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Household-Level Dynamics of Crop Commercialization: A Study of East Siang, Upper Siang, and Lower Dibang Valley

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ABSTRACT

In this paper, the extent of commercialisation of crops at the household level in the three districts of Arunachal Pradesh viz, East Siang, Upper Siang and Lower Dibang Valley is analyzed based on primary data collected from a sample of 360 households. The extent of commercialisation is measured by taking indicators such as participation of households in crop marketing, marketing by farm sizes, marketing by crop types etc. Household Commercialisation Index (HCI), has been constructed to measure the degree of commercialisation by the sample households. The study has shown that 79 per cent of farming households are engaged in crop marketing while the rest 21 per cent do not participate in crop marketing that is they are operating at full subsistence level. The analysis of crop marketing by farm size revealed that marginal farmers have the lowest participation in the market with only 27 farmers participating in the market which accounts for just 6.9 per cent of the total sample households while all the large farmers are completely engaged in crop marketing. The level of crop marketing varies positively with the farm size. The study of crop-specific commercialisation shows that the proportion of households involved in the marketing of cash crops is highest in the entire study area (62.20 per cent) while pulses are the least marketed crop among the sample households (6.82 per cent). The highest HCI values are observed in oilseeds and cash crops while food grains have the lowest HCI values. The result of the logistic regression indicated that the size of the operated area, worker-to-population ratio, and the education level of the household head were found to have a positive and significant effect on the extent of crop commercialisation across all three districts while the coefficients of family size and distance from the market are found to be negative meaning that an increase these factors will cause a decline in the extent of commercialisation.

Keywords: Crop Commercialisation, Household Commercialisation Index, High Value Crops, foodgrains, market oriented, crop marketing

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1.   INTRODUCTION

Similar to any other state of India, the state of Arunachal Pradesh is also rural in nature, wherein agriculture is the mainstay of the rural populace. Agriculture contributes 29.22 per cent to the GSDP and employs around 58 per cent of the total workers in the State (Directorate of Economics and Statistics Govt of Arunachal Pradesh, 2020). With deep valleys, high mountains, rivers and rivulets, the mountainous and hilly landscape of the state renders most of the land unfit for sedentary cultivation. Thus, the total geographical area of the state available for cultivation is only 5 percent. The population density of just 17 person per square kilometer (Census of India, 2011) turns out to be a misnomer so far the accessibility of land for cultivation is concerned. The terrains and rugged slopes make most part of the land surface, thereby, making the available land either inaccessible or unfit for sedentary cultivation of crops. However, the scope for further expansion of cultivable land in the state is not yet exhausted. But, bringing these areas under cultivation would be a costly affair for the state. Further, in recent times, sedentarisation of farming to the fullest possible has already been undertaken. Permanent cultivation which earlier was mainly confined to a few river valleys has been extended in recent decades to all the plain areas and the hilly slopes that could be terraced and irrigated (Roy and Kuri, 2001). The limitations posed to secure sedentary livelihood by limited plain lands, however, are rescued by the traditional age-old practice of shifting cultivation of the hill slope. Thus, for the huge majority of the rural populace, agriculture is not only the way of life but the coexistence of a dual practice- a mix of shifting and sedentary.

As far as commercialisation is concerned, a farming household is considered commercialised if it is producing a significant amount of cash commodities, allocating a proportion of its resources to marketable commodities, or selling a considerable proportion of its agricultural outputs (Immink and Alarcon, 1993; Strasberg et al., 1999). Thus, it means the process of increasing the proportion of agricultural production that is sold by farmers (Pradhan et al., 2010).It may also mean increasing the area under cash crops or increasing the number of cash crops in a farmer's portfolio mix of crops. However, commercialisation is not restricted to cash crops only as traditional crops (staple food grains) are also being frequently marketed to a considerable extent. Therefore, a commercialised household may be defined as one which targets markets in their production decisions rather than selling whatever surplus is

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left after their consumption requirements are fulfilled (Pingali and Rosegrant, 1995).A diversification from low-value traditional subsistence crops to high-value cash crops (HVCs) may also be taken as a measure of agricultural commercialization. Commercialisation may facilitate specialisation and technology adoption, leading to higher yields and therefore higher expected returns. This additional income may enable smallholders to purchase adequate and healthy calories in the market, in turn improving their nutrition (Asselt and Useche, 2022).According to conventional wisdom, the transition from subsistence (or semi-subsistence) to commercial agriculture represents a key ingredient for the economic development of low-income countries (Carletto *et al.,* 2017).

