"A STUDY OF THE PATTERN AND DETERMINANTS OF AGRICULTURAL DEVELOPMENT IN THE STATE OF GUJARAT"

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Abstract

India is mainly a rural country. As per the 2011 census about 69 percent of total population and 72 percent of total workforce comprising of main workers and marginal workers in India resides in the rural areas. Compare to all India, the Gujarat state is more urbanized. As per the 2011 census about 57 percent of total population and 63 percent of total workforce in Gujarat resides in the rural areas. The fragmentation of land holding and steady transition to urbanization over the years has led to the decline in the share of rural population and workforce in the rural areas. Nonetheless, the agriculture sector continues to be considered as the prime sector of rural economy and rural employment. Over the period of time, the modernization in agricultural practices and the shift in cropping pattern have brought significant changes in the composition of output and steady movement of rural labour from agriculture to more productive non-farm sectors which is considered as an important source of economic growth and transformation in the rural economy.

Purpose: *The purpose of this paper is to explore the Analysis of Agricultural inputs and their role in the development of agriculture sector in state of Gujarat and India..*

Design/ Methodology/ Approach: *The present study is a descriptive study.*

Research limitations/ implications: *The study has explored Analysis of Agricultural inputs and their role in the development of agriculture sector in state of Gujarat and India and it has suggested measures to improve its contribution in the state GSDP.*

Originality/ Value: *The paper has explored a positive relationship between Various Agricultural inputs and the development of agriculture sector in state of Gujarat and India.*

Paper type: *Conceptual Research Paper*

Keywords: *Agricultural inputs, Agricultural Development, Agriculture, Role of Agricultural inputs, Agricultural Sector.*

1 INTRODUCTION

Soon after independence, the Government of India initiated several measures to enhance the overall development of Indian agriculture. Therefore several initiatives were undertaken for changes in the institutions and infrastructure which were considered necessary for the growth of agriculture. In this regard the major policy initiates for the development of agriculture in India may be classified into the following five phases:

(i)   First phase may be considered as the policies implemented during the period from 1947 to mid-1960s.
(ii)   Second phase started from the mid-1960s to 1980,
(iii) Third phase covered the period 1980 to 1991,
(iv) Forth phase includes t early period of reforms from 1991 till the NAP 2000,
(v)   Fifth phase starts with the implementation of New Agricultural Policy 2000.

The first phase of the agricultural policy witnessed several agrarian reforms, development of major irrigation projects, development of cooperative societies and cooperative credit institutions. The agrarian reforms abolished the intermediaries and granted land ownership title to the actual cultivators. This motivated the owner cultivators to enhance the quality and productivity of their crops. Although the land reforms contributed significantly in increasing agricultural production during this phase, the production of food grains in India lagged behind the rising demand due to which India remained dependent upon imports to feed the rising population.

The second phase in Indian agriculture started with adoption of new agricultural strategy in mid-1960s. This phase is known as Green Revolution period. New agricultural strategy adopted during this phase assigned more importance to introduction of on high-yielding varieties of crops, expansion of area under HYV crops, multiple cropping, increase in irrigation facilities, agricultural extension activities by the agricultural universities, spread of improved farm technology, input supply, credit supply, development of marketing infrastructure and market price support were the prime concern of policy makers during this phase. Major

achievement of the New Agricultural Strategy adopted during this phase was the achievement of self-sufficiency in the production of food grains in India.

Third phase of agriculture policies started in the early 1980s. During this period there was significant diversification in cropping pattern due to which there was high growth in the production of non-food grains. Important policy initiatives were undertaken for the attainment of white revolution in milk production, yellow revolution in oilseeds production, blue revolution in fisheries and growth in fruits and vegetables, etc. This phase witnessed the announcement of various subsidies and support schemes to agriculture sector by the Centre as well as State Governments in India.

The fourth phase of agricultural policies started when the Government of India had initiated the process of economic reform in 1991. The implementation of economic reforms involved deregulation of markets, reduction in the government participation in economic activities and liberalization of trade policies. This phase witnessed the opening up of domestic market to the foreign and multinationals after India became a WTO member on January 1, 1995. The World Trade Organization (WTO) is an inter-governmental organization that regulates international trade. This raised new challenges among Indian policymakers.

