

Status of Diversification in Agriculture across districts of Jammu and Kashmir: An Abstract of NSSO 70th Round

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Abstract

Agricultural diversification is an important mechanism for the economic growth of country. In order to meet the challenges of a globalized market in agriculture as well as the growing and changing needs of the increasing population, many countries have undertaken crop diversification to enhance the productivity and to cultivate high value crop with positive outcomes. Countries are gradually diversifying their crop sector in favour of high value commodities, especially fruits, vegetables and spices. Indian agriculture has been diversifying during the last two decades towards High Value Commodities (HVCs) i.e., fruits, vegetables, milk, meat, and fish products. Diversification in agriculture is “developing a large number crop of enterprises mix in favour of high value as well as more remunerative crops”. Agricultural diversification ensures stability in the farm incomes by minimizing risk because low return from one crop is compensated by high returns from other “it can only happen when eggs are not all in one basket” (Heady, 1968). This paper deals with status of agriculture and diversification index across districts of J&K based on NSSO data. For agriculture status average, percentage is calculated. Comparison is made among the districts of J &K. For the purpose of diversification index, different indices like Simpson and Herfindhal were calculated. Based on the indices value division is made among the districts and categorized as highly, medium and low level of diversification, whereas the results of both the indices are somehow constant.

Keywords: Agriculture; Diversification; Cropping pattern; Quantity produced; Quantity sold.

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Introduction

Low level of absolute income as well as large and deteriorating disparity between income of farmer and non-agricultural worker constituted a significant cause for emergence of agrarian distress in the country since 1990s. The important identified factors for this are: losses from farming, shocks in farm income, low farm income, crop failure, natural shocks. The period i.e., 1995-2004 also witnessed a sharp slowdown in growth rate of agricultural out-

put (Chand and parapurathu, 2012). The low as well as highly fluctuating income from farming is causing detrimental effect on individual interest in farming and farm investment. More and more cultivators are forced to leave farming especially younger age group because of this fluctuating trend. This will ultimately lead to adverse effects on future of agriculture sector in the economy of India. According to Chand (2016) income earned by farmers from agriculture sector is crucial to address the agrarian dis-

stress in the country. In this background of increasing agrarian distress among farmers in the country, goal was set by Prime minister "Narendra Modi" to double the farmer's income by 2022-23. Study made by Chand et al. Observed, that income earned from agriculture was not adequate to keep as many as 53% farm households out of poverty, who operated on less than 0.63 hectares of land holding. Goal of doubling farming income is central to promote farmers welfare, in reducing the agrarian distress and to bring parity between the income of farmers and those working in non-agricultural profession. Economic indicators do not show equitable and egalitarian growth in income of the farmers. The human factor behind agriculture i.e., the farmers still remain in frequent distress, despite higher productivity and production. To overcome this stress, diversification in agriculture has been recognized as a significant strategy/ to cope up with the challenges and problems faced by the farmers. Diversification in agriculture implies developing a large number crop of enterprises mix in favour of high value as well as more remunerative crops. The pattern of cropping is determined by various factors like agro-climatic conditions, farm size, prices, profitability and government policies. A diversified cropping pattern will help in mitigating the risks faced by farmers in terms of price shocks and production/ harvest losses. Bairwa et.al, 2014 suggests that there is need of critical reviewing the sustainability parameter in agriculture. Biswajit et.al, in 2017 founds that there is shift in production pattern in favour of high value crops and enterprises from its existing pattern. Risk could be decreased if and only if farmers go for diversifying their cropping pattern (Kumar et.al, 2002). Agricultural diversification is an important mechanism for the economic growth of country. In order to meet the challenges of a globalized market in agriculture as well as the growing and changing needs of the increasing population, many countries have undertaken crop diversification to enhance the productivity and to cultivate high value crop with positive outcomes. Countries are gradually diversifying their crop sector in favour of high value commodities, especially fruits, vegetables and spices. Indian agriculture has been diversifying during the last two decades towards High-Value Commodities (HVCs) i.e., fruits, vegetables, milk, meat, and fish products.

