
Contribution of Primary Agricultural Co-operative Society in food grain production of Uttar Pradesh

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Abstract

The agriculture sector has a very important contribution to the rural development of a developing country like India, which without the contribution of Uttar Pradesh in food grains production is incomplete. Hence, to maintain the development of the agricultural sector and its fulfilment, a high cost is required which is fulfilled by the rural credit delivery systems. The present article discusses the role of sources and agencies providing agricultural credit, mostly co-operative banks give adequate credit to the farmers and which increase the productivity of the agricultural sector. This study covers the performance of primary agricultural co-operative societies, loan delivery, recovery, and growth pattern of food grain production in Uttar Pradesh and India. The analysis period covers from 1985-86 to 2014-15. The logical findings show that there is a positive correlation between credit and agricultural production in Uttar Pradesh and the share of agricultural finance in short and medium-term credit provided by co-operative banks has continuously been increasing.

Keywords: PACSs; CAGR; AAEGR; food grains; Co-operative

1. Introduction

In a country like India, the importance of rural development is mainly based on agricultural productions which according to Census-2011 of India 68.84 percent of the people live in rural areas in which only Uttar Pradesh has 16.5 percent rural population and 77.7 percent rural population in the state. Percentage resides thus the importance of rural areas is highly dependent on agriculture-based activities in Uttar Pradesh, in which more than 70^[1] percent of the workforce is still dependent on this area, thus the role of banking institutions in the development of this area becomes important. Co-operative banks in Uttar Pradesh provide short and medium-term agricultural loans through primary agricultural co-operatives societies, which are known as the base of Co-operative banks and provide only seasonal short and medium-term agricultural loans. Thus, both institutions provide credits for agriculture-based activities and supplement each other. Under the short and medium-term loans, the major ones are minor irrigation, agricultural mechanization, animal farms, agricultural activities, and

new resources. To evaluate the credit facilities granted to all these heads, it becomes necessary to observe their comparative status and growth as it indicates that the modification and development of rural financial activities has been provided in favour of loans.

In Uttar Pradesh, the co-operative bank was established in 1944 mainly with a view to features the indebted farmers from the clutches of money lenders, since then a lot of change has taken place concerning its activities and this bank has been playing an optimistic role in rural development of Uttar Pradesh ^[2]. In the sight of that the government, considers the growth of agricultural production to be important for the contribution of rural development in its programs and schemes, but the evaluation of the achievement of various rural development programs show that the programs were started by the government with remarkable objectives. Therefore overall socio-economic rural development in the state depends upon the growth of food production.

The requirement of credit and formation of savings have long been expected as an essential element in any rural development policy. Credit plays a crucial role in the modernizations of agriculture but its role in the eradication of rural poverty has seldom economized. Financial institutions in developing countries, whether public or private, have shunned rural areas for various reasons such as opportunity costs and low financial credibility. Further, rural financial services have mostly been controlled by rich farmers, who can use their large endowment base and authority within the local power structure to secure loans of very beneficial terms. Credit policies are also generally concentrated on Land-based agricultural production programs, neglecting off-farm activities in which the poor are mainly occupied ^[3].

The State economy has been accepted as an agricultural economy for the reason that a larger size of its population still lives in rural areas and they contribute significantly to GDP. But the rural poor men and women, landless,

artisans, agricultural laborers, and small farmers have almost been excluded from these financial services either because they were not available resources and securities of credit condition. The imperfect view is that the poor do not save, that they cannot invest given immediate consumption needs, and that they are unaware of the base principle of sound money management. In the competition for a small quantum of financial resources, the poor naturally lost out in the institutional markets and were forced to cure to unfair informal sources of credit such as money-lenders and traders the letters can react rapidly and with great elasticity to vital demand, and develop the poor and supplementary multiple their scarcity.

On the other hand, the co-operative bank gives the credit of its own member according to the principle of open membership, but these members are rich, powerful farmers and have failed to make any contribution to the improvement of poverty ^[4]. The benefits of co-operative institutions have regularly been preoccupied to serve the rigorous of a select only some Government policies of many developing countries are built around the hypothesis that increasing the flow of credit to rural re-establishment is possible. By combining labor with more capital, both production and productivity can be improved ^[5] i.e. more produce and more income. Credit for rural development depends upon two crucial factors: rural savings and provision of liquidity to farmers lacking sufficient funds to invest in improved technological advances. There must be sufficient investable funds to utilize opportunities created due to technological get through credit enables extension of central as separate shape ownership of resources^[6], but, it should be extended for investment in ‘clearly spelled out’ opportunities or it will certainly end up as supplementary expenditure.

