

# A Statistical Study on the Estimation of Infrastructural Development in Jammu Province of J&K State

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**Abstract:** The present investigation was carried out on the basis of secondary data on development of infrastructural facilities for the period from 1984-85 to 2013-14. All the relevant data required for estimating compound growth rate as well as percentage changes over the base period were collected from published sources, annual reports and agencies of Jammu province of J&K State, Government of India. The need of the present study arose mainly to search importance of infrastructural items for agriculture growth in the region. The analysis has been presented in tabular form and the study is mainly descriptive in nature. The analysis of study found that there was significant increase in area irrigated by wells and tanks from 0.31 per cent and 0.33 per cent during period I to 1.41 per cent and 0.59 per cent in overall period, respectively; however, area irrigated by canals was highest 86.55 per cent. As far as development of physical infrastructural items were improved considerably and substantially in the region. As such, Surface road length and storage capacity for agricultural produce has increased by 31.02 per cent and 59.10 per cent, respectively, during the period under study. All infrastructural items have shown increasing trend in terms of percentage changes over the base period except number of godowns which decreased by 1.28 per cent over base period during the entire period. The analysis of study revealed that growth rate were positive for distribution of agricultural implements, road length both surface and unsurface, number of godowns, storage capacity and tube wells/ pump sets and negative for credit disbursements and electrification of villages during overall period under study. The study concluded that there is need to improve the flow of credit through financial institutions for the farmers in Jammu region.

**Keywords:** Infrastructural facilities, Growth rate, credit disbursement.

## 1 Introduction

The development of the agriculture sector is not only dependent on advancement in technology but also on the improvement of agriculture infrastructure. Adequate infrastructure facilities help in raising production and lowering the unit cost of production activities. Infrastructure both physical and institutional such as irrigation, tube wells, machinery, roads, electricity, storage capacity and financial institutions etc. together play a key role in determining the agriculture output. This paper presents the importance of physical infrastructure as well as institutional infrastructure especially for agriculture development. Institutional infrastructure such as storage capacity with Government agencies and financial institutions play a pivotal role in the growth of agriculture sector. Financial institutions play a vital role in development of agriculture sector. Financial institutions provide the credit facilities to buy the equipment's such as tractors, pump sets and other durables at low interest rate as compared to private money lenders. This institutional credit further reduces the cost of borrowing and increases the investment in production that enhances the returns to the farmers [1]

Infrastructure facilities lead to reduce in marketing cost, which is crucial for increasing the income of farmers and reducing

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cost to the consumers. Infrastructure system provides nourishment to production activity, income generation and positive effect on income distribution. Improved infrastructure is a primary driving force under every condition for commercialization. The benefits of commercialization and specialization to a large extent depend upon infrastructure and both have push and pull relationship [2]. From the strategic and development point of view the area under agriculture in the Jammu region of J&K State can be broadly categorized into irrigated and un-irrigated area which are spread over the lower sub-tropical plains, higher temperate areas and the intermediate areas. Irrigation in Jammu division is carried out by way of canals, wells and various other sources. As against availability of 397 thousand hectares area, only 109 thousand hectares of net area sown has been brought under irrigation which constitutes 27 per cent of the net area sown. Small holdings and limited irrigation facilities, makes agriculture in the region as under developed [3]. The work carried out by [4] and [5] in India and China are some of the few studies that look into the relationships between investment in infrastructure, rural growth, poverty alleviation and the role of complementarities of investments. The transportation facilities are regarded as the arteries of mainstream development and a prerequisite for development of modern marketing system. In agriculture, road investment can increase intensity of land use [6]. One study, for example found for Tanzania a significant increase in non-agricultural activities as a consequence of a better infrastructure in roads [7]. This diversification could be the product of the necessity to hedge against unanticipated risks in a context where credit and insurance markets malfunction or are not existent [8] and [9]. Alternately the result could be due to the existence of entry barriers that prevent access to more profitable labour markets due to insufficient public or private assets [10]. Rural electrification is an important basic infrastructure essential for agricultural modernization as it leads to the adoption of several advanced technologies. Consistent with this studies have observed that rural electrification increases use of pump sets to harness underground water for crop cultivation because of its better reliability and controllability [11]. Besides, a study on macro data was used from 85 random selected districts of India to examine the role of rural roads, among other factors in agriculture investment and output. The study found that the road investment contributed directly to the growth of agricultural output, increased use of fertiliser, expansion of commercial banking operations, etc. [12]. Better road access improvement can increase the utilization key inputs with lower cost as well as contributed to the productivity enhancement especially in remote areas [13]. The main objectives in this paper are to examine infrastructural development for agriculture growth in Jammu region and to work out the trend for infrastructural items