Fifth phase of the agriculture policies in India started with the announced a New Agricultural Policy in July 2000. Broad objectives of NAP are to achieve the untapped growth potential of Indian agriculture. Therefore the target was fixed to attain output growth rate of 4 percent per annum in agriculture sector. The policy seeks to achieve this objective in a sustainable manner. Therefore the emphasis during the fifth phase has been on strengthening the rural infrastructure, accelerating the growth of agro business, generating employment opportunities in the rural areas, discouraging migration to urban areas and facing the challenges arising out of economic liberalization and globalization. To achieve the objectives of the NAP 2000, several policy initiatives have been taken which include, generation and transfer of technology, inputs management, expanding institutional structure in rural areas, risk management and management reforms.

2 IMPORTANCE OF AGRICULTURE IN GUJARAT ECONOMY

The study of sectoral variations in output over different phases of time is very important to know the transition in the rural economy. Table 4.1 shows the contribution of three major sectors to the Gross State Domestic Product in Gujarat. GSDP represents the market value of all goods and services produced within the boundaries of the State during a given period of time, accounted without duplication. Over the period of 20 years since the implementation of economic reforms, the importance of agriculture to the state economy has remained almost stable while the importance of other two sectors viz. industry and service sector have witnessed some changes. The contribution of industrial sector to the Gross State Domestic Product has increased while that of the services sector has declined over the period of time since the implementation of economic reforms. Thus economic reforms and globalization of Indian economy have benefitted the industrial sector in Gujarat. On the other hand the importance of rural sector in the Gujarat economy has remained almost unaffected in the post reforms period.

Table 1 Contribution of Major Sectors to Gross State Domestic Product of Gujarat

Year	Agriculture & Allied Activities i.e. Rural Economy	Agriculture & Animal Husbandry	Share of Agriculture & Animal Husbandry in Rural Economy	Manufacturing	Services
1993-94	25.5%	19.9%	78.2%	35.8%	38.8%
1999-00	18.6%	14.5%	78.1%	39.2%	42.2%
2001-02	19.0%	14.7%	77.8%	36.0%	45.0%
2002-03	18.2%	12.8%	70.5%	37.7%	44.1%
2003-04	20.8%	16.4%	79.0%	37.5%	41.7%
2004-05	19.5%	13.2%	67.3%	36.5%	43.9%
2005-06	20.6%	14.4%	70.0%	37.1%	42.2%
2006-07	20.6%	14.8%	72.0%	37.3%	42.2%
2007-08	20.3%	15.5%	76.5%	37.3%	42.4%
2008-09	18.6%	13.9%	74.6%	37.4%	44.0%
2009-10	17.9%	13.6%	76.0%	39.5%	42.6%

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2010-11	21.9%	18.0%	82.3%	35.4%	42.7%
2011-12	22.2%	18.5%	83.4%	36.0%	41.8%
2012-13	19.0%	13.6%	71.8%	43.5%	37.5%
2013-14	20.9%	16.5%	78.8%	41.9%	37.2%
2014-15	19.4%	15.0%	77.2%	44.3%	36.3%
2015-16	19.3%	13.9%	72.1%	44.7%	36.0%

Source: Gujarat State Socio Economic Review, Statistical Abstract of Gujarat

The share of agriculture and allied activities in the Gross State Domestic Product has remained around 20 percent although there have been some oscillations caused by unfavorable weather (floods or drought) in some years. Another important observation from the table is that agriculture and animal husbandry related activities have continued to contribute around 70 percent to 80 percent to the rural economy of Gujarat state. Thus agriculture continues to play an important role in the progress of rural economy in Gujarat.

3 DRIVERS OF THE GROWTH OF AGRICULTURE IN GUJARAT

After 1991, agriculture sector in India witnessed the impact of liberalization of the Indian economy. India joined the World Trade Organization (WTO) on January 1, 1995. WTO is an intergovernmental organization that regulates international trade. The WTO officially commenced on 1 January 1995 under the Marrakesh Agreement, signed by 123 nations on 15 April 1994 which replaced the General Agreement on Tariffs and Trade (GATT) which was commenced in 1948. With the implementation of reforms the process of deregulation initiated due to which the government intervention reduced and the domestic markets were opened up for the multinationals. This posed major threat to the agriculture sector. Therefore, to safeguard the interests of the farming community, the Government of India announced the National Agriculture Policy (NAP) in July 2000. The NAP 2000 emphasized on the implementation of new policy initiatives for sustainable agricultural growth, food and nutritional security, transfer of technology, inputs management, incentives for farmers, investments in agriculture, development of institutional structure, risk management and management reforms. All the new policy measures were announced with the objective of attaining more than four percent per annum growth in the agriculture sector.

