



Production efficiency of non-farm activities in Nagaland

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Abstract

This paper examines the various non-farm activities undertaken in rural Nagaland and attempts to analyse their contribution to livelihoods in terms of employment, income, efficiency of production and income and employment diversity. Rural non-farm activities and employment have a relatively high positive correlation of 0.782 while it is even higher in income generation with 0.969. Regression coefficient is 0.5018 for employment and for income it is 25107.43. Production function shows that the non-farm activities use more of labour than capital. Labour coefficient (β_1) is 0.90 and capital coefficient (β_2) is 0.22. Non-farm activities exhibit increasing returns to scale as $\beta_1(0.90) + \beta_2(0.22)=1.12>1$. Income diversity among the activities is 0.7 and employment diversity is 0.8 implying that rural non-farm generates high income and also have employment opportunities.

Introduction

Rural non-farm activities have become an important issue and are being discussed in many development literatures regarding the relationship between rural non-farm activities and employment, and economic growth. The question appears to be whether or not rural non-farm activities and employment will decline in importance as a country develops or industrializes (Chuta and Leidholm 1979). Rural non-farm activities encompass all non-agricultural activities: mining and quarrying, trade and commerce, transport, construction, household and non household manufacturing and other services. There has been an increasing recognition over the past few years that the rural economy is not confined to the agricultural sector, but embraces all the people, economic activities, infrastructure and natural resources in rural areas (Csaki *et al.*, 2000).



A number of empirical studies support the view that rural non-farm activities and employment have been rising with development. The available *time-allocation* studies reveal high figures for the percentage of labor time spent on non-farm activities in the rural economies. Mukhopadhyay and Lim (1985) and Oshima (1984) traced the experiences of East-Asian countries and found that rural non-farm activities and employment in Japan, Korea, and Taiwan have gained significant increases as these economies moved through various stages of development. Anderson and Leiserson (1980) observed that the rural non-farm labor force increased faster than agricultural labor force during the period 1959-1970 in the Asia-Pacific region. Chum and Leidholm (1979) similarly confirmed the phenomenon using more specific micro data.

Rural non-farm employment can play a potentially significant role in reducing rural poverty and numerous studies indicate the importance of non-farm enterprise to rural incomes. Rural non-farm sector development generally entails multiple benefits. For instance, the non-farm sector may absorb a growing rural labor force that cannot be employed in the agricultural sector and it may slow down rural-urban migration. Similarly, non-farm sector expansion may enhance growth and promote a more equitable distribution of income (Lanjouw and Lanjouw, 2001)

Bhakar, R. et al (2007) conducted a micro level study in the state of Chhattisgarh to examine the income and employment pattern and found out that farm and non-farm activities are the main sources of income and employment and off-farm activity (agricultural labour) contributes only a negligible portion. The smallholders as well as landless households during the slack agricultural season depend on rural non-farm activities as the source of earning. A wide disparity in economy of farm and non-farm households has been observed. The income has been found higher under farm than non-farm households, but on per capita basis, no significant difference has been observed between farm and non-farm households. A majority of households has been found to generate their employment through non-farm activities. The annual employment generated by non-farm household is considerably higher as compared to that by farm households. There are also evidences to show that productivity and profitability in the non-farm sector is generally higher than in the farm sector; as are the average wages and working conditions that obtain in the non-farm sector (Fisher et al. 1998).

Objectives

The main objectives of the study are to examine the contribution of non-farm activities to income, employment and to analyze the efficiency of production and the overall contribution of factors to production.



Data collection and methodology

The Primary data have been collected through a survey using questionnaire adopting random sampling method with a sample size of 360 units from 24 villages covering six districts. The statistical tools used for the study are correlation, regression and cob-douglas production function.

