Level of Diversification in Agriculture: A District level analysis in Jammu and Kashmir

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ABSTRACT

The present study is an attempt to assess the level of diversification across districts of Jammu and Kashmir. For the same purpose Simpson index and transformed Herfindhal index were used. Based on the different values of indices districts across Jammu and Kashmir categorized into highly, medium and low level of diversification. The results were consistent based on both indexes employed for measurement.

1. Introduction

Committee on "doubling farmer's income by 2022" recommended straggles to double farmers' income; diversification towards high-value crops is among them. Diversification towards high-value crops offers great scope to improve farmers' income. Farmers had low level of absolute income in India (Chand, 2015). There existed a large and worsening disparity between income of farmer and non-agricultural worker, which constituted a significant cause for emergence of agrarian distress in the country since 1990s. The period i.e., 1995-2004 also witnessed a sharp slowdown in growth rate of agricultural output (Chand and parapurathu, 2012). The low and highly fluctuating income from farming is causing a detrimental effect on individual interest in farming and farm investment. According to Chand (2016), income earned by farmers from the agriculture sector is crucial to address the agrarian distress. More and more cultivators are forced to leave farming especially from younger age group. According to Chand (2016) income earned by farmers from agriculture sector is very crucial to address the agrarian distress 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 (DFI report). Chand et al. (2011) observed that income earned from agriculture was not adequate to keep as many as 53% farm households out of poverty trap, who operated on less than 0.63hectares of holding. As per the doubling farmer's income committee report, Goal of doubling farming income is

important to promote farmers welfare, it will also help in reducing the agrarian distress and to bring parity between the income of farmers and those working in non-agricultural profession.

It can also be described as the economic development of non-agricultural activities (Start, 2001). Diversification of income sources has been recognized as a significant strategy/way to cope with the challenges and problems faced by many developing countries. Diversification in agriculture implies growing a large number crop of enterprises mixed in favour of high value and more remunerative crops. Diversification in agriculture can help overcome the problems marginal and small farmers face by ensuring food security, providing more significant employment, and alleviating poverty and conservation of natural resources. In the era of commercialization, the preservation of natural resources is the most complex task to do. Past experience and literature on agriculture highlighted that higher agricultural growth partially came at the cost of overexploitation and degradation of natural resources. 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. Risk could be decreased if and only if farmers go for diversifying their cropping pattern (Kumar et.al, 2002). Agricultural diversification is an important measure for the economic growth of country. Diversification helped the farmers to reduce risk (Mani and Varadarajan, 1985). There is

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considerable scope for increasing farm income as well as employment levels through dairy and off farm labour employment (Shukla et.al, 1994). Birthal .P.S et.al, (2007) analyzed that agricultural diversification towards high value crops has the potential to increase farm income. 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 J and k was found. Also there is dearth of literature related to level of diversification among different farm category of Jammu and Kashmir. In this backdrop in the present paper level of diversification is analyzed across districts of J&K as well as among farm category in 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 conflict, 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.

Objectives of the present study:-

1. To determine level of diversification across farm category in Jammu and Kashmir
2. To assess the level of diversification across districts of Jammu and Kashmir.

Hypothesis 1st:- Different farm categories in the Study Area are not highly diversified.

Hypothesis 2nd:- There is no variation in diversification level across districts in the Jammu division as well **as at the state level**

3. Methodology of the study:

The present study is based on secondary data. For the fulfillment of the objectives of study the data was extracted from NSSO 70th round "Situation Assessment Survey of Agricultural Household". Data was also collected from various Agricultural census and Department of Agriculture and Farmers welfare. To assess the level of diversification, Different diversity indices were used. The level of diversification was measured using different indices of diversification such as:-

1. **Herfindhal Index (HI):-**

$$Hi = \sum_i^n pi^2$$

Where p is the proportion of area under ith crop and Σi is the summation of area under all 'i' crops.
i= 1/2/3.....n
When the value of HI decreases crop diversification takes place and when HI rises, concentration takes place.

2. **Simpson index (SI):-**
Index of diversification = 1- (proportionate area of food grains in Gross cropped area)

3. **Results and discussion**

Table 1. Level of diversification across districts of Jammu and Kashmir based on NSSO data.

District	Visit 1		Visit 2		District	Visit 1		Visit 2	
	THI	SI	THI	SI		THI	SI	THI	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 different indices value of diversification across all the districts of Jammu and Kashmir based on visit one and visit two conducted in NSSO 70th round on "situation assessment.