The new policy initiatives under the NAP 2000 were as follows:
a) Encouraging private sector equity in agriculture.
b) Increased investment in agriculture in terms of capital formation and stepping up the public sector investments.
c) Exports of agricultural products;
d) Implementing institutional and management reforms for managing the risks in the agriculture sector.
e) Easy availability of institutional credit and inputs to the farming community.
f) Training farmers about efficient use of inputs and environment protection

With the announcement of NAP 2000 the government of Gujarat focused on building the micro-irrigation infrastructure. This included building of check dams, encouraging drip irrigation based on the practices used in Israel. For the adoption of drip irrigation practices, the government of Gujarat announced subsidies and loans for the purchase of drip-irrigation equipment by farmers.

Gujarat was the first state to issue Soil Health Cards (SHCs) to its farmers. SHCs are based on the scientific testing of soil and contain details of soil properties such as mineral composition, water-retaining capacity and are custom-tailored to each farmer's piece of land. SHCs contain information such as the crops suited to the farmers' soil and the use of right amounts of fertilizer, pesticide and water on that soil. Thus the SHCs have helped the farmers to take decisions about the cropping pattern for enhancing crop productivity on their land.

Every year the government of Gujarat organizes farmer's events known as "Krishi Mahotsavs" in which the farmers interact directly with government officials and agriculture experts. These events help in the imparting information about the best practices in agriculture. The farmers communicate to government officers about their problems. Besides, the government organizes animal health checkups at the "Krishi Mahotsavs".

Development of road network is vital for the development of the rural sector. Gujarat has one of the best road-networks in India. Nearly 98 percent of villages in Gujarat are connected by all-weather "pucca" roads.

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Water management initiative taken by the Gujarat Groundwater Resource Development Corporation (GWRDC) under the Ministry of Water Resources operates the public tube-well program. In coordination with the State Electricity Board (SEB) the Government can regulate water use by regulating the power supply to users' pumps. Besides the Gujarat Land Development Corporation also implements government programs for water conservation and augmentation.

Sardar Patel Water Conservation Scheme popularly known as the Narmada Dam project, is one of large irrigation projects for planned use of Narmada river water. The development of this project will benefit four states viz. Gujarat, Maharashtra, Madhya Pradesh, and Rajasthan. The project is planned to provide irrigation for 1.8 million ha spread over 3,393 villages of 14 districts in Gujarat. Other benefits of this project include generation of up to 1 billion units of power per annum and provision of drinking water to 8,215 villages and 135 urban centers.

Sujalam-Sufalam Scheme project is the latest in a series of government schemes to overcome water scarcity problems in the drought-prone areas. This scheme was launched in February 2004 and its objectives are : (i) recharging North Gujarat aquifers through unlined recharge canals, (ii) lifting water from Narmada Main Canal (NMC) to existing reservoirs in North Gujarat, (iii) constructing check-dams and bori bandhs (sand-bag dams), and (iv) constructing khet talavdis (small farm ponds). The project promotes a range of water harvesting and storage techniques, income generation, and groundwater recharge. This scheme aims at water harvesting and construction of reservoir under development of small-scale projects in isolated locations. The design of these projects includes the entire watershed and a macro view of groundwater recharge.

Supply of Inputs is very important for the growth of agricultural sector. Increased use of inputs such as seeds of high yielding varieties (HYVs), fertilizer and irrigation along with rainfall continue to remain as important factors in explaining the growth in agricultural output in the state. Rainfall and source-wise irrigation in Gujarat have already been discussed in detail in in the earlier sections.

3.1 Supply of Seeds
Timely and adequate availability of seeds are very important for the development of farm economy. Scarcity of seed adversely affects the decisions and sowing operation of the crops. This situation was prevailing in the early years of Green Revolution when the farmers had to go to distant places to buy good quality HYV seeds of wheat. Similar situations prevailed when the hybrid maize and Bt-cotton was introduced in Gujarat. Since the early years of this century the use of Bt-cotton and hybrid maize seeds have shown encouraging results. Table-13 shows the demand and supply of quality seeds in Gujarat in the years 2008-09 and 2011-12.

