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Marketing Infrastructure Development in Punjab and Farm Laws 2020: Some Observations

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Abstract

Market infrastructure is important not only for the performance of marketing functions and expanding the size of market but also for the transfer of appropriate price signals leading to improved marketing efficiency. Punjab Mandi Board has been playing a significant role in improving the infrastructure in many ways as it has established 154 regulated markets, 277 sub-yards and 4006 purchasing centres in the state. The Board in collaboration with other departments has linked every single village with the metallic link roads. Punjab would not have been a major contributor to country's food security in the absence of such well developed infrastructure boosted by state marketing board. It was observed from the step-wise regression that regulated markets, road length and maintenance of roads were the major contributors towards the agricultural output along with other variables. The present study also threw light on the likely adverse effects of the dissolution of APMC act wherein the farmers might have been left at the mercy of private companies after the end of regulated market system. Resultantly, the income of Board and state revenue would have drastically declined which would have adversely affected the funding of various developmental works, market infrastructure and road network system in the state.

Key words: APMC, infrastructural development, Farm laws, Value of agricultural output

JEL Classification: M31, Q13, Q19

Introduction

The Punjab state achieved many landmarks in producing higher grains per unit of area in India, supported by not only the high yielding variety seeds, irrigation and fertilizer but with the provision of organizational and institutional support in the form of prompt marketing of agricultural produce at endorsed prices by creating required infrastructure. This abetted the farmer to increase their earnings and added investment of augmented income in improved technology. These linkages of enhanced income and higher investment made the Punjab state prosperous in particular and dragged the country from import ship to export ship in general. Market infrastructure plays a key role in the growth and development of the economy (Narayanamoorthy, 2006). The linkages between infrastructure development and sustained output growth have been documented by various studies at global level (Canning, 1998; Calderon and Chong, 2004). Rural infrastructure (both physical and institutional) such as irrigation, watershed development, rural electrification, roads, markets, credit institutions, rural literacy, agricultural research and extension, etc., together play a key role in determining the agricultural output in India. Better access to markets bolsters farm productivity and profitability (Ahmed and Hossain, 1990; Ali and Pernia, 2003). But the introduction of new act in the monsoon session during September, 2020 related with farm economy especially, 'Farmers Produce Trade and Commerce (Promotion and Facilitation) Act, 2020' would have repealed the Agriculture Produce Market Committee (APMC) Act, 1961. Although the farm laws are repealed but it was claimed by the central government and many scholars that the new agri-market reforms were historic which had the potential of bringing about a revolutionary change in the farming as well as rural economy of the country as they were related with storage and hoarding of food articles, contract farming and Agriculture Produce Market Committee (APMC) Act. The present study was conducted to analyse market infrastructure developed in the state, agricultural output linkages and prospective impact of Farmers Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 in Punjab.

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Data Sources and Methodology

Secondary data were collected from various published issues of Statistical Abstract of Punjab. Stepwise regression analysis was carried out by using value of agricultural output as dependent variable and market related other variables as

independent variables were taken, such as metalled roads treated as general infrastructure as maintained by PWD and Punjab Mandi Board (ROADM) and length of roads expressed as ROADL, kilometers per thousand geographical area, irrigation (IRRI), credit (CREDIT), cropping intensity (CI), electricity (ELEC), machinery (MACH), regulated markets (RMKT), fertilizer (FERT) etc. Value of agricultural output (VOP) was calculated by multiplying the production of different crops such as paddy, maize, cotton, groundnut, jowar, bajra, sugarcane, potato, wheat, gram, barley, rapeseed and mustard, arhar, sesamum, mash, moong, lentil, sunflower and chillies by their constant farm harvest prices at TE 2009-12.

The following form of linear regression function was estimated for each situation using step-wise regression method.

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9$

Y= Value of agricultural output (Rs/ha)

x_i' =Explanatory variables, x_1=Road length (km), x_2= Maintenance of roads (km/ha), x_3= Irrigation (ratio of irrigation), x_4= Machinery (No/ha), x_5= Cropping intensity(%age), x_6= Fertilizer use (Kg nutrient/ha), x_7= Credit outstanding (Rs/ha), x_8= Regulated markets (No/ha), x_9= Electricity use in agriculture (KWH/ha)

In step-wise regression method, the program performs a series of multiple regressions, starting with most influential variables and adding one step at a time, one new variable which makes the greatest improvement in the goodness of fit. Numerous combinations of different independent variable have been tried. Under this method not only the significance of the variable added through each step in the model is tested at some specific level but also the variables which have entered in the previous steps. This procedure terminates when the specific level of significance is achieved (10 per cent probability level in the present study) or regression coefficient of the last variable added fails to reach or all programmed variable gets included in the model. Step-wise regression analysis was carried by using SAS software System.