Review of literature: Diversification had helped the farmers to reduce risk (Mani and Varadarajan, 1985). For diversifying farms, farmers not only adopted multiple cropping system but also non Crop enterprises (Giri and Gandopadhayay, 1985). Factors that determine the level of diversification were farm size, irrigation, mechanization, mode of farming (Gupta

and tenari, 1985), (pal and pal, 1985). The other factors determining diversification level were market density, family size, profitability of fruits, infrastructure facilities (singh et.al, 1985), (Swarup, Sikk and Vaidha (1987). Gulati et.al (2000) concluded that factors were per capita income, urbanization and socio-economic variables. Other significant determinants were access to credit, education and occupation (Oluwatayo, 2009). The inter cropping pattern became more popular as well as more gain full than the single cropping due to diversification. Area under paddy and rice crop is increasing over a period of time (singh and singh, 1999), (Gill .K.S 1992). There are significant changes in cropping pattern (Patil, 1996). Rather et.al (2013) concluded that total production of fruits under horticulture increased every year. There is positive relationship between total production and number of years. Risk could be decreased if and only if farmers go for diversifying their cropping pattern (Kumar et.al, 2002). High value segment growth of the agriculture is likely to have contributed a lot to rural poverty reduction (Ravallion and Datt, 1996). Singh and Bhatia in 1988 found that net returns from vegetables crop are higher as compared to cereal crops. There is considerable scope for increasing farm income as well as employment levels through dairy and off farm labour employment (Shukla et.al, 1994). Rather et.al, (2013) concluded that total production of fruits under horticulture increases every year. There is positive relationship between total production and number of years.). Birthal .P.S et.al, (2007) analyzed that agricultural diversification towards high value crops has the potential to increase farm income. Small and large landholders appear to participate in HVA at similar levels while small holders participate significantly more in vegetables. The study also indicated that profitability of diversification towards HYV decreased with farm size. Bhat.H.M and Salam.A.M (2016) found that Anantnag, Kulgam, and pulwama are at the top of diversification index with interchanging position across the indices. Shopian is the least diversified district. District with higher rank on diversification indices have higher value of diversification towards HYC. In the review of literature no study pertaining to Status of Agriculture and Diversification across Districts of Jammu and Kashmir was found, in this backdrop in the present paper agriculture status along with level of diversification is analyzed across districts of Jammu and Kashmir. The present study will be having significant policy implications for the policy makers and researchers. The state of Jammu and Kashmir, with its varied and diversified geographic, agro climatic and topographic features, has great potential for growth of agriculture and horticulture crops. But due to ongoing con-

flict, political instability and turmoil, the state has remained as one of the least studied geographical regions. In this context, an attempt is made here to examine the nature and pattern of agriculture diversification in the state of Jammu and Kashmir.

Scope of diversification Situated between 32°17' N and 36° 58' N latitudes and 73° 26' E and 80° 30' E longitudes; the state of Jammu and Kashmir constitutes the northern most extremity of India. Jammu and Kashmir is basically an agrarian economy. The dependence of rural labour force on agriculture and allied activities is quite substantial as it directly or indirectly, supports about seventy per cent of population. As per Census 2011, 18.38 lakh persons comprising 15.92 lakh cultivators and 2.46 lakhs as agricultural labourers depend directly on Agriculture for their livelihood forming about 49 percent of the total working force (37.54 lakh persons). The climate of the state varies from tropical in Jammu plains to semi-arctic cold in Ladakh with Kashmir and Jammu mountainous tracts having temperate climatic conditions