Table 2: Seed Requirement and Availability in Gujarat (Fig. MT)

Crops	2008 - 09			20011 - 12		
	Demand	Supply	Surplus(+)/ Deficit(-)	Demand	Supply	Surplus(+)/ Deficit(-)
Kharif Crops						
Paddy	5650	8485	2835	8550	8600	50
Bajara	2821	3435	615	2625	2701	756
Moong	1275	1488	213	1500	1530	30
Arhar (Tur)	1550	1597	47	2000	2010	10
Groundnut	9850	9954	104	51762	51762	0
Castor	2215	3085	870	250	3686	3436
Cotton	7094	10257	3163	7451	7499	48
Total	30455	38300	7846	74138	77788	4330
Rabi Crops						
Wheat	32250	57209	24959	42500	43250	750
Bajara	750	1787	1037	1500	1776	276
Moong	960	2234	1274	1200	2210	1010
Gram	1800	2100	300	2650	2700	50
Groundnut	3035	3105	70	3650	3870	220

| Mustard | 750 | 777 | 27 | 550 | 561 | 11 |
| Total | 39545 | 67212 | 27667 | 52050 | 54368 | 2318 |

Source: "State of Gujarat Agriculture 2011-12", AERC REPORT 146, AERC, SPU, VVN.

In the earlier section it was stated that among the major crops in sown in Gujarat paddy, wheat, groundnut and cotton are the most important crops and the production and yield of these crops has recorded significant growth over the period of time. The use of good quality seeds is the major contributing factor for the rise in productivity of these crops. Table 2 shows that the seeds in these crops are more in demand. The table states that the seed producing and distribution agencies have been able to estimate the demand for seeds of respective crops and accordingly maintain adequate stocks of seeds at the seeds distribution (sales) centers. As a result the supply of seeds has always remained higher than the demand. It appears from the table that due to relatively high increase in the demand for groundnut seed in the year 2011-12 there were zero surpluses. Since the demand for remaining major crops is relatively low, the seed marketing agencies maintain relatively low stock for such seeds.

3.2 Fertilizer Consumption

The dwarf HYV crops necessitate the use of chemical fertilizers to achieve higher levels of crop yields. The chemical fertilizers can be applied only under irrigation conditions i.e assured water supply from rain or ground level sources. Table 3 shows that the consumption of chemical fertilizers providing plant nutrients like nitrogen (N), phosphate (P) and potash (K) has increased over the period of time. Average consumption of chemical fertilizer nutrients NPK which was nearly 71 kg per hectare of gross cropped area in 1995-96 increased to about 187 kg per hectare in 2014-15. Significant increase in the use of fertilizers was driven by the increased availability of water for irrigation and rise in the area under HYV crops especially paddy, wheat, groundnut and cotton.

Table 3: Year-wise Gross Irrigated Area ('000 hec), Average Rainfall (mm), Average Crop Yield and Fertilizer Consumption (kg. per hec in Gujarat)

Year	Gross Irrigated Area	Average Rainfall	Average Crop Yield	Fertiliser (NPK) Consumption
1995-96	3499	558	1059	70.6
1996-97	3643	681	1294	76.2
1997-98	3779	950	1390	102.0
1998-99	3840	856	1575	92.7
1999-00	3626	532	1006	91.0
2000-01	3342	500	764	70.1
2001-02	3572	712	1268	90.2
2002-03	3637	559	990	90.2
2003-04	4111	948	1879	94.7
2004-05	4280	804	1587	99.5
2005-06	4764	853	2070	111.1
2006-07	5279	1038	1898	124.6
2007-08	5611	1004	2169	132.8
2008-09	5310	792	1875	140.5
2009-10	4922	527	1830	147.2
2010-11	5616	1039	2347	174.1
2011-12	6305	804	2262	132.4
2012-13	5913	632	1737	102.5
2013- 14	NA	1192	2672	153.9.
2014-15	NA	766	2506	187.2

Source: Statistical Abstract of Gujarat State, Directorate of Economics and Statistics Government of Gujarat, Gandhinagar.