Results and Discussion

Market Infrastructural Development in Punjab

The primary objective of PMB and market committees is to establish markets for efficient marketing of agricultural produce by providing modern facilities in the markets and to enforce the provisions of the Act, rules by-laws framed there under. The Punjab Mandi Board (PMB) has taken many crucial policy decisions for the strengthening of agricultural marketing system in the state and imparted number of benefits to rural economy in the state. It is imperative to mention here that the existing system of agricultural marketing in itself is a unique system as it collects the fee from the market and spends it for the development of the rural areas where these markets are situated paving the way for smooth marketing of agricultural produce. PMB intervenes in many ways to make effective checks and monitoring in terms of collection of market charges and providing various facilities to the rural economy. It has extended its wing in the ways as follows:

Establishment and Strengthening of Agri-Markets

PMB has managed to provide large network of main markets, sub-yards and seasonal purchasing centres in the state, in addition to these markets pucca auction platforms, water supply, sewerage system, permanent electrification, drainage and construction of cover sheds on auction platforms in selective markets. Several principal yards were set up in the main towns only and the marketing places in the smaller towns were declared sub yards of these principal yards. For each principal yard, a market committee was set up to look after the functioning of various market yards falling within the jurisdiction of the concerned committee. During the last couple of decades, several new market committees have been established.

However, there is an upsurge in the number of regulated markets to 154 in 2018-19 up from130 in 1984-85 (Table 1). This market density varies from 103.20 sq km in Punjab to 11214.50 sq km. Meghalaya (Marieswaran and Kalaivannan, 2017) but ideally a regulated market should be available to farmers within a radius of five km (GOI, 2013). Moreover, the Punjab Mandi Board establishes about 1800 procurement centres in the peak marketing season of wheat and paddy every year. During COVID-19 crisis, 4006 purchase centres were set up for wheat marketing in 2020-21. Hence, there are 2.73 villages per purchasing points. This way a farmer in Punjab does not have to travel more than 8 to 10 km for the sale of the principal crops i.e., wheat and paddy. This not only saves time of the farmers but also brings efficiency in various market operations like unloading, cleaning, filling, stiching and loading of the farm produce. It also reduces congestion in the main yards of the market committees.

Construction and Maintenance of Link/Approach Roads

Punjab Mandi Board has made all the efforts for the development of road network which is the most essential part because these roads serve as arteries of the rural economy. The Board has been gainfully utilizing the funds collected from levy of market fees and rural development fee for construction and repair of rural link/approach roads and it is a matter of pride for the state of Punjab that all the villages of the state are linked with the markets through this vast network of rural link pucca roads which are well carpeted. The state has a total road length of 91 thousand km in 2018-19 maintained by Punjab Mandi Board in collaboration with other departments.

Table 1. Marketing infrastructure in Punjab, 2018-19

Particulars	2018-19
Number of regulated markets	154
Number of sub yards	277
Number of purchasing centres	4006*
Number of villages served per main market	81
Number of villages per purchasing centre	2.73
Total roads (km)	90945
Road length per 100 sqkm of area (km)	2181
Villages linked with Roads (%)	100
Maize dryers	7
Drying and pre-cleaning unit for cotton	1
Kinnow waxing plants	4
Pack houses	11
Potato grading plant	1
Debt relief fund (Rupees)	700 crore
Health insurance for farmers (Rupees)	5 lakh/farmer
Kisan Bhawan	1
Kisan Haveli	1

