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Is there Quantity Rationing for Credit in India? A Panel Conditional Fixed Effects Logistic Regression Estimation of Sources of Credit

T. Lakshmanasamy¹

Abstract

Financial inclusion drives by the RBI and the government aim to include the weaker and vulnerable sections of population into the services provided by the financial sector with access and at affordable costs. Still a major portion of population lack access to the financial sector services, especially the banking services, and the thriving business of the informal credit sources that charge an exorbitantly high interest rates testifies the weaknesses of the formal financial sector in India. The formal banking institutions, even with nil or low rates of interest, is constrained by quantity rationing due to high transactions cost of smaller size credit demand, and lending to the poor is restricted due to the inability of poor to provide collateral security and surety. The legal and documentation procedures of the banks and the easy accessibility of the informal sources for the borrower, mainly the local moneylenders, influence the household decision to borrow from informal sources even at much higher interest rates. The extend of such formal credit quantity rationing is analysed in this paper using the IHDS-I & II (2004-05 and 2011-12) data and applying panel conditional fixed effects logistic regression model. The panel estimates of this study show that, even with low interest rates, there exists quantity rationing in credit by the formal bank lending in India. Further, households borrow from informal sources at much higher interest rates, due proximity with local moneylenders. Though present, the extent of credit rationing in the formal sector in India is minimal.

Keywords: Access to Credit, Conditional Fixed Effects, Financial Inclusion, Informal Credit, Quantity Rationing, Logistic Regression

Introduction

The term financial inclusion gained currency in the international policy forms since early 1990s with the success of microfinance approach and the vast and improved services of the financial institutions. In the 1960s, the Reserve Bank of India has initiated financial inclusion with the priority sector lending, lead bank scheme,

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regional rural banks, service area approach, and the like. However, the concept of financial inclusion as has been widely understood has been fully recognised with a mention about the same in the RBI's 2005-06 annual policy statement and the self-help group-bank linkage programme initiatives. The National Democratic Alliance Government's flagship programme Pradhan Mantri Jan Dhan Yojana (PMJDY 2014) and Jan Dhan Aadhaar Mobile (JAM) are primarily designed to enhance financial inclusion by providing access to the financial services primarily to weaker sections of India'. Economic Survey 2016 articulates PMJDY and JAM trinity and the 2016 demonetisation move as a drive for financial inclusion and formalisation of banking integration of the public.

The Rangarajan Committee on Financial Inclusion (2008) defines financial inclusion as "the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost" (Government of India, 2008, p.35). The Raghuram Rajan Committee on Financial Sector Reforms (2009) defines financial inclusion as "universal access to a wide range of financial services at a reasonable cost. These include not only banking products but also other financial services such as insurance and equity products" (Raghuram Rajan, 2009, p.50). The objective of universal access to various financial services under PMJDY has been promoted by providing individuals with bank accounts without any minimum balance requirement, mostly in a public sector bank. As on April 2018, about 31.48 crores accounts have been opened under this scheme. For example, the Punjab National Bank alone has opened 253.9 million accounts as on April 2018, mobilising Rs.632.8 billion in these PMJDY accounts. The private sector banks have opened 9.9 million PMJDY accounts with Rs.22.18 billion deposits. Thus, financial inclusion drive provides access to financial sector for the marginalised and formal finance deprived sections of the society.

However, such financial inclusion drives do not mean mere opening of formal bank accounts. The success of the financial inclusion move greatly depends on the availability of credit to weaker sections and low income vulnerable groups at affordable interest rates. The truth seems to be contrary to the objective of financial inclusion. Still a majority of population is not brought under financial inclusion and they depend on the same old modes like moneylenders and borrow at high interest rates. Table-1 reveals that despite financial inclusion drives, still a large number of individuals in the lower income quartiles, as compared to relatively higher income quartiles, borrow at relatively high rates of interest. Despite the RBI's mandate of peer-to-peer lending norm that the maximum rate of interest that can be charged on a loan not to exceed 21 per cent per annum, about 67 percent, 50 percent, 45 percent and 35 percent of the individuals belonging to lowest income quartile, second income quartile, third income quartile and the highest income quartile respectively borrow at over and above 24 per cent per annum. These facts show that the presence of the unregulated sources that lend at higher interest rates, despite the availability of credit at lower rates from the formal credit institutions such as commercial banks, microfinance institutional and cooperative societies.

Table-1: Interest Rates by Income Quartiles

Income Quartile	Percentage of Persons Paying Interest (percent per annum)			
	≤12	13-24	25-36	>36
Lowest	16	16.9	18.7	48.4
Second	22.8	18.8	18.7	39.7
Third	29.1	26.1	18.7	26.2
Highest	40.4	24.5	11.7	23.4
Total	22.6	19.4	17.7	40.4

Source: Planning Commission (2009): Invest India Incomes and Savings Survey (IISS).

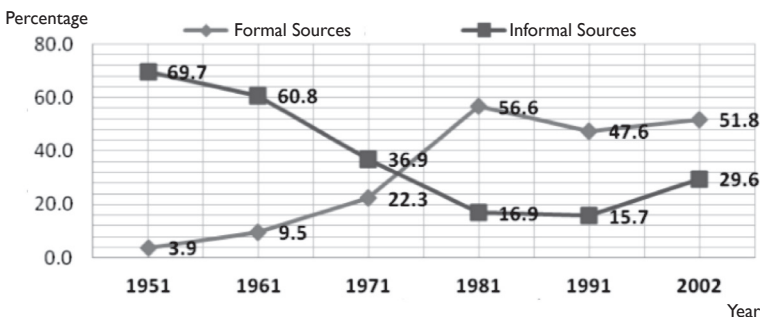
A further look into the breakup of the sources of credit of individuals belonging to various income quartiles throws greater light on the poor state of affairs in financial inclusion drives of India. The figures presented in Table-2 points out that the non-formal sources are the main source for the low income groups. Nearly 80 percent of individuals in lower income quartiles borrow from friends, relatives and moneylenders. Though about one third in the highest income quartile borrows from friends, relatives, the source of credit from moneylenders is only 15 percent. But, for about 80 percent of individuals in the top two income quartiles, the formal banks are the main sources of borrowing. The role of SHGs and microfinance institutions as source of credit is rather limited even among the low income quartiles. As revealed in Table-5, as income increases, the share of total borrowings from moneylenders steadily declines from 39.8 percent to 14.8 percent while that of banks increases from 9.6 percent to 45.8 percent. Thus, from Tables-1 and 2, it can be inferred that, in contrast to the aims of the financial inclusion, the source of credit for low income groups are mainly non-formal, like moneylenders who charge high interest rates for credits availed.

Table-2: Sources of Credit by Income Quartiles

Credit Source	Percentage of Persons in Income Quartile Availed Credit in the Past Two Years			
	Lowest	Second	Third	Highest
Relatives and friends	39.2	34.4	33.2	32.0
Moneylenders	39.8	33.2	25.8	14.8
Banks	9.6	20.7	33.3	45.8
Self-help groups	9.7	8.4	3.3	3.4
Cooperative societies	5.4	4.9	6.5	7.4
Chit funds	1.6	1.9	1.5	1.2
Microfinance institutions	1.1	1.4	1.2	0.9
Others	1.0	0.9	0.8	1.4

Source: Planning Commission (2009): Invest India Incomes and Savings Survey (IISS).

Figure-I Trend in Sources of Borrowings in India



The Figure-1 depicts the trends in household borrowing sources in India. Initially, between 1950s and 1970s, households were more reliant for borrowings on informal sources like moneylenders, unauthorised lending services, friends, family etc. But after 1970s, with nationalisation of commercial banks and the establishment of cooperative societies, the trend of borrowing has changed. Borrowing from formal sources has increased whereas borrowing from informal sources has gone down. However, the dependence for borrowings on informal sources has been rising since 1990s as a result of corporatisation of commercial banks as well as the of financial markets deregulation as parts of the 1990 economic reforms.

The Table-3 presents the trends in institutional and non-institutional borrowing in rural India. It can be noted that there is a sharp rise in the share of formal sector lending since 1970s i.e. after the nationalisation of banks. As a consequence, the share of borrowings from the non-institutional sources has declined over the years. However, still about 43 percent of rural credit is from non-institutional sources, and moneylenders constitute nearly 30 percent share in the non-institutional credits. As per the Indian Human Development Survey (2004-05 and 2011-12) about 27.6 per cent of the household loans are sourced from family and friends with an average interest rate of 13.8 percent per annum. It may also be noted that such interest rates charged is still lesser than the rates of interest charged by the local moneylenders whose mean lending rate stands at 41 percent per annum. It can be inferred that credit from family and friends, though falls under non-formal source sector, they do not exploit the creditor with exorbitantly high interest rates as the moneylenders do.

Table-3: Institutional and Non-Institutional Rural Credit in India

Credit Source	1951	1961	1971	1981	1991	2002
Government	3.3	5.3	6.7	4.0	5.7	2.3
Co-op. society/bank	3.1	9.1	20.1	28.6	18.6	27.3
Commercial bank including RRBs	0.8	0.4	2.2	28.0	29.0	24.5
Insurance agencies	-	-	0.1	0.3	0.5	0.3
Provident fund	-	-	0.1	0.3	0.9	0.3
Other institutional agencies	-	-	-	-	9.3	2.4
All institutional agencies	7.2	14.8	29.2	61.2	64.0	57.1
Landlord	1.5	0.9	8.6	4.0	4.0	1.0
Agricultural moneylender	24.9	45.9	23.1	8.6	6.3	10.0
Professional moneylender	44.8	14.9	13.8	8.3	9.4	19.6
Traders and commission agents	5.5	7.7	8.7	3.4	7.1	2.6
Relatives and friends	14.2	6.8	13.8	9	6.7	7.1
Others	1.9	8.9	2.8	4.9	2.5	2.6
All non-institutional agencies	92.8	85.2	70.8	38.8	36	42.9
Total	100	100	100	100	100	100

Source: All India Debt and Investment Survey (AIDIS), 1954-2002 (various rounds).

The presence of sizable non-formal lending at exorbitantly high rates of interest is not peculiar to India but to the whole of the developing world. To address this issue, the state governments in India have enacted laws that lead to

punitive actions against the lenders who charge over the specified rates such as the Kerala Prohibition of Charging Exorbitant Interest Act, 2012 and the Tamil Nadu Money Lenders Act, 1957. The very persistence of the informal credit alongside the credit market points to the fact that mere punitive actions are insufficient to resolve the problem. Therefore, existence of informal lending and the associated high interest rates is to be understood with the constraints on the working of formal sector sources of credit in India.

In the credit market, commercial banks constitute a significant part of the financial system in India. Other formal credit market agencies also cater sizable credit needs of the population. However, commercial banks, as they care about profits, generally provide credit of large sums and the formal agencies satisfy specific purpose credits. Moreover, these formal institutions require collateral security and surety for the credit. The weaker strata of the society cannot provide the type of collateral that commercial banks and formal agencies need to sanction a credit. Moreover, due to high transaction costs involved in handling transactions of smaller size credits, the banks and formal agencies are reluctant to provide credit of smaller amounts and to weaker sections. In the formal sector credits, the costs of acquiring credit worthiness of potential borrowers of small amounts, screening the borrowers and the subsequent monitoring of the borrowed credits are substantial. This leads the formal credit markets to the problems of adverse selection and moral hazard. This problem of small size credits is widely recognised as the credit market's "quantity rationing" (Stiglitz and Weiss, 1981). Moreover, there may not be higher returns on investments on economic and investment activities with such small size by the poor income groups for whom the formal agencies have to lend at lower interest rates as compared to the investment activities of higher income groups (Conning and Udry, 2007). Hence, the formal credit agencies may not be willing to advance credit to the poor and weaker sections. Therefore, the financial inclusion drive towards the vulnerable groups, for example, PMJDY may be insufficient in resolving the problem of informal sector lending in India.