Broadly speaking, agricultural commercialisationmay occur on both the output and input side. It may occur on the output side of production with increased marketed surplus or on the input side with increased use of purchased inputs.However, the present study is committed to the analysis of crop commercialisation as a constituent of agriculture commercialisation only on the output side in the study region. By commercialisation, here we mean crop commercialisation only and not the other types of commercialisation being taking place in agriculture in the region. The analysis of commercialisation of agriculture on the input side could not be undertaken in the study region because it has been found that the participation of farmers on the input side is not very significant apart from a few large progressive farmers who are in constant touch with their respective agriculture department and benefited mostly from them.

2. OBJECTIVES

The present study is aimed at fulfilling the followingobjectives:

- To measure the degree of commercialisation by using Household Commercialisation Index (HCI).
- To estimate the determinants of crop commercialization among the farmers in the study area.

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3. METHODOLOGY

Study Area

The study will cover three districts, namely; Upper Siang, East Siang and Lower Dibang Valley, which were purposely selected as the practice of both the farming pursuits of sedentary and shifting are predominant in these districts. Furthermore, agriculture practices in these three districts represent broader agricultural practices and challenges found in Arunachal Pradesh. In East Siang, farming is dominated by sedentary cultivation on vast plains, with rice, plantations, and orchards being key crops, though shifting cultivation is still practised in some pockets. Upper Siang, with its mountainous terrain, relies mainly on shifting cultivation and terrace farming for rice. Lower Dibang Valley exhibits both hills and plains, allowing a mix of sedentary, shifting, and terrace farming, especially near the fertile Dibang River. Owing to increasing modernization, improved practices, infrastructures and communication, agro-products of these districts are finding markets and outlets in the periphery areas as well as around the neighbouring states. Consequently, there has been a marked transformation in cropping patterns, practices, traditionally grown crops and methods towards more viable and profitable crops and ventures.

Data Collection and Sampling Method

Multi-stage sampling technique is used to select the blocks/circles and villages so that there is a proportional representation of each of the above blocks/circles. However, the selection of households at the unit level is based purely on a random selection process. The sample selection follows the systematic stratum-based criterion. We have selected three districts for the present study. From each district (stratum), three community development blocks (sub-stratum) comprising many circle offices (sub-sub-stratum) are selected. From each block, two circles are selected and from each circle, one village is taken from which the sample householdsare drawn. As such, the total number of villages selected is 18 for the whole study (3 districts x 3 C-D blocks x 2 circles/villages = 18 villages). The unit of analysis is the peasant or the farming household.

Finally, the size of the sample is estimated using Yamane's (1967) equation which is given by:

$$n = \frac{N}{1+Ne^2}$$

n is the sample size.

N signifies the population under study.

e is the margin error.

Using the above equation, a sample of 360 farmers is selected for study from the universe of 2639 households by taking 20 households from each village.

With regard to primary sources, data is generated scientifically using structured questionnaires, and semi-structured schedules, in addition to ethnographic methods of data extraction.

Analytical Procedure

The source of primary data is the nine blocks of all three districts which form the universe/population of the study and was collected during the year 2021-22. The extent of commercialisation is estimated by indicators like the participation of households in crop marketing by farm size and by crop types. Participation of households in crop marketing by farm size is calculated by taking the number of households that are involved in the marketing of outputs according to different size classes while participation of households in crop marketing by crop types is calculated by taking the number of households that are involved in the marketing of types of crops such as cereals and pulses, fruits and vegetables, cash crops etc. The following analytical tools were used in the study.

a)   **Household Commercialisation Index:** The Household Commercialisation Index (HCI) measures the degree to which farming households in a particular area or region participate in commercial activities. It provides valuable insights into the level of economic development, urbanization, and the extent of monetization of domestic production and consumption within a given society.