Agro-climatic zones	Region	Main crops produced
Temperate Zone	Entire Kashmir Valley, Parts of Poonch, Rajouri, Doda, Kathua and Udhampur of Jammu Division	Rice, Oil seeds, Main crops produced Wheat, Pulses, Maize
Intermediate zone or Sub-Temperate (Mid Zone)	Parts of Kathua District, Parts of Poonch (Surankote), parts of Rajouri parts of Udhampur, parts of Reasi, some portion of Doda, Ramban and Kishtwar	Wheat, Pulses, Maize
Sub tropical zone	Jammu , parts of Kathua district, parts of Rajouri, parts of Udhampur and lower areas of Reasi), parts of Doda (Ramban)	Wheat, Pulses, Rice
Arid temperate zone	Leh and Kargil	Small millets, Wheat, Fodders

The annual rainfall also varied from one region to another region with 92.6 mm in Leh, 650.5 mm in Srinagar and 1115.9 mm in Jammu. A large part of the State forms part of the Himalayan Mountains. The State of Jammu and Kashmir is endowed with varied agro climatic conditions for growing a variety

of crops (Hassan 1999). The favorable climatic conditions as well as fertile soil of the State provide enormous scope for promotion of agriculture along with allied sector. As this sector is labour intensive in nature, provides employment opportunities to a large number and it contribute considerably towards the growth of state economy. The agrarian nature of the State provides tremendous scope for promotion of all agriculture related sectors like, Mushroom development, apiculture, floriculture, fisheries, sericulture development etc.

Objectives

1. To analyze the status of agriculture across districts of Jammu and Kashmir
2. To determine level of diversification across farm category in Jammu and Kashmir.
3. To examine the level of diversification among districts of Jammu and Kashmir.

Methodology of the study: The present study is based on secondary data. For the study the data was collected from NSSO 70th round on "Situation Assessment Survey of Agricultural Household" is used. Different diversity indices were used to measure the degree of diversification taking place in the state. The level of diversification was measured using different indices of diversification such as:-

1. **Herfindhal Index (HI):** It is an index of concentration. Herfindhal Index is computed by taking sum of squares of acreage proportion of each crop in the total cropped area

$$H_i = \sum_{i=1}^n p_i^2$$

Where p is the proportion of area under ith crop and $\sum_{i=1}^n p_i^2$ is the summation of area under all 'i' crops.

$$i = 1/2/3 \dots n$$

When the value of HI crop diversification takes place and when HI rises, concentration takes place.

2. **Simpson index (SI):** Simpson's index is a measure of horizontal diversification. Horizontal diversification is the increase in the number of crops grown given the economical rationality of this expansion. This index has been worked out using the following formula:

Index of diversification = $1 - (\text{proportionate area of food grains in Gross cropped area})$

Findings of the study

Table 1: Status of operated land and farmer's category by size of holding across districts in J & K.

District	Category of Farmers				Operated land for Agri.		District	Category of farmers				Operated land for Agri.	
	Marginal	Small	Semi med	Medium	Yes	No		Marginal	Small	Semi med	Medium	Yes	No
Anantnag	98.60%	1.40%	0.00%	0.00%	100.00%	0.00%	Kupwara	99.30%	0.70%	0.00%	0.00%	94.30%	5.70%
Bandipore	98.10%	1.20%	0.70%	0.00%	100.00%	0.00%	Leh	58.40%	41.60%	0.00%	0.00%	100.00%	0.00%
Baramula	97.90%	1.90%	0.20%	0.00%	100.00%	0.00%	Poonch	85.00%	7.50%	7.30%	0.20%	100.00%	0.00%
Budgam	99.80%	0.10%	0.10%	0.00%	100.00%	0.00%	Pulwama	95.10%	4.60%	0.20%	0.00%	100.00%	0.00%
doda	93.60%	4.40%	2.00%	0.00%	99.00%	1.00%	Rajouri	91.30%	7.60%	0.70%	0.40%	100.00%	0.00%
Ganderbal	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	Ramban	91.10%	6.90%	2.00%	0.00%	100.00%	0.00%
Jammu	83.00%	9.20%	7.80%	0.00%	86.00%	14.00%	Reasi	71.90%	22.50%	5.00%	0.50%	87.60%	12.40%
Kargil	87.70%	12.30%	0.00%	0.00%	100.00%	0.00%	Samba	81.30%	13.50%	5.20%	0.00%	89.80%	10.20%
kathua	80.80%	10.60%	6.90%	1.80%	93.70%	6.30%	Shopian	99.40%	0.60%	0.00%	0.00%	100.00%	0.00%
Kishtwar	88.30%	11.50%	0.20%	0.00%	99.80%	0.20%	Udhampur	83.30%	12.90%	1.70%	2.00%	99.70%	0.30%
Kulgam	94.80%	4.90%	0.30%	0.00%	100.00%	0.00%	Total	89.90%	7.40%	2.30%	0.40%	97.10%	2.90%