** Figure pertains to the year 2020-21*
Source: 1. GOP, 2019
2. Punjab State Agricultural Marketing Board

Modern Initiatives

In these modern initiatives, Punjab Mandi Board has provided the facility of *Apni Mandi* started during Feb, 1987, with a view to encourage the small farmers for selling their produce directly to the consumers in the urban and semi-urban areas. The Board also provides the basic infrastructure facilities like market yard, lighting etc. in these mandis. *Apni Mandis* are being organized at about 50 cities and towns of the state including Chandigarh. *Apni Mandi* has really proved to be a blessing for the farmers particularly the small farmers and boon to the consumers(Singh, 2017; Benti, 2014) as endorsed by various studies in the Punjab state. A new modern Fruit and Vegetables (F&V) market has been established in Phase-11, Mohali. The Punjab Mandi Board in collaboration with National Fishery Development Board has planned to establish five modern fish & meat markets with modern facilities in the state. The PMB has established four dedicated/specialized wood markets in the state namely Khasi Kalan (Ludhiana), Balachaur (SBS Nagar), Dasuya (Hoshiarpur) and Naushehra (Hoshiarpur) which cater to the need of buyers and sellers. A Common Facility Centre is being established in Naushehra (Hoshiarpur) to train carpenters.

Under the scheme of grading and standardization, a project of Rs. 206.04 crore was approved by the Directorate of Marketing and Inspection (GoI) for developing four new markets like New Sabji Mandi Patiala (Fruits & Vegetables), Phillour, Sahnewal, Mullanpur Dakha (Additional Market Yard). Besides this, infrastructure had been strengthened in Pakharpur (Majitha), Jalandhar, Kalanaur, Gidderbaha, Talwandi Bhai, Cheema and Bhulath. These measures are useful for the changing environment of domestic and global trade in the new economic order. In Punjab, 47 markets have been provided with motorized sweepers for the better sanitation which are successful in providing clean and hygienic surroundings in the market area. The Punjab Mandi Board has established 11 ultra-modern pack houses for fruit and vegetable products to give a big boost to export of perishable commodities from the state. These pack houses have been put up to encourage farmers to go for diversification in agricultural sector, and it would also have mechanical grading and sorting line, pre-cooling chamber, cold storage, a reefer van and a pick-up van.

PMB has provided 49 information kiosk units and 52 electronic display boards in different markets of the Punjab state. These units extend benefits to the farmers for keeping them updated about the arrival and prevailing prices of all the commodities including the perishable ones which are prone to excessive price fluctuations. For the grading of kinnow and potato, four grading plants have been set up in Punjab. Two plants are established in Abohar which is known as kinnow hub of the state. Similarly, another two plants, one each in Bathinda and Hoshiarpur are set up for grading of fruits and vegetables. Punjab Mandi Board has made the arrangements for the installation of around 37 electronic weigh bridges in different markets in the year. The Board has also established seed cotton drying and pre-cleaning unit in Malout market in the year 2014. Besides this, PMB keeps in touch with Self Help Groups and cooperative societies for the direct marketing of goods other than wheat and paddy. The Board has set up two maize dryers worth Rs 19.67 crore in NawanShehar and Garh Shankar markets and five more in Bhogpur, Focal Point Phuglana, Nakodar, Kapurthala and Machhiwara worth costing Rs 41 crore. The Borad has made arrangements for the broadcast of prices of various items of agricultural produce through radio, newspapers and television etc. Day-to-day market rates are disseminated through AGMARKNET. Now, PMB has also planned to develop need based storage units in the markets because space is provided in the plan for every regulated market.

Establishment of Post Harvest Technology Centre

In order to minimize the post harvest losses the state government has established Post Harvest Technology Centre at Punjab Agricultural University Ludhiana with the financial assistance of PMB. The basic purpose of this centre is to develop techniques for increasing the shelf life

of horticultural and vegetable produce and to impart training to the producers, traders, concerned government department employees for proper handling, grading, storage, packaging and transportation of produce.

Launching the Welfare Schemes

PMB has launched many welfare schemes for the students, researchers, farmers and farm labourers. One such is Award of Scholarships in which the Board has been providing scholarships to the poor and deserving students from rural areas through Punjab Agricultural University, Ludhiana at the rate of Rs. 750 per month. The total number of scholarships of different classes in the College of Veterinary Science and Animal Husbandry and Kandi area (foot hills) is 284. To ensure medical facilities to the farmers and their dependent family members, insurance cover has been provided to all farmers under 'Bhagat Puran Singh Yojna'. This scheme provides free medical treatment up to Rs. 50 thousand for the entire dependent family members of the farmer, and covers life insurance (except natural death) of Rs. 5 lakh for the head of the family. The farmers' insurance scheme was started in 1984 and the rates of compensation range from Rs. 10 thousand to Rs. 2 lakh. Under this scheme, financial aid is provided to the thresher victims, deaths due to road accidents of the farmers/labourers while bringing produce to the markets, death due to snake bite during farm operations, death due to fire in the markets or any other kind of loss while working in the farm and markets.