$$\text{HCI} = \sum_n^{i=1} \frac{\text{Gross value of crops sales by household } i \text{ in year } j}{\text{Gross value of all crop production by household } i \text{ in year } j} \times 100$$

According to this measure, the value of HCI equals to 0 (zero) would signify a pure subsistence-oriented household, while the value of HCI closer to 100 would indicate a higher degree of commercialisation.

b) **Logistic Regression Model:** A logistic regression model is used to assess the determinants of commercialization since the values of various indices that have been taken as dependent variables are categorical.

$$\Pr(y=1/x) = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}} = \lambda(\beta_0 + \beta_1 x)$$

Where, $\Pr(y=1/x)$ is the probability of y = 1, given x.

β_0 is the intercept or constant term.

β_1 is the coefficient of the predictor variable x.

$\lambda(z) = e^z / (1 + e^z)$ is the logistic function.

4. RESULTS AND DISCUSSIONS

Participation in Crop Marketing by Farm Size and Crop Types

Table 1 reveals that 79 percent of the farming households in the study area are engaged in crop marketing while the rest 21 percent do not participate in crop marketing that is they are operating at full subsistence level (consumed 100 per cent of their production). Among the farm sizes, marginal farmers have the lowest participation in the market with just 27 farmers involved in crop marketing which accounts for only 39.70 percent of the total marginal farmers in the study area. The level of crop marketing varies positively with the farm size, that is, the proportion of farmers engaged in crop marketing increases with the increase in farm size and vice-versa. It can be seen from Table 1 that around 75 percent of the small farmers participated in crop marketing which increases to around 90 percent for semi-medium farmers which further increases to 96.74 percent for medium farmers and finally, 100 percent for large farmers that is; all the large farmers are completely engaged in crop marketing.

Table 1:Participation in crop marketing by size class

(Figures in the brackets indicate percentage to its respective total)

Size	Marginal	Small	Semi-medium	Medium	Large	All
No. of Households	27 (39.70)	79 (75.24)	88 (89.79)	89 (96.74)	18 (100)	**301 (79.00)**

Source: Field survey.

The level of crop specific commercialisation in the study area has been presented in table 2. The analysis of crop specific commercialisation shows that the proportion of households involved in the marketing of cash crops is highest in the entire study area (62.20 percent). Fruits and vegetables secured the second highest rank. There are 174 households (45.67 percent of the total sample household) that are involved in selling fruits and vegetables. 16.27 percent of the households are involved in the marketing of cereals which mostly include food grains. Pulses account for the least marketed crop by the sample households. Just 6.82 percent of the household participate in the marketing of pulses.

Table 2:Participation in crop marketing by crop types

(Figures in the brackets indicate percentage to the total)

Crop types	Cereals	Pulses	Fruits & vegetables	Cash crops
No. of Households	62 (16.27)	26 (6.82)	174 (45.67)	237 (62.20)

Source: Field survey.

Household Commercialisation Index (HCI)

District-wise Estimation of HCI

Table 3 reveals that the Household Commercialization Index (HCI) for the whole study area is estimated at 59.22 per cent meaning that the households in the study area sold almost 60 per cent of the total value of their products in the market. This implies that the households in the study area are moderately commercialized. Among the districts, Lower Dibang Valley recorded the highest HCI value of 68.49 per cent while Upper Siang recorded the lowest HCI value of 27.71 per cent. East Siang recorded an HCI value of 64.42 per cent. Thus, it may be assumed that East Siang and Lower Dibang Valley are moderately commercialized while Upper Siang has a low level of commercialization as far as output marketing is concerned. A low level of commercialization in Upper Siang is expected because of several factors such as geographical and topographical challenges which make it difficult for agriculture to operate on a large scale.