Correlation

$$r = \{N\sum dxdy - (\sum dx) (\sum dy)\} \div \{\sqrt{N\sum dx^2 - (\sum dx)^2} \sqrt{N\sum dy^2 - (\sum dy)^2}\}$$

Regression

$$Y = a + bX$$

Cobb-douglas production function

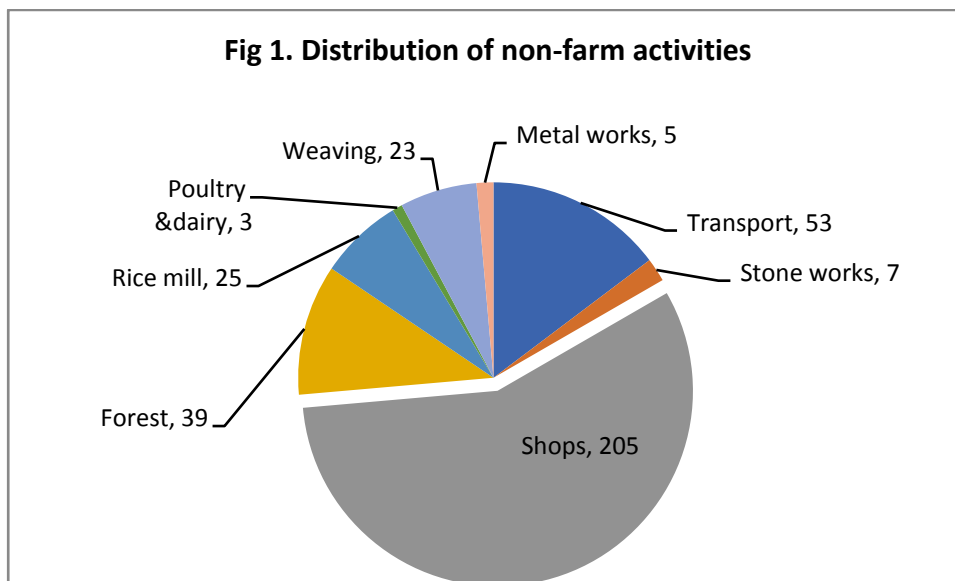
$$Q(L,K) = AL^{\beta_1} K^{\beta_2}$$

Income and employment diversity

$$D = 1 - \frac{\sum n(n-1)}{n(n-1)}$$

Findings

The activities that were identified for the study includes transport (commercial trucks, bus and taxis), stone works (quarry, building and construction blocks), shops (groceries, stationery, repair outlets etc), forest products (saw mill, furniture, firewood, handicrafts, house construction), metal works (fabrication, household use and farm use products), poultry and dairy, weaving and rice mill.





Out of the total 360 respondents, 265 are male (74 percent) and 95 (26 percent) female. Marital status indicates that 73 percent are married and 27 percent single. The total number of dependents is 1044 persons with an average of 2.9 dependents per household.

Table 1. Age distribution

Age	<20	20-30	30-40	40 +	Total
Persons	2(0.55)	82(22.78)	158(43.89)	118(32.78)	360(100)