Kisan Bhawan- A Unique Facility

Kisan Bhawan (Farmer's House) is located in the heart of the beautiful city, Sector 35 A, Chandigarh where a very neat and clean accommodation is being provided to farmers and general public on subsidized rates. About 300 dormitory beds are available at the rate of Rs. 40 per bed for 24 hrs for the farmers who visit Chandigarh. Good quality food at reasonable price for the persons staying in the Kisan Bhawan is being provided in the canteen of the Kisan Bhawan. Deluxe/ Semi-Deluxe rooms are also available. Two halls with the seating capacity of 125 and 800 people are available to meet the requirements of meetings, seminars and conferences. Same type of house named Kisan Haveli is built by PMB for the comfortable stay of the farmer families at Anandpur sahib.

Clearly, the role of the PMB has been vital in creating the infrastructure. In addition to providing amenities for the sale of agricultural commodities in the mandis the Board has facilitated the state's journey to becoming the breadbasket of India. According to market infrastructural index (MID) which was constructed based on various indicators of development, the state of Punjab stands at first position distantly followed by Kerala (Rank II), Tamil Nadu (Rank III) and Haryana (Rank IV) which is entirely due to the continuous efforts of PMB.

Table 2. Marketing infrastructural development (MID) index for different states

States	2004-05	Rank
Andhra Pradesh	103.3	IX
Assam	77.8	XV
Bihar	81.3	XIII
Gujarat	124.3	V
Haryana	137.5	IV
Himachal Pradesh	98.8*	XI
Jammu and Kashmir	84.0*	XII
Karnataka	104.9	VIII
Kerala	178.7	II
Madhya Pradesh	76.8	XVI
Maharashtra	112.8	VI
Orissa	81.0	XIV
Punjab	187.5	I
Rajasthan	75.9	XVII
Tamil Nadu	149.1	III
Uttar Pradesh	101.2	X
West Bengal	111.2	VII
All India	100	-

**Figures pertain to the year 1993-94*
Source: Acharya and Aggarwal, 2016

Markets, Roads and Agricultural Output: Inter-linkages

The imperative relationship between agricultural development and investment in infrastructure has long been recognized by not only in India but all over the world. Large numbers of studies (Fan et al, 2000; Fernald, 1999; Narayanamoorthy and Harijla, 2005 and 2006; Narayanamoorthy, 2013) confirm that rural infrastructure is a sine qua non for significantly improving agricultural production and subsequent failure to such services would be the greatest impediment to the growth of agricultural productivity. The infrastructure in the form of rural link roads has undoubtedly brought efficiency in the marketing of farm produce and it has also facilitated the movement of rural people to the nearby towns/cities to make essential purchases in the lesser time at low cost. Besides, the children from villages can go to the schools and colleges in the cities without moving to the hostels. Moreover, these roads in the rural areas have provided many indirect benefits in the form of additional jobs in the tranportation sector, road side dhabas/ restaurants, petrol pumps, automobile repair workshops, tea stalls etc. Above all, it has social implications also. The women from the rural areas come to the cities/towns to buy items of daily use/durable items. The impact of infrastructure

on agricultural output cannot be envisaged directly but it is expected to increase through improved transport facility as well as via forward and backward linkages between agriculture and other sectors (Binsmanger *et al,* 1993; Bhatia, 1999; Ruttan 2002; Walls, 2002).

It was observed from the step-wise regression results that irrigation, road length, agricultural credit and cropping intensity were the major contributors towards value of agricultural output among all variables. Better access to institutional credit reduces the cost of borrowings and improves the investment of farmers in agriculture in the form of machinery or other costlier inputs.