Table 2. Division of Districts across Jammu and Kashmir Based on Simpson Index

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

Table 3. Division of Districts across Jammu and Kashmir Based on Transformed Herfindhal Index (THI)

Category	THI	
	Visit 1	Visit 2
Highly diversified	Reasi	
Moderate	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	Kishtwar, Kulgam, Pulwama, samba, Shopian	Anantnag, Bandipora, Baramulla, Budgam, doda, Kargil, pulwama, Reasi, samba, Shopian, udhampur, J&K

Map 1st Based on Simpson index (visit 1 NSSO) categorization of districts (diversification level) in J &K
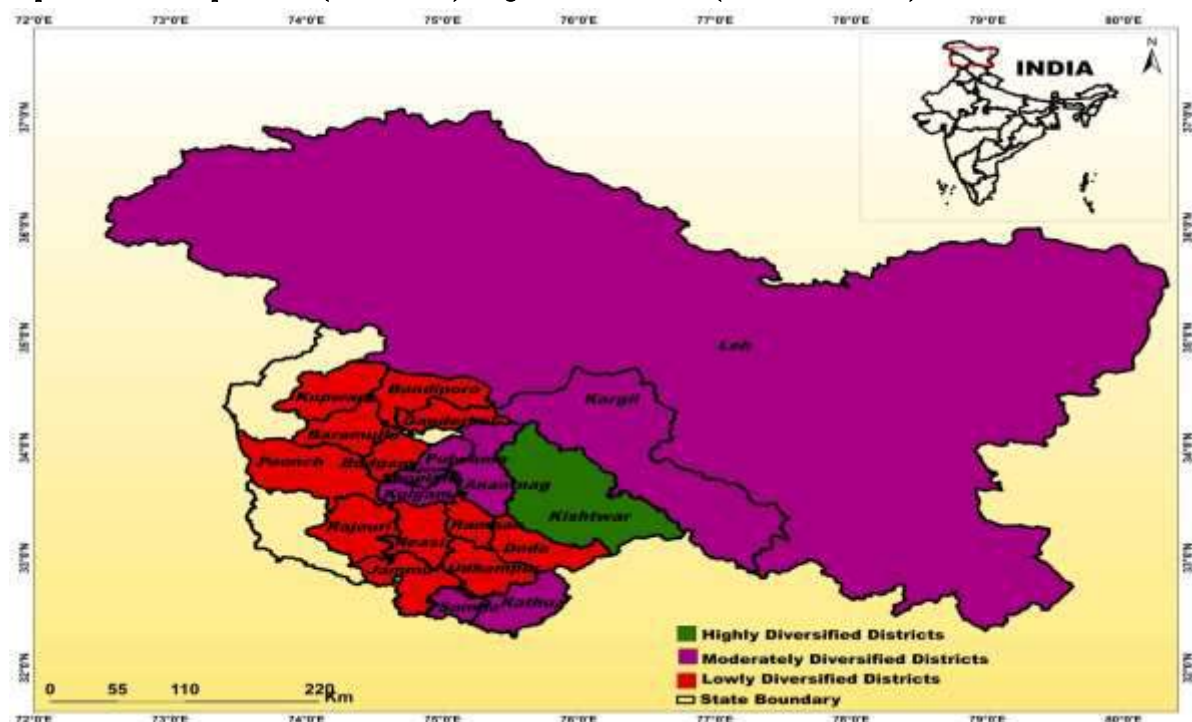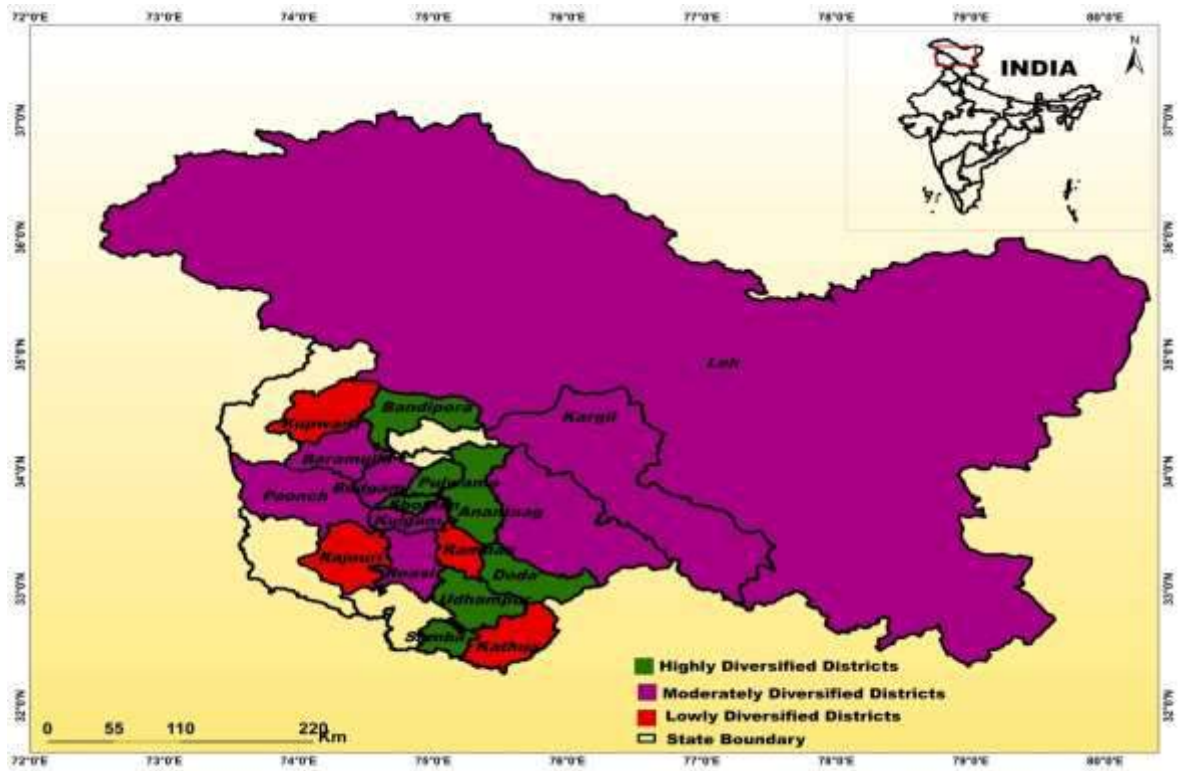