To mend the gaps in formal banking sector credits, many alternative non-bank financial institutions specially to provide credit to the poor and weaker sections like government credit programmes, cooperative societies, self-help groups and microfinance schemes have been evolved, somewhat similar to the banking sector but without their stringent rules and regulations. However, these institutions also face the problems of small size loan and credit rationing like the bank credit. Once again, the poor are compelled to depend on informal sources, like local moneylenders, relatives and friends, who charge high interest rates. Guirkingner (2008) argues that money lenders have greater access to information about the financial status of the borrower which allows them to have greater control over screening and monitoring as well as collateral requirements potentially overcoming adverse selection. Though cooperative societies, non-governmental organisations (NGOs) and self-help groups (SHGs) do not fall under the informal credit category, their proximity with the borrowers allows them to access as much information as the moneylenders. Also, unlike the moneylenders the lending rates are lower with these non-banking financial institutions.

Thus, despite availability of relatively cheap credit from formal banking as well as formal non-banking financial sources, the existence of a huge and sustained

demand for informal sources of credit is truly a puzzling phenomenon. The literature shows that the demand for informal credit may be spillover in nature (Bell, Srinivasan and Udry, 1997) or a deliberate choice by the household (Kochar, 1997). The inability to provide collateral security or surety for the loan can also result in quantity rationing in formal credit markets (Stiglitz and Weiss, 1981). Since the source of credit is a result of demand side and supply side interactions in the credit market, the problem is to be approached from both sides. Hence, this paper analyses the determinants of credit source of households in India, using the India Human Development Survey data (IHDS-I 2004-05 and IHDS-II 2011-12) and applying the panel conditional fixed effects logistic model.

A Brief Review of Recent Studies

Before analysing the determinants of source of credit for households, the concept of quantity rationing need to be understood as it is perceived that the demand for informal credit may spill-over in nature due to quantity rationing in formal markets. Rationing refers neither to limited credit nor to credit from a credit source though the specific interest rate charged by the source could be paid by the borrower. In the context of this study, it refers to not obtaining credit from banks despite being able to pay the interest rates charged by the banks. This concept has been studied, both theoretically and empirically, and most studies carried out are pertaining to credit markets in developing economies. Literature points out that rationing is of three types namely quantity rationing, risk rationing and transaction cost rationing. Of the three, quantity rationing is given greater importance and it refers to the smaller size of the loan sought as the prime source for the formal lenders denying a loan or a borrower voluntarily opting out of the formal credit market. Theoretically, Stiglitz and Weiss (1981) argue that endogenous quantity rationing may arise because formal lenders have limited local information and thus rely on collateral to overcome moral hazard and adverse selection intrinsic in credit transactions.

Zeller (1994) discusses the quantity rationing in formal and informal credit sectors in Madagascar, Africa. The source of credit depends on the purpose of the loan and its relationship with the repayment rate. Also, the occupation of the borrower determines the size of borrowing as well as the capacity to repay.

Kochar (1997), using a subset of the All-India Debt and Investment Survey 1981-1982 survey data of Northern Uttar Pradesh, examine the formal rural credit market quantity rationing employing the methods of univariate, bivariate and trivariate logistic regressions with three different assumptions. The demand to credit from formal source is measured by the loan application and the access to credit is defined as the sanction of loan by the formal credit institution are analysed by the bivariate probit model. The estimated coefficients of interest rate for access is an insignificant 0.0045 and for demand is a significant 0.1224, showing a positive effect of interest rates on both access and demand for credit in formal institutions of credit. Kochar also observes that the choice of non-formal credit by households is a deliberate choice as it is cheap compared to the formal credit sources. Therefore, the informal credit demand is not to be perceived as spillover demand which is a result of rationing in formal credit markets.

Guirkinger (2008) examines the coexistence of formal and informal credit markets, from a primary survey in Peru between 1997 and 2003 - for a sample of 499 households, applying random effects logistic regression. As data contains information on the borrower's source of credit and the type of credit rationing, the issue of quantity rationing in the formal credit sector is directly analysed. The coefficient on quantity rationing is 1.64 and is statistically significant showing positive impact of credit rationing on the household's credit source being informal source. Therefore, Guirkinger (2008) concludes that the presence quantity rationing in formal credit sector of Peru.

Wydick, Hayes and Kempf (2011) investigate the role of social capital in access to credit in Rural Guatemala using primary survey data conducted in 2004 and multinomial logit method. The paper argues that social networks facilitate households to secure loans from different sources. In the empirical analysis, the social capital is measured by church membership, for its effect on the household's ability to obtain a loan. The estimated multinomial logit results indicate that membership in a church committee, indicating the effect of social network, has a significant positive impact of 1.843 on obtaining credit from microfinance institutions.

Campero and Kaiser (2013) study the awareness and use of formal and informal credit institutions in Mexico using Mexican Family Life Survey data for the period 2004-05, employing two-stage multinomial probit method. The empirical results show that the average schooling of the head and the presence of spouse have a significant coefficient of 0.0467 for the awareness of existence of banks and a significant 0.0321 coefficient for savings banks. Similarly, the log of annual incomes of the households had a significant positive impact on the awareness of formal credit sources. The estimated coefficients are 0.186 and 0.173 for banks and savings banks respectively, both significant at 1 per cent level.

Kumar et al. (2017) study the access to institutional credit and non-institutional credits in India, using the NSSO National Farmers Survey, 2013 data. They report that the access probability for formal institutional credit increases with increasing farmer education. The estimated coefficients are 0.393, 0.610, 0.870 respectively for primary, higher secondary and graduate levels of education, all significant at 1 percent level. The measure of household income, log of per capita monthly expenditure, shows a positive effect, 0.298, significant at 1 percent level, on the probability of access to formal institutional credit. The reported coefficient is.

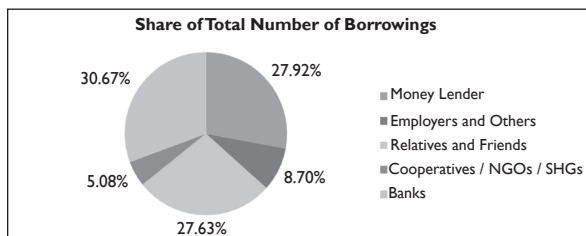
Thus, both demand and supply side influences determine the access as well as the demand for borrowing from a credit source. The size of the loan, purpose of loan, interest rate, awareness, access, household income and education, repayment capacity and social networks are some of the factors that significantly affect the household demand as well as access to formal credit sources. Therefore, this paper tries to examine does quantity rationing matters in the household choice of informal institutional credit. Whether the proximity of the household with the informal credit sources influences the demand for credit of these households is also analysed. Further, the role of other environmental factors on the household credit source is also investigated.

Data and Methodology

In the empirical analysis, this paper uses the two rounds of Indian Human Development Survey (IHDS) data conducted jointly by University of Maryland and National Council for Applied Economic Research (NCAER). The IHDS is a representative of multi-topic survey spanning across 1503 villages and 971 urban neighbourhoods in India. The 2004-05 first round of IHDS survey covered 41,544 households and the second round was conducted in 2011-12 covering 42,152 households, with re-interview of about 83 percent of the households interviewed in the 2004-05 first round. Combining the two rounds of the IHDS surveys allows construction of a panel dataset combining the two rounds of data and to perform a panel data analysis. As the objective is to analyse the effects of the determinants of household choice of credit source, all those households that have taken loan in both surveys have been considered. A total of 23,008 households that borrowed both in 2004-05 and 2011-12 from any one of the sources, consisting of 8,225 households that borrowed from the formal sources and 14,783 households that borrowed from informal sources is the database for this study.

The Figure-2 presents the shares of the sources of credit for households in the sample. Among the sources of household borrowings, commercial banks constitute the single largest share which stands at 30.67 percent of borrowings in both the years 2004-05 and 2011-12. However, it is only one third of the total credits by households. Still the share of loans from moneylenders and relatives stands at 27.92 percent and 27.63 percent respectively, together constitute well above one-half of total borrowings of households. Another 8.07 percent of borrowings is from employees and others who also fall under the informal sources category. Thus, the informal sources of credit constitute nearly two-thirds of the credit sources, a result that also corroborated by the AIDIS data. In total, the informal sources constitute 64.25 percent of the borrowings while the formal sources constitute only 35.75 percent of the same. It is appalling that the cooperatives, NGOs, SHGs and government programs put together constitute only 5.08 percent of household borrowings. These non-banking institutions are capable of overcoming moral hazard and selection bias in credit because of their nearness to the borrowers. However, the share of their lending has been abysmally low. Over all, the large share of borrowings from the informal sources shows formal sector quantity rationing and inadequacies in catering to the demand for credit by the households. Therefore, households source credit from informal sources, even though the interest rates are high.

Figure-2: Sources of Credit for Households in India



Source: IHDS - Round I (2004-05) and Round II (2011-12).

In the empirical analysis, credit source is the dependent variable in the analysis and it is treated as dichotomous variable. Formal credit source is assigned value one, while the informal credit sources are taken as zero. The independent variables are household income, credit size, interest rate, education, social network, purpose of the loan, occupation and residence of the borrowers. The variable quantity rationing is measured by the loan amount and membership in NGOs, co-operative societies or SHGs is used to capture the impact of social networks. The purpose of loan is classified into four categories as personal, housing, education and business loans, and are used as dummy variables. The occupation of the household is classified into five categories as salaried professional, agriculture and allied activities, organised business, wage labourers and others, and treated as dummy variables.

The Table-4 presents the average credit amount and the average interest rates on the loans from the credit sources. Overall, the average credit amount is Rs. 48,590 and the mean interest rate is 19.72 percent. The average loan amount from formal sources is higher than the loan size from informal sources and the interest rate is lower for formal credit than for informal credit. The moneylenders charge an interest of 42 percent while the bank interest rate is only a 11 percent. The loan amount from moneylenders is about one-third of the size of credit from commercial banks, showing the presence of credit rationing. But the moneylenders charge three times more than the formal financial institutions. It seems the credit sources like employers, relatives and friends is more reliable as sizable amounts are borrowed with moderate interest rates from these informal sources, the interest rate falling between the interest rates of formal sources and moneylenders. Overall, the sizable informal credit, though costlier than formal credit, is due to quantity rationing in the formal sources and the proximity of informal sources to households.