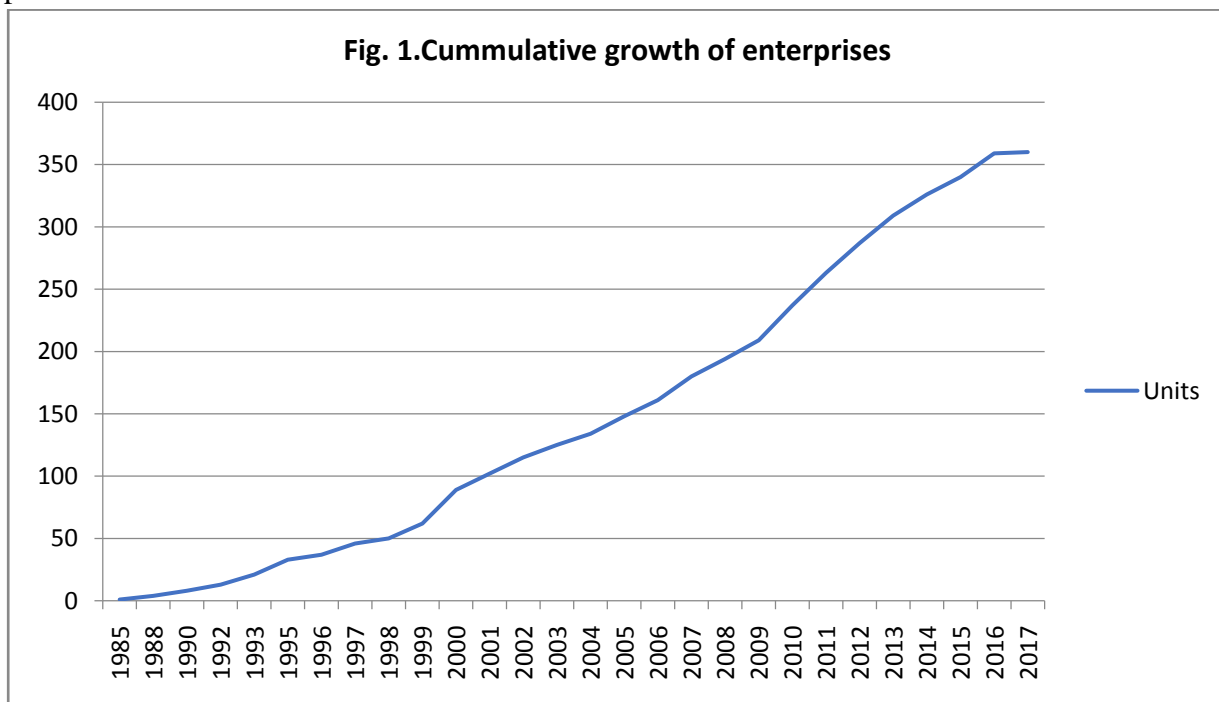
Age distribution of the respondents shows that the highest is in the range of 30-40 years with 44 percent followed by 40 years and above with 33 percent. The level of education indicates that 85 percent of the owners have studied only upto class XII. A reasonably high number of the owners are also graduates.

Table 2. Educational status

Education	<X	<XII	G	PG	O	Total
Persons	164(45.56)	140(38.88)	41(11.39)	8(2.22)	7(1.94)	360(100)

*G-graduate; PG-post graduate; O-others

The compound annual growth rate of rural non-farm activities from 1985-2017 is 19.52 percent. Over the first 11 years i.e from 1985-2005 there were 33 units which increased to 128 units during the next eleven years (1996-2006) with a percentage change of 288 percent and during the next eleven years (2007-2017) it further increased to 199 units and the percentage change is 55 percent.





The establishment cost or the initial investment incurred depends on the type and nature of the activity. Activities where more of machinery is required usually incur higher investment than those using less machinery. The total investment made by the 360 units is Rs 40,37,6940 of which transport (44 percent) and shops (40 percent) constitute 84 percent of the total investment. The average investment in transport is Rs 334462.26 and in shops it is Rs 79328.29. The lowest investment is in weaving with Rs 2014.78 and the reason for the low investment is the use of traditional method of weaving.

The monthly total expenditure incurred by these 360 units comes to Rs 87,38,179 of which raw material cost or cost of capital alone accounts for 51 percent. Some of the activities where high raw material or cost of capital is incurred include purchase of retail goods by shops and purchase of wood under the forest based units. Miscellaneous expenditures account for 19 percent of the total expenditure of which petroleum and other related products accounts for 63 percent.

A regression analysis was carried out to find the relationships between output (Net Monthly Income) and the various operating costs involve in the process of production.

All the variables (x_1 , x_3 , x_4 , x_5 , x_6) have a positive relation on the output i.e Net monthly income except for rent (x_2). An increase in all the variables excepting rent will bring about an increase in income. The coefficient of determination or $R^2=0.99$ indicating that 99 percent of the variation in income is explained by the independent variables.