Source :- NSSO visit 1 70th round and author compilation

Map 2nd Based on Herfindhal index (visit 1 NSSO) categorization of districts (diversification level) in J &K
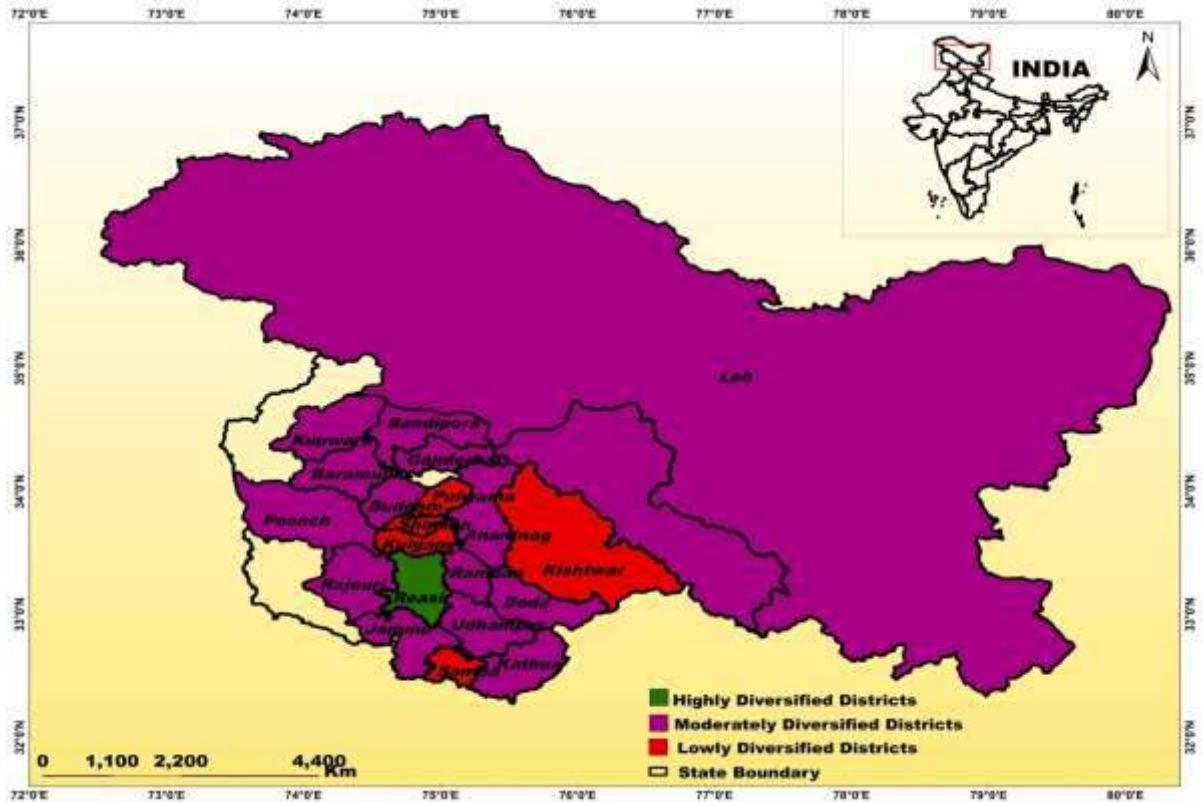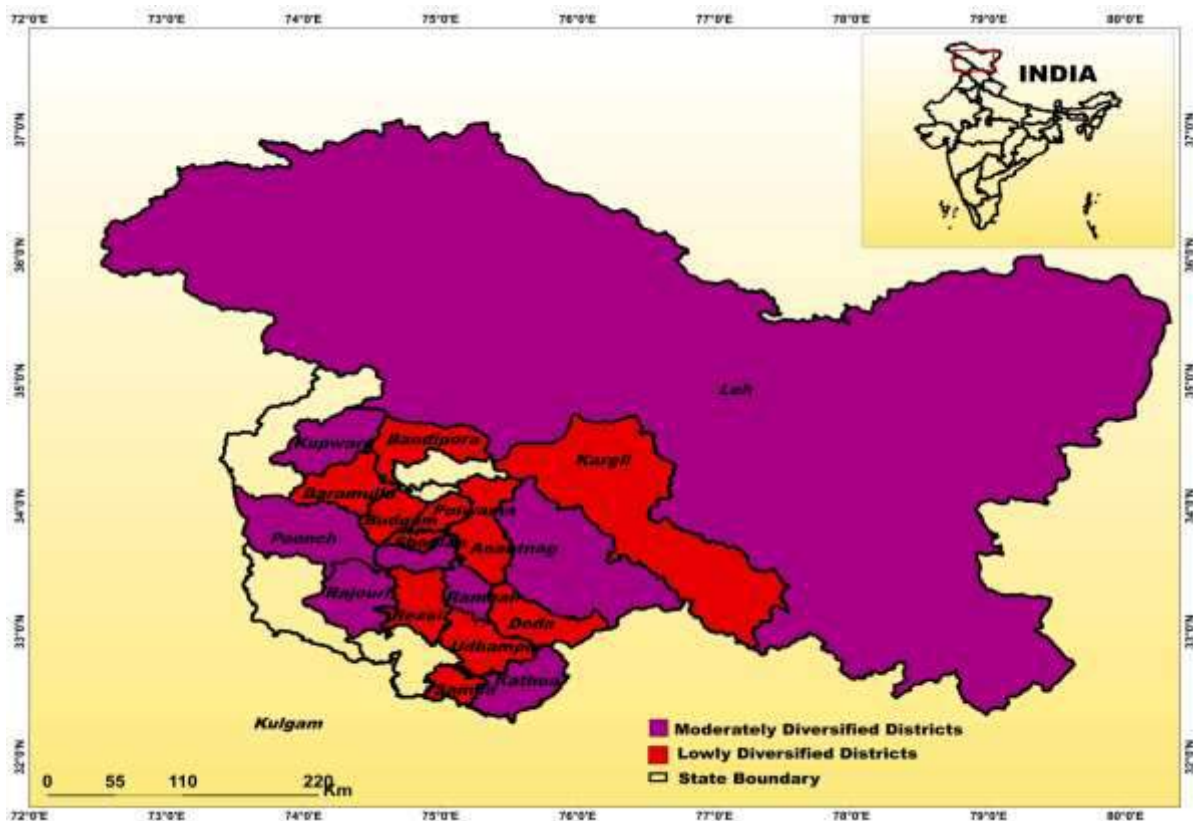