Table-4: Average Size of Credit and Interest Rate by Sources of Credit

Source	Size of Credit (Rs. in 000s)	Interest Rate (in percentage)
Moneylenders	28.17	41.90
Employers and others	34.87	15.50
Relatives and friends	23.27	13.87
Cooperatives / NGOs / SHGs	44.61	11.54
Banks	94.55	11.02
Total	48.59	19.72

The Table-5 reports the summary statistics of the variables used in the empirical analysis. The source-wise mean and standard deviations are reported for continuous variables, while the proportions are reported for the qualitative variables like formal and informal sector borrowers. The Table-5 indicates that a majority of households, about 65 percent, availed credit from informal sources, whereas only 35 percent of households borrowed from formal sources. On average, the formal sector loans are much larger than the loans informal sector borrowings. The standard deviations of the loan amount from these two sources also differ significantly. The large variance of the formal source borrowings points to the

existence of significant quantity rationing. Also, the mean as well the deviation of the total household income for the formal sources are observed to be larger than the average and the deviation of the same for informal sources. Those who borrowed from formal sources have more years of education, 10.25 years, while that of the informal credit source is 8.44.

Table-5: Averages and Proportions of Variables in Sources of Credit

Variable	Informal Credit	Formal Credit
Continuous variables - Mean and standard deviation		
Size of the credit (Rs. in 000s)	26.9 (84.2)	87.5 (589.5)
Total household income (Rs in 000s)	40.2 (51.4)	82.2 (159.9)
Education (in years)	8.44 (3.49)	10.25 (3.67)
Interest rate (per annum)	25.85 (26.33)	11.08 (5.88)
Qualitative variables - Share of total borrowings (percent)		
Membership in co-operative society or NGO or SHG		
Member	50.85	49.15
Not a member	65.38	35.45
Credit purpose		
Education loan	55.47	44.53
Housing/land loan	58.96	41.04
Business /agriculture loan	40.96	59.04
Consumption loan	78.61	21.39
Residence		
Rural	64.11	35.89
Urban	64.77	35.23
Occupation		
Salaried/professional	54.96	45.04
Wage labourer	76.87	23.13
Agriculture and allied worker	54.81	45.19
Organised business	51.55	48.45
Others	59.42	40.58
Number of observations	14,783	8,225

The average rate of interest rate charged by the informal sources is more than double (25.85) the interest rate of formal sources (11.08). As noted in Table-4, the average lending rate of moneylenders stood at 42 percent per annum. The IHDS data shows that the informal sector credit is costlier than the formal sources, contrary to Kochar (1997) who reports that some of the informal sources may give loans at cheaper rates and the household make a deliberate choice of the borrowing. Though 65 percent of the households who are not members in any of formal or informal networks borrowed from informal credit sources, the observation that about 50 percent of the households who are members of mainly the cooperative societies or SHGs / NGOs borrowed from formal sources suggests that formal membership households exploit social capital in securing credit from formal sources. The Table-5 shows that only 21 percent of the consumption loans are obtained from a formal credit source, whereas 59 percent of the business

or agriculture loans, which are investments, are obtained from formal sources. However, education loans and land development loans of formal banking sector have not penetrated the credit market.

Due to greater economic activity in urban areas, awareness about banking and increased concentration of banks, the accessibility and transaction costs for those households applying for a loan is lower than that of rural households. It is to bridge this gap that the RBI has taken efforts such as establishing RRBs and lead banks. Yet, the share of informal borrowings in the urban areas and the share of that in rural areas are similar and sizable - 35 percent. The Table-5 also shows that about 40 to 50 percent households belonging to various occupations borrow from formal sources. But, the condition for poor wage earners is pathetic where 23 percent of the wage labourers could borrow from the formal sources, and for 77 percent of labour households moneylenders and local sources are the only viable and dependable source of credit. The pathetic situation of the wage labourers can be attributed to the absence of collateral security, surety, small credit size and illiteracy. Thus, it is the poor sections of the society that pay the unbearable interest rate to the moneylenders.

Panel Data Methods

As the dependent variable, the source of credit is qualitative in nature and data relates to two time periods for 2004-05 and 2011-12, this paper uses the panel data logistic regression approach. The panel logistic regression equation is expressed as,

$$y_{it} = \beta' x_{it} + \varepsilon_{it} \quad i = 1, \dots, n \quad t = 1, 2 \quad \dots (1)$$

where y is the binary dependent variable and x is the set of explanatory variables, ε_{it} is the stochastic disturbance term, and i and t represent observations and time periods respectively. As the dependent variable is dichotomous, estimating equation (1) directly by maximum likelihood method requires the assumption that the errors in the two time periods u_{i1} and u_{i2} are uncorrelated. However, in panel data there is within groups correlation between the error terms and no correlation between groups. Hence, to control for the unobserved heterogeneity and resolve the issue of correlated error terms, panel estimations follow the fixed effects and random effects models. Writing $\varepsilon_{it} = u_{it} + v_i$ where u_{it} is the usual error term and v_i is the unobserved time-invariant individual heterogeneity, the assumption on relationship between v_i and x_{it} decides the appropriate method of estimation viz. fixed effects or random effects model.

Empirical Analysis

The objective of this work is to identify and estimate the variables that effect the source of credit for households, the probability of credit from a source, formal or informal, is taken as a dichotomous variable i.e. $y=1$ or 0 and the dependent variable is measured as logits or the log of odds ratio. The Table-6 presents the summary statistics of the variables used in the empirical analysis. About 36 percent households borrowed from formal source, thus, a majority have obtained from informal sources. The average credit size is Rs.48,590 and the annual interest rate

paid by the households is on average Rs.19.72 on the credit. The standard deviation of both variables is substantial showing wide variations both in loan amount and interest rates across the sources. It is to be recalled that the variable formal sector institutional quantity rationing is measured by the loan amount borrowed from such institutions. About 29 percent of households are members in cooperatives or NGO or SHG. Nearly 28 percent of households borrowed for business/agriculture, while another 15 percent availed loan for housing or land purchase. For about 40 percent of households, agriculture is the primary occupation.

Table-6: Descriptive Statistics of the Variables

Variable	Description	Mean	S.D.
Creditsource	If credit sourced from formal institutions = 1, 0 otherwise	0.36	0.48
Irate	Annual rate of interest charged on the credit (in percent)	19.72	21.74
Loanamt	Credit amount measured in 2004-05 constant prices adjusted with GDP deflator (in Rs.000)	48.59	360.07
HHinc	Total of all incomes of all the individuals in a household from various sources measured in 2004-05 constant prices adjusted with GDP deflator (in Rs.000)	55.22	106.05
Edu	Education by the most literate individual in the household (years)	9.18	3.68
Urban	Urban=1, 0 otherwise (Census 2001 and Census 2011 based)	0.22	0.41
Member	Membership in any of three cooperative, NGO or SHG group = 1, 0 otherwise	0.29	0.46
Lnedu	If loan is for education = 1, 0 otherwise	0.04	0.19
Lnbusiness	If loan is for business/agriculture = 1, 0 otherwise	0.28	0.45
Lnhouse	If loan is for housing/land purchase = 1, 0 otherwise	0.15	0.36
Osalary	If occupation is salary employed = 1, 0 otherwise	0.11	0.32
Oagri	If occupation is agriculture = 1, 0 otherwise	0.40	0.49
Obusiness	If occupation is business = 1, 0 otherwise	0.03	0.16
Other	If other occupations = 1, 0 otherwise	0.04	0.20
N	No. of observations	23,008	

Both the panel conditional logistic fixed effects and random effects models are estimated and the results are presented in Table-7. The estimating panel logistic regression equation is specified as,

$$\begin{aligned} \text{Creditsource}_{it} = & \beta_1 (\text{Irate}_{it}) + \beta_3 (\text{Loanamt}_{it}) + \beta_4 (\text{HHinc}_{it}) + \beta_5 (\text{Edu}_{it}) \\ & + \beta_6 (\text{Urban}_{it}) + \beta_7 (\text{Member}_{it}) + \beta_8 (\text{Lnedu}_{it}) + \beta_9 (\text{Lnbusiness}_{it}) + \beta_{10} (\text{Lnhouse}_{it}) \\ & + \beta_{11} (\text{Osalary}_{it}) + \beta_{12} (\text{Oagri}_{it}) + \beta_{13} (\text{Obusiness}_{it}) + \beta_{14} (\text{Oother}_{it}) + \lambda_i + u_{it} \dots (2) \end{aligned}$$

where λ_i indicates the individual effects. Application of the Hausman specification test suggests that the appropriate model is the fixed effects logistic regression model. The Hausman specification test rejects the null hypothesis that the random effects model at 5 percent level of significance. Therefore, the conditional fixed effects logistic regression estimates only discussed and the maximum likelihood results of random effects model are presented only for comparison. Further, as the estimated coefficients indicate the effect of the variables on the probability, the more relevant marginal effects are interpreted.

The estimated results show that credit size has a statistically significant positive effect on borrowing loan from the formal credit source. The estimated marginal effect is 0.2 percent showing that an increase in the demand for credit by Rs.1000, the probability that the household avails loan from a formal source increase by 0.002. Therefore, it can be inferred that credit size has a very low impact on the formal source of credit, showing the presence of formal banking sector quantity rationing. This observation is in conformity with the observations in the literature (Guirking, 2006). Further, the negligible impact of the demand for credit size on formal sector lending shows the ineffectiveness of the microfinance initiatives of governments and priority sector lending policy of the RBI as methods of financial inclusion. Further, the presence of formal sector quantity rationing is the reason for households to turn towards the informal sources for their credit needs, which is also confirmed by the estimated significant negative effect of interest rate on the formal sector credit. An increase in interest rate reduces the probability of credit by 0.5 percent, in conformity with the results in the literature (Kochar, 1997).

Table-7: Panel Logistic Regression Estimates of Source of Credit in India
Dependent variable: Source of credit

Variable	Conditional Fixed Effects Model		Random Effects Model	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Irate	-0.0525* (0.00)	-0.0051* (0.00)	-0.6166* (0.00)	-0.0151* (0.00)
Loanamt	0.0024* (0.00)	0.0002* (0.00)	0.0006* (0.00)	0.0016* (0.00)
HHinc	0.004* (0.00)	0.0004* (0.00)	0.0047* (0.00)	0.0011* (0.00)
Edu	0.1294* (0.00)	0.0125* (0.00)	0.0775* (0.00)	0.0190* (0.00)
Urban	1.129* (0.004)	0.0879* (0.00)	-0.1484** (0.018)	-0.0362** (0.017)
Member	0.9923* (0.00)	0.0875* (0.00)	0.4831* (0.00)	0.1194* (0.00)
Lnhouse	0.6483* (0.00)	0.0532* (0.00)	0.8402* (0.00)	0.2069* (0.00)
Lnedu	0.9029* (0.00)	0.0637* (0.00)	0.8009* (0.00)	0.1970* (0.00)
Lnbusiness	1.0529* (0.00)	0.0936* (0.00)	1.5337* (0.00)	0.3656* (0.00)
Osalary	0.2138 (0.24)	0.0195 (0.21)	0.1876** (0.014)	0.0464** (0.014)
Oagri	0.0087 (0.94)	0.0008 (0.95)	0.2912 (0.00)	0.7158 (0.00)
Obusiness	0.133 (0.61)	0.0122 (0.59)	0.3218(0.004)	0.1037 (0.004)
Oother	-0.1518 (0.57)	-0.0155 (0.59)	0.3218 (0.004)	0.0800 (0.004)
Number of observations		3350		13333
Number of groups		1675		9196
Log likelihood		-821.43		-6878.35
Prob>Chi2 [Wald chi2]		0.000		0.000
Hausman Test – Prob>Chi2				0.000

Note: p-values in the parentheses. * p<0.01, ** p<0.05, *** p<0.1

This implies that though interest rate charged by the formal sources is relatively low, the cost of credit in addition to the transaction costs arising from the administrative delays in procedures which sends a disincentive signal for the

household to apply for formal credit and for the banks to sanction the loan. Even increasing household income may not be sufficient to provide collateral to the formal sector credit, as the estimated coefficient on household income. Though significantly positive, the probability that the household borrows loan from a formal source increases only by 0.04 percent for an increase in household income. All these results show the presence of significant presence of formal institutional quantity rationing in credit, and the small size of loan amounts demanded may not be feasible for formal institutional credits. Hence, households borrow from local informal sources such as moneylenders and relatives even at higher interest rates.