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Table 3: HCI for Different Crops

Crop	East Siang	Upper Siang	LDV	All districts
Paddy	2.23	2.98	2.49	2.54
Maize	0*	0	80.89	77.39
Millets	0*	0	0*	0
Buckwheat	89.20	0*	89.27	89.22
Urad	87.79	0*	83.81	86.91
Mustard	89.43	0*	83.90	87.72
Sesame	96.51	0*	86.70	92.97
Palm oil	0*	0*	100	100
Ginger	82.89	81.62	89.60	88.62
Cardamom	0*	93.38	94.17	93.80
Chilly	88.47	67.48	0*	79.65
Sugarcane	77.78	0*	0*	77.78
potato	84.22	0*	71.82	83.25
Mustard greens	0*	59.78	0*	59.78
Eggplant	0*	65.70	0*	65.70
Bitter eggplant	0*	52.12	0*	52.12
Cabbage	0*	0*	78.86	78.86
Orange	78.75	75.40	85.74	80.42
Pineapple	75.62	54.08	72.07	74.94
Banana	0*	76.82	81.94	80.65
Lemon	0*	0*	76.86	76.86
Kiwi	0*	56.25	0*	56.25
Betel nut	97.26	0*	65.82	88.43
Rubber	100	0*	0*	100
Tea	100	0*	0*	100
All Crops	**64.42**	**27.71**	**68.49**	**59.22**

Source: Computed by author

*Indicate crops that are not produced in the respective districts.

Cash crops including oil seeds and spices such as mustard, sesame, ginger, cardamom etc. and plantation crops such as rubber, tea etc. are the most marketed crops. The proportion of these crops sold ranges from 80 percent to 100 percent. For instance, more than 85 per cent of cash crops such as ginger, sugarcane, cardamom, oilseeds etc. are sold by the households, and 100 per cent of the output of plantation crops such as rubber, tea and palm oil are sold. These categories of crops are the most commercialized in the study area. The next commercialized crops are the horticultural crops. The proportion of output of these crops sold ranges from 70 per cent to 90 per cent. Vegetables that are grown exclusively for cash such as cabbage and potato are highly commercialized and the proportion of their output sold is around 80 per cent. However, those vegetables that are grown also for self-consumption are less commercialised such as mustard green, bitter eggplant, eggplant etc. Their HCI ranges from 50 to 65 percent. Among the foodgrains, rice is the least commercialised, however, non-staples such as buckwheat and urad dal are highly commercialised with HCI values greater than 80 per cent.

HCI for Different Size Class

Table 4examine the Household Commercialisation Index (HCI) for different size class in the study area. It can be seen that the commercialization index for all crops increases with the increase in farm size. This is in linewith our earlier discussion that participation in crop marketing increases with the increase in size of the farm. This means that bigger farmers are more market-oriented than smaller farms in the production of crops. The HCI for large farms is the highest among all sizes of farmers in the study area (76.61 per cent) while the marginal farmers have the lowest commercialization index of 13.84 per cent.

Table 4: HCI for Different Size-Class

Crops	Marginal	Small	Semi-medium	Medium	Large
Paddy	3.075	2.287	0.848	2.523	6.270
Maize	35.055	30.70	64.84	85.18	91.85
Millets	0	0	0	0	0*
Buckwheat	0*	91.89	90.52	89.52	87.37
Urad dal	0*	82.61	85.88	86.52	89.55

Mustard seeds	0*	92.42	86.14	89.99	82.43
Sesame seeds	0*	73.33	88.31	93.43	97.75
Palm oil	0*	0*	0*	100	0*
Ginger	90.15	88.615	90.37	88.29	87.44
Cardamom	90.42	93.73	94.89	90.89	0*
Chilly	71.67	74.25	62.13	87.93	0
Sugarcane	80	0*	0*	0*	0*
potato	0*	71.14	82.49	88.44	71.72
Mustard green	75	60.86	56.53	56.97	0*
Eggplant	64.28	67.62	64.51	65.71	0*
Bitter eggplant	58.00	44.44	56.41	50.00	0*
Cabbage	0*	68.57	82.86	85.00	68.00
Orange	72.64	31.41	83.66	76.02	89.57
Pineapple	37.89	78.96	77.68	76.77	63.16
Banana	0*	81.55	75.76	60.00	0*
Lemon	0*	0*	80.00	74.07	0*
Kiwi	0*	0*	66.67	50.00	0*
Betel nut	0*	0*	96.54	87.68	86.32
Rubber	0*	0*	100	100	100
Tea	0*	0*	0*	100	0*
All Crops	**13.84**	**34.09**	**53.01**	**64.55**	**76.61**