## 2 Materials and methods

In order to study the impact of infrastructural development changes, the present study made use of time-series data on different variables like irrigation, credit disbursement, agricultural machineries, road length, godowns, storage capacity, villages electrification and tubes wells/ pump sets energized in Jammu division. The period wise i.e., period I (1984-1985 to 1993-1994), period II (1994-1995 to 2003-2004), period III (2004-2005 to 2013-2014) and Overall period (1984-1985 to 2013-2014) changes in absolute terms were analyzed by simple tabular method, compound growth rate as well as percentage change over the base period.

## 3 Compound Growth Rates

The Compound Growth Rates [20] were worked out by fitting exponential function of the following type to the data for four periods, as used by [14].

$$y_t = y_0(1+g)^t \text{ or } a(1+g)^t$$

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Or 
$$\log y = \log a + \log b$$

Then, compound growth rate  $(r) = (\text{Antilog } b)$

Where,  $Y$  = Area in hectares, production in quintals and yield in quintals per hectare,  $a$  = Intercept,  $b$  = Estimated

regression

coefficient (Parameter) and  $t$  = time period (in year)

Finally the annual rate of compound growth in area, production and productivity of the crops was worked out by using the formula

$$r = (\text{Antilog } b - 1) \times 100$$

The significance of the estimated compound growth rates was tested with the help of students'  $t$ -test which is given below.

$$t = r/S.E. (r) \sim t_{\alpha, n-2}$$

$$S.E = b \sqrt{\frac{\left[ \sum (\log y)^2 - \frac{\left( \sum \log y / n - \log b^2 \right)^2}{\sum x_i^2} \right]}{0.43429 (n - \alpha) (\sum x_i^2) \times 100}}$$

## 4 Results and Discussion

### 4.1 Changes in the credit disbursement (loans advanced) through PACCS

It was revealed from the Table 1 that, the credit disbursed through Primary Agricultural Co-operative Credit Society increased from 1820.08 lakh to 6771.27 lakh during period I to period II, while it decreased tremendously to 1465.50 lakh during period III, the overall period has depicted credit disbursement as 3352.28 lakh. On the other hand, it has increased during period II by 272.03 per cent over the base period, whereas it had decreased by 19.48 per cent during period III. The Table further revealed that decadal compound growth rate was showing non-significant negative growth rate from period I to overall period by -1.79 per cent, -4.67 per cent, -3.43 per cent and -0.56 per cent, respectively.

The Table 1 indicated the credit which is disbursed through Primary Agricultural Credit Co-operative Society for the farmers as a loan for their financial needs had shown negative growth rate during period I, II, III and overall period under study to the tune of -1.79 per cent, -4.67 per cent, -3.43 per cent and -0.56 per cent, respectively. The decrease or fluctuation in case of growth revealed that the farmers of Jammu province of J&K state are not taking advantage of institutional finance for overcoming their financial needs. Agriculture credit is playing a key role in supporting agriculture production and it appeared to be an essential input along with modern technology for their productivity. An important aspect that has emerged in the last three decades is that the credit is not only obtained by smaller and marginal farmers for survival but also by the large farmers for enhancing their income as well. Therefore, In order to improve the flow of credit to the agriculture sector, the Lead Banks or State Co-operative Banks in the region needs to prepare Special Agricultural Credit Plan with the help of Co-operative Credit Organizations to flow credit through NABARD, District Co-operative Central Banks, Primary Agricultural Co-operative Credit Society and Commercial Banks.