On the other hand, the increase in the education of household members increases the probability of credit from formal sources. The coefficient on years of education of highest educated individual in the household is significantly positive. This points out that education promotes financial literacy and awareness of formal credit among households as noted by Campero and Kaiser (2013). Likewise, membership in a cooperative society or NGO or SHG has the greatest effect on borrowing from a formal sector credit institution. The probability of borrowing from a formal institutional source increases by a significant 8 percent when the household is a member of such organisations as compared to non-membership. Since these organisations play a dual role of both offering credit and enhancing the social networking of the households, membership plays a crucial role in a household obtaining formal credit. Thus, the access to formal credit source is significantly influenced by social capital, as observed by Wydick et al. (2011).

As compared to borrowers in rural areas, there is a greater chance that the borrowers in urban areas have formal credit as their credit source. The probability that a household sources loan from formal sources is greater by 8 percent in urban areas as compared to rural areas. This further indicates the claim that environmental factors and awareness play a greater role in obtaining credit from a formal source. In respect of the purpose of credit, with consumption loans being the reference category, it is found that the housing loans, business loans and education loans increases the probability of the credit source being formal institutions by 5 percent, 6 percent and 9 percent respectively, results in line with Zeller's (1994) argument that purpose of credit impacts the repaying rate and consequently the source of credit. For occupation categories, though the estimated coefficients are positive, none of the variables are statistically significant. However, the results suggest that, as compared to wage labourers, other categories have a greater probability of borrowing from formal sources. As indicated in the preceding paragraphs, providing the required collateral and sureties for obtaining a credit from the formal sector financial institutions is beyond the capacity of a wage labour. Moreover, the demand for small size of credit by the wage labourer is constrained by high transactions cost associated with formal institutional sources and therefore quantity rationing in credit by the formal institutions to these sections of population is applied. Further, with poor education and the absence of social networking, the inadequate information and being unaware of the credit availability in formal institutions is poor for a wage labour. Though one has to pay much higher interest rate on the credit, the proximity of a wage labour to the moneylenders and other informal sources with easy access and repayment conditions, provides much incentive for the potential borrower to source credit.

Conclusion

The financial sector that provides credit to the public in India consists of both formal and informal sources. The formal sector institutions provide credit at low interest rates, but with collateral and surety, while the informal sources extend credit more on the basis of proximity and high interest rates. Generally, the household demand for loans is constrained by some institutional requirements which operates from the supply side and the inability of households to acquire necessary information on the access and eligibility criteria that operate from the demand side factors. Moreover, the small size of credit demand necessarily involves transactions cost for the formal sector sources leading to quantity rationing, while the same increases the prospects of informal sector borrowings with less monitoring and enforcement costs for the local moneylenders, relatives and friends.

This paper tries to understand whether the quantity rationing operates in the formal credit institutions in India. Towards this objective, this paper uses the IHDS-I & II (2004-05 and 2011-12) data and applies the panel fixed effects logistic regression models. The paper uses the size of credit as a measure of formal institutional quantity rationing. Along with quantity rationing, interest rate is used as the determinant of sources of credit. The estimated fixed effects results of this study show that the probability of borrowing from formal institutional sources is influenced by quantity rationing as well as interest rates. Though the interest rates are low in the formal sector, to some extent quantity rationing is present in the formal sector lending in India due to the small size of demand for credit and absence of collateral security and surety. And due to this the households borrow from informal sources at much higher interest rates, where the proximity and information flow are the main determinants of lending by local moneylenders and relatives. Further, the size of credit, household income, education, urban residence, membership in NGO / SHG or co-operatives and loan purpose have significant positive effect on obtaining credit from formal sources by the households. Overall, the study shows that formal institutional quantity rationing, in India, is minimal. And due to this and the inability to provide collateral even for small amounts of loans, households turn to the informal sources paying higher interest rates as the proximity of these non-formal sources.

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Notion of Start-up India Initiative Policy Framework: Insights for Start-up to Scale-Up

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R. L. Godara³

Abstract

Entrepreneurship has been recognized as vital to increasing productivity, spurring innovation, and enhancing employment opportunities (Audretsch, Keilbach, & Lehmann, 2006; Fritsch, 2008; Koellinger & Thurik, 2012). Starting up a new business differs from operating an established business because much of the explicit and tacit knowledge needed for its establishment and operation has yet to be acquired by the entrepreneur (Chrisman, 2005). Through the launching of Start-up India initiative, Government encouraged for entrepreneurship. To build India as an attractive region for entrepreneurs, the Government has flagged various favourable policies such as taxation reforms, structured approach towards ease of doing business, developing the skills of young India and constructing digital & traditional infrastructure for efficient start-up ecosystem. But there are numerous challenges, which start-ups face from stage of idea validation to scale-up. These challenges include raising funds for the venture, lack of sector-specific policies, and commercialization of innovation, output-based incubation support, hiring competent human resources, high compliance requirements, and scaling up the business. There is a need to address such bottlenecks to minimize failures and ensure that the Start-up may convert into scale-up. In view of this the authors have suggested a framework to develop a layer of entrepreneurial culture in the Nation to reap the benefits of untapped Indian local market as well as the global market through central & state Government's support.

Keywords: Start-ups Ecosystem and Policy Reforms, Start-ups India Initiative

Introduction

Entrepreneurs are critical drivers of economic and social progress. Rapidly growing entrepreneurial ventures are often viewed as relevant sources of innovation, productivity, growth and employment (WEF, 2014). To catalyze start-ups culture

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and strengthen the inclusive ecosystem for innovation and entrepreneurship, Government of India launched the Start-up India initiative in January 2016. Driven by areas such as “Simplification and handholding”, “Funding support and incentives” and “Industry-academia partnership & incubation” (DIPP, 2018), Start-up India initiative lays down the roadmap for the creation of a conducive ecosystem for the growth of start-ups in India.

Start-up ecosystem experts, founders, investors and policy leaders are working as pillars of the Start-up ecosystem in India. Start-up India has rolled out several initiatives with the objectives of building up a robust start-ups ecosystem and transforming India into a country of job creators instead of job seekers.

The ecosystem comprises of 28114 Start-ups (DPIIT recognized start-ups as of 08 February 2020) spread across 499 districts in 29 states & 6 UTs (DPIIT, 2019). Approximately 350 incubation & business acceleration programs, 200 global & domestic venture capital firms supporting home-grown Start-ups, and a fast-growing community of 231 angel investors and eight angel networks (DIPP, December 2018). As per DPIIT, 2019, annual report, 15,478 start-ups has created 1,77,116 jobs with an average number of 11 employees per Start-up.

The objective of the present study to explore the emerging trends that define the Indian start-up ecosystem and to examine the role played by ecosystem enablers in nurturing the start-ups. The study also reviews the notion of Start-up India initiative and suggests a framework for Start-up to scale-up.

Defining Start-ups

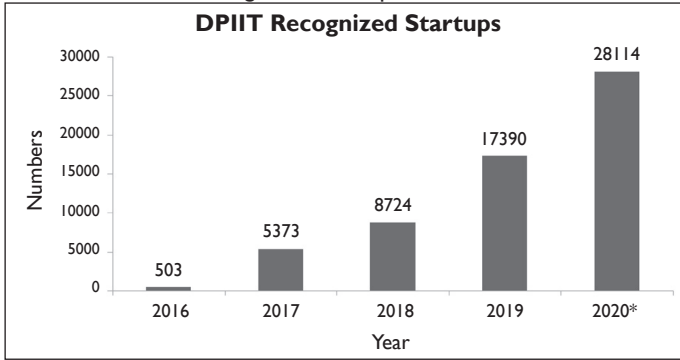
An entity (a private limited company or registered as a partnership firm or a limited liability partnership in India) shall be considered Start-up up to ten years from the date of incorporation/registration, with an annual turnover not exceeding Rs. 100 crore for any of the financial years since incorporation/ registration. The entity must be working towards innovation, development or improvement of products/ processes / services, with a high potential of employment generation or wealth creation (The Gazette of India, 2019).

Start-ups usually identify as a newly emerged, fast-growing business that aims to meet a marketplace need by developing a viable business model. An entity working towards innovation, development, deployment, and commercialization of new products, processes, or services driven by technology or intellectual property will be defined as Start-up if founded in India. The current working status is active, and the Start-up must have at least a prototype or Minimum Viable Product. (NASSCOM, 2018)

Facts and Figures

Under the Start-up India initiative, eligible companies can get recognized as start-ups by DPIIT to access a host of tax benefits, easier compliance, IPR fast-tracking and other benefits. Exhibit-1 represents the growth in start-ups recognition since last five years.

Exhibit-1: Growth in DPIIT Recognized Start-ups



Source: (DPIIT, 2019) * DPIIT recognized start-ups as of 08 February 2020

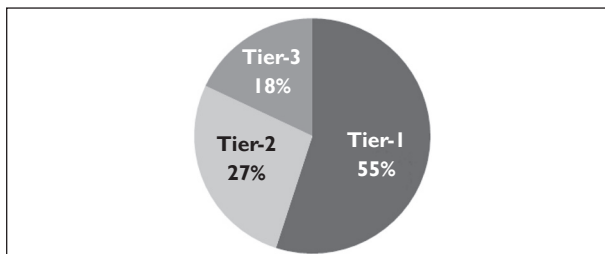
Start-up India initiative is trying to ensure that the culture of entrepreneurship trickles down to every part of the Nation. Exhibit-2 represents the classification according to states & UTs for recognized start-ups.

Exhibit-2: State-wise Classification of DPIIT Recognized Start-ups

State / UT	No of Start-ups	State / UT	No of Start-ups
Andaman and Nicobar Islands	04	Madhya Pradesh	384
Andhra Pradesh	259	Maharashtra	2587
Arunachal Pradesh	04	Manipur	11
Assam	106	Meghalaya	02
Bihar	178	Mizoram	01
Chandigarh	52	Nagaland	07
Chhattisgarh	168	Odisha	251
Dadra and Nagar Haveli	03	Puducherry	19
Daman and Diu	02	Punjab	102
Delhi	1833	Rajasthan	371
Goa	61	Sikkim	01
Gujarat	712	Tamil Nadu	709
Haryana	710	Telangana	748
Himachal Pradesh	27	Tripura	04
Jammu and Kashmir	63	Uttar Pradesh	1129
Jharkhand	116	Uttarakhand	108
Karnataka	1973	West Bengal	417
Kerala	461		

Source: DIPP December 2018

Exhibit-3: City-wise Classification of DPIIT Recognized Start-ups



Source: DIPP December 2018

Although top metro cities control the majority share of start-ups concentration in the country, yet the Tier-2 and Tier-3 cities have been catching up. The exhibit 3 represents the Tier-1, Tier-2 and Tier-3 cities wise classification of start-ups.