Table 3 also shows that per hectare fertilizer consumption was subject to ups and down during the period from 1995-96 to 2014-15. Average consumption increased from 70.7 kg per hectare in the year 1995-96 to 102 kg per hectare in 1997-98. In the subsequent three years average consumption registered continuous decline; it was 92.7 kg in 1998-999, 91 kg in 1999-2000 and further decreased to 70.1 kg in the year 2000-01. Since the implementation of New Agriculture Policy 2000, the consumption of fertilizers has shown steady increase which touched the 174.2 kg per hectare mark in the year 2010-11. In the subsequent two years there was slump in the consumption of fertilizer nutrients as the average NPK consumption declined to 132.4 kg per hectare in the year 2012-13 and 102.5 kg per hectare in the year 2012-13. Monsoons were favourable in the years 2013-14 and 2014-15 and the consumption of fertilizers also recorded significant increase in these two years. Per hectare consumption of the chemical fertilizers NPK increased to the level of 154.9 kg in 2013-14 and touched a new peak of 187.2 kg in 2014-15.

Chart 4.2: Gross Irrigated Area, Average Rainfall, Average Crop Yield and Fertilizer Consumption in Gujarat
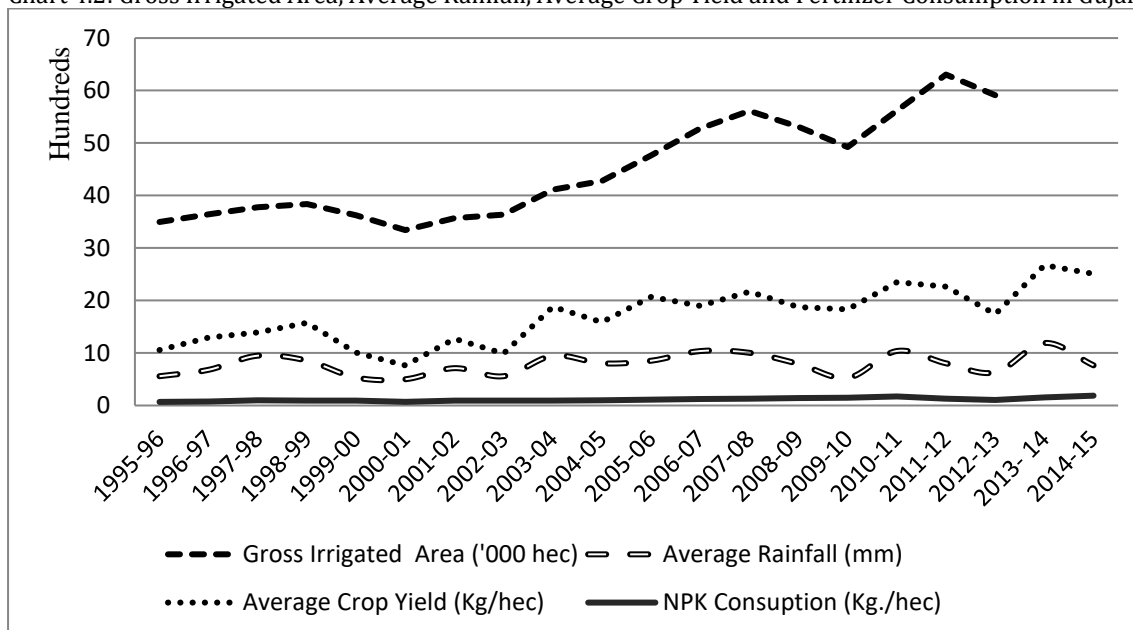
Source: Table 4.15

4 DETERMINANTS OF GROWTH

If we observe the data in Table 3 minutely, it appears that the consumption of fertilizers increases and decreases with the increase or decrease in rainfall in most of the years. Similarly the average crop yield increases or decreases with the ups and downs in average rainfall. The Table-14 data when presented in the chart form shows interesting results. The trend lines representing gross irrigated area, average rainfall and average crop yield moved in almost similar directions. This indicates that the availability of adequate supply of water for irrigation is crucial for achieving the potential crop yields. As the consumption of fertilizers per hectare is shown on the bottom scale of the graph, the trend line relationship between fertilizer consumption and crop yield is not clear. Therefore it is important to find the relationship between fertilizer consumption and water availability for irrigation and also the relationship between fertilizer consumption and crop yield. Since the groundwater resources in Gujarat are limited and most of the irrigation water is sourced from rain fall through check dams, pods and other water harvesting schemes, therefore we will consider rainfall as the deciding factor for the use of fertilizers.