Source: NSSO 70th round (2012-13) "situation assessment survey of agricultural households (visit-1 and visit-2)".

The above table shows the distribution of farmers by category across districts of J & K, showing that in all the districts proportion of marginal farmers is higher. Majority of the farmers were marginalized. In district Ganderbal all the farmers were marginal. In district Jammu and kathua percent of marginal farmers is 83% and 80 % respectively. Overall in Jammu and Kashmir, majority (89.9%) of the farmers are marginal. Percent of small farmers in Leh, Reasi,

Kargil and Jammu were 41.5%, 22.5%, 12.30% and 9.20% respectively. Also found that all the farmers across districts have operational land for agriculture because of introduction of land reforms in J & K. As per SWOT analysis of "directorate of agricultural production and farmers welfare" major problem of agriculture in Jammu and Kashmir is lesser availability of quality seeds and small fragmented holdings. Due to risk associated with agriculture farmers are forced to divert from agricultural activities. Decreasing interest of individuals in agriculture leads of marginalization.

Table: 2nd status of total cultivated area and quantity produced across districts in Jammu and Kashmir

District	Visit 1		Visit 2		District	Visit 1		Visit 2	
	Total Cultivated Land	Total Qty Produced	Total Cultivated Land	Total Qty Produced		Total Cultivated Land	Total Qty Produced	Total Cultivated Land	Total Qty Produced
Anantnag	1.3	3845	0.59	104.3	Kupwara	1.44	2115	4.48	3355.3
Bandipore	1.82	3295	0.68	71.98	Leh	2.06	2196	8.67	4794.8
Baramula	1.91	2702	1.23	177	Poonch	2.48	2633	5.54	1854.5
Budgam	1.34	2990	1.09	1374	Pulwama	1.34	4368	3.61	502.31
Doda	2.62	4747	1.11	997	Rajouri	2.14	3042	8.16	1072.8
Ganderbal	1.14	1924	0.18	0	Ramban	1.98	517	2.6	349.69
Jammu	3.77	13510	0.11	0	Reasi	5.75	3070	0.99	63.889
Kargil	3.34	1703	3.9	778	Samba	2.35	4614	1.69	1404.1
Kathua	3.28	4340	4.99	618.6	Shopian	1.49	14132	0.75	900.19
Kishtwar	0.91	400	3.91	775	Udhampur	2.8	1293	0.26	82.031
Kulgam	1.64	7627	4.25	1295	Total	2.36	4411	2.99	1152.9

Source: NSSO 70th Round (2012-13) on Situation Assessment Survey of Agricultural Households (Visit-1 and Visit-2).

Table 2nd shows the status of total cultivated area as well as quantity produced across districts in Jammu and Kashmir. According to visit 1, total land cultivated on an average was 2.36 hectare, whereas total quantity produced was 4411 Qtls. In visit 2 it was 2.99ha and 1152.9 Qtls. In visit 1 total cultivated land area was highest in the Reasi district i.e., 5.75 ha and total quantity produced was highest in the Shopian district. In visit 2 total cultivated land as well as total quantity produced was highest in the Leh district i.e., 8.67 and 4794.8 respectively. As per the NSSO data in J and K, yield of paddy is 4091 Qtls