New technologies in the state do not require additional credit or those new rural technologies have not been adopted without credit. Thus, credit is neither necessary nor sufficient for the initiation of rural development ^[7]. Rural credit agencies, however, can support new investment as well as substantial re-

allocation of untouchable assets through mediation between savings and commercial investors, and the role of capital growth by increasing incentives to save investment and work. Also increases.

2. Review of Literature

Numerous studies are conducted related to the performance, feasibility, profitability, trend, and operational efficiency of the cooperative banking sector in India. Here, an attempt has been made to review the literature with various reports of groups, committees, and study teams, etc. working as a part of my research paper. Some of the main selected studies are discussed.

Rural Banking Inquiry Committee (1949), All India Rural Credit Survey Committee (1954), Cooperative Credit Committee (1960), All India Rural Credit and Investment Survey (1962), All India Rural Credit Review Committee (1969), Work on Rural Banks The Group (1975), the Committee to Review Institutional Credit for Agriculture and Rural Development (1981), the Agricultural Review Committee (1989), and the Narasimhan Committee 1991 and 1998 were constituted by the Government of India to look into their work and their Several recommendations were made to improve health and efficiency.

3. Research Methodology and Data Collection

The present study is based on the availability of secondary data, publications particularly report on currency and finance, bulletins, statistical tables on co-operative banks, a publication of NABARD especially a review of the cooperative movement, U.P. Statistical Diary, and Report of several studies by Government and RBI.

In this study, statistical and econometric tools are applied to analyze the data and get results to derive logical conclusions. General statistics such as mean, standard deviation, and the correlation coefficient, compound annual growth rate (CAGR), and average annual exponential growth rate (AAEGR)^[8] during the period from 1985–86 to 2014–15.

3.1 Coefficient of Variation (CV)

The coefficient of variation represents the ratio of the standard deviation to the mean; it is a useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from each other.

It is a statistical measure of the dispersion of data points in a data series around the mean. It is expressed in the following form-

$$CV = SD/Mean$$

3.2 Measurement of Compound Annual Growth rate (CAGR)

It is a simple measure to find out the year-wise increase and decrease in the variables under study. The CAGR is a number that represents a steady level of growth from the initial value to an ending value as it determines the average of the year to year, the growth rate for the time series data. Assuming that the relationship between the dependent variable (Y) and the independent variable (X) is

$$Y = \exp(\beta_0) * \exp(\beta_1 * X) \dots \dots \dots (1)$$

Taking natural logarithms of both sides of the equation we get

$$\ln Y = \beta_0 + \beta_1 X \dots \dots \dots (2)$$

This is a linear relation between $\ln Y$ and X .

Measurement of compound annual growth rate $\{Y_t = Y_0(1+r/100)^t\}$ in a variable has been calculated by firstly regressing the natural the logarithm of the variable on time which is called the semi-log model used in the following form-

$$\ln Y_t = \ln Y_0 + \beta_1 * t + u_t \dots \dots \dots (3)$$

Where Y_t is the value of the variable in the time, whose annual compound growth rate is to find out, and t is the period. The years have been coded as 0, 1, 2, 3 n, and so on. β_0 and β_1 are parameters, and u_t is the disturbance term. After estimating the above regression model, the following formula has been used for getting compound annual growth rate (CAGR)-

$$r = [\text{anti } \ln(\beta_1) - 1] \times 100 \dots \dots \dots (4)$$

Where r = compound annual growth rate (in %).

3.3 Measurement of Average Annual Exponential Growth Rate (AAEGR)

The following the formula has been used to calculate the average annual exponential growth rate during a period.

$$G = (1/t) \ln (Y_1/Y_0) \dots \dots \dots (5)$$

Where G = average annual exponential growth rate (in %)

Y_1 = value in the final year of the period

Y_0 = value in the initial year of the period

t = number of years contained in the period

$\ln$ = exponential logarithmic operator.