Source :- NSSO visit 1 70th round and author compilation

Map 3rd Based on SI (visit 2 NSSO) categorization of districts in J &K

Source :- NSSO visit 1 70th round and author compilation

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Map 4ᵗʰ   Based on HI (visit 2 NSSO) categorization of districts in J &K

Source :- NSSO visit 2 and author compilation

Table 4. level of diversification across farm category

Category	visit 1 NSSO		visit 2 NSSO	
	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)

Division of farm category based on indices of diversification

Category	SI		HI	
	Visit 1	Visit 2	Visit 1	Visit 2
Highly diversified	Small farmers	Semi-medium, small		
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-medium, small

Table 5. Level of Diversification across Districts of Jammu Division

| Area	THI	SI
Jammu	0.8651	0.69915
Samba	0.9035	0.69505
Kathua	0.8874	0.70332
Udhampur	0.8362	0.67797
Ramban	0.6206	0.57512
Doda	0.641	0.63645
Kishtwar	0.6515	0.63707
Rajouri	0.7793	0.57779
Poonch	0.2125	0.10072
Reasi	0.7399	0.58761
Jammu division	0.8723	0.72986

Source: Author's Own Calculation from Different Agricultural Census

**Division of districts of Jammu division, J&K based on indices value of THI and SI**

The above shows the values of different diversification indices across districts of the Jammu division. Indices are constructed based on data from the Agriculture Survey by the Department of Agriculture and Ministry of Agriculture and Framers welfare. Based on the indices values, districts are classified into three divisions: - high diversification, medium diversification and low diversification.

Districts/indices	THI	SI
Highly diversified	Jammu, Samba, Kathua, Udhampur, Jammu division	Jammu, Samba, Kathua, Udhampur, Poonch, Jammu division
Medium level	Ramban, Doda, Kishtwar, Rajouri, Reasi	Ramban, Doda, Kishtwar, Rajouri, Reasi
Low level	Poonch	