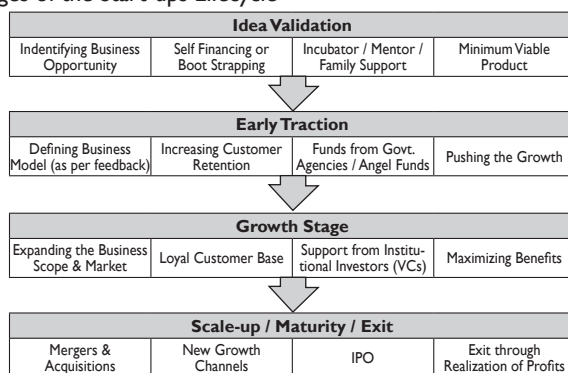
Bangalore, Delhi with NCR and Mumbai were found as top start-up hubs as they consist more than 10 per cent of the total recognized start-ups in the country. Hyderabad, Chennai, Pune and Kolkata were considered as growing start-up hubs. Kerala, Jaipur and Chandigarh were considered as emerging start-up hubs. (NASSCOM, 2018)

India is the 3rd largest start-up ecosystem in the world (NASSCOM, 2018), with huge consumer base, increasing adoption of technology by young India (Median age < 29 years). A section of fast-growing internet users with 451 million active internet users (AIMAI, 2019), Indian start-ups are working in various industries ranging from FinTech to Food-Tech, Media & Entertainment to Travel and HR-Tech to Agri-Tech.

Stages of Start-up Lifecycle

The start-ups landscape is growing at a rapid pace in India. To sustain the growth and encourage the start-ups enablers need to understand the lifecycle of a Start-up. Exhibit 4 depicts the various stages of the start-ups life cycle in India (Grant Thornton, 2016) (DIPP, 2018).

Exhibit-4: Stages of the Start-ups Lifecycle



Source: Developed by author

Start-up Ecosystem Players

Open markets, human capital and funding & finance are the areas of pivotal importance in the entrepreneurial ecosystem. Other than these, support systems or mentors, Government & regulatory framework, education & training, significant universities as catalysts and social support also play a vital role (WEF, 2014). For entrepreneurs, significant differences in the start-ups ecosystem exist from country to country. Major components of the start-ups ecosystem in India are described below:

Government Policies and Regulations: Access to necessary infrastructure, e.g. transports, water, electricity plays a pivot role in ecosystem development. India ranked 77th in the “ease of doing business” ranking in 2019 as against the 100th

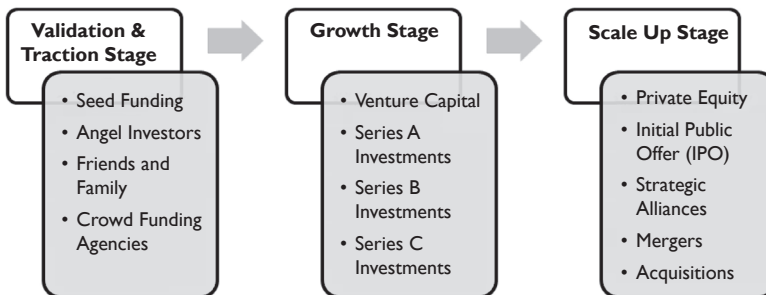
rank in 2018. (World Bank Group, 2019). Regulations and archaic rules impede the growth of start-ups.

Institutional support such as Incubators and Accelerators: Incubators and accelerators are essential partners in the overall start-ups ecosystem which accelerates business prospects. They offer office spaces, shared resources, research labs, entrepreneur’s networks, and investor networking opportunities, start-up boot camps, summits, alumni support, technology support, and client-specific business solutions.

International and Indian corporate also run their dedicated incubator and accelerator programs in India. They help start-ups in idea development and developing prototypes. There are more than 335 active incubators and accelerators in India managed by academic institutes, corporate, private players and Government for start-ups (NASSCOM, 2019).

Access to Finance: Angel investment organizations, equity crowdfunding platforms, venture capital funds, corporate seed funds and institutional investors directly investing in new ventures, have significantly increased the menu of funding channels (Stefano, 2019). These play a significant role in bridging the funding needs of a start-up at every stage of their development. They nurture, invest and mentor start-ups to make measurable returns. Depending on the scene of a start-up, the investor types are depicted in exhibit 5 (Grant Thornton, 2016) (DIPP, 2018).

Exhibit-5: Start-up Stages & Financing Cycle



Source: Developed by Author

Access to Markets: Having access to a significant market is in part reliant on being in the middle of a self-sustaining and growing ecosystem. India has a large consumer market with increasing disposable income. Under start-up India initiative, many international partnerships are made to expand the footprints of start-ups to foreign markets through innovative products and services.

In various sectors like agriculture, social and defence sectors, the Government itself is a significant procurer. To ensure the access to high demand, the central Government has relaxed the norms of a procurement policy for MSME & start-ups to participate in public tenders without prior experience / turnover and exemption from submission of EMD/Bid Security in public procurement tenders (GFR, 2017). National public procurement portal, Government e-Marketplace (GeM) portal has also been launched to simplify public procurement to boost the start-ups.

Enriched Human Capital: Start-ups grow out of ideas, and so even before technical and physical infrastructure, human workforce is considered utmost. The demographic advantages of India can be realized if the existing workforce re skilled and up skilled (Dilip, 2019). Availability of good education, managerial and technical talent is a crucial requirement of start-ups. In the absence of trained and qualified human capital, start-ups have to invest substantially to provide them with in-house training which may lead to an increase in cost. Government is playing a significant role in mapping the resource pipeline for Start-ups through initiatives like Skill India.

Universities as Catalyst: Guided preparation helps entrepreneurs define the requirements for their business and how to combine resources and at which stage to do so (Osama, 2020). The focus of academia towards nurturing creativity, commercialization of innovation and skilling will turn the burgeoning young workforce of the Nation as 'future-ready' human capital. Significant Universities are promoting entrepreneurial culture by including the entrepreneurship and skill-related courses in their curriculum. Universities are also going on the Choice Based Credit System. They are also setting up technology and business incubators, entrepreneurship & Skill development cells and providing entrepreneurship specific training, dedicated programs on new technologies such as artificial intelligence, machine learning, Internet of Things (IoT).

Entrepreneurial Culture: Cultivation of entrepreneurial culture will provide a smooth road to the advent of the Fourth Industrial Revolution. In India, the environment of innovation and creativity must be constructed by society. Positive social status for entrepreneurs will work towards self-employment preference. Our youth need to be encouraged to come forward and build successful enterprises. Their tolerance for risk and failure needs to redefine. Government is making consistent efforts to bring cultural transformation in India.

We can conclude that stakeholders of the start-ups ecosystem must come together to leverage business growth opportunities for existing and upcoming start-ups in the Nation.

The Notion of Policy Interventions Related to Taxation

Tax Exemption Under 80IAC: Eligible start-ups can be exempted from paying income tax for three consecutive financial years out of their first ten years since incorporation (Previously it was seven years). The eligible Start-up must be having a turnover up to Rs 100 crore (previously it was 25 crore) (Union Budget, 2020-21).

Employee Stock Option Plan (ESOP) Taxation: During the formative years of start-ups, the ESOP is a significant component of compensation for start-up employees. The burden of taxation on the employees relaxes through deferring the tax payment by five years or till they leave the company or when they sell their shares, whichever is earliest (Union Budget, 2020-21).

Exemption under Section 56(2) (VIIB) of Income Tax Act: Investments into eligible start-ups by Accredited Investors, Non-Residents, AIFs (Category I), listed companies with a net worth of more than Rs. 100 crore or turnover more

than Rs. 250 crore shall be exempt under Section 56 (2) VIIB of Income Tax Act. (www.startupindia.gov.in)

CBDT Notification on Section 56 of the Income Tax Act, 1961 issued on 05 March 2019 says that section 56(2) (vii bi) shall not apply to the consideration received by a company for issue of shares that exceeds the face value of such shares. (www.startupindia.gov.in) According to the new notification of DPIIT, neither the Inter-Ministerial Board (IMB) certificate nor a merchant banker certificate is required for such tax exemption. Start-ups are not required to submit investor income and net worth details, the investors can now directly upload these details on the DPIIT portal (DPIIT, 2019).

The tax exemption applications of DPIIT recognized CBDT would directly evaluate start-ups. To ensure quick processing of such tax exemption applications, CBDT will assess and respond within 45 days of receiving applications from DPIIT (DPIIT, 2019).

Tax exemption considerations of shares received by eligible start-ups for shares issued or proposed to be published by all investors shall exempt up to an aggregate limit of Rs 25 crore (previously it was ten crores) (Amendment, 2019).

Other Taxation or Return Filing Related Intervention (DIPP, 2018): (i) Removal of limit on acceptance of deposits by Start-ups from members (ii) Section 54GB has changed for capital gains exemption to Start-ups (iii) Introduction of section 54EE to encourage Start-ups (iv) Exemption from providing cash flow statement as part of financial statements (v) Reduction in the number of a board meeting for Start-up companies from 4 to 2.

The Notion of Policy Interventions Related to Easier Public Procurement Norms

Public procurement refers to the process by which governments purchase goods and services from the market. Government organizations have significant spending power, and they are considered to be a huge market for start-ups.

Opportunity to list your product on Government e-Marketplace: Government created e-Marketplace (GeM) is trying to establish a Unified Procurement System in the country for providing a single platform for procurement of goods, services and works (Union Budget, 2020-21). GeM portal is integrated with Start-up India portal, and DPIIT recognized start-ups could register on GeM as sellers and sell their products and services directly to Government entities. It has impacted in 1,528 start-ups having registered as sellers on GeM, 12,915 products have been published, and 5,116 orders have been placed to start-ups till March 2019 (DPIIT, 2019).

Exemption from Prior Experience / Turnover: To promote start-ups Rule 173(i) has been incorporated in GFR, 2017, which provides relaxation of conditions of turnover and prior experience for Start-ups. The exemption is granted to the Start-ups in the manufacturing sector subject to without any compromise on the stated quality standards or technical parameters. (GFR, 2017)

EMD Exemption: Rule 170(i) of GFR 2017 has been amended on 25 July 2017 allowing all Start-ups as recognized by DPIIT exemption from submission of EMD/Bid Security in public procurement tenders. (GFR, 2017)

The Notion of Policy Interventions Related to Self Certification for Ease of Doing Business

Self-certify compliance for Labour Laws & Environmental Laws: To reduce the regulatory burden on DPIIT recognized start-ups, self-certify agreement has been allowed through a simple online procedure. It is for six labour laws and 3 Environmental Laws (for '36 white category' start-ups) (www.startupindia.gov.in). Under the above labour laws, no inspections will be conducted for five years, except in the case of receipt of a credible and verifiable complaint of violation (DPIIT, 2019).