4. Total Short and Medium-Term Loans Distributions, Recoveries, and Agricultural Production

The growth of loan amounts to measure the level of growth in the agricultural sector the increasing number of borrowers for the purchase of seeds, mechanization, Fertilizer, and other new assets of agricultural types of equipment to increasing production of food grain for the analysis of 30 years from 1985-86 to 2014-15.

The combined effect of short and medium-term loans increasing the tendency of agricultural loans is reflected in food production that is shown with the help of table-1. The table has shown that the terms of food production, it increased from 30.04 million tons in 1985-86 to 50.03 million tons in 2013-14 in Uttar Pradesh with the total short and medium-term credit is increased from 254.48 crores in 1985-86 to 1583.27 crores in the year 2014-15. The loan recovery in Uttar Pradesh increased from 239.84 crores in 1985-86 to 1331.44 crores in the year 2014-15 for 30 years. The agricultural food grain production in graph-1 is observably present in the form of exponential growth in the state.

In comparison to India, the agricultural loan structure of short and medium-term was increased to Rs. 3111 crores in 1985-86 and Rs. 180823 crores in the year 2014-15 it is presented more than 58 fold amounts of loans and advances during the three-decade from 1985-86 to 2014-15. But food grain production was

increased to 150.44 million tons in 1985-86 and 265.04 million tons in the year 2013-14 its shown only approximately increase during the same period.

The co-operative banks have been playing a significant role in assets creation also in rural areas by providing short and medium-term agricultural credit through Primary Agricultural Credit Societies (PACs). The society provides finance for the construction of wells, minor land improvement, purchase of seeds, fertilizers, purchase of cattle and small agricultural implements, etc. The table reveals that the cumulative amount of loans and advances of PACs has increased to 254.48 crores in 1985-86 to 1583.27 crores in the year 2009-10 with the average mean is Rs. 975.02 crores and coefficient of variance is 52.72 percent present the more variation of loans disbursed in the state. These assets help in improving the standard of life of rural masses. In figure-1 describes how the growth rate of short and medium-term loans in Uttar Pradesh should be along the exponential line, but due to the unavailability of data, this figure indicates that short and medium-term loans are continuously increasing in order. It's going on

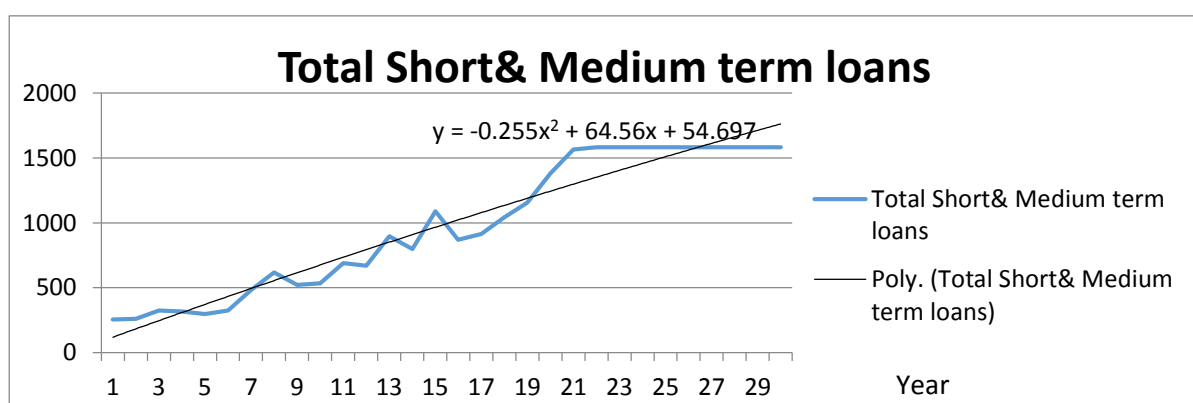
Table-1 Amount of loans issued, Recovery and Food Grains Production in Uttar Pradesh and India

