

Crop diversification in Himachal Pradesh -A temporal analysis

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Abstract

Objective: To study the crop diversification of Himachal Pradesh in India.

Methods/Statistical analysis: Secondary data is used for this study during the period 1990 to 2008 (18 years) by using the time series data of Himachal Pradesh. The period has been separated into three sub-period 1990-96, 1996-2002 and 2002-2008. To measure the crop diversification Herfindahl Index and compound growth rate are used.

Findings: Crop diversification is taking place in Himachal Pradesh during the period because the value of Herfindahl diversification index is nearby zero. This verifies that the Himachal Pradesh economy is diversifying gradually.

Improvements/application: This study also tries to explicate the changing share and area of major and minor crops in Himachal Pradesh.

Keywords: Crop Diversification, Herfindahl Index, Compound Growth Rate, Himachal Pradesh

I. Introduction

Diversification [1] in agriculture describes very often the shifting from the regional dominance of one crop towards other crops and to satisfy the increasing demand of these crops. It also can be delineated because the economic development from agriculture activity to non-agriculture activity [2]. Himachal Pradesh is an agriculturally progressive hill state in north Republic of India. Majority of the farmers within the unsmooth region have tiny land holdings and thus historically, the farmers are concerned in husbandry. However, lately the state has emerged as a model for alternative hill state within the region for experimenting with farming systems within the hills; remarkably for farming of vegetables, fruits and substitute high worth crops. However, still the enhancements in farming, the pressures on farmlands also are visible within the state due to several non-agricultural development initiatives. To keep up industrial viability of the farm sector, introduction of improved farm technologies, crops and farm enterprises guaranteeing complementarities and economical resource use are still required. Therefore, farm incomes will solely be increased and maintained through introduction of high worth crops and thru adoption of heterogeneous cropping schemes. Diversification so would facilitate in broadening and strengthening of the financial gain sources of rural households [3] and it's conjointly expected to assist in ecological enhancements.

The main advantage of the study of diversification in an exceedingly region lies within the undeniable fact that it permits us grasp the impact of physical and socio-economic conditions on the agriculture. Moreover, its assistances to know the modern competition among crop for space, for rotation and result on double cropping, total production and per hectare productivity [4]. This study has been structured on the following lines: Section II describes the materials and methods. While section III represents the results and discussion. Section VI discusses conclusion.

2. Materials and Methods

Present study was conducted in HP state of North Hill Region of India. For the purpose of analysing crop diversification, the time series data pertaining to area under diverse crops. Secondary data is used for this study during the year of 1990-2008. The time series data for the period of 18 years is divided into three sub-period 1990-96, 1996-2002 and 2002-2008.

Data collected from published and unpublished sources viz, Directorate of Economics and Statics, Directorate of Agriculture, Himachal Pradesh and other several Government published sources such as (Economic Survey, Annual Season and Crop Report, Statistical Outline and District Statistical Abstract) [5].

1. Compound growth rates

Average area under each crop and share to the total cropped area for each crop has been worked out for this study. To check the change in cropping pattern the Compound growth rate has been applied. To estimate the compound growth rate the formula has been described in following way:

$$\text{Log} Y = a + bt$$

$$\text{Growth rate} = (\exp(b) - 1) * 100$$

Where,

Y = area of i^{th} crop at a time t (ha)

a = intercept

t = time

b = slope coefficient

Herfindahl Index

Herfindahl Index is computed by taking of square of acreage proportion of each crop in the total cropped area. Mathematically, the index is given as below.

$$\text{H.I.} = \frac{1}{N} \sum_{i=1}^N P_i^2$$

Where N is the total number of crops and P_i represents area proportion of the i -th crop in total cropped area. The relation between diversification and Herfindahl index is negative which implies that with the development in diversification, the Herfindahl index would diminish. The value of Herfindahl index lies between zero to one where perfect diversification is expressed by zero and perfect concentration shows by one.

3. Results and Discussion

1. Changing share of important crops in Himachal Pradesh

The changing trend of major crops as a share of Himachal Pradesh in gross cropped area is shown in Table 1. The maximum share in gross cropped area was the 38.48% of wheat which are followed by maize, rice, fruits & vegetables and barley during the period in the state.

Table 1. Share of major crops in Himachal Pradesh

Crops	1990-96	1996-2002	2002-2008	1990-2008
Rice	8.64	8.51	8.49	8.55
Wheat	38.51	38.55	38.38	38.48
Barley	2.84	2.69	2.54	2.69
Maize	32.29	31.45	31.56	31.77
Ragi	0.45	0.44	0.21	0.37
Gram	0.29	0.19	0.14	0.21
Black Gram	1.86	1.57	1.27	1.57
Masur	0.17	0.15	0.08	0.13
Sugarcane	0.26	0.33	0.29	0.29
Fruits & vegetables	6.86	4.56	6.92	6.12
Chillies	0.09	0.11	0.07	0.09
Ginger	0.15	0.20	0.24	0.19
Cotton	0.01	0.01	0.006	0.01
Groundnut	0.04	0.02	0.01	0.03
Sesamum	0.72	0.48	0.43	0.55
Rape-mustard	0.09	0.94	0.95	0.93
Linseed	0.38	0.28	1.47	0.27
Tea	0.26	0.31	0.30	0.29
Fodder crops	1.01	1.06	1.08	1.05

Sources: Directorate of economics and Statistics, Government of Himachal Pradesh, Shimla