Map 5th based on division across Jammu division (Simpson Index)
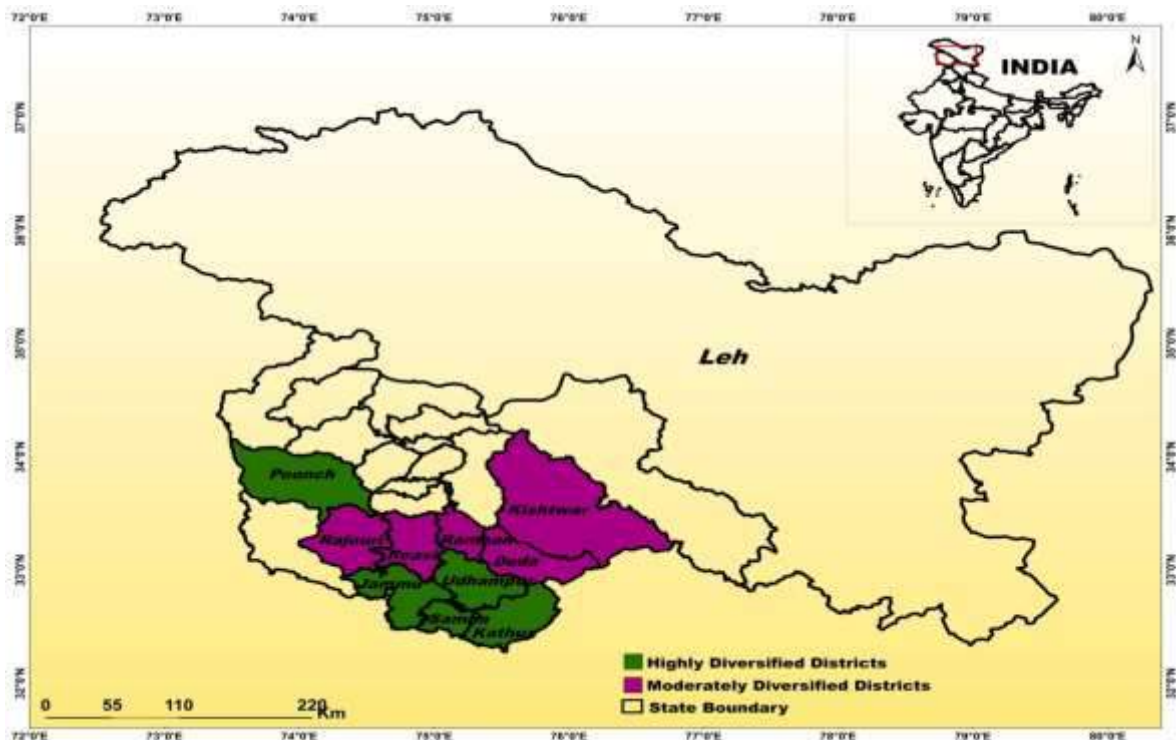
Map 6th based on division across Jammu division (Herfindhal index)
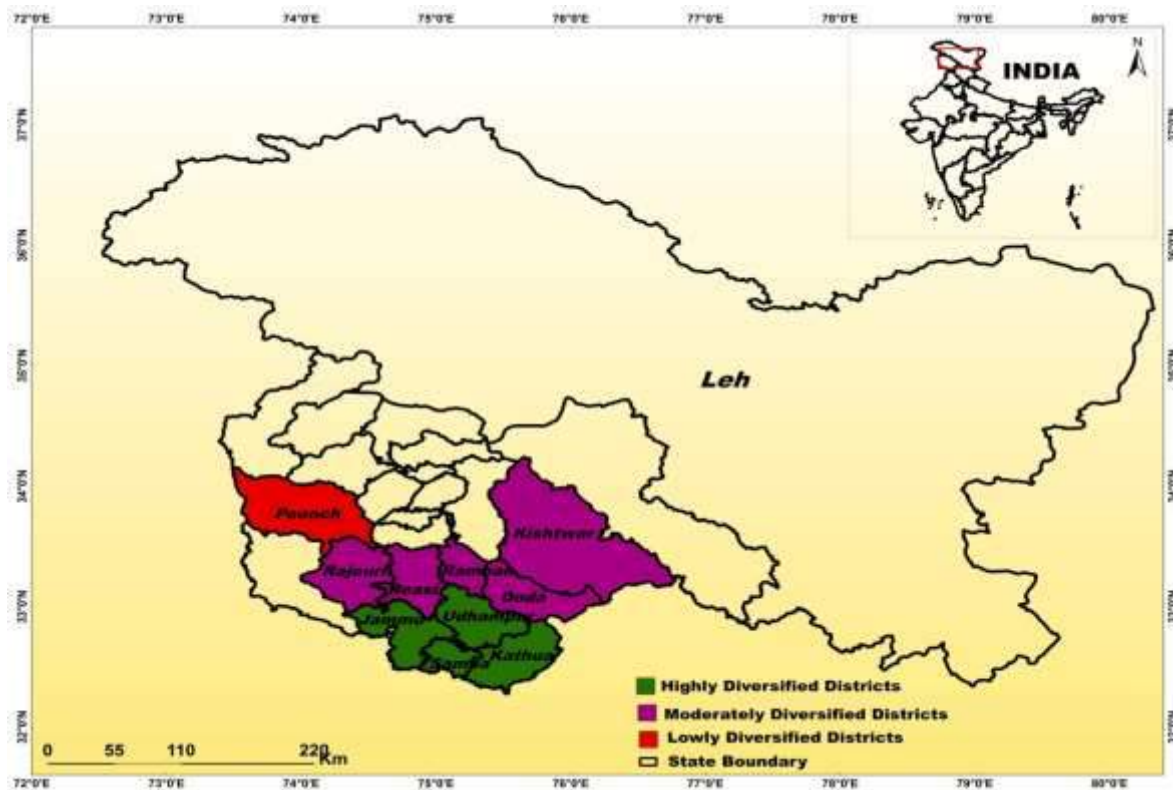
Source: - Agricultural census and author compilation

Concluding remarks

In the present study "Diversification in Agriculture: A district level analysis in Jammu and Kashmir" index constructed to assess the level of diversification across districts of Jammu and Kashmir. Simpson index and Transformed Herfindhal indexes were used.

1. **NSSO 70th round Visit 1 results**

   a) In Visit 1 of NSSO, based on Simpson index, a highly diversified district across J and K was Kishtwar and based on Herfindhal index; it was Reasi.

   b) In visit1, based on Simpson Index, Moderate diversification was seen in Anantnag, Budgam, Kargil, Kathua, Kulgam, Leh, Pulwama, Samba and Shopian. Based on the Herfindhal index, districts like Baramulla, Doda, Jammu, Poonch, Rajouri, and Udhampur were also added in the same category of moderate diversification.

   c) As per Simpson index, the low diversified district was Bandipora, Baramulla, Doda, Ganderbal, Jammu, Kupwara, Poonch, Rajouri, Ramban, Reasi and Udhampur. Based on the Herfindhal index, Kishtwar, Kulgam, Pulwama, Samba, Shopian, and Rajouri were low diversified districts.