### 4.2 Changes in the distribution of agricultural implements

It was observed from the Table 1 that, the distribution of agricultural implements increased from (8825 Nos.) to (9278 Nos.) during the period I to overall period. In case of percentage it increased by 4.27 per cent, 4.64 per cent and 5.13 per cent during period II, III and overall period over the base period, respectively. The table has shown further that, the annual compound growth rate of agricultural implement was showing significantly positive growth rate of 1.00 per cent, 1.00 per cent and 1.01 per cent significant at 1 per cent level of significance during period I. period II and overall period respectively, while it recorded non-significant positive growth rate of 1.00 per cent during period III under study.

The (Table 1) further indicated that, the use of improved agricultural implements had increased considerably over the period which is contributing significantly in the development of agriculture in region. In addition, compound growth rate had shown positively significant growth rate at 1 per cent level of significance during period I. II and overall period, while period III was observed non-significant positive growth. Increased productivity in agriculture has been achieved mainly by modernization of agriculture which consists largely of using modern farm machinery such as tractors, harvesters, threshers etc. Therefore, it more needed to more modern equipments for cultivation, sowing, harvesting and other agricultural

implements for the farmers.

### 4.3 Changes in the development of road length

The development of roadway is essential for better transportation and communication in the region. It provides basic infrastructure facilities for marketing of agricultural produce, besides with better road access improvement; it reduces the cost of inputs as well as reduces the rural poverty. Table 1 revealed that the length of surface road has increased from (1689 km) to (2213 km) during period I to overall period, respectively, In reference to percentage changes it increased by 3.55 per cent, 25.75 per cent and 31.02 per cent over the base year. However, Table 4.8 indicated that the length of unsurface road has increased from (1826 km) to (5990 km) during period I to overall period, respectively. In case of percentage changes it increased by 6.18 per cent, 222.01 per cent and 228.03 per cent over the base period.

The Table further revealed that annual compound growth rate of surface road length had shown positively significant growth of 1.00 per cent during period I and III, while as period II and overall period was showing non-significant positive growth rate with the value of 1.03 per cent and 1.05 per cent, respectively. The results of Table has shown further that annual compound growth rate of unsurface road length had shown positively significant growth rate of 1.01 per cent significant at 1 per cent level of significance, 1.24 per cent and 1.26 per cent significant at 5 per cent level of significance during period I, period II and overall period, respectively, while as it was recorded non-significant positive growth rate with the value of 1.00 per cent during period III.

### 4.4 Changes in the status of co-operative facilities

Co-operative facilities are very essential for protection of agricultural products against disease, pests, insects and climatic factors. It provides balanced temperature for agricultural produce as well as it reduces the price risk. Table 1 revealed that no. of godowns had increased from (312 Nos.) to (318 Nos.) during period I and II, respectively. In case of percentage changes it was showing increasing trend from period II to period III by 1.92 per cent and 2.88 per cent over the base period, respectively, whereas it decreased to 1.28 per cent during overall period. The storage capacity for agricultural produce increased from (40223 million tonnes) to (40646 million tonnes) during period I to period III. In terms of percentage changes it had increased by 0.05 per cent, 1.05 per cent to 59.10 per cent during period II, III and overall period, respectively over the base period under.

The table further revealed that except period I annual compound growth rate of godowns had shown positively significant growth rate with 1.03 per cent and 0.97 per cent significant at 1 per cent level of significance and 0.99 per cent significant at 5 per cent level of significance during period II, III and overall period. The table further indicated that except period III annual compound growth rate of storage capacity had shown positively significant growth rate with 1.06 per cent, 1.09 per cent and 1.07 per cent during period I, II and overall period, respectively.

Likewise, According to [15], provision of efficient infrastructure is now widely recognized as indispensable to agriculture progress as it is a known fact that infrastructure can support economic growth, reduce poverty and make development environmentally sustainable.