The minimum share was 0.01% of Cotton followed by groundnut and chillies i.e 0.03 and 0.09% respectively. Segment of the major cereal decreased from 1990-96 to 2002-08 except maize. The wheat showed the increment in the share from 38.51% to 38.55% in 1990-96 to 1996-2002 and declining rate in 2002-2009 i.e 38.38%. Pulses, gram, black gram and masur continuously showed the declining trend from 1990-96 to 2002-08. Sugarcane firstly increased from 1990-96 to 1996-2002 i.e. 0.26 to 0.33 and then decreased to 0.33 in 2002-08. However, the share of fruits & vegetables initially showed the declining trend and then increasing trend. The share of other crops like chillies, cotton, groundnut, sesamum showed the reducing rate over the period. Whereas, ginger, rape-mustard, linseed, tea and fodder crops showed the growing trend in the gross cropped area over the period. The area of linseed crop extended triple time in the study period. However, rape-mustard increased ten times more in 2002-08. Share of tea and fodder crops showed slightly improved over the year.

It can be verified from the above discussion that on the one hand, the major crops such as rice and wheat showed the declining share whereas wheat showed the increasing share in the state during the period. On the other hand, the minor crops such as fruits & vegetables, ginger, sugarcane, linseed, rape-mustard, fodder crops and tea showed the enhancement in the share over the period. This proves the shifting towards crop diversification rather than specialisation in Himachal Pradesh.

2. Area growth of important crops

Compound growth rate of major crops in Himachal Pradesh is presented in Table 2. It is found that over the period the area of all cereal crops grown-up negatively. In only 1990-1996 positive growth was showed by Maize and in 1996-2002 it was showed by barley. All pulses showed negative growth during 1990-2008. The area under sugarcane showed positive growth in 1990-96 i.e. 5.46% and negative in 1996-2002 i.e. 7.45 and again positive in 2002-08 that was 1.19%. Fruits & vegetables and rape mustard showed negative growth in 1990-96 and further positive growth in the area. The area under chillies diminished 2.01% over the period under study. Similarly, cotton, groundnut, sesamum and linseed reduced over the period.

Table 2. Compound growth rate of major crops in Himachal Pradesh

Crops	1990-96	1996-2002	2002-2008	1990-2008
Rice	-0.17	-0.77	-0.71	-0.41
Wheat	-0.89	-0.74	-0.04	-0.28
Barley	-1.64	0.17	-1.18	-1.13
Maize	0.08	-0.99	-0.11	-0.39
Ragi	-11.29	-2.36	-12.89	-6.46
Gram	-4.60	-13.69	0.05	-6.28
Black Gram	-2.94	-4.67	-1.88	-3.29
Masur	-9.71	12.18	-3.71	-6.56
Sugarcane	5.46	-7.45	1.19	0.71
Fruits & vegetables	-10.67	3.45	12.04	-0.05
Chillies	2.89	-7.57	-6.99	-2.01
Ginger	-3.61	13.36	-1.43	3.37
Cotton	-7.48	-21.92	-1.07	-7.32
Groundnut	-6.98	-23.19	-8.29	-11.35
Sesamum	-5.92	-5.08	-4.27	-4.45
Rape-mustard	-0.68	0.04	0.07	0.18
Linseed	-2.58	-6.01	-5.98	-7.41
Tea	-20.09	-1.49	-0.04	1.15
Fodder crops	2.14	-0.79	0.74	0.37

Sources: Directorate of economics and Statistics, Government of Himachal Pradesh, Shimla

It is also found that the crops which have a large share in state like wheat, maize, rice and fruits & vegetables showed the negatively growth in area. However, which crops was having least share like ginger, sugarcane, rape-mustard, tea and fodder crops showed positive growth over the period.

3. Crop diversification in Himachal Pradesh

Himachal Pradesh crop diversification results are presented in Table 3. It is found that crop diversification is taking place in the state during the period because in 1990-1996 Herfindahl value of index was 0.34 which diminished to 0.26 in 1996-2002.

Table 3. Crop diversification Index

Period	Herfindahl Index
1990-1996	0.34
1996-2002	0.26
2002-2008	0.26

4. Conclusion

Himachal Pradesh crop diversification is analysed by using Herfindahl index and Compound growth rate for different crop. The results of the study show that the share in the gross cropped area of the major crops such as wheat, maize and rice take the first place during the period. In 1990-96 the share was 38.5%, 32.29% and 8.64% of wheat, maize and rice respectively. The share declined in the area to 38.38%, 31.56% and 8.49% in 2002-08. However, the share in area of minor crops such as tea, linseed and fodder crops which were 0.26%, 0.38% and 1.01% in 1990-96 improved to 0.30%, 1.47% and 1.08% respectively in 2002-08. Therefore, it can be concluded that on the one hand, the major crops such as rice and wheat showed the declining share in the state during the period. On the other hand, the minor crops such as fruits & vegetables, ginger, sugarcane, linseed, rape-mustard, fodder crops and tea showed the enhancement in the share over the period.

This proves the shifting towards crop diversification rather than specialisation in Himachal Pradesh. The results also find that the crops which have a large share in state like wheat, maize, rice and fruits & vegetables show the negatively growth in area. However, those crops have least share like ginger, sugarcane, rape-mustard, tea and fodder crops showed positive growth over the period. Finally, it is concluded that crop diversification is taking place in the state during the period because the value of Herfindahl index shows the declining trend.

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The Publication fee is defrayed by Indian Society for Education and Environment (www.iseeadyar.org)

Cite this article as:

Sapana Sharma. Crop diversification in Himachal Pradesh -A temporal analysis. *Indian Journal of Economics and Development*. July 2019, Vol 7 (7), 1-4.

Received on: 29/04/2019

Accepted on: 11/07/2019