The Pearson's correlation coefficient co-efficient of correlation were estimated to find the interrelationship between fertilizer consumption, rain fall and crop yield in Gujarat state. The Pearson's correlation coefficient is a statistical measure that indicates the strength of a linear relationship between paired data. The value of correlation coefficient ranges between -1 and +1. When the estimated value of correlation coefficient is closer to one (+1 or –1), then the linear correlation is considered as very strong. The correlation coefficient matrix for the paired values of the Average Rainfall, Average Crop Yield and Fertilizer Consumption is presented in Table 4.16.

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The calculated values of the coefficient of correlation (r) between rainfall and fertilizer consumption was 0.49 which indicated a moderate relationship. This could be due to the fact that irrespective of rainfall the chemical fertilizers are applied to the crops which are highly dependent on irrigation water supplied through canals and tube-wells. But large parts of the kharif crops in Gujarat depend upon rain fall. High values of the coefficient of correlation (r) between fertilizer consumption and crop yield which was 0.86 indicate a very strong correlation between the paired variables. Similarly high value of the coefficient of correlation (r) between rainfall and crop yield which was 0.72 indicate a strong correlation between the paired variables.

Table-A Correlation Coefficient Matrix

Particulars	Fertilizer Consumption	Rainfall	Crop Yield
Fertilizer Consumption	1		
Rainfall	0.49	1	
Crop Yield	0.86	0.72	1

The Value of the coefficient f correlation (r) shows how closely the paired variables X and Y are related. As stated earlier the values of coefficient of correlation r can range from -1 to +1. By taking the square of the r value, all values of R^2 are positive. Therefore R^2 falls between 0 (no correlation) and 1 (perfect correlation). R^2 is known as the coefficient of determination. The value of R^2 explains the variation in the dependent variable. From the correlation matrix in Table-A the calculated squared value of the correlation between fertilizer consumption and crop yield (r 0.86) is 0.74. Thus the coefficient of determination of 0.74 suggests 74 percent of the variability in crop yield is explained by the use of chemical fertilizers (NPK).

The same relation could be established with the use of regression method. The regression equation of the following form was used:

$Y = a + \beta X + e$

where

Y is average crop yield (dependent variable)

X is per hectare consumption of fertilizers (explanatory variable)

a is constant or intercept and

β is coefficient or slope of regression line or the elasticity of Y with respect to X

The regression output obtained from the time-series data for the period from 1995-96 to 2014-15 provided following output:

Table B : Regression Summary Output (1995-96 to 2014-15)

Regression Statistics	
Multiple R	0.8626
R Square	0.7440
Adjusted R Square	0.7298
Standard Error	281.0589
Observations	20

ANOVA		
	df	SS
Regression	1	4132433
Residual	18	1421892
Total	19	5554325
	Coefficients	Standard Error
Intercept	122.13	228.211
X Variable1	13.898	1.921

In order to test the overall significance of the regression, we have to compare the estimated value of F-Statistic with the table-value of F. The F statistic, determines whether the observed relationship between the dependent and independent variables occurs by chance. From the F-table, we see whether the regression equation as a whole is statistically significant. The Table value of F- statistic at one percent level of significance for is for n-k-1 d.f. is (+-) 8.4. Since the estimated value of F in the regression output table is high 52.313, it implies that the regression equation is helping us to understand the relationship between X and Y. Thus the significance of R^2 has been tested with the F-test. The value of R^2 which is 0.7440 as per regression estimate suggests that about 74 percent of the variability in crop yield is explained by the use of fertilizers (NPK). The critical value of t statistics at n-k-1 i.e. 18 degree of freedom at the 1% level of significance is (+-) 2.8487. Since

the critical value of estimated t-statistics for the β coefficient is 7.2328 which is higher than the critical value in t-table i.e 2.8487, therefore, fertilizer consumption has a significant effect on crop yield.

Similarly the Regression Output table obtained to examine the linear relationship between crop yield and rainfall provided following results:

Regression Summary Output

Regression Statistics	
Multiple R	0.7194
R Square	0.5175
Adjusted R Square	0.4907
Standard Error	385.8591
Observations	20

ANOVA		
	df	SS
Regression	1	2874355
Residual	18	2679970
Total	19	5554325
	Coefficients	Standard Error
Intercept	285.41	335.2699
X Variable 1	1.6108	0.3666

The regression results for the relationship between crop yield and rainfall show that the estimated value of F in the regression output table is high 19.3056 while the table value of F- statistic at one percent level of significance for is for n-k-1 d.f. is (+-) 8.4. This implies that the regression equation is helping us to understand the relationship between X and Y. Thus the significance of R^2 has been tested with the F-test. The value of R^2 which is 0.5175 as per regression estimate suggests that about 52 percent of the variability in crop yield is explained by rainfall. The critical value of t statistics at n-k-1 i.e. 18 degree of freedom at the 1% level of significance is (+-) 2.8487. Since the critical value of estimated t-statistics for the β coefficient is 4.3938 which is higher than the critical value in t-table i.e. 2.8487, therefore, rainfall has a significant effect on crop yield.

