Abstract

Most less developed countries [LDCs] are predominantly rural, with agriculture as their dominant economic sector. Non-agricultural sectors cannot arise without the growth of agriculture. The Lewis model emphasised the overall economic development in the LDCs through structural change and transfer of surplus labour from rural agriculture to highly-productive urban industrial sector. However, increased labour absorption in agriculture and allied activities in their present technological form cannot significantly contribute to increasing livelihood opportunities for the growing rural labourforce. Economic development as Lewis postulated is also impossible. Farm employment can be raised through agricultural diversification, which is thus a critical component within the rural transformation of the LDCs.

The livelihoods of rural people comprise of multiple activities so that they can survive in adversities and improve their living standards Although agriculture provides livelihoods to the bulk of mountain people, because of shorter crop-cycles, agricultural seasonality and low crop-yields, hill farmers maintain a complementary relationship between crop farming and livestock activity or other niche-based subsidiary activities. With larger eco-physical constraints resulted from mountain physiographic and eco-fragile environment conditions, mountain farming systems are more fragile and sensitive than the others. With rapid population growth, mountain agriculture becomes unsustainable. Agricultural diversification, which implies the process of latent change within agricultural production scenarios, and includes expansion into allied production activities, is used to add resilience to traditional hill farming. Rural farmers follow this process for income maximisation or risk minimisation or both, and for stabilisation of year round income.

Diversification takes heterogeneous forms and the factors in diversification are location-specific. Hence, more location-specific micro-level studies on diversification need to be conducted for clarifying the debates found in the literature regarding the impacts of diversification on rural poverty relief, farm productivity, and its micro-level determinants. While some studies point out the growing unsustainability in mountain agriculture and postulate future agricultural development through cultivation of high-value cashcrops, no study on agricultural diversification in hill areas using the farming systems approach exist yet. Hence, the present study proposes to investigate the role of agricultural diversification in agricultural and rural development in the Darjeeling hills, as the possible basis for a future mountain development strategy. The core investigation in this study is based on primary data drawn from farming households using multistage purposive sampling technique in this region. The main objective of this study is to lay bare the strategic mechanisms operating in highly constrained mountain regions, for agricultural and rural development. For this study, fourteen research questions have been raised and fourteen hypotheses have been designed to be tested, most of which are on diversification options, their determinants and effects, and reasons of crop substitution. The data are analysed mainly by ratio and percentage techniques.

The analysis of development potential in each Darjeeling district CD block in relation to its typical forms of landuse and economic activity, shows that after the urban centres, the agricultural blocks of the district have the highest potential of economic development, as livelihood decisions here have remained within the sphere of the rural people. Rapid population growth in the district has put substantial pressure on basic infrastructure and land-resources, leading to severe crises in rural livelihoods and the environment, particularly in the hill blocks. Hamlet level analysis reveals that such crises take on distinct social and regional patterns. Nevertheless, the physiographic and agroclimatic diversity across the area provided certain opportunities to farmers in terms of differentiation in production niches, which can be harnessed well by agricultural diversification conforming to the sustainability of local resource utilisation.

Climate-adaptability of the alternative crops and the farmers' water adaptation strategy jointly determine the cropping patterns in each village. The farmers also adapt in harnessing microclimatic niches for crops like green peas. Besides seasonal rainfall, access to irrigation in the villages depends on the elevation and slope of cropland. The need of household food security leads to cereal-dominance in the village cropping patterns. Intercropping is practised by the farmers mainly due to overall land scarcity, as reflected in the small holding-sizes. Risk-averse farmers try to overcome stresses resulted from low yields and profits of cereals by committing low cropland to a large number of crops, especially in less irrigated villages. So, crop diversification indices are

low in the villages. Growing of inferior cereals like millet was initially replaced by enhanced growing of superior cereals like maize. Subsequent crop substitution takes place through introducing floriculture and higher-value cashcrops like cherry peppers. The rise in crop numbers is not reflected by corresponding increase in cropland. For the diversification indices are more receptive to cropland changes than to crop multiplication, the measured degree of intertemporal crop diversification is low in most villages. But the locational determinants of all of these vary widely between the hamlets.

The low crop-yields in the villages act as the main production constraints. In per hectare terms, money value of output, costs of cultivation and profits are generally much higher for cashcrops and green crops than for cereals and pulses. While most major vegetables are economically viable for the farmers, diversification into cashcrops generates more profits and yield rates in most hamlets. Many more labour man-days are generated from vegetables on less irrigated lands than from foodgrains on irrigated holdings. The vegetables have greater economic potential of diversification despite having more adverse impact on the environment. With cereal dominance in the cropping patterns however, profits and money value of output on cultivation are generally low in the villages. The extent of cropland diversification is determined primarily by the need of smoothing household consumption of cereals and pulses, while income generation depends more on land commitment to cashcrops and green crops. Niche adaptation in the extent of lands committed to vegetables and preservation of some cultivation of drought-resistant inferior crops, especially in less irrigated hamlets, point towards the need for agricultural diversification as a survival and coping strategy. Consequently, the true agricultural diversification in hill farming is better measured in terms of complexity of crops, climatic niches and land acreages than as formal crop diversification indices defined essentially by crop acreages alone. While the yield rates and profitability of nearly all crop-groups fall gradually, crop incomes per household rise gradually with holding-size. Due to this relation, severe inequality in the distribution of crop income related to farm-size is thus revealed.

The rearing of livestock, especially milch cattle, plays a complementary role in low value and income generation from crop cultivation in the villages, and maintains integration between farming and livestock activities. With relatively lower value and income from crop cultivation in the less irrigated villages, the total annual value, income and net return of the cattle and the total livestock per household are higher in these villages than in the well irrigated villages. The income, total value and net return of the bovine and the total livestock per household rise sharply with holding-size. The acute cattle dominancy over all animals in cattle equivalent units primarily results in low livestock diversity in the villages.

The farmers also take livelihood support from other niche-based subsidiary activities commonly found in the hill regions, like horticulture, agroforestry, floriculture, sericulture, apiculture, etc. The household participation rate, value, income, and profits of fruits and floriculture are relatively higher. Because of the necessity of suitable agroclimate for orange cultivation and low economic potential of most fruits, the value, income and profits from total fruits and oranges per household are low in the villages but relatively higher in villages with inferior slope aspect. Of the floriculture items, only Gladiolus spread more to ordinary farm households. With necessity of more technical knowledge and finance as well as access to market, marketing channels and irrigation, the household participation rate in floriculture and Gladiolus is low in the villages but relatively higher in the well irrigated, nearer villages. The floriculture items, especially Gladiolus, have substantial economic potential of diversification in the villages but have more adverse effects on environment. Thus, livelihood diversification in hill areas is guided by sound economic logic that seeks to optimise the economic livelihoods accessible to mountain farming communities under many constraints. Livelihood diversification is visible as an essential part of economic adaptation.

Agricultural communities in the hills are seen to practise livelihoods highly adapted to certain mountain situations. While livelihood diversification forms an essential strategic component of their economic adaptation, the particular form that this assumes depends on a host of local locational factors, defining the heterogeneities within farming communities in mountain areas. Although agrarian factors continue to play crucial roles, their force is somewhat mitigated by the technology limitations and small activity scales that exist within mountain agriculture. Limited access to market also creates constraints on diversification.