2. **Visit2 of NSSO 70th round results**

   a) As per the Simpson index, highly diversified districts were Anantnag, Bandipora, Doda, Pulwama, Samba, Shopian and Udhampur, whereas no district was based on the Herfindhal index was included in this category.

   b) As per the Herfindhal index, moderate diversified districts were Kathua, Kishtwar, Kulgam, Kupwara, Leh, Rajouri and Ramban. On the other hand, based on the Simpson index, they were Baramulla, Budgam, Kargil, Kishtwar, Kulgam, Leh, Poonch and Reasi.

   c) The least diversified districts based on Simpson Index were Kathua, Kupwara, Rajouri and Ramban. Based on the Herfindhal index, they were Anantnag, Bandipora, Baramulla, Budgam, Doda, Kargil, Pulwama, Reasi, Samba, Shopian, Udhampur.

3. **Diversification across Jammu division**

   a) Districts like Jammu, Samba, Kathua, Udhampur were highly diversified based on the Transformed Herfindhal Index. Ramban, Doda, Kishtwar, Rajouri and Reasi were in the category of medium diversification level. Poonch was the least diversified district across the Jammu division.

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b) Based on the Simpson Index, highly diversified districts across the Jammu division were Jammu, Samba, Kathua, Udhampur and Poonch. Ramban, Doda, Kishtwar, Rajouri, and Reasi were moderately diversified.

4. **Diversification across farm categories**

a) Visit 1:- as per the Simpson Index, small farmers were highly diversified. Medium farmers were moderately diversified and marginal; semi-medium farmers were in the zone of least diversification. Based on the Herfindhal Index, marginal, medium and semi-medium farmers were moderately diversified, whereas small farmers were least diversified.

b) Visit2:- as per the Simpson index, semi-medium and small farmers were highly diversified, whereas marginal and semi-medium farmers were diversified moderately. All categories of farmers were least diversified as per the Herfindhal index.

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. 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. 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. Most of farmers were poor with small landholding sizes. They cannot made investments on irrigation techniques. They cannot invest in required agri-technology and scientific methods to increase their per unit crop yield. Smaller land holdings were 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. 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. Gupta, R.P. and Tewari, S.K. (1985) concluded that larger farms were relatively less diversified. They also added that Tenancy (cash renting) discourages diversification. There was a positive relation

between Farms with higher irrigation intensity and located nearer to market with the level of diversification. Pal and Pal (1985) found that the mode of farming, the degree of mechanization and the farm size were drivers in enhancing diversification. Mishra et al. (2004) found that access to subsidies was an important determinant of the decision of diversification. Other factors were access to credit ((Akaakhol and Aye 2014) (Khatun and Roy 2014)), access to agricultural services (Ibrahim et al., 2014), equipment in agricultural machinery ((Ashfaq et al., 2008) (Amine and Fatima 2016)). The agricultural experience was also an important determinant of the decision of diversification ((Amine and Fatima 2016) (Rahman 2010)).

Rejection/ Acceptance of Hypothesis of the Study

Hypothesis 1st:- Different farm categories in the Study Area are not highly diversified. The majority of the Marginal and Small farmers under study have been found to be highly diversified based on the Bhatia index of diversification. The majority of the respondents stated that the main reason behind their diversification in agriculture was income security and sustainability of livelihood. (Null hypothesis is not accepted)

Hypothesis 2nd:- There is no variation in diversification level across districts in the Jammu division as well as at the state level. :- There existed variation in the level of diversification across districts in the Jammu division as well as at the state level based on various indices of diversification like Simpson Index, Herfindhal index, Bhatia Index and others. Districts have been categorized into highly, moderately and less diversified based on the various indices of diversification. (Null hypothesis is not accepted)

Suggestions and policy implications

1. An awareness programme needs to be organized at the village level to make the farmers more aware of the use of crop-specific seeds.
2. Awareness among the farmers who were not diversified should be created about diversification in agriculture and allied activities for improving the socio-economic conditions and income-employment opportunities in the Study Area.