Source: Computed by author

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The type and the amount of crop marketed also differ among different farm sizes. The HCI of paddy for marginal farmers is higher than that of small, semi-medium, and medium farmers implying that marginal farmers are selling rice under duress.Among the marginal farmers, ginger and cardamom are the highest marketed crops followed by orange and chilly. Rice is the least marketed crop among all farm sizes. Mustard seeds, buckwheat and urad dal are the highest-marketed crops for small farmers, though buckwheat and urad dal fall under the foodgrain category, it is considered cash crops in the study area. Among the semi medium farmers, buckwheat, cardamom, betel nut, ginger and rubber are highly marketed crops. More than 90 per cent of the total value of these crops is marketed by the farmers. In the medium class farmers, rubber, tea, cardamom and sesame are highly marketed. And lastly, the crops which are highly marketed by large farmers include rubber, sesame, and maize (HCI values ranging from 90 to 100 per cent). The other crops that also secured high commercialization index among this class of farmers include buckwheat, urad dal, ginger, orange and betel nut (HCI ranging from 80 to 90 per cent).

Logistic Regression Estimates of the Determinants of Crop Commercialisation

The Stata 7 software was used to identify the variables that affect the level of the commercialisation in the study area.Household Commercialization Index (HCI) was taken as the dependent variable while various socio-economic indicators of the sample households were taken as independent variables. The pseudo R-squared value indicates that 66.78 per cent of the variation in the extent of crop commercialization is explained by the independent variables in East Siang, 61.24 per cent in Lower Dibang Valley and 50.79 per cent in Upper Siang (Table 5). It can be seen that the coefficients of the operated area and education level are all positive and statistically significant in all three districts. This implies that the level of commercialization in the study area varies positively with the operated area and education level. For each additional unit of operated area, the odds of having a higher HCI increase by a factor of 1.193 (or 19.30 per cent), 1.278 (or 27.80 per cent) and 2.230 (or 123 per cent) in East Siang, Lower Dibang Valley, and Upper Siang respectively. A unit increase in the education level of the household head increases the odds of having a higher HCI by a factor of 1.413 (or 14.13 per cent), 1.579 (or 15.79 per cent) and 1.350 (or 13.50 per cent) in East Siang, Lower Dibang Valley, and Upper Siang respectively. HCI also vary positively with worker to population ratio in East Siang and Lower Dibang Valley while it is not

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significant in Upper Siang. A unit increase in the worker-population ratio increases the odds of having a higher commercialization index by 13.48 per cent in East Siang and 14.73 per cent in Lower Dibang Valley. The coefficients of the age of the household head and average years of farming by the household head though positive are not significant in the study area.

Table 5:Determinants of Crop Commercialisation at the Farm Level
(Figures in the parentheses indicate p-values)

Variable	East Siang		Lower Dibang Valley		Upper Siang	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Intercept	-0.7892 (0.1595)	0.454	-1.2345 (0.0687)	0.291	-1.5840 (0.0891)	-
Operated area	0.1765 (0.0240)*	1.193	0.2456 (0.0071)**	1.278	0.8023 (0.0031)**	2.230
Family size	-0.4123 (0.0089)**	0.662	-0.5678 (0.0032)**	0.567	-0.2156 (0.0462)*	0.825
Worker-population ratio	0.2987 (0.0182)	1.348	0.3876 (0.0078)**	1.473	0.5327	2.116
Percentage of female population	-0.0567 (0.5648)	0.945	-0.1234 (0.2811)	0.884	-0.0301 (0.3924)	0.992
Education level of HH	0.3456 (0.0068)**	1.413	0.4791 (0.0029)**	1.579	0.3120 (0.0189)*	1.350
Age of HH head	0.0178 (0.0693)	1.018	0.0356 (0.0743)	1.035	-0.0531 (0.6548)	0.951
Average years of farming	0.0289 (0.2933)	1.029	0.0178 (0.5838)	1.018	0.1492 (0.2167)	1.113
Distance from the market	-0.2345 (0.0061)**	0.791	-0.3456 (0.0007)**	0.708	-0.1783 (0.0194)*	0.342
Log-Likelihood	**-63.278**		**-59.123**		**-54.212**	
Pseudo R-squared	**0.6678**		**0.6124**		**0.5079**	

