

Asheim, Smith et al (2011) in this paper authors have discussed on the three important things related to regional innovation system (RIS), for instance theoretical analysis competitive advantages and policy. The RIS has grown significantly over the past three decades in India. RIS is inspired by national innovation systems. According to authors there was not available literature especially related to Regional Innovation Systems in the year 1980–1989. But after that, sixty-five articles were available in 2000–2009. It means RIS has also increased, reflecting the growing importance of this approach within social sciences research generally and within innovation and regional studies in particular. The following figure shows the growth of the regional innovation literature in terms of the proportion of Social Science Citation Index SSCI articles with the term 'regional innovation' in their title.

Figure No. 2.1 Proportion of articles in the Social Science Citation Index (SSCI)



Source: Asheim, B. T., Smith, H. L. and Oughton, C. (2011)

Note: ‘innovation’ (left y-axis) or ‘regional innovation’ (right y-axis) in their title, 1980–2009

The main focus of this paper is on three areas, first the demarcation of types and varieties of RIS, their efficiency and their impact on regional competitive advantage, second the boundaries of RIS, clusters and networks and the role of cognitive frontiers, knowledge transfer and learning; and third the creation, attraction, utilization and renewal of human capital within RIS and the role of the labour market.

Seppänen (2008) has tried to examine how the main elements, operations and features of regional innovation systems have been playing a vital role in the thirteen competitiveness and innovation indexes. Author has done some literature review related to theory of regional innovation systems which includes the background of the concept. In understanding of RIS concepts author has taken some basic ideas by Lundvall 1992, Nelson 1993, Cooke et al. 1997, Howells 1999, Carlsson 1995, Edquist 2005 and Malerba 2002, etc. Institutional structure of a regional innovation system; in this part author has discussed about the internal organisation of firms, inter firm relationships, role of the public sector, institutional set-up of the financial sector,

R&D intensity and R&D organisation and training system. Along with it the author has also discussed on actors (likes; industrial companies, public sector, institutions, public research institutions and collaborators, etc) and dynamics and interaction of regional innovation systems. It is at the level of the internal dynamics of the interaction of firms and organisations and their links back to the wider institutional structure within the regional system of innovation that is so important and makes regions valuable for study in their own right (Howells 1999, p. 78).

For data analysis, eleven main groups and their sub-groups which represent the contents of the indexes were formed. The groups are; Human capital, Innovation, Private sector, Public sector, Research and development, Finance, Interaction, Attitudes and values, Infrastructure, Economic performance and Environment and health. Of course not all the indicators included in the nine groups are equally relevant when illustrating the influence of regional innovation systems on regional competitiveness. The remaining two: Infrastructure and Environment and health are in indirect interaction with regional innovation systems.

Zygiaris (2009) highlights some problems/weaknesses of regional innovation system into applying any regions. Such as, lack of availability of such elaborate data sources and metric problems. Basically, Regional Innovation System (RIS) is helpful for addressing an agglomerated interaction of private and public organizations that collaborate according to institutional rules and regulate relationships that contribute in the generation, usage and diffusion of knowledge. Author makes an attempt to incorporate existing regional data sets into an abstracted system model. The cross reference of EIS data set availability and the interactions presented in empirical studies conceived the following components/drivers of innovative performance. 1) Policies for research funding are a key aspect of the innovation chain interacting among public bodies and the knowledge production sub-system 2) Private investments in R&D 3) The influence of research in innovation follow the path connecting patents and economic growth. The correlation between academic research and industrial patents conclude that university patents are the beginning of many industrial innovations 4) Venture capital: defines venture capital as funds that are invested in developing new innovative businesses 5) Enterprise investment in

innovation is an important attribute of the innovation process, linking private placement with the innovation subsystem 6) Public funding for innovation is an important driver of innovative performance set by public funding policies at national, regional and international levels 7) Clusters are regional agglomerations of interconnected organizations and enterprises toward innovative activities and new technological knowledge has positive effect in the innovation chain. Technology is an important factor for the development of innovation.

Asheim and Coenen (2006) discuss the importance of regional innovation system (RIS) in the context of global economy. The RIS represents regions. The paper discusses knowledge-based economy. According to Lundvall (1992), on the basis of learning economy innovation is understood as an interactive learning process, which is socially and territorially embedded and culturally and institutionally contextualized. Basically in this paper, authors are trying to mention the linkage between clusters and regional innovation systems with the help of knowledge bases and institutional framework. European comparative cluster survey (Isaksen, 2005), which shows that regional resources and collaboration are of major importance in stimulating economic activity in the clusters. Isaksen (2005) found that this was supported by formal organisations and local institutions, which helped to co-ordinate activities and manage transactions in the clusters.

2.3 Co-related with above both contexts

According to Hall (2007), agricultural technology promotion and innovation is still a source of considerable debate. This article mentions that the most important role for irrigation innovation is that of R&D. Moreover, the article has discussed regarding radical technical innovation and incremental innovation. This article also brings forth issues related to technology transfer and innovation capacity as well as manual irrigation. Most importantly it says that there is a need of scientific research and the capacities, resources and priorities to support and guide public research and training organisations for the innovation in agriculture technology.

Waghmare and Sinha (2016) have tried to evaluate the current scenario of irrigation sector of Maharashtra with the help of regional innovation system (RIS) framework. Authors have discussed the importance of basic components of RIS such as, research

and development (R&D) centre, university, industry/company and organization in the case of irrigation sector of Maharashtra. The paper mainly focuses on how RIS component plays a vital role for the development of irrigation sector. For writing this paper, authors have done survey in Maharashtra's state agricultural universities, some industries/companies, government organizations and corporations and R&D centres which are engaged for development of irrigation systems. Paper also discusses the impact of irrigation technology on the agricultural production in Beed district, Maharashtra.

2.4 Summary

In this chapter, some essential literature related to research topic has been largely discussed. After reviewing articles and books, it is clearly understood that there is a lot of literature available which is related to agriculture, horticulture, and wine and grapes production in the socio-economic context of Maharashtra state. Most of the literature written on horticulture as well as grapes, wine production and regional innovation perspective, have a different perspective as compared to alone study of a socio-economical, political and environmental etc., but there is scarcity of literature co-related to both the above mentioned concepts. The chapter has tried to draw the relation between regional innovation system and horticulture especial grapes and wine production. Also, how regional innovation system plays a vital role in the grapes and wine production in Maharashtra has been discussed. It may prove to be very beneficial for society and Maharashtra academia, since very less research work has been done on it.