5 CONCLUSION

Agriculture sector in India has been considered as the prime sector of rural economy and rural employment. Compare to all India, the Gujarat state is relatively more urbanized. As per the 2011 census about 63 percent of total workforce in Gujarat and 72 percent of total workforce in India reside in the rural areas. Over the period of time, farm mechanization and shift in cropping pattern have brought major changes in the composition of output and shift in the labour from agriculture to more productive non-farm sectors.

Since independence, the growth of agriculture in India has taken place in a phased manner which resulted from implementation of several policy initiatives for enhancing the production and productivity of crops. The study of sectoral variations in output over different phases of time revealed that the implementation of economic reforms and globalization of Indian economy did not affect the agricultural sector in the Gujarat. More importantly, the agriculture and animal husbandry related activities have continued to contribute around 70 percent to 80 percent to the rural economy of Gujarat.

Over the period of time, there has been subdivision of households due to which average farm sizes in Gujarat have declined. The numbers of marginal and small farm households have increased while the numbers of medium and large farmer households have declined. Shrinking farm sizes have put pressure on the farming community especially marginal and small farmers to find alternate income sources do intensive cultivation and shift to more income generating cash crops. The structure of agriculture employment, which is comprised of cultivators and agricultural labourers have changed significantly. The study revealed that the proportion of cultivation in total farm employment have declined while the proportion of agricultural labourers have increased over the period of time.

According to village land records, net cropped area in Gujarat is more than half the total reporting area. Due to limited availability of land, there was marginal increased in the net cropped area. However, intensive cultivation has increased the cropping intensity from 112.2 percent in 1980-81 to 122.5 percent in 2007-08. The study revealed that gross cropped area under food crops has increased marginally while the area

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under non-food crops increased significantly. The statistics tell that the availability of water determine the allocation as well as utilization of land for agriculture and over 54 percent of agriculture in Gujarat is rain-fed. The study revealed that the impact of green revolution technology has mainly confined to wheat and rice and in the irrigated regions because the production of high yielding varies necessitate that use of chemical fertilizers and the use of chemical fertilizers depend on irrigation sources. Over the period of time the traditional low-yielding varieties of wheat and rice wheat were replaced by the high-yielding varieties. However, deficit rainfall and less than required availability of ground level water sources adversely affect the crop yields.

The implementation of economic reforms and the WTO agreement, the domestic markets were opened up for the multinational which posed major threat to the agriculture sector. Therefore, to safeguard the interests of the farming community, the Government of India announced the National Agriculture Policy (NAP) in July 2000. NAP emphasized on the implementation of new policy initiatives for sustainable agricultural growth, food and nutritional security, transfer of technology, inputs management, incentives for farmers, investments in agriculture, development of institutional structure, risk management and management reforms. All the new policy measures were announced with the objective of attaining more than four percent per annum growth in the agriculture sector. The study concluded that the implementation of new policies under the NAP 2000 has contributed significantly to the growth of agriculture sector in Gujarat.

REFERENCE

[1] Abdullah S., Zhou, D., S. Khan, K. Jebran, and A Ali, (2015), "Agricultural Credit In Pakistan: Past Trend And Future Prospects", Journal of Applied Environment, Vol. 5, No. 12 , pp. 178 – 188.

[2] Ahmed, N. (2011), "Impact of Institutional Credit on Agricultural Output: A Case Study of Pakistan", Theoretical and Applied Economics Vol. XVIII, pp. 167-188.

[3] Badal, P .S (2008), "Agriculture cooperation, Finance and Business management : Agricultural credit", Institute of Agricultural Science, Banaras Hindu University, Varanasi, India.
http://nsdl.niscair.res.in/jspui/bitstream/123456789/499/1/PDF%20revised%20agricultural%20CREDIT.pdf

[4] Balakrishnan P, Golait R, Kumar P (2008), Agricultural Growth In India Since 1991, RBI Study No. 27, Department of economic Analysis and Policy, Reserve Bank Of India, Mumbai, April 30, 2008.