The results of (Table 1) indicated that number of godowns decreased marginally from (312 Nos.) during period I to (308 Nos.) during overall period, while storage capacity for agricultural produce has increased substantially over the entire period. Compound growth rate had shown positive significant during period I, II and overall period for storage capacity, but it was showing non-significant positive growth rate during period III. Therefore, both godowns and storage capacity is very important for protection of agricultural produce against fluctuation of climatic factors, disease, pests and insects. The local government should build or improve the rural infrastructure in the remote areas that the farmers can protect their produce until to reach the central market to sell that.

### 4.5 Changes in the villages electrified in Jammu region

Infrastructural and organizational facilities are very much essential and play a crucial role in promoting economic growth and thereby contribute to the reduction of economic disparity, poverty and deprivation in a country. On the other hand,

proper development of infrastructure will not only decrease the cost of distribution but also facilitate to various section of

the population like, farmers, traders, consumer, scientists, sociologist and administrator. The result of Table 1 revealed that villages which were electrified in Jammu division had increased from 6699.09 villages to 8081.05 villages during period I to period II, respectively, while as it decreased to 7758.02 and 7513.02 villages during period III and over all period. It was observed that electrification transfer to the villages has increased by 20.62 per cent during period II, but again it decreased by 15.80 per cent and 12.14 per cent during period III and overall period over the base period, respectively.

Decadal compound growth rate of villages electrified in Jammu region had shown positive growth rate with 0.67 per cent and 2.76 per cent significant at 1 per cent level of significance during period I and period II, respectively, whereas during period III it was showing significantly negative growth rate with -15.27 per cent. However, during overall period it recorded non-significant negative growth rate with the value of -0.21 per cent.

Investment in rural infrastructure, particularly electricity will therefore be required to support the anticipated growth in agriculture production. Proper development of infrastructure system will not only decrease the cost of distribution but also facilitate to various sections of the population. The villages which were electrified in Jammu region (Table 1) revealed that villages electrified has increased by 20.62 per cent, 15.80 per cent and 12.14 per cent respectively over the base period. During period I and II, positively significant growth rate were observed, while period II and overall period were witnessed negative growth. The result of table has shown that State government provided sufficient electricity for Jammu region. Therefore, having electricity in the remote areas would contribute directly and indirectly for agriculture growth.

#### *4.6 Changes in the utilization of tube wells/ pump sets energized in Jammu region*

The Table 1 indicated utilization of tube well/ pump sets energized for irrigation purposes in Jammu region and revealed that no. of these implements has increased from (3242.03 Nos.) to (6167.04 Nos.) during period I to period II, respectively, while as it was showing a decrease with (5670.08 Nos.) during period III. In terms of percentage changes it was observed that in period II, III and overall period has increased by 90.22, 74.89 and 55.05 per cent, respectively to the base period. The table further revealed that decadal compound growth rate had shown significantly positive growth rate during period I and period II with the value of 1.88 per cent and 11.11 per cent, respectively, while it was observed significantly negative growth rate with -31.27 per cent during period III. However, it was recorded non-significant positive growth rate with the value of 0.14 per cent during overall period.

Likewise, tube wells/ pump sets which energized in Jammu division for irrigation purpose presented in the (Table 1) revealed that during period I and period II, positive significant growth were observed, while significant negative growth for period III and non-significantly positive growth for overall period were recorded. It shows that many minor irrigation structures have been expanded in the region that could contribute to bring more land under cultivation.

#### *4.7 Changes in the Irrigation status in Jammu region, 1894-85 to 2013-14*

The irrigation status of Jammu region is presented in Table 2 Fig 2 the data in the Table revealed that the net irrigated area in Jammu region has increased from 93.28 thousand hectares in period I, to 98.11 thousand hectares in period II, to 103.26 thousand hectare in period III and it was 98.22 thousand hectare in overall period. As far as gross irrigated area was concerned, it had increased from 163.05 thousand hectares in period I, to 165.05 thousand hectares in period II, to 192.09 thousand hectares in period III and was 173.96 thousand hectares in overall period. The percentage area under canal irrigation had marginally come down from 88.57 per cent in period I to 86.55 per cent during overall period, while as irrigated area coverage under tanks and wells had small increase from 0.33 per cent and 0.31 per cent in period I to 0.59 per cent and 1.41 per cent during overall period. The result of table had further shown that net sown area irrigated had increased marginally from 25.00 per cent to 26.16 per cent from period I to period III, but as compared to period III it come down to 25.68 per cent during overall period, whereas gross sown area irrigated increased from 25.26 to 27.10 per cent from period I to period III, but as compared to period III it come down to 25.91 per cent during overall period. On the other hand, Irrigation intensity had increased from 174.79 per cent to 177.11 per cent from period I to overall period.