Irrigation plays a key role in determining the agricultural productivity. Irrigation infrastructure increases the land use intensity, cropping intensity and provides incentives to the farmers for using productivity enhancing inputs. The coefficients of irrigation and cropping intensity came positive and significant, thus justifying the role played by irrigation during TE 1981-84 in Punjab. These variables were significant at 10 per cent level. In this way rural road increases the diffusion of agricultural technology by improving access to markets. The value of R^2 which is estimated to be 0.88 implies that 88 per cent of the variation in VOP was explained by the variables included in the regression analysis during the period TE 1984 (Table 3). The coefficient of road length, in addition to irrigation and credit is significantly associated to VOP. This implied that during the initial years of green revolution roads were definitely required to improve the accessibility of the farmers to the market. The market access is not only required to sell the marketable surplus of the crops but also to buy the inputs used to produce those crops. In this way rural roads increase the diffusion of agricultural technology by improving access to markets. Similar findings were given by Fernald, 1999 that in rural areas development goes with the expansion of roads. During the period (TE 1992) machinery and electricity variables significantly influenced the agricultural output (Sharma et. al. 2014).

During the period (2009-2012) independent variables road length, fertilizer, regulated markets, irrigated area and road maintenance came out significant. The model explained 47 per cent of the variation with these independent variables. Provision of adequate and quality infrastructure in rural areas facilitates improvement in productivity. The issue relating to rural roads in economic development remains unsettled. However, there is an agreed view that good rural roads are a necessary condition, but not a sufficient condition for rural

Table 3. Determinants of value of output in agriculture by market and non-market factors: step-wise regression results (TE 1984 to TE 2012)

Variable	**Intercept**	**IRRI**	**ROADL**	**CREDIT**	**CI**	**R2**	**F Value**	**Pr>F**	**N**
TE 1984									
Parameter estimate	-46.70	16.56	28.53	39.83	23.08	0.88	57.17	<0.0001	36
Pr> F	<.0001	0.0042	<.0001	<.0001	0.0007				
TE 1992									
Variable	**Intercept**	**MACH**	**ELEC**	**CI**	**IRRI**	**R2**	**F value**	**Pr>F**	**N**
Parameter estimate	-16.57	20.83	61.46	77.76	80.83	0.7311	21.07	<0.0001	36
Pr> F	0.797	0.004	0.0001	0.0723	0.0645				
TE 2002									
Variable	**Intercept**	**ROADL**	**FERT**	**RMKT**	**R2**	**F value**		**Pr>F**	**N**
Parameter estimate	29.81	-8.26	15.75	33.01	0.49	15.11		<0.0001	51
Pr> F	<.0001	0.0031	0.0822	<.0001					
TE 2012									
Variable	**Intercept**	**ROADL**	**FERT**	**RMKT**	**IRRI**	**ROADM**	**R2**	**F value**	**Pr>F**	**N**
Parameter estimate	-54.52	-2.96	61.24	14.82	71.56	16.75	0.47	9.62	<0.0001	60
Pr> F	0.0033	0.0296	0.0286	0.0077	0.0003	<.0001				

Note: All variables are significant at 10 per cent level.

and overall economic development. During the initial years of green revolution, the effect of accessibility was greater in bringing socio-economic change of the rural masses. Once the connectivity of all villages is achieved by increasing road length, the desired goals of the society will be achieved. Expenditure on such infrastructure turns down the production surface with the passage of time. What became important is the quality of roads. Maintenance of roads leads to improve the accessibility of farmers to markets. Improvement of rural road network will accelerate agricultural as well as other socio-economic transformation of the rural society. The regression coefficient of expenditure on maintenance of roads was 16.75 (TE 2012) and significant at one per cent level confers indication towards the need for good quality roads along with length of roads.

Likely Infuence of Abolition of APMC Act

The status of infrastructural facilities reflects the structure of markets which sustain the addition of place, time and farm utilities to the products and services. Although three farm laws (2020) were withdrawn but various arguments put forth in favour of these laws are based on their ability to bring about competition, improve marketing and price efficiency and increase farmers' income level (Chand, 2022, Government of India, 2022, Kumar et al, 2021, Sangwan, 2021). Most of these arguments however are bereft of evidence and are based on imaginary justification. The present study based on empirical evidences brings forth the role played by Punjab Mandi Board and APMC Act in enhancing the prosperity of the state.With the dissolution of APMC act, it was observed that there would be manifold adverse effects on farmers at the first step leaving them at the hands of private companies. The repeal of APMC act would have finished the regulated market system, resultantly the income of the PMB would have been seriously impacted as there is no provision to charge any fee/ tax on the purchase of private players. As a result, the income of Board and state revenue would have declined which would have further badly affected the funding of various development works, market infrastructure and road network system in the state. Above all, large number of workers would have been out of jobs which included, labourers, employees of PMB and market committees, petty-shopkeepers, workers, small self-employers working in and around the marketing areas. Ultimately, this would have irreparably affected the entire system of rural development. The farming community which is already debt ridden due to increasing costs and stagnant yields and is forced to commit suicides, would have fallen prey to the corporates who are eager to capture the agricultural produce market of the country.