The Notion of Policy Interventions Related to Fast Tracking Process of Start-up Patent, Trademark, Design and IPR Application

Constitution of the panel of Facilitators: Start-up patent, trademark, design applications shall be fast-tracked for the examination so that their value realizes sooner. For effective implementation, a group of facilitators is constituted by the controller general of patents, designs and trademarks (CGPDTM). Till March 2019, panels of 1496 facilitators for patents and 2761 facilitators for trademark applications have been formed to facilitate the process of patent filing and acquisition. Till March 2019, 389 requests were granted expedited examination, and 103 patents were granted (DPIIT, 2019). A rebate of 80 per cent in the filing of patents, 50 per cent rebate in trademark filing fees will be issued to start-ups to help them to reduce costs in the crucial formative years

The Notion of Policy Interventions Related to Investments

SEBI registered Foreign Venture Capital Investors (FVCI) can invest in equity or equity-linked instrument or debt instrument of Indian Start-ups under an automatic route.

Along with this, intervention is also made related to angel funds they are now allowed to invest up to 25 per cent of their corpus in overseas start-ups. The upper limit for the number of angel investors in an angel fund has been increased, to 200 and the minimum corpus requirement of an angel fund has been reduced, to five crore rupees. The lock-in period for investments made by an angel fund reduced to 1 year, minimum investment limit made by an angel fund in start-ups has been reduced, to Rs 25 lakh. The maximum investment limit made by an angel fund in start-ups has increased to twenty-five crore rupees (DIPP, 2018).

The Notion of Collaborations with Other Govt. Departments / Ministries

A corpus of Rs. 10,000 crore as Funds of Funds (FFS) allotted to SIDBI by Ministry of Finance. Atal Innovation Mission, Atal Thinker Labs, and Atal Incubation Centres are being established under NITI Ayog. 31 Atal Incubation Centres have funded Rs 57.68 crore, 2071 Atal Thinker Labs have been provided funding of Rs. 12 Lakh each (DPIIT, 2019).

8 Research Parks are being set up under Start-up India initiative in IITs, 41 bio-incubators have been supported through the Bio NEST (Bio-Incubator Nurturing Entrepreneurship for Scaling Technologies) Program and for this Rs 174.26 crore have been disbursed (DPIIT 2019). Department of Science & Technology launches

National Initiative for Development and Harnessing Innovations (NIDHI). 10 Start-up Centres with a grant of Rs 3.75 lakh each and 11 Technology Business Incubators (TBIs) with a grant of Rs. 18.69 crore are established by MHRD and Department of Science & Technology (DPIIT, 2019).

Other Policy Interventions

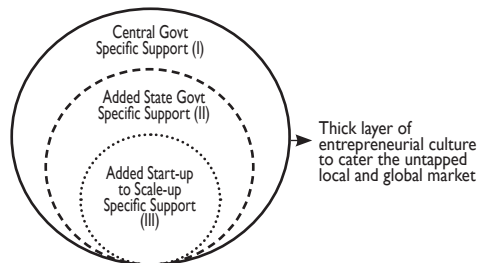
As a Banking Policy Interventions, Indian Start-up, who has overseas subsidiary are allowed to open foreign currency account with a bank outside of India. Commercial Borrowings plays an active role for start-ups, so the External Commercial Borrowing Regulations is relaxed for Start-ups. As an institutional mechanism, a Committee of Secretaries (CoS) chaired by Finance Secretary, for dealing with regulatory issues facing start-ups has been constituted. CBDT has constituted a Start-up Cell to redress grievances and to address various tax-related matters in the cases of start-ups.

The above policy interventions put an impact on start-ups directly as well as indirectly, and they create a more holistic broader ecosystem of support for businesses, one in which start-ups can thrive within the value chain.

Framework for Efficient & Effective Start-up Ecosystem Development

For proximity of thick layer of entrepreneurial culture, the authors have suggested a model proposed by central Government specific supportive measures, state Government specific support which will be an add-on to Central Support and measures related to Start-up to scale-up Support (Exhibit 6).

Exhibit-6: Framework for Efficient & Effective Start-up Ecosystem Development



Source: Developed by Author

Central Govt. Specific Supportive Measures: The Government is willing to provide early life funding, including a seed fund to support ideation and development of early-stage Start-ups (Union Budget, 2020-21). Central Government has created a Fund of Funds for Start-ups (FFS) which contributes to the corpus of Alternative Investment funds (AIFs) for investing in equity and equity-linked instruments of various Start-ups. A corpus of Rs. 10,000 crore as FFS allotted to SIDBI and out of which, as on 31 March 2019, only Rs 2,265.70 crore is committed to 40 AIFs (DPIIT, 2019) and only 264 start-ups are funded, under this (DPIIT recognized

start-ups funded as of 08 February 2020), so more deployment & disbursement of funds is required, through the AIFs.

Creating smooth financial ecosystem through the formulation of central seed funding guidelines, and providing further tax-related incentives to invest for investors, more ESOP related relaxations, innovative measures beyond tax concessions for Angel investors are required, for the rapid growth of start-ups ecosystem.

Strong policy support in the form of easy taxation process, efforts for ease of doing business, policy focus, (like the govt. did for electric vehicles) and relaxation of 3-5 years in provident fund and employees' state insurance to start-ups may give a strong foundation for start-ups. Basic infrastructure for start-ups with an effective Smart City development approach for Tier 2 & 3 cities, reliable electricity and water supply, excellent transport links, and technology infrastructure will create a smooth road towards the establishment of start-up hubs.

Structured institutional support like Fab Lab model (small scale workshops offering digital fabrication) developed in Ahmadabad may be established, by central Government in every state. Early-stage start-ups registered at Karnataka Start-up Cell, are provided "Start-up Karnataka Booster Kit". From these cells, the start-ups can avail various services like cloud services, Government incubation facilities, marketing, promotion, incentives, mentorship, legal and accounting on a very reasonable price. Global incubation centres are facilitated to early-stage start-ups to tap into global markets.

To provide exposure to both entrepreneurs and their teams, Google, Ericsson, and Microsoft set up their global AI research centres in India in 2019. On the same lines, corporate innovation labs and corporate R&D centres may be established, under CSR. Corporate can revisit or build new programs to improve their collaboration with universities, industry, governing bodies, and start-ups for developing a robust ecosystem (NASSCOM, 2020).

Through recent whitepapers and policies such as IPR Policy, National Strategy for Artificial Intelligence, National Drones Policy, and National Digital Communications Policy, Government is trying to create a conducive environment for start-ups to build solutions without ambiguity around rules and regulations. The same must be done for other untapped markets to expand targetable market opportunities.

Specific Supportive Measures added by the State Govt.: State's Start-up focused policies like Student Start-up, and Innovation Policy of Gujarat, sector-specific policies, supportive policies for the availability of affordable co-working spaces and online platforms for start-ups. They can play a significant role in building a robust start-up ecosystem to build a thriving National start-up ecosystem.

Till December 2018, only 12 States had designed the seed funding guidelines to support budding start-ups (DIPP, 2018), such seed funding guidelines like of Government of Karnataka's seed funding 'Idea2PoC' scheme, Government of Jammu & Kashmir's Seed Capital Fund Scheme, Government of Chhattisgarh's angel fund "36 Angel Fund Scheme," etc. must be developed at each state-specific level.

Incubators enable the entrepreneurial process by providing well-developed technological and business infrastructure, business support services and networking (Bergek & Norrman, 2008). Till December 2018 only 16 states had supported

in setting up or scaling up of incubators through financial grants. Overall, more than 70 incubators across the country have received financial support by State Governments in 2016-18 (DIPP, 2018). Karnataka is establishing the accelerators and incubators on a PPP basis. Some of the successful incubators include GOK NASSCOM10K Start-ups Warehouse; GOK Incubator for Tech Start-Ups (GIFTS); GOK-Mobile 10x Start-Up Hub; Bangalore Bio-innovation Centre; and NASSCOM DeITY IoT-CoE. The State Govt. of Karnataka has provided, over 1,20,000 sq. Ft. of incubation area to these centres. Other states must follow this practice of establishing the accelerators and incubators on a PPP basis.

Rule 173(i) had been incorporated in GFR, 2017, which provides relaxation for conditions of turnover and prior experience for DPIIT recognized Start-ups. But till December 2018, only 3 States have removed the criteria of 'prior experience' and 'turnover' completely for start-ups participating in states' public procurement (DIPP, 2018). In the same line of action, rule 170(i) of GFR 2017 amendment has been done allowing all DPIIT recognized start-ups from submission of EMD/Bid Security in public procurement tenders. Until December 2018, only 5 States had removed the criteria of 'EMD submission' from their procurement tenders (DIPP, 2018). There must be a development of Supportive government procurement policies with more predictability and state-specific complaint redressal mechanism.

Added Start-up to Scale-up Specific Supportive Measures: The innovation world has already recognized the potential of financial innovation, and the number, variety, and reach of Fintech start-ups have risen in the last decade (KPMG 2018). In India, Enterprise Software, FinTech, HR Tech and HealthTech together comprise of 50 per cent of total start-ups, and we have also witnessed the 150 per cent growth in the number of Advanced Tech start-ups established in 2018 (NASSCOM, 2018). In 2018 Telangana had developed a strong mentor network of over 100 start-ups mentors under T-Hub initiative with PPP of Government, India's premier academic institutes (IIIT-H, ISB & NALSAR) and key private sector leaders. Govt. of Maharashtra has announced a FinTech Policy to declare Mumbai as a FinTech capital. The two approaches followed must be at a state-specific level for developing sector-specific hubs through easy land acquisition policies by building industry-specific world-class innovation clusters – the establishment of the Centre of Excellence (CoE) for sector-specific priorities.

For commercialization of innovation, state-specific IPR policies must be developed, with easy IPR filing process at low cost. As of 12 December 2018, total IPR applications were 2,027 (801 for patents & 1,226 for trademarks), and out of 801 patent applications, 41 patents were granted (DIPP, 2018). It shows that support for IPR testing, certifications, copyright, global marketing, and patent creation is very much required, in the nation and universities can play a significant role in this through incorporating IPR related syllabus as a compulsory component. Establishment of technology transfer offices and Intellectual Property Rights Facilitation Centre (IPFC) of MSME at Universities level can support commercialization of innovation.

Only very few start-ups will become large enough to generate significant employment. India has the highest number of unicorn start-ups after US and China. The year 2018 was phenomenal for India as 08 Unicorns, were added in that year. While the Indian start-up ecosystem continues to be the third-largest in the world, it saw seven new additions to its incessantly flourishing Unicorn club in

the Year 2019. So to scale-up the start-ups, the Centre of Excellence (CoE) must be assigned a role to collaborate with existing corporate collaborative initiatives to promote the top 40 scale-up companies in their jurisdiction.

Conclusion

To conclude, we can say that in India, enterprises are increasingly looking for digital solutions to various enterprise problems. Indian start-ups have great potential for Enterprise product, FinTech, HR-Tech, Agri-Tech, Travel, Entertainment, and Food-Tech. Sector-specific physical & digital sandboxes, sector-specific hubs & policies must be built for B2B, B2B2C solutions and SaaS-based start-ups at state government level.

We have witnessed the success and real outcomes of incubation centres established by the Government of Karnataka on a PPP basis. Revision in current CSR guidelines like increasing capital availability under CSR, and allowing deployment of CSR funds to incubators of a PPP model (presently the deployment of the fund is allowed to public enterprises only) is required to enhance the outcome-based corporate participation. State Governments can play a role by providing incentives like low-cost land to encourage companies for establishing incubations hubs on a PPP basis.