Significant codes: *5 %, **1 %

As expected, the coefficients of family size and distance from the market are negative and significant in all three districts. This means a bigger family size and greater distance from the market reduces the level of commercialization by a farming household and vice-versa. A unit increase in family size decreases the odds of having a higher HCI by a factor of 0.662 (or 33.8 per cent), 0.567 (or 43.3 per cent) and 0.825 (or 17.5 per cent) in East Siang, Lower Dibang Valley, and Upper Siang respectively. For an additional unit

of distance from the market, the odds of having a lower HCI increase by a factor of 0.791 (or 79.1 per cent), 0.708 (or 70.8 per cent) and 0.342 (or 34.2 per cent) in East Siang, Lower Dibang Valley, and Upper Siang respectively. The coefficient of percentage of female population though negative is not significant in the study area.

5.   CONCLUSION AND POLICY IMPLICATIONS

The above discussion shows that 79 per cent of the sample households participate in crop marketing while 21 per cent do not participate in crop marketing that is they are operating at full subsistence level. The commercialisation of crops is mostly undertaken by the large farmers in the study area which conforms to the earlier studies that the level of crop marketing varies positively with the farm size, that is, the proportion of farmers engaged in crop marketing increases with the increase in farm size and vice-versa. Thus, the participation of large farmers in crop marketing is the highest while the least participation is done by the marginal farmers. This pattern is observed across all three districts. The analysis of crop-specificcommercialisation has shownthat the proportion of households involved in the marketing of cash crops is highest in the entire study area and pulses account for the least marketed crop

The estimation of HCI has shown that the sample households in the study area sold almost 60 per cent of the total value of their products in the market which means that the households in the study area are fairly commercialized. Among the districts, Lower Dibang Valley recorded the highest HCI value followed by East Siang while Upper Siang is the least commercialised. Factors such as geographical and topographical challenges, poor road connectivity, high transportation costs, lack of local markets, many farmers still relying on traditional farming practices etc. are the reasons for the low level of commercialization in Upper Siang.

The estimation of HCI also reveals that cash crops including oil seeds and spices such as mustard, sesame, ginger, cardamom etc and plantation crops such as rubber, tea etc. are the most marketed crops. Non-staple foodgrains such as maize, buckwheat and urad dal were also found to have high HCI values. Fruits and vegetables which are grown exclusively for cash such as cabbage and potato are highly commercialized while those vegetables which are also grown for self-consumption are less commercialized.

The result of the regression revealed that the size of the operated area, the worker-to-population ratio, and the education level of the household head were found to have a positive and significant effect on the extent of crop commercialisation across all three districts. This means an increase in the above explanatory variables will cause an increase in the extent of commercialization in the study area. The coefficients of family size and distance from the market are found to be negative meaning that an increase in family size and distance from the market will cause a decline in the extent of commercialization.

It has been observed that the least diversified farmer groups are the small and marginal farmers this is because they have to prioritise their food security first by growing traditional food grain crops on their limited land. Therefore, as a policy recommendation, it is suggested that the yield of the foodgrains should be improved because this would allow these farmers to diversify further into non-foodgrain commercial crops. One way of increasing the yield is to promote the use of hybrid seeds that are disease-resistant and require less water. Another way is to provide access to affordable, small-scale agricultural machinery suitable for small plots of land since the use and ownership of farm machinery is very low among the small and marginal farmers. Since it was observed that Upper Siang is the least commercialised, it is suggested that a proper policy framework specifically designed to meet the needs and challenges of the district should be prescribed by the policymakers given its hilly and mountainous topography. For instance, programs aimed at improving the cultivation of crops such as kiwi and cardamom which are gaining popularity in the region will improve the agricultural scenario of the region. The educational level of the household head was found to have a significant positive effect on the extent of commercialisation. Therefore, it is recommended that sufficient training and knowledge should be provided to the farmers, especially the small and marginal farmers on the prospects and advantages of commercialization.