[5] Cook, J., K. Oviatt, D. Main, H. Kaur and J. Brett (2015), "Re-Conceptualizing Urban Agriculture: An Exploration of Farming along the Bank of the Yamuna River in Dehli, India", Agriculture and Human Values, Vol. 32, No. 2,June, pp. 265 – 279. http://econpapers.repec.org/RePEc:spr:agrhuv:v:32:y:2015:i:2:p:265-279

[6] Dholakia, R. H (2003), "Exports of Agri-Products from Gujarat: Problems and Prospects", Vikalpa, Vol. 28, No. 4 Oct-Dec, pp. 41-50.

[7] Gandhimathi, S. and S. Vanitha (2010), "Developments Of Borrowing Behavior Of Farmer – A Comparative Study Of Commercial And Cooperative Bank", Agricultural Economics Research Review, Vol.23, January - June, pp.157-164

[8] Government of Gujarat, "State Report on Agriculture Census: 2010-11 - Part-II", Agricultural Census Commissioner, Sachivalaya, Gandhinagar, January 2015.

[9] Government of India (2007), Report of working group on "Gender Issues, Panchayat Raj Institutions, Public Private Parternship, Innovative finanace and micro Finance in Agriculture, 11th Five Year Plan (2007 - 12)", Planning Commission of India, New Delhi.

[10] Government of India, NSS 70th Round (January– December, 2013), Some Characteristics of Agricultural Households in India, Ministry of Statistics and Programme Implementation, National Sample Survey Office, Ne Delhi, November 2015.

[11] Gulati, A., Shah, T. and Shredhar, G (2009), "Agriculture Performance in Gujarat Since 2000: Can it be DIVADANDI (Lighthouse) For Other States", International Journal of Agriculture and Food Science Technology, Vol. 4, No. 4, pp. 281 – 286. http://www.ijcrar.com/vol-4/11.html
https://www.google.co.in/search?q=Deepak+Shah+(2009)%2C+%E2%80%9CAgricultural+Credit+delivery+system+in+Maharashtra%3A+A+synthesis+of+working+of+RFIs.&oq=Deepak+Shah+(2009)%2C+%E2%80%9CAgricultural+Credit+delivery+system+in+Maharashtra%3A+A+synthesis+of+working+of+RFIs.&aqs=chrome..69i57.2696j0j9&sourceid=chrome&ie=UTF-8&enablesearch=true#

[12] Kalkoti, G., K. Kalkoti and A. Patel (2012), "Bank Credit to Agriculture in India: Policy, Performance and Issues", Manan Prakashan, Mumbai.

https://www.gapgyan.org/

[13] Ramachandran, A and N. Kavitha (2009), "Profitability of the Indian Schedule Commercial Bank Management", Vol. VIII, issue 3 & 4, pp.129-139" https://ideas.repec.org/a/icf/icfjbm/v8y2009i3&4p129-139.html

[14] Roy,D., R.Herring and C. Geisler (2007), " Naturalising Transgencies: Official Seeds, Loose Seeds and Risk in the Decision Matrix of Gujarati Cotton Farmers" , Journal of Development Studies Vol. 43,No.1, pp.158-176. http://www.academia.edu/24487811/Naturalising_transgenics_Official_seeds_loose_seeds_and_risk_in_the_decision_matrix_of_Gujarati_cotton_farmers

[15] Reserve Bank of India, Handbook of Statistics on the Indian Econoimy, Department of Statistics and Information Management, Reserve Bank of India, Mumbai.

[16] Ruttan V. W. (1965), "Growth Stage Theories and Agricultural Development Policy", Australian Journal of Agricultural Economics June 1965 pp.17-32.

[17] https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1467-8489.1965.tb00327.x

[18] Sahu, G. B. (2007), "Supply Analysis of Institutional Credit to Agricultural for Major States in India", Indian Journal of Agricultural Economics, Vol. 62, No. 4, pp. 664-677.

[19] Saraswat, V., S. Sharma, K. Patel, and Singh (2014), "Economics of Brinjal Production in South Gujarat", Economics affairs: 59(2)

https://www.gapgyan.org/