Decadal compound growth rate during period I revealed that wells and net sown area irrigated had shown significantly positive trend of 2.30 per cent and 1.00 per cent, while gross sown area irrigated and irrigation intensity were significantly negative to the extent of -1.00 per cent and -0.99 per cent, respectively. Canals, tanks, other sources and net irrigated area were non-significantly positive with the value of 0.06 per cent, 1.02 per cent, 1.37 per cent and 0.20 per cent, respectively.

However, the table further recorded non-significant negative growth rate in case of gross irrigated area with -0.02 per cent

**Table 1:** Changes in the infrastructural development for agricultural growth and their CGR in Jammu region, 1984-85 to 2013-14

Particulars	Period				Decadal Compound Growth Rate (per cent)				
	Period I	Period II	Period III	Overall period	Period I	Period II	Period III	Over all period	
Loans advance (Rs. in Lakh)	1820.08	6771.27 (272.03)	1465.50 (-19.48)	3352.28 (84.23)	-1.79	-4.67	-3.43	-0.56	
Improved agricultural implements (Nos.) (Annual CGR)	8825	9202 (4.27)	9235 (4.64)	9278 (5.13)	1.00*	1.00*	1.00	1.01*	
Road length (Kms) (Annual CGR)	Surface	1689	1749 (3.55)	2124 (25.75)	2213 (31.02)	1.00**	1.03	1.00*	1.05
	Unsurface	1826	1939 (6.18)	5880 (222.01)	5990 (228.03)	1.01*	1.24**	1.00	1.26**
Co-operation (Annual CGR)	Godowns (Nos.)	312	318 (1.92)	321 (2.88)	308 (-1.28)	1.00	1.03*	0.99**	0.97*
	Storage capacity (Mts.)	40223	40245 (0.05)	40646 (1.05)	63995 (59.10)	1.06**	1.09*	1.69	1.07*
Villages/ Hamlets electrified in Jammu division (Cumulative No)	6699.09	8081.05 (20.62)	7758.02 (15.80)	7513.02 (12.14)	0.67*	2.76*	-15.27*	-0.21	
Tube wells/ Pump sets energized in Jammu division (Nos.)	3242.03	6167.04 (90.22)	5670.08 (74.89)	5026.83 (55.05)	1.88**	11.11*	-31.27*	0.14	