Total funding received by Start-up in 2019 (from January to September) is 4.4 Bn Dollar through 390+ institutional investors (NASSCOM 2019), which was 4.2 Bn Dollar in 2018 for the same period (NASSCOM, 2018). There is negative growth of 15 per cent in the number of deals from 2017 to 2018, and the seed stage funding has also witnessed a 21 per cent negative growth from 2017 to 2018. The funding growth in Early Stage series A & B funds has just been 4 per cent from 2017 to 2018, which seems insufficient for the Indian market (NASSCOM 2018). Due to the limited availability of funds, it is difficult for start-ups to tap into markets aggressively. Majorly, every Start-up needs financial support, so state Governments must take the initiative to come with a framework of funding policies & smooth funding process, for seed capital funding, and series A & B early-stage venture capital funding. State government should build state-wise forums for angel investors, VCs, accelerators, and incubators for easier access to resources for start-ups.

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Impact of Macroeconomic Variables on the Performance of Mutual Funds: A Selective Study

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Abstract

Over the period, investment in mutual fund has played an important role in the financial market and its popularity has increased at a very fast rate. India has seen a phenomenal growth in both the number and size of diversified equity mutual funds in recent years. The market associated with mutual fund is always subjected to market risk. In such circumstances, it is very hard for the investor to maintain his investment portfolio. Normally the performance of equity-diversified mutual fund depends upon the stock market performance. In India, the performance of mutual funds has been volatile because of several macro-economic factors. The purpose of this study is to examine the impact of economic events on the risk-adjusted returns/performance of mutual funds in India. The study sought to establish the effect of macroeconomic variables on financial performance of selected mutual funds in India. For the calculation of impact, researcher has selected four equity mutual funds comprising of Aditya Birla Sun Life Equity Fund, Axis Long Term Equity Fund, ICICI Prudential Long Term Equity Fund and HDFC Equity Fund. The research concludes that the influence of macroeconomic variables is about 52% on the performance of Mutual Funds.

Keywords: AUM, Exchange Rate, Inflation Rate, Interest Rate, Mutual Fund, NAV, Performance

Introduction

With capital market being developed, investments particularly in stock have emerged as a very good option for producing higher returns, but there exists the risk associated with lack of knowledge about stock selection and its movement. Due to these factors, mutual funds have emerged as a very good option for investing the savings with lower risk associated with all the burden of investment shouldered to investment experts. A mutual fund is an investment vehicle that pools capital from clients purchasing its shares to invest in a portfolio of securities, with purchasing

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and selling of securities being decided by a fund manager (Reilly et al, 2003). Three parties are involved in a mutual fund: board of directors, a fund management company and shareholders. The fund gathered is managed by professional experts who deal with the securities for the growth of the fund. The profit obtained is shared among the investors based on the units they hold. The market value of the fund is defined in NAV, while represented at a per share value it provides with the funds per unit market value, the price at which investors can buy or sell fund units. The value of NAV is directly proportional to the value of security in the fund. NAV is considered as the main parameter for judging the performance of the mutual fund, which is generally based on risk return.

Literature Review

Number of studies have been conducted to understand the impact of economic variables on stock returns and also fund returns in different countries: Gupta & Agarwal (2009) in their research focused on constructing the best possible portfolio using cluster model by selecting Equity Diversified Mutual Funds in India. Brown (2011) concluded in his study and concluded that there is no underlying mechanism for driving prices, which can be used to infer some new information; it also provides information about the hypothesis, which fails in providing a benchmark for detecting the formation of a bubble and when it might collapse. The financial crises in United States that occurred in 2007 and 2008 were caused by subprime mortgage landing which has resulted in the economy failure for not just United States but for other country, also with their financial market influenced. Narayan and Narayan (2012) conducted a paper for analysing the influence on stock market return and pricing due to changes in inflation or industrial production. Mohammadreza, Monjazeb and Esmaeel Ramazanpour (2013) provided hypothesis. First, hypothesis was that the model estimation is accepted and the result produced concluded that the exchange rate has a positive effect on the mutual fund return. Secondly, that the effect of inflation rate was also found to be positive, they found that in the long run macroeconomic factors would not affect the mutual fund return. Sweta Goel (2013) in her study of investors' behaviour in mutual fund concluded that investors usually search for schemes that are provided by the fund as the basis for judging the performance. It is must to have strong emphasis on the characteristic of the scheme. Emily Chelanget Kariuki (2014) indicate that NAV of Kenya's mutual fund was affected by the 5 macroeconomic variables, namely money supply, interest rate, inflation rate, GDP and exchange rate. These factors almost represent 70.9% mutual fund performance in Kenya. Money supply, interest rate, inflation rate, GDP positively affects the Kenya's mutual fund, while the exchange rate provides a negative influence on mutual fund. Sushil Kumar Gupta & Dr. Amit Kumar Sinha, in their study concluded that the macroeconomic variables do not play much significant effect on the NAV of the Fund but in case of ICICI Prudential, there was much relation of dependent variable with the independent variables. Pala and Chandnib (2014) studied the performance of few income and debt related mutual funds scheme based on daily NAV's for the time of Oct 2007 to Oct 2012. The study concluded that best scheme was HDFC Mid Cap Opportunity, Birla Sun Life MNC Fund and Quantum Long-Term Equity.

Scope of the Study and Methodology

The above literature review makes it clear that there is little evidence of research that is tuned towards the macroeconomic variables influencing the performance of mutual fund. By analysing the literature available on mutual fund and the economic factors, researcher found that only few literatures are, available that is tuned towards the economic factors i.e. inflation, interest rates, foreign exchange rates, GDP etc. Despite the knowledge about investment and the role of macroeconomic variables, the continued poor performance of mutual funds raises a lot of concern. Previous studies on mutual fund performance have indicated that many of the funds do not get affected or a little by these factors. The magnitude which macroeconomic variables elements affect financial performance has also been inconsistent. So there arises a gap to judge when and why these macro-economic factors affect a fund's performance?

The research objectives of the study are to analyse the impacts of economic events on mutual fund performance; to select the mutual fund whose performance is mostly affected by the macro-economic variables and to ascertain the degree of relationship between the events and the performance of selected mutual funds.

The research methodology used here is data driven which includes various parameters that are included in analysing the performance of selected mutual funds. The period for this study, the population and its associated sample with the technique implied for analysing the data have been discussed below.

For studying the performance of selected mutual fund industry, a sample of 5 years i.e. from Jan 1st 2015 to 10th March 2019 has been taken by us. All the mutual fund schemes were operational in this particular period, which is taken as the population for study. For analysing the behaviour of market factors such as interest rate, exchange rate and inflation rate are taken into consideration.

The data is collected indirectly through various datasets uploaded on official sites of various firms from where selected parameters are filtered for further analysis.

A random sample of four equity-diversified mutual funds of Aditya Birla Sun Life, Axis, ICICI Prudential, and HDFC are taken for study for a period of five years. For analysing the performance efficiency score with the parameter AUM in consideration is calculated. The data is mined from numerous data sheets and is fitted into the sample interval for consideration the mean value of certain scheme is taken in account. The targeted inputs are grouped together into linear graphs for better understanding of the trend from which conclusions could be derived.

Hypothesis

From the above research question, the hypotheses can be framed as:

Null Hypothesis

H₀: Framework designed using the macro economic variables can provide a model for significantly predicting performance of mutual funds.

Alternate Hypothesis

H₁: Framework designed using the macro economic variables cannot alone provide a model significantly predicting performance of mutual fund.

Analysis of Data

The study is based upon **attribute analysis**, which allows the investors to analyse the trend in various attributes associated with the fund including factors like macroeconomic factors. Attribute analysis helps in determining a fund's performance, which is driven by the asset allocated with respect to the performance driven by selected stock. The value of attributes for the sample period is calculated and plotted in graphical manner for analysing the trend.

Attributes

The parameters consider in the study have been discussed below:

Net Asset Value (NAV), represents the value of the fund in a market, while represented at a per share value it provides with the funds per unit market value, the price at which investors can buy or sell fund units. The value of NAV is directly proportional to the value of security in the fund.

Asset under Management (AUM), is the market value of the asset that has been pooled from various investors; this asset is being managed by the investment company or some financial institute. AUM is a parameter that provides with the size of the fund. The assets managed either can be for a particular client or can be in general. AUM is dynamic in nature and changes with the flow of money that investor's pool in a mutual fund.

Dividend is a periodic distribution of reward from a certain portion of earning that the company made. It is paid to its shareholders. The company's board of directors decides the dividends jointly and the shareholders where it must be approved by the shareholders to the voting rights provided to them.

Interest rate, is defined as the amount charged by a lender to a borrower for the particular use of an asset. They are typically noted on annual basis and are expressed as the percentage of principal. In India, this rate is controlled by Reserve Bank of India (RBI). The RBI decides the repo rate the interest at RBI lends money to other banks. The allocation of capital and pricing of securities by business and investors is influenced by interest rate. Debt-oriented funds are majorly influenced by the impact of changing interest rate. Studies have reported the time varying dimension of interest rate and the inverse effect interest rate shows on the price of equity. A rise in interest rate affects the decision taken by the investors resulting in change in the investment portfolio composition. NAV is deeply impacted with the rising interest rate if the interest rate drops and older bond begin trading at a premium, the NAV may jump significantly.

Exchange rate is defined as the price of the currency of one country with respect to another country. It has 2 components both domestic currency and foreign currency, they can be either fixed or floating. Fixed exchange rate is decided by the central bank of a country for example RBI, whereas floating exchange rate is specified by the change in value in market. Exchange rate plays a crucial role on the rate of return for foreign investors who tend to invest in the domestic market and domestic investors investing in the foreign market. The common currency we use here is the US Dollar (US\$). If the Rupees appreciates against the US (\$) in such situation, it is likely the share price may fall.

Inflation rate is defined as the percentage by which the value of the currency decreases during a period by which the consumer price index (CPI) increases. It

could be interpreted as the rate by which prices increases over a period decreasing the purchasing value of the currency. Investors become risk averse during inflationary periods and during the period of recession, the economic uncertainty leads to high-risk aversion on the part of investors. The element of risk leads to reduction in the contribution towards equity mutual fund until the value begins to pick up to the level where it is proportional to the level of risk.