Years	Uttar Pradesh			India	
	Amount of Short and Medium terms PACs Loans (Rs. crores)	Total Loans Recovery (Rs. crores)	Agricultural Production (Food Grain Million Tons)	Amount of Co-operative Loans (Rs. Ten Mill)	Agricultural Production (Food Grain Mill Tons)
(1)	(2)	(3)	(4)	(5)	(6)
1985-86	254.48	239.84	30.04	3111	150.44
1986-87	259.03	236.22	28.82	3304	143.42
1987-88	324.75	267.47	27.51	3688	140.35
1988-89	316.52	258.31	33.91	4364	169.92
1989-90	297.91	206.07	31.18	4513	171.04
1990-91	322.97	390.25	33.87	4311	176.39
1991-92	482.99	338.01	33.82	5575	168.38
1992-93	616.49	620.08	34.61	6223	179.48
1993-94	520.75	631.47	35.54	7158	184.26

1994-95	534.1	819.31	37.59	8312	191.49
1995-96	689	630.38	36.67	10552	180.41
1996-97	669.86	588.35	42.39	11292	199.44
1997-98	896.8	816.3	41.59	12137	192.26
1998-99	798.54	706.71	40.42	12743	203.61
1999-00	1089.18	819.01	45.65	23662	209.81
2000-01	870.31	771.6	42.72	25698	196.81
2001-02	913.19	846.77	44.14	30770	212.85
2002-03	1042.54	927.89	38.14	33996	174.77
2003-04	1156.2	997.32	44.25	35119	213.19
2004-05	1380.47	1297.92	37.84	39211	198.36
2005-06	1564.94	1303.46	40.41	42920	208.58
2006-07	1583.27	1331.44	41.22	49613	217.28
2007-08	1583.27*	1331.44*	42.1	57643	230.78
2008-09	1583.27*	1331.44*	46.73	58787	234.47
2009-10	1583.27*	1331.44*	44.02	74937	218.11
2010-11	1583.27*	1331.44*	47.25	91303	244.49
2011-12	1583.27*	1331.44*	50.28	107300	259.29
2012-13	1583.27*	1331.44*	50.75	161909	257.13
2013-14	1583.27*	1331.44*	50.03	171419	265.04
2014-15	1583.27*	1331.44*	39.59	180823	252.02
mean	975.02	856.52	39.77	42746.43	201.46
SD=	514.04	419.10	6.35	51511.64	33.87
CV=	52.72	48.92	15.96	120.51	16.81

Source: References: Co-operative Societies in Uttar Pradesh, Statistical Profile 2007-08; U.P. Co-operative Banks various issues. Agricultural production related to CMIE June 2010. Directorate of Economics & Statistics, DAC&FW * 4th Advance Estimates. M. Jagamohan, Sept 2019.* Figures Relates to 2006-07.

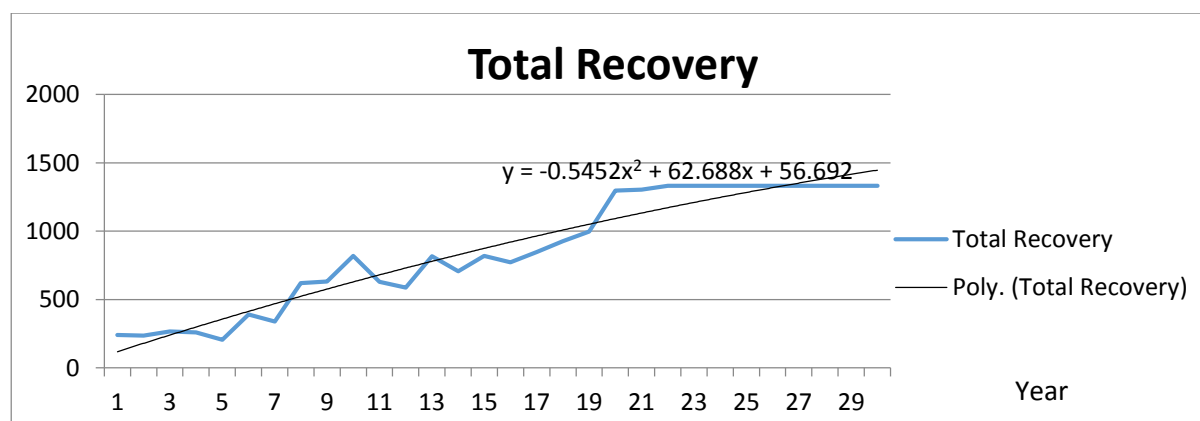
Figure-1 Linear growth patterns of total short and medium term loans issued in Uttar Pradesh



Source: The figure is based on table-1. Authors' calculations based on the amounts of loans issued by primary agriculture cooperative societies in the period from 1985-86 to 2014-15 in the state.