3. References

Akaakhol, M. A., & Aye, G. C. (2014). Diversification and farm household welfare in Makurdi, Benue state, Nigeria. *Development Studies Research*, 1(1), 168–175

Amine, B.M and B. Fatima (2016). Determinants of on-farm Diversification among Rural Households: Empirical Evidences from Northern Algeria. *International Journal of Food and Agricultural Economics*, 4(2), 87-99.

Birthal, Pratap S., A.K. Jha, P.K. Joshi and D.K. Singh (2006), "Agricultural Diversification in North Eastern Region of India: Implications for Growth and Equity", *Indian Journal of Agricultural Economics*, Vol.61, No.3. July-September.

Bhalla, G.S. and Chadha, G.K. (1982), "Green Revolution and Small Peasant: A Study of Income Distribution in Punjab Agriculture-I", *Economic and Political Weekly*, XVII (20): 826-833.

Bhalla, G.S. and Singh, G. (2009), "Economic Liberalization and Indian Agriculture: A State Wise Analysis", *Economic & Political Weekly*, xliv (52). .

Chand, Ramesh (1996), "Diversification through High Value Crops in Western Himalayan Region: Evidence from Himachal Pradesh", *Indian Journal of Agricultural Economics*, Vol.51, No.4, Oct-Dec, pp 652-663.

Chand, Ramesh, Kumar, Praduman and Kumar, Sant (2011). Total Factor Productivity and Contribution of Research Investment to Agricultural Growth in India. Policy Paper 25, National Centre for Agricultural Economics and Policy Research, New Delhi.

Chand Ramesh, P A lakshmi Prasnna, Aruna Singh (2011). Farm Size and Productivity Understanding the Strengths of Smallholders and Improving their Livelihoods, *Economic Political Weekly*, 46 (26-27).

Chand Ramesh, R Saxena and S. Rana (2015). Estimate and Analysis from Income in India(1983-84 to 2011-12). *Economic Political Weekly,* 50(22), 139-145.

Chand, R. (2017). Doubling farmers' income: Strategy and prospects", *Indian Journal of Agricultural Economics*, 72(1), 1–23.

Gupta, R.P. and Tewari, S.K. (1985). Factors Affecting Crop Diversification-An Empirical Analysis. *Indian Journal of Agricultural Economics*, 40(3), 304-307

Goletti, F. (1999), "Agricultural Diversification and Rural Industrialization as a Strategy for Rural Income Growth and Poverty Reduction in Indochina and Myanmar", *MSSD Discussion Paper* No. 30, Washington D.C: International Food Policy Research Institute.

Government of India*, Census Reports*, 2001, 2011.

Haque. T., (1996), „Small Farm Diversification: Problems and Prospects', NCAP, New Delhi.

Joshi, P.K., Ashok Gulati, Pratap S. Birthal and L. Tewary (2004), "Agriculture Diversification in South Asia: Patterns, Determinants, and Policy Impications*"; Economic and Political Weekly*, June 12.

Joshi, P.K., Ashok Gulati and Pratap S. Birthal (2007), "*Agricultural Diversification in India: Status, Nature and Pattern",* in Joshi P.K., Ashok Gulati, Ralph Cummings Jr. (ed.)

Kennedy, K. and King, L. (2014**), "**Political Economy of Farmers' Suicide in India Indebted Cash Crop Farmers with Marginal Land Holdings State Level Variations in State Level", presented at conference-Globalization and Health, *Economic and Politically Weekly.*

Khatun, D., & Roy, B. C. (2012). Rural Livelihood Diversification in West Bengal : Determinants. *Agricultural Economics Research Review,* 25(1), 115–124.

Pal, D.P. and Pal, G.P. (1985). Crop diversification: Its causes and impacts on the farm economy. *Indian Journal of Agricultural Economics*, 40(3), 342-343.

Pingali, P.L. and M. W. Rosegrant (1995), "Agricultural Commercialization and Diversification: Processes and Policies", *Food Policy,* 20(3), pp-171-186.

Rahman ,S. (2010). Determinants of Crop Choices by Bangladeshi Framers: A Bivariate Probit Analysis. *Agricultural Economics: New Research,* 189-203.

Vyas, V.S. (1996). "Diversification in Agriculture: Concept Rationale and Approaches". *Indian Journal of Agricultural Economics.* 51(4) Pg. 636-643.