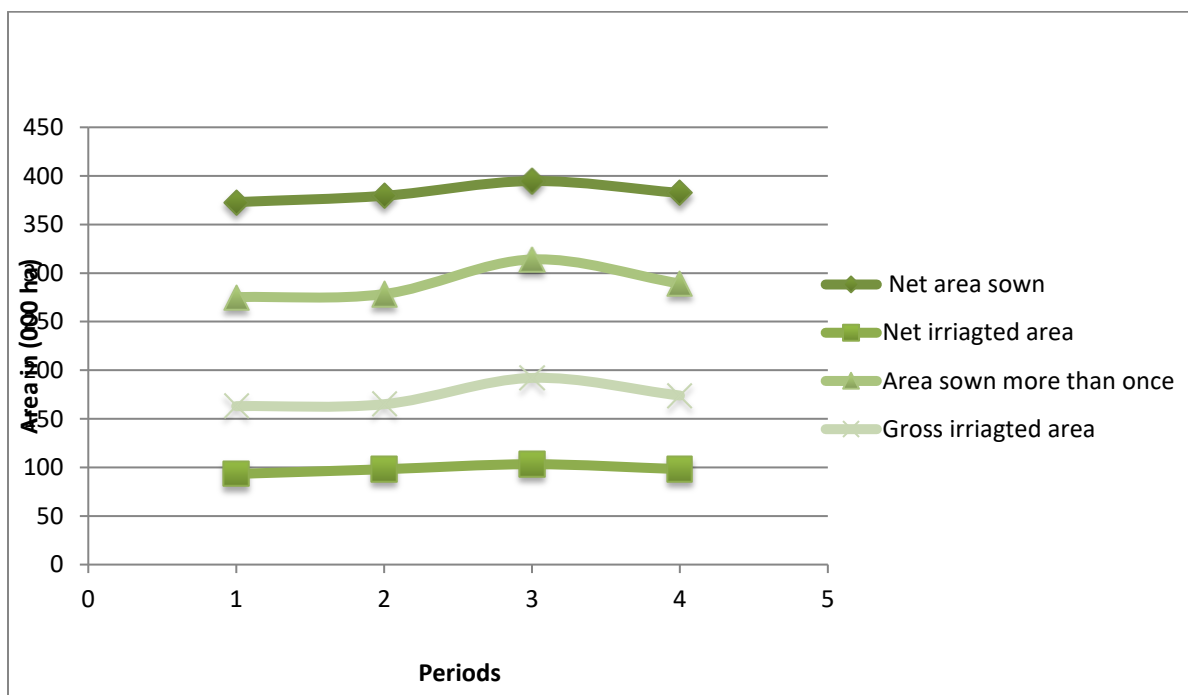
**Note:** Figures in parentheses indicates percentage change over the base period.

\*significant at 1% los (level of significance), \*\*significant at 5% los and \*\*\*significant at 10% los.

Source: Agriculture census, Statistical digests {[ 3 ],[ 16 ],[ 17 ]and [ 19 ]} Directorate of Economics and Statistics, J&K State.

during period I. During period II growth trend in terms of canal was (0.68 per cent), other sources (4.14 per cent), net irrigated area (1.10 per cent) and gross sown area irrigated (1.01 per cent) was observed at 5 per cent level of significance, while the growth trend of tanks and wells was recorded non-significantly positive with the value of 2.48 per cent and 6.88 per, respectively, However, gross irrigated area, net sown area irrigated and irrigation intensity was observed non-significant negative trend of -0.11 per cent, -0.86 per cent and -0.96 per cent, respectively. During period III, all sources of irrigation and area showed a positively significant growth except canals which recorded non-significant positive growth to the tune of 0.27 per cent and significant negative growth trend with -6.02 per cent for other sources. During overall period, canal, tanks, wells, net irrigated area, gross irrigated area, net sown area irrigated and gross sown area irrigated had shown significantly positive growth trend of 0.32 per cent, 1.34 per cent, 10.75 per cent, 0.53 per cent, 0.78 per cent, 1.01 per cent and 1.03 per cent at 1 per cent level of significance, but for gross sown area irrigated it was showing at 5 per cent level of significance, while, for other sources and irrigation intensity it was showing non-significant positive growth trend with 0.26 per cent and significantly negative growth trend with the value of -1.01 per cent at 1 per cent level of significant, respectively.

Irrigation is the most important input in agriculture. A significant change in cropping pattern could be brought with the help of adequate irrigation facilities. The area under agriculture in Jammu region can be broadly categorized into irrigated and un-irrigated areas which are spread over the lower sun-tropical plains, higher temperate areas and the intermediate areas. As far as many minor irrigation structures have been constructed like, canals, tanks, wells, tube wells and other sources have come into existence. Jammu region has significantly benefitted from development of canals (Table 2 and Fig 1) as more than 85 per cent of area was irrigated through canals. However, with the increase in minor irrigation sources, area irrigated through canals had marginally declined from 88.57 per cent to 86.55 per cent from period I to overall period, but still it was the largest source of irrigation, the reason might be that in Jammu region there are large plains of deep fertile soil that are drained by well distributed rivers which substantially is an important condition for canal condition. The result of table indicated that only 25.68 per cent of area is irrigated and 74.22 per cent of net cultivated land is un-irrigated. Although, irrigation intensity has found to be increasing over the period of time, therefore, it is very important to ensure more ground water and surface water schemes to increase minor irrigation, this strategy could be achieved through active participation of individuals and cooperative efforts of the farmers with the help of state government. It should be mentioned that, more of the irrigation management programmes should be implemented to improve the performance and sustainability of irrigation system in Jammu region.