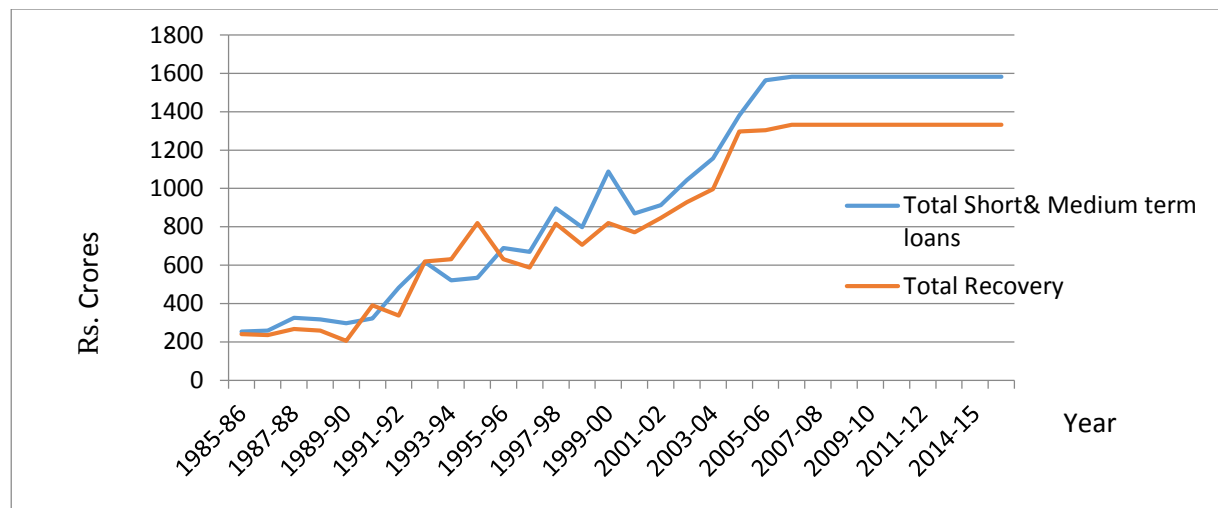
In the table-1 {Col.3} presents the recovery performance of short and medium-term loans in the state was increasing to Rs. 239.84 Crores in 1985-86 and Rs. 1331.44 crores in 2014-15. The average mean of loan recovery is Rs. 856.52 crores with a standard deviation are 419.10 and the coefficient of variance is 48.92 percent show less variation compared to loans and advances. The calculation of the correlation coefficient between Uttar Pradesh co-operative societies and total food grain production in the state has been 0.82. However, there is a higher degree of positive correlation coefficient between total short & medium-term loans and total recovery is **0.98** it represents the recovery is high because agricultural production is increased during the analysis period from 1985-856 to 2014-15. Just as through Figure 1, we find that the growth of short and medium-term loans keeps increasing trend, similarly, in Figure 2 we find that the recovery rate of issued loans in the state is continuously increasing at a linear pace.

Figure-2 Linear growth patterns of loans recovery in Uttar Pradesh



Source: The figure is based on table-1. Authors' calculations based on amount of loans recovery in year 1985-86 to 2014-15 in the state.

Figure-3 Patterns of Loans issued and recovery growth in Uttar Pradesh



Source: The figure is based on table-1. Note the total amounts of loans issued, and recovery patterns during the period from 1985-86 to 2014-15.

From figure-3 we find that the disbursement of issued loans and amount of loans recovery show scatter plots with increasing trends. According to analysis period it shows that the year the amount of issued loans has increased. Production of food grains has increased in that year, due to which the rate of loan recovery has also increased; it is known to us that if more loans are provided to the farmers then the production of food grains in the state will continue to increase.