So, the need of the hour is to save the peasantry which is indebted, depeasantized and killing self. There should rather be efforts to make the existing system of agricultural marketing more efficient, the reverse was being done. In the notion of 'one nation one market', it is unviable for private players to develop good infrastructure, which is free of usage charges as they incur induced investment for profit motive.

It is therefore recommended that a lesson should have been learnt from the state of Bihar where the APMC act was repealed on September 1, 2006. The decision of the repeal of the APMC act by Bihar government was taken on the assumption of opening up space for the new markets and private investment in the agricultural marketing infrastructure. It was promulgated that the Bihar farm reforms might improve the efficiency of the marketing system; consequently Indian agriculture will become globally competitive by reducing transaction costs and mitigating market risks. Unlike the promulgated view of massive investment, Bihar did not usher in private investment for creating new markets or strengthening facilities in the existing ones. The Bihar State Agricultural Marketing Board has lost revenue due to the repeal of the APMC Act that led to deterioration of existing infrastructure in the state. The revenue collected from the APMC earlier was used not only for the modernization of these market yards but also for the laying of roads and construction of other infrastructure to provide farmers better access to markets. But after the repeal, there have been no takers for these market yards, with no investment in creating private markets. Even in other states where there is deregulation to allow private traders; there is hardly any investment to create market spaces let alone providing other facilities. Inadequate market facilities and institutional arrangements are responsible for low price realisation and instability in prices in the state of Bihar. In the absence of any regulator/facilitator, these unregulated markets are deprived of development of marketing infrastructure and may become inhospitable and exploitative to the users in course of time (Sharma, 2019). Hence, it is clear that, like Bihar, the obliteration of APMC act would have demolished the well-functioning marketing system of the Punjab state.

Beyond doubt, the public sector, under the APMC regime, has made remarkable contribution in the development of sufficient market infrastructure in Punjab and Haryana. With the dismantling of regulated marketing system and entry of private players under recent laws, agriculture markets would be deprived of the required marketing infrastructure and remunerative prices to all stakeholders.

Conclusion and Policy Implications

The study highlighted the role of Punjab Mandi Board (PMB) as an efficient facilitator in the marketing of farm produce and also explained the likely effects of the obliteration of APMC Act in the state. The State Marketing Board no doubt had been playing a significant role in revolutionizing the rural economy. Apart from which, it had also supported institutions and organizations, roads, warehouses, cold stores, processing units, research and training activities, means of communications etc. The Board in collaboration

with other departments had linked every single village with the metallic link roads. The manifold increase in the agricultural production might not had been achieved without the successful development of an efficient marketing system. All these interventions paved the way for smooth procurement of food grains to maintain buffer stock and for public distribution system. But with the dissolution of APMC act, it was observed that there would be manifold adverse effects on farmers at the first step leaving them vulnerable at the hands of private companies. The repeal of APMC act would finish the regulated market system, resultantly the income of the PMB would be seriously impacted as there was no provision to charge any fee/tax on the purchase of private players. Bihar is the perfect example of the adverse implications of repeal of APMC Act in 2006 as the Bihar State Agricultural Marketing Board had lost revenue due to the repeal of the APMC Act that led to deterioration of existing infrastructure in the state. With the dismantling of regulated marketing system and entry of private players under recent laws, agriculture markets would be deprived of the required marketing infrastructure and remunerative prices to all stakeholders.

Note: The study covered all the districts of the Punjab state the number of which went on increasing because new districts were being carved. The information regarding different variables was collected to study the changing pattern and impact of various parameters at the district level for which triennium averages of area and output of crops were taken for early 1980s, early 1990s, early 2000s and early 2010s.

Limitation of the study is that production and prices of all fruits and vegetables were not available, so were not included in the study.

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