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References

▪   Abafita, J., J. Atkinson, and C-S. Kim. "Smallholder Commercialisation in Ethiopia: Market Orientation and Participation." *International Food Research Journal* 23, no. 4 (2016).

▪   Acharya, Saraswati Poudel. "Crop Diversification in Karnataka An Economic Analysis." PhD diss., UAS, Dharwad, 2011.

▪   Agwu, Nnanna Mba, Cynthia Ijeoma Anyanwu, and E. I. Mendie. "Socio-economic determinants of commercialisation among smallholder farmers in Abia State, Nigeria." *Greener Journal of Agricultural Sciences* 2, no. 8 (2012): 392-397.

▪   Basic Statistics of North Eastern region, 2015 Government of India, NEC Secretariat

▪   Basu, P. Roy and U.K. Barman, "Crop Concentration and Diversification in Jalpaiguri District of West Bengal: a case study." *International Journal of Food, Agriculture and Veterinary Science,* Vol. 4, No.3 (September-December, 2014), pp. 5-9

▪   Census 2011, Government of India

▪   Hashmi, Najmul Islam. "Pattern of Crop Concentration and Diversification in Upper Ganga Yamuna Doab." *International Journal of Innovative Research and Development* 1, no. 5 (2012): 481-496.

▪   K. Hussein and J. Nelson*, Sustainable Livelihoods and Livelihood Diversification* (IDS working paper 69, Brighton 1998)

▪ Kabiti, H. M., N. E. Raidimi, T. K. Pfumayaramba, and P. K. Chauke1. "Determinants of agricultural Commercialisation among smallholder farmers in Munyati resettlement area, Chikomba district, Zimbabwe." *Journal of Human Ecology* 53, no. 1 (2016): 10-19.

▪ Kirui, Oliver Kiptoo, and Gergina Wambui Njiraini. "Determinants of agricultural commercialisation among the rural poor: The Role of ICT and Collective Action Initiatives and gender perspective in Kenya." In *GI-Jahrestagung*, pp. 1747-1754. 2013.

▪ Kumar, Sanjeev, and Sakshi Gupta. "Crop Diversification towards High-value Crops in India: A State Level Empirical Analysis." *Agricultural Economics Research Review* 28, no. 2 (2015).

▪ M.V Nadkarni and K.H. Vedini," Accelerating commercialisation of Agriculture: Dynamic Agriculture nd Stagnating Peasants?", *Economic and Political Weekly,* Vol.31, No. 26 (Jun 29, 1996), pp. A63-A73

▪ Malik, D. P., and I. J. Singh. "Crop diversification-An economic analysis." *Indian Journal of Agricultural Research* 36, no. 1 (2002): 61-64.

▪ Martin, Lee R., ed., *A survey of Agricultural Economics Literature: Agriculture in Economic Development 1930s to 1990s,* Chapter VI: Marketable Surplus and Marketing Behaviour, University of Minnesota Press, 1992

▪ Nadkarni, M.V and K.H. Vedini," Accelerating commercialisation of Agriculture: Dynamic Agriculture nd Stagnating Peasants?", *Economic and Political Weekly,* Vol.31, No. 26 (Jun 29, 1996), pp. A63-A73

▪ Okezie, Chukwukere A., Jamalludin Sulaiman, and Aloysius Chidi Nwosu. "Farm–level determinants of agricultural commercialisation." *International Journal of agriculture and Forestry* 2, no. 2 (2012): 1-5.

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▪ Roy, N.C and P.K. Kuri, *Land Reform in Arunachal Pradesh,* Classical Publishing Company, Kamarupa, N/Delhi, 2001

▪ Ventura, Jaume.,"Growth and Interdependence", The *Quarterly Journal of Economics*, Vol. 112, No. 1 (Feb.,1997)

▪ Vishal Gupta, "Jhum Cultivation Practices of the Bangnis (Nishis) of Arunachal Pradesh," *Indian Journal of Traditional Knowledge,* (2005), Vol 4 No. 1, pp47-56.