Table-2 Decade wise growth analysis of loans issued and Recovery in Uttar Pradesh and India

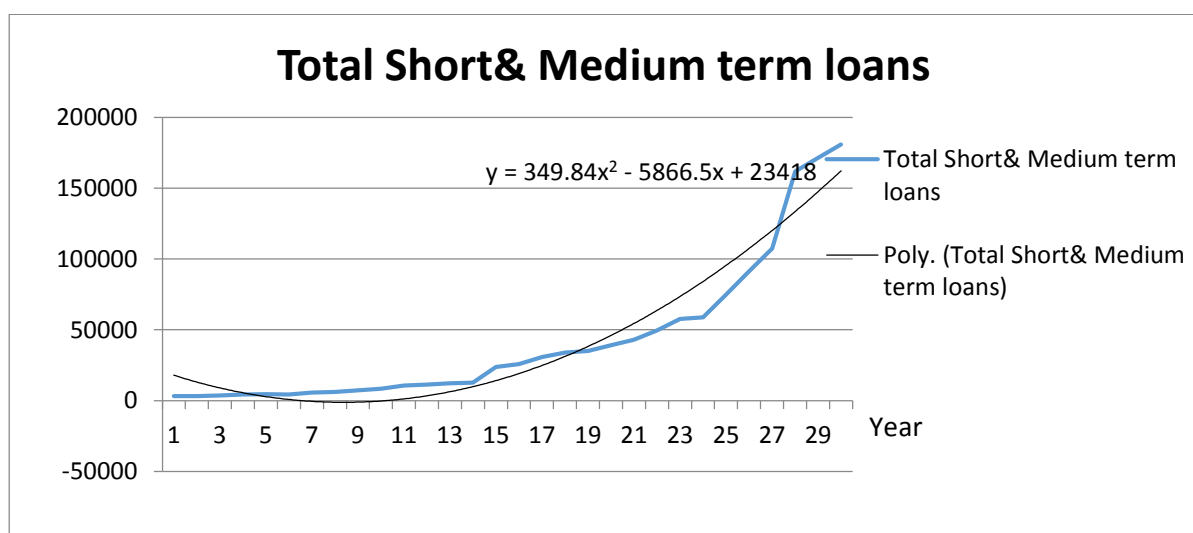
Decade time	Uttar Pradesh				India	
	Short and Medium terms PACSs Loans		Total Loans Recovery		Co-operative Loans	
	CA GR	AAEGR	CAGR	AAEGR	CAGR	AAEGR
1985-86 to 1994-95	3.27	3.22	5.48	5.34	4.36	4.27
1995-96 to 2004-05	3.75	3.69	3.19	3.13	5.97	5.80
2005-06 to 2014-15	0.05	0.05	0.09	0.09	5.85	5.69
1985-86 to 2014-15	2.68	2.65	2.51	2.48	5.86	5.70

Source: Calculated on table-1

In table-1 reveal that the terms of loans and advances in form of short and medium-term loan disbursement over India were increased continuously from Rs. 3111 crores in 1985-86 and Rs. 180823 crores in the year 2009-10 with the average mean are Rs. 42746.43 crores and the coefficient of variance is 120.51 percent during the period from 1985-86 to 2014-15. However, coefficients of variance present vastly variations of loan disbursement over the country.

The authors' calculate the average CAGR of total loans disbursement of PACSs has increased from 3.27 percent in the first decade and 3.69 percent in the second decade, whereas during the third decade the CAGR have been decreased and become 0.05 percent but the average CAGR over the entire period of study i.e. from 1985-86 to 2014-15 was 2.68 percent and similar pattern follow in the case of AAEGR. As regards the recovery of loans, its percentage share has been found varying from year to year. It recovered from Rs. 239.84 crores in 1985-86 to Rs. 819.31 crores in 1994-95 and further it recovered Rs. 1331.44 crores in the last year of study. The average mean of loan recovery is Rs. 856.52 crores during the period from 1985-86 to 2014-15, with SD, is 419.10 and CV is 48.92 percent during the same period. It is clearly shown in the table-2. In the figure-4 demonstrate the pattern of issued amount of loans is above the exponential growth line indicate continuously have been increasing trends.

Figure-4 linear growth patterns of total short and medium-term loans issued in India



Source: The figure is based on table-1. Authors' calculations based on amount of loans issued by primary agriculture cooperative societies in the period from 1985-86 to 2014-15 in the country.