**Figure 1:** Changes in the irrigation status in Jammu region

**Table 2:** Changes in the Irrigation status and their CGR in Jammu region, 1984-85 to 2013-14

Sources of Irrigation	(Area in 000 ha)				Decadal Compound Growth Rate (per cent)			
	Period I	Period II	Period II	Overall period	Period I	Period II	Period III	Over all period
Canals	82.62 (88.57)	84.31 (85.93)	88.12 (85.33)	85.01 (86.55)	0.06	0.68**	0.27	0.32*
Tanks	0.31 (0.33)	0.05 (0.05)	1.37 (1.32)	0.58 (0.59)	1.02	2.48	4.53*	1.34*
Wells	0.29 (0.31)	0.56 (0.57)	3.31 (3.20)	1.39 (1.41)	2.30*	6.88	0.44*	10.75*
Other sources	9.74 (10.44)	13.16 (13.41)	10.45 (10.12)	11.12 (11.32)	1.37	4.14**	-6.02*	0.26
Net irrigated area	93.28 (100.00)	98.11 (100.00)	103.26 (100.00)	98.22 (100.00)	0.20	1.10**	1.00***	0.53*
Gross irrigated area	163.05	165.05	192.09	173.96	-0.02	-0.11	1.47*	0.78*
Net sown area irrigated %	25.00	25.85	26.16	25.68	1.00**	-0.86	1.01**	1.01*
Gross sown area irrigated%	25.26	25.00	27.10	25.91	1.00**	1.01**	1.01*	1.03**
Irrigation intensity %	174.79	168.22	186.02	177.11	-0.99*	-0.96	1.01**	-1.01*

Note: Figures in the parentheses indicates percentage to net irrigated area.

\*significant at 1% level of significance(los), \*\*significant at 5% los and \*\*\*significant at 10% los.

Source: Agricultural census, Statistical Digest [18] and [3], Directorate of Economics and Statistics, Government of J&K.

## 5 Conclusion

The result regarding infrastructural items indicated that amount of credit which was disbursed through (PACCS) has increased by 272.03 per cent over the base period during period II, whereas it decreased by 19.48 per cent over the base period during period III, while as it increased by 84.23 per cent during overall period. On the other hand, distribution of agricultural implements has increased by 5.13 per cent over the entire period. Unsurface road length has increased considerably and substantially in the region, while surface road length has increased by 31.02 per cent over the entire period. Number of godowns has increased by 1.92 per cent and 2.88 per cent over the base period during period II and III, whereas it has declined by 1.28 per cent in overall period. However, storage capacity has increased tremendously by 59.10 per cent over the entire period under study. As far as the result regarding the villages electrified was concerned in Jammu division, it has increased during last three decades. While tube well or pump sets which was used for irrigation purposes has increased by 90.22 per cent, 74.89 per cent and 55.05 per cent during period II, III and overall period over the base period under study. There was significant increase in area irrigated by wells and tanks from 0.31 per cent and 0.33 per cent in period I to 1.41 per cent and 0.59 per cent in overall period, respectively; however, area irrigated by canals was highest 86.55 per cent. The percentage area under canal irrigation had marginally come down from 88.57 per cent in period I to



86.55 per cent during overall period, but it is still the largest source of irrigation, while as irrigated area coverage under tanks and wells had small increase from 0.33 per cent and 0.31 per cent in period I to 0.59 per cent and 1.41 per cent during overall period. As far as development of physical infrastructural items were concerned, they improved considerably, substantially and satisfactory in the region which accompanied by a steady growth in agriculture. On the other hand, all infrastructural items have shown increasing trend in terms of percentage changes over the base period except number of godowns which decreased by 1.28 per cent over base period during the entire period. The analysis of study revealed that growth rate were positive for distribution of agricultural implements, road length both surface and unsurface, number of godowns, storage capacity and tube wells/ pump sets and negative for credit disbursements and electrification of villages during overall period under study.

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