per ha. It is highest in district Budgam followed by Shopian. In case of crop of bajra, yield is 1941 Qtls per ha and it is highest in district Kulgam. Yield of maize crop is 1361 Qtls per ha. Yield of maize is highest in district Doda followed by Kargil. Yield of wheat crop is 1982 Qtls per ha. It is highest in district Jammu. Yield of pulses is highest in district Ganderbal. In Visit 2 Yield of wheat is highest in district Poonch followed by Leh and Kulgam. Barley crop yield is highest in kathua district. Yield of potato and onion is highest in Bandipora and Shopian respectively.

Table 3 : Level of diversification across districts of Jammu and Kashmir based on NSSO data.

District	Visit 1		Visit 2		District	Visit 1		Visit 2	
	HI	SI	HI	SI		HI	SI	HI	SI
	Mean	Mean	Mean	Mean		Mean	Mean	Mean	Mean
Anantnag	0.44	0.56	0.12	0.88	Kupwara	0.62	0.384	0.54	0.46
Bandipora	0.7	0.305	0.04	0.96	Leh	0.41	0.589	0.46	0.54
Baramulla	0.7	0.295	0.36	0.64	Poonch	0.65	0.353	0.47	0.53
Budgam	0.45	0.548	0.21	0.79	Pulwama	0.36	0.636	0.33	0.67
Doda	0.51	0.485	0.28	0.72	Rajouri	0.51	0.491	0.64	0.36
Ganderbal	0.56	0.44	-	-	Ramban	0.66	0.336	0.52	0.48
Jammu	0.6	0.404	-	-	Reasi	0.89	0.109	0.38	0.62
Kargil	0.5	0.503	0.4	0.6	Samba	0.39	0.615	0.19	0.81
Kathua	0.44	0.563	0.54	0.46	Shopian	0.33	0.668	0.11	0.89
Kishtwar	0.11	0.893	0.44	0.56	Udhampur	0.55	0.453	0.17	0.83
Kulgam	0.37	0.631	0.44	0.56	Total	0.51	0.493	0.37	0.63

Source: Authors Own calculation from NSSO 70th Round (2012-13) on Situation Assessment Survey of Agricultural households (Visit-1 and Visit-2).

This table shows the value of different indices value of diversification across all the districts of Jammu and Kashmir based on visit 1 and visit 2 conducted in NSSO 70th round on “situation assessment survey

of agricultural households”. Based on indices values division is made across districts and categorized into: high diversification, medium diversification, low diversification.

Interpretation of table 3rd

Category	SI		HI	
	Visit 1	Visit 2	Visit 1	Visit 2
	Highly diversified	Kishtwar	Anantnag, Bandipora, Doda, Pulwama, Samba, Shopian, Udhampur	Reasi
Moderate	Anantnag, Budgam, Kargil, Kathua, Kulgam, Leh, Pulwama, Samba, Shopian	Baramulla, Budgam, Kargil, Kishtwar, Kulgam, Leh, Poonch, Reasi, J & K	Anantnag, Bandipora, Baramulla, Budgam, Doda, Ganderbal, Jammu, Kargil, kathua, Kupwara, Leh, Pooch, Rajouri, Ramban, Udhampur, J & K	Kathua, Kishtwar, Kulgam, Kupwara, Leh, Poonch, Rajouri, Ramban
Low	Bandipora, Baramulla, Doda, Ganderbal, Jammu, Kupwara, Poonch, Rajouri, Ramban, Reasi, Udhampur, J&K	Kathua, Kupwara, Rajouri, Ramban	Kishtwar, Kulgam, pulwama, samba, Shopian, Rajouri	Anantnag, Bandipora, Baramulla, Budgam, Doda, Kargil, Pulwama, Reasi, Samba, Shopian, Udhampur, J&K