Table-3 Annual growth rate of Foodgrain production in Uttar Pradesh and India

(Million Tons)

Years	Uttar Pradesh	Index	AGR	India	Index	AGR
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1985-86	30.04	100.00	0.00	150.44	100.00	0.00
1986-87	28.82	95.94	-4.06	143.42	95.33	-4.67
1987-88	27.51	95.45	-0.48	140.35	97.86	2.53
1988-89	33.91	123.26	27.81	169.92	121.07	23.21
1989-90	31.18	91.95	-31.31	171.04	100.66	-20.41
1990-91	33.87	108.63	16.68	176.39	103.13	2.47
1991-92	33.82	99.85	-8.77	168.38	95.46	-7.67
1992-93	34.61	102.34	2.48	179.48	106.59	11.13
1993-94	35.54	102.69	0.35	184.26	102.66	-3.93
1994-95	37.59	105.77	3.08	191.49	103.92	1.26
1995-96	36.67	97.55	-8.22	180.41	94.21	-9.71
1996-97	42.39	115.60	18.05	199.44	110.55	16.33
1997-98	41.59	98.11	-17.49	192.26	96.40	-14.15
1998-99	40.42	97.19	-0.93	203.61	105.90	9.50
1999-00	45.65	112.94	15.75	209.81	103.05	-2.86
2000-01	42.72	93.58	-19.36	196.81	93.80	-9.24
2001-02	44.14	103.32	9.74	212.85	108.15	14.35
2002-03	38.14	86.41	-16.92	174.77	82.11	-26.04
2003-04	44.25	116.02	29.61	213.19	121.98	39.87
2004-05	37.84	85.51	-30.51	198.36	93.04	-28.94
2005-06	40.41	106.79	21.28	208.58	105.15	12.11
2006-07	41.22	102.00	-4.79	217.28	104.17	-0.98
2007-08	42.1	102.13	0.13	230.78	106.21	2.04
2008-09	46.73	111.00	8.86	234.47	101.60	-4.61
2009-10	44.02	94.20	-16.80	218.11	93.02	-8.58
2010-11	47.25	107.34	13.14	244.49	112.09	19.07
2011-12	50.28	106.41	-0.92	259.29	106.05	-6.04
2012-13	50.75	100.93	-5.48	257.13	99.17	-6.89

2013-14	50.03	98.58	-2.35	265.04	103.08	3.91
2014-15	39.59	79.13	-19.45	252.02	95.09	-7.99

Source: Calculated on table-1

Table-3 reveals that the total food grain production of Uttar Pradesh in the year 1985-86 was 30.04 million tons it's amounted to 39.59 million tons in 2014-15. The average mean agricultural production is 39.77 million tons, the SD and CV for food grain production are 6.35 and 15.96 respectively during the period from 1985-86 to 2014-15. The table reveals that the whole country production was increased from 150.44 million tons in 1985-86 to 252.02 million tons in the year 2014-15 with the average mean is 201.46 million tons and SD is 33.87 and a very low coefficient of variation is 16.81.

In the Table-3 {Col. (3) and Col. (6)} explain the pattern of food grain production and it observed based on index number 1985-86=100 percent, The index number of the first decade 1985-86 to 1994-95 increased up to 105.77 percent and for the year 2013-14, it was 79.13 percent revealing decreasing trends due to very low food grain production of the current year. The index number of food grain production in India during the same period presents tiny decreasing trends and shows 95.09 percent in the year 2014-15.

In Table {Col. (4) and Col. (7)} explain the annual growth rate of agricultural production of Uttar Pradesh was the highest in the year 2003-04 and it was 29.61 percent whereas it was the lowest negative -31.31 percent in the year 2089-90. Over the study period the food grain production in the country had a similar tendency in food gain production and it was 39.87 percent highest in 2003-04 and lowest growth rate was negative -28.94 percent in the year 2004-05.