All together 334 persons were employed with an average of 0.93 person per unit. The highest average number of employment generated is in stone works activity with 8.86 persons followed by forest based activity with 1.97 persons. Activities like weaving, rice mill and retail shops are mostly owner run business. The total wages is Rs 1390250 which is 19 percent of the total expenditures. Average wages ranges between Rs 3670.51(retail shops) and Rs 7600(poultry and dairy)

Table 3. Regression results between income and expenditures

Variables	Coefficient (t-value)
Constant	75368.323 (7.26)
Wage (x_1)	3.4668665 (31.31)
Rent (x_2)	-38.36389 (-5.02)
Electricity(x_3)	6.6636199 (2.23)
Maintenance (x_4)	2.6888348 (33.75)
RM (x_5)	1.9334886 (11.63)
Misc (x_6)	0.0958005 (1.04)
R^2	0.99
N	360

* *Figures in parenthesis indicates t-value*



The Correlation between units and employment is 0.782 implying a relatively high positive relation. The coefficient of determination or R^2 is 0.61 indicating that 61 percent of the variation in the employment is explained by the number of units. Regression coefficient $b=0.5018$ showing that a change in one unit will have an impact on employment by 0.5018 times. The p value of regression coefficient is 0.0227 which is less than the p value of 0.05, therefore the regression coefficient is significant. Employment diversity in the non-farm units is 0.8 which indicates that there is high employment opportunity in this sector.

Table 4. Regression results between units and employment

Employment	<i>Coefficients</i>	<i>Std error</i>	<i>t stat</i>	<i>P- value</i>
Intercept	19.2013	12.6986	1.51208	0.18127
Units	0.5018	0.16464	3.04353	0.0227

The net monthly income generated is Rs 11641962 with an average of Rs 32338.78. The total annual net income thus comes to Rs 13,97,03,544. Stone works generates the highest average income with Rs 128928.6 followed by poultry and dairy with Rs 66666.67. The lowest income is in weaving units with an average net monthly income of Rs 6726.08.

Table 5. Regression results between units and income

Income	<i>Coefficients</i>	<i>Std error</i>	<i>t stat</i>	<i>P- value</i>
Intercept	325410.7	378119.2	0.86064	0.422508
Units	25107.43	4902.378	5.1221481	0.002175

The Correlation between units and income is 0.969 implying a high positive relation. The coefficient of determination or R^2 is 0.92 indicating that 92 percent of the variation in income is explained by the number of units. Regression coefficient $b=25107.43$ showing that a change in one unit will have an impact on income by 25107.34 times. The p value of regression coefficient is 0.0021 which is less than the p value of 0.05, therefore the regression coefficient is significant. Income diversity among the units is 0.7 implying that income generated from the non-farm activities is high.

The production function represents the technological relationship between output and factor inputs. This relationship conveys the returns to the scale of production, substitutability between factors of production, the overall efficiency of production and the overall contribution of different factors to production.

Table 6. Estimated Cobb-Douglas production function

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.24041	1.403301	0.171318	0.870691
Labour	0.900211	0.136539	6.593076	0.001206
Capital	0.224769	0.084639	2.655624	0.04512



The output elasticity of labour (β_1) and capital (β_2) is 0.90 and 0.22 respectively, indicating that if labour input is increased by 10 percent output (Net monthly income) will increase by 9.0 percent holding capital constant and holding labour constant a 10 percent increase in capital input will bring about a 2.2 percent increase in output (Net monthly income). In non-farm activities more of labour is used (labour intensive) than capital as shown by the regression estimates of (β_1) and (β_2) values. The estimates also shows that the nonfarm units exhibits increasing returns to scale as $\beta_1 + \beta_2 = 1.12$ which is greater than 1 and that additional labour input will be preferred to capital as output elasticity of labour is higher than output elasticity of capital.

Conclusion

Considering the contributions of non-farm sector in generating income and employment, there should be continued efforts in creating an environment that maximizes the non-farm activities economic provision and where rural non-farm can thrive. Thus, focus on improving business environment, access to financing, business infrastructure, and in strengthening rural workers skills should be advocated by the government sector to help businesses specifically those engaged in non-farm activities to operate in a global environment.

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