Table 4th level of diversification across farm category

Category	Visit 1		Visit 2	
	HI	SI	HI	SI
	Mean	Mean	Mean	Mean
Marginal	0.5128833	0.4871167	0.3897179	0.6102821
Medium	0.4443104	0.5556896	0.3901419	0.6098581
Semi-med	0.5047733	0.4952267	0.3397444	0.6602556
Small	0.2433805	0.7566195	0.3390578	0.6609422
Total	0.5066804	0.4933196	0.3704133	0.6295867

Source: NSSO 70th round (2012-13) on situation assessment survey of agricultural households (visit-1 and visit-2)

Interpretation of table 4th

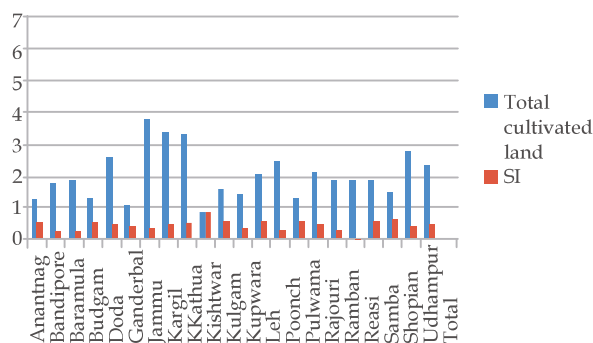
Category	SI		HI	
	Visit 1	Visit 2	Visit 1	Visit 2
Highly diversified	Small farmers	Semi-medium Small farmers		
Moderate	Medium farmers	Marginal farmers, medium farmers	Marginal farmers, medium farmers, semi-medium	
Low	Marginal farmers semi-medium farmers		Small	Marginal, medium, semi-medium farmers, small

Concluding remarks:-

In the present study "Status of Agriculture and Diversification across Districts of Jammu and Kashmir: An Abstract of NSSO 70th round" based on secondary data it has been observed there is negative relationship between total cultivated land and Simpson index.

Low Productive and Lesser Diversified

1. **Land size:** Lesser the cultivated land, higher is the value of diversification index. Higher the diversification level, lesser the cultivated area.



Districts of Jammu and Kashmir are divided based on the level of diversification viz; highly diversified, medium diversification and low level of diversification. Small farmers are highly diversified in comparison to marginal, semi-medium and large farms based on both indices of diversification because of limited cultivable land. Marginal farmers are less diversified across districts of Jammu and Kashmir.

2. **Fragmented holdings:** The landholdings of the farmer in the state are small and fragmented with very low use of quality inputs. Due to steep slopes, the soil is easily eroded, degraded, and thus losing its fertility. People living in hilly regions because of the communication gap and lack of road connectivity are not much aware of the modern and advanced farming techniques. Rainstorms, hailstorms, snowfall, earthquakes, landslides etc. are some of the common and major problems of the state.
3. **Low productivity:** The farmers of this country desperately need farm reforms and the new farm laws introduced through the three farm bills are a step in the right direction if implemented well. India is one of the top producers of several crops in the world but when it comes to productivity parameters, i.e., crop produced per unit of land, we are yet laggards. This affects the most important chain of our food production system, i.e., farmers directly. Their livelihood is linked to the production they have in their fields but they failed to increase their grain production to the needed scale.
4. **Less investment (low inputs):** Most of them are poor farmers with small landholding sizes. They cannot invest in irrigation techniques in a country where seasonal rains through the monsoon fail regularly. They cannot invest in required agri-technology and scientific methods to increase their per unit crop yield.
5. **Less access to credit:** Smaller land holdings are either fragments of larger holdings which have been passed on within the family or have been informally leased by a large holder, farmers who cultivate these holdings often do not have a formal lease agreement. The absence of such land records does not allow these farmers to access formal credit or be eligible for government benefits such as input subsidies or crop insurance schemes. In addition, small and marginal farmers, who account for about majority share of total land holdings, take more short term loans than farmers with medium or large land holdings. This farm category also has the highest share of borrowings from informal sources of credit such as moneylenders, family and friends

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