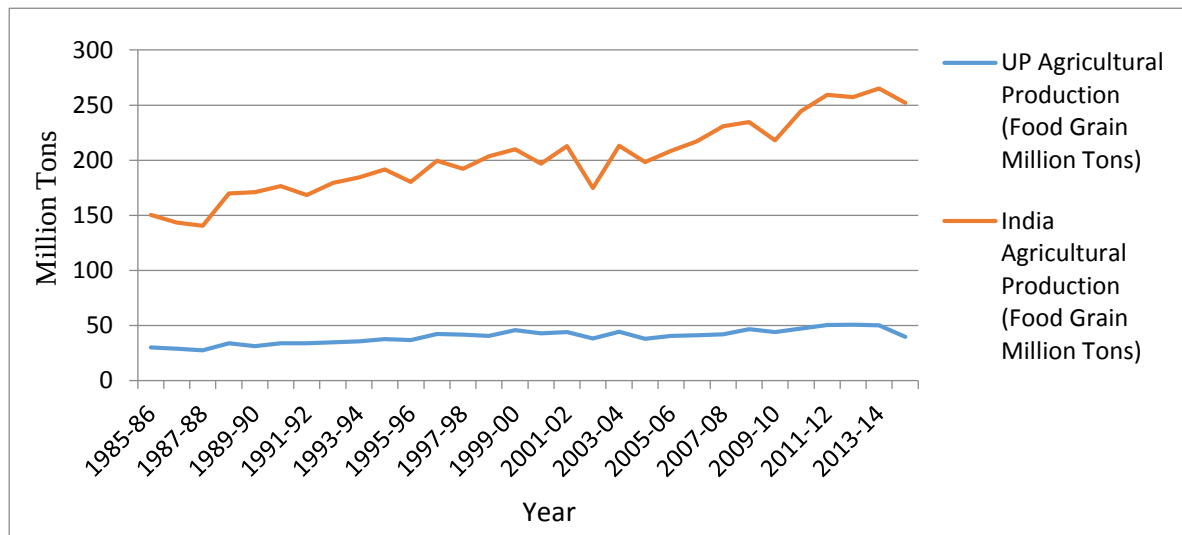
Table-4 Decade wise food grains production growth in Uttar Pradesh and India

Decade time	Uttar Pradesh		India	
	CAGR	AAEGR	CAGR	AAEGR
1985-86 to 1994-95	0.978	0.974	1.053	1.048
1995-96 to 2004-05	0.136	0.136	0.413	0.412
2005-06 to 2014-15	-0.089	-0.089	0.825	0.822
1985-86 to 2014-15	0.400	0.400	0.750	0.747

Source: Calculated on table-1

Table-4 reveals that the compound annual growth rate of total food grain production in Uttar Pradesh was 0.978 percent during the decade 1985-86 to 1994-95 and the second decade to the third decade declined the CAGR from 0.136 percent to -0.089 percent. The compound annual growth rate during the study period from 1985-86 to 2014-15, it was 0.40 percent and approximately the same in the case of average the annual exponential growth rate in the state. In the term of CAGR of food grain production of India declined from 1.053 percent to 0.825 percent throughout the analysis period from 1985-86 to 2014-15. In the word of average annual exponential growth rate was similar trends and it was 0.747 percent during the period from 1985-86 to 2014-15.

Figure-5 Pattern of Food Grains Production in Uttar Pradesh and India



Source: The figure is based on table-1, the food grains production calculated from 1985-86 to 2014-15.

From Figure-5, we get very accurate information that in the year the food grains production of the state increased, the food grain production of the country also increased in the same year. But due to financial irregularity and divine disaster, if the agricultural production in the state decreases, so due to this, the growth rate of food grains production in the whole country decreases. On the basis of my analyses, it is concluded that without increasing the agricultural production of Uttar Pradesh, the entire production of India is incomplete. It is clear that the data are co-integrated in terms of agricultural production.

The analysis reveals that there is a higher degree of a positive correlation between food grain production in the country and Uttar Pradesh. The value of the correlation coefficient is found to be Positive 0.91. However, these analyses represent the most important position of Uttar Pradesh in respect of food grain production in India.

5. Findings

In the past green revolution period, farm mechanization has been more important and popular for the improvement of agricultural production. The combined effect of short and medium-term loans to increased consumption of fertilizer and pesticide, irrigation facilities the increasing tendency of farm mechanization, and other farm sector activities reflected on the growth of food grain production, further analysis reveals that there is a higher degree of a positive correlation between the loans issued for the farm sector and total agricultural production. The value of the correlation the coefficient is found to be 0.82 and similar patterns show the correlation coefficient between cooperative loan issue and agricultural production in India is 0.85.

The entire above conclusion the PACSs belong to the oldest forms of collective action in India playing an essential role to promote rural development. They are supplying only farm credit and supporting the improvement of the agriculture sector. The maximum numbers of respondents are satisfied with the functioning of co-operative societies. The services level of PACSs is very high and it is playing an extraordinary role in agriculture credit delivery. In short, we can say that PACSs are playing a major role in rural credit delivery in Uttar Pradesh.

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