Comparison Between Different Mutual Funds

Table-1: AUM (Asset Under Management)

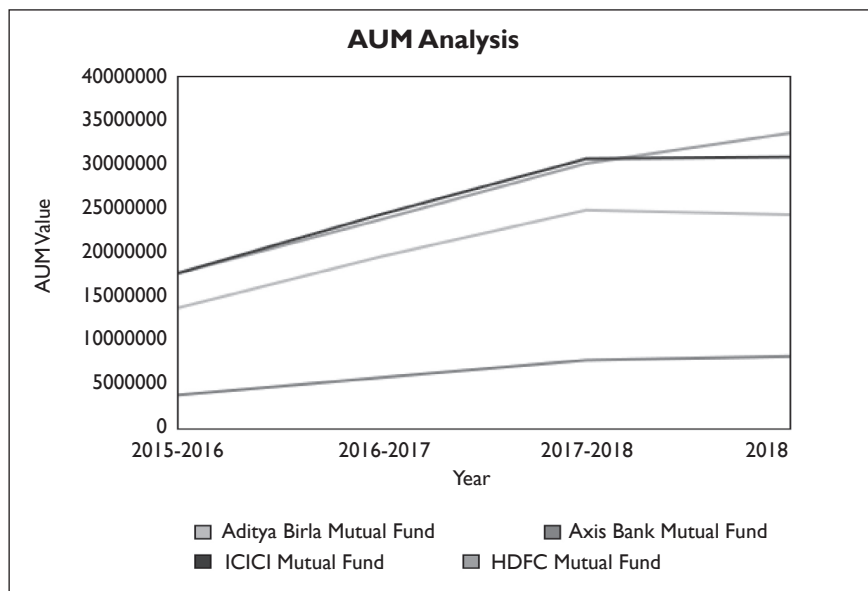
Year	Aditya Birla Sun Life	Axis Bank	ICICI Prudential	HDFC Bank
2015-16	13650341.22	3768787.25	17588086.75	17577938.52
2016-17	19504900.94	5769984.77	24296130.61	23717761
2017-18	24752912.44	7732540.54	30573920.49	30054875.26
2018	24234389.67	8162224.91	30773543.97	33496409.64

Source: www.amfiindia.com

*The above data is calculated manually by the researcher by averaging the AUM from various databases for various different schemes and represented into a tabular form using excel.

Table-1 explains values (Rs in lakhs) are taken as summation of AUM values of all the schemes that were operated in the sample time period with the attribute named **grand AUM**. The quarter in sample is selected from October to December.

Figure-1



*The above graph is manually made by the researcher from the tabulated data in **Table-1**.

Figure-1 shows the trend in the AUM for the sample (2015-2018). The AUM values of the subjected firms saw a constant linear increase from 2015 to 2017

with ICICI Prudential Mutual Fund and HDFC Mutual Fund are very close to each other in terms of AUM as shown in graph. From 2017 to 2018 the slope of increment for all the firms apart from HDFC decreased.

Table-2: NAV (Net asset value)

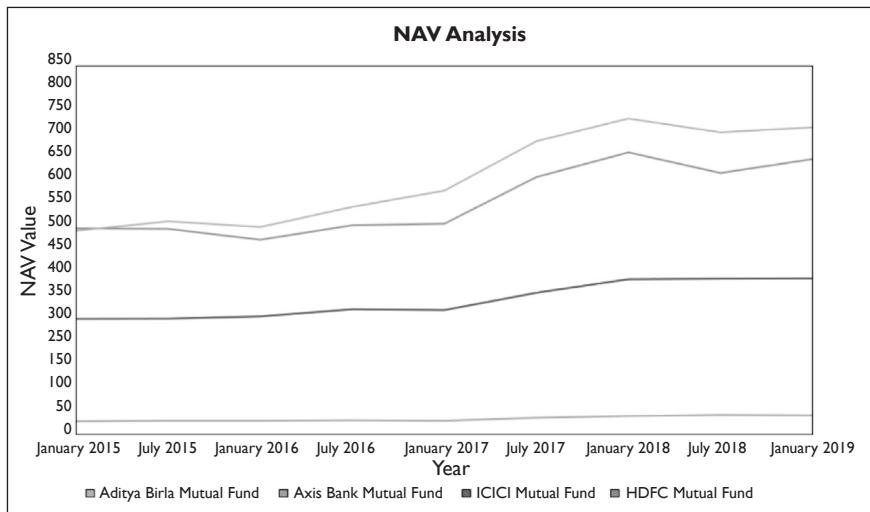
Date	Aditya Birla Sun Life	Axis Bank	ICICI Prudential	HDFC Bank
01-01-2015	468.86	29.5	265.7	474.35
15-07-2015	490.57	30.7	266.14	473.13
01-01-2016	477.46	30.7	271.25	448.01
15-07-2016	523.9	31.58	287.71	481.5
01-01-2017	561.41	30.55	285.81	485.07
15-07-2017	675.44	37.46	325.76	592.74
01-01-2018	727.63	41.54	357.08	649.55
15-07-2018	695.68	43.69	358.22	601.99
01-01-2019	707.42	42.97	358.8	634.09

Source: www.moneycontrol.com

*The above data is recorded manually by the researcher for the selected dates suitable for the sample and is converted into a tabular form using excel.

Table-2 explains NAV values (in Rs) taken for a sample of 5 years with a year divided in two quarters and values are taken on 1st of January and 15th of July of every year. The schemes in consideration for the calculation of above values are Aditya Birla Sun Life Equity Fund, Axis Long Term Equity Fund, ICICI Prudential Long Term Equity Fund and HDFC Equity Fund.

Figure-2



*The above graph is made by researchers from the tabulated data in **Table-2**.

Figure-2 shows the trend in the NAV for the sample (2015-2019). The NAV values of the firms are subjected to the per unit share which shows a frequent change for HDFC the NAV value saw irregular decrement in the value January 2015 to January 2017 followed by irregular increment in the value from January

2016 to January 2018 similar trend is observed in Aditya Birla Sunlife Mutual Fund with a constant linear increase in the value from January 2015 to July 2015. ICICI prudential show an increment in its NAV value throughout the sample with the slope of increment becoming nearly constant from January 2018 to January 2019

The above NAV's can provide a better understanding about the performance of the firm, if it is analysed with respect to the inferring calculations such as, standard deviation and certain ratios like Jensen's Alpha Ratio, Beta Ratio, Sharpe Ratio and Treynor's Ratio.

Standard deviation: This value determines the volatility associated with the fund returns that are subjected for a particular year, lower value indicates more performance that is predictable and vice versa.

Jensen's Alpha Ratio: This ratio provides with the information about the additional returns compared to the benchmark. The benchmark is subjected to market index with alpha ratio being equal to 1 signifies that the firm perform 1% more than the benchmark.

Beta Ratio: This value provides with an idea about the volatility of the fund's performance with respect to similar funds that are operating in the market. Lower Beta signifies that the fund is producing predictable results with respect to similar fund.

Sharpe Ratio: This value indicates the risk taken for generating the returns. A higher value signifies that the fund is able to give greater return for risk taken. We can calculate Sharpe ratio by subtracting the risk free return, which is government bond from the funds return, and then dividing it by standard deviation.

$$S = (R_x - R_f) / \text{standard deviation}(x)$$

Where, x = the investment, R_x = average rate of return

R_f = the best available rate of return of a risk free security

Standard deviation(x) = the standard deviation of return

Treynor's Ratio: It tells us the returns generated in proportion with the risk taken per unit. Greater value signifies that the fund is providing better returns for risk taken. Treynor's ratio can be calculated by subtracting the risk free return such as government bond from the fund return and dividing it by the beta of return.

$$T = (R_p - R_f) / B_p$$

Where, T = Treynor's ratio, R_p = portfolio return, R_f = risk free return and

B_p = beta of portfolio.

Table-3: Ratio Analysis

Scheme Name	Standard Deviation	Beta	Sharpe Ratio	Treynor's Ratio	Jenson's Alpha Ratio
Aditya Birla Sun Life equity fund regular plan	15.13 vs 8.15	1.01 vs 0.52	0.54 vs 0.09	0.08 vs 0.03	1.84 vs -0.47
Axis long term equity fund	14.66 vs 10.18	0.96 vs 0.66	0.39 vs 0.24	0.06 vs 0.04	-0.27 vs -0.51
ICICI prudential long term equity fund	13.24 vs 10.18	0.85 vs 0.66	0.32 vs 0.24	0.05 vs 0.04	-0.82 vs -0.51
HDFC equity fund	17.44 vs 8.15	1.16 vs 0.52	0.5 vs 0.19	0.07 vs 0.03	1.55 vs -0.47

Source: www.moneycontrol.com

*The above table is manually made by the researcher by selecting data from various different databases related to the mutual fund ratios.

Table-3 provides with the ratios calculated on daily returns for an interval of 3 years as of March 2019. The value's in the table shows the comparison between the actual ratios calculated for the fund versus the category average, providing a better insight on the performance of the scheme. Aditya Birla Sun Life equity fund regular plan and HDFC Equity Fund showed a greater standard deviation in comparison to other funds which means that the performance of the fund for the subjected year were not that much predictable. The performance for Axis Long Term Equity Fund and ICICI Prudential Long Term Equity Fund showed a predictable performance as well as lower Treynor's ratio which subjects to lower returns for risk taken. Superior risk-adjusted performance is attached with a high and positive value of Sharpe Ratio while low and negative value is an indication of unfavourable performance. A funds performance is superior over the market if its Sharp Ratio is greater than benchmark comparison.

Macro-economic Variables

The macroeconomic factors are pivotal determinants of the growth of an economy. The analysis of these factors provides an idea of the current economic position and a projection of the future economy based on which the investors can determine their investment portfolio. Fluctuation in these macroeconomic variables was recorded for the sample period ranging from January 2015 to January 2019. Their graphical representation was made with respect to the NAV of subjected firms to analyse the performance trend of mutual fund with respect to the economy.

Table-4: Macroeconomic Variables

Year	Interest Rate	Inflation Rate	Exchange Rate
Jan-15	8	6.32	63.355
Jul-15	7.25	6.32	63.507
Jan-16	6.75	2.23	66.235
Jul-16	6.5	2.23	67.079
Jan-17	6.25	4	68.145
Jul-17	6.25	4	64.424
Jan-18	6	5.24	63.68
Jul-18	6.25	5.24	67.69
Jan-19	6.5	4.89	69.453

Source: www.statista.com; www.tradingeconomics.com

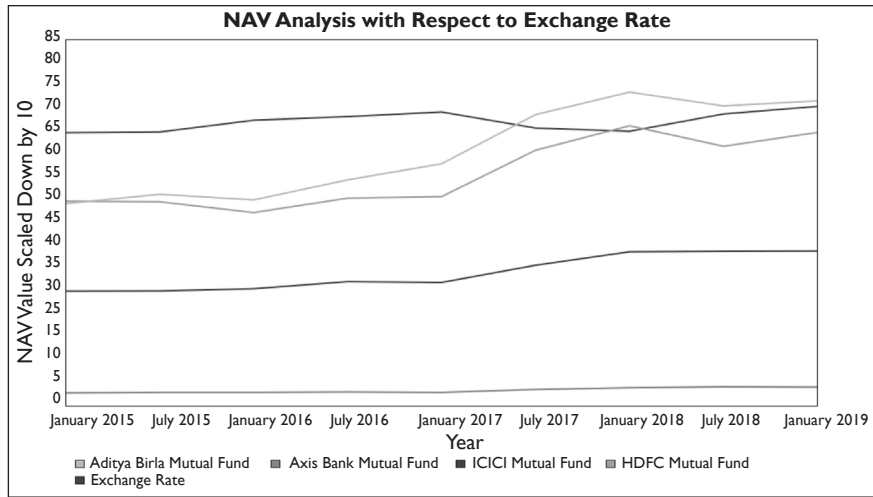
*The above table is manually made by the researcher with data taken from different sites and aggregated into a single table.

Table-4 provides with the macroeconomic values for the sample. The interest rate and inflation rate are both in the form of percentage (%). The exchange rate is the value of Rupees with respect to the US Dollar (US\$) at that time.

Analysis and Interpretation

An overview of how macroeconomic variables like inflation, exchange and interest rate with respect to NAV of certain firms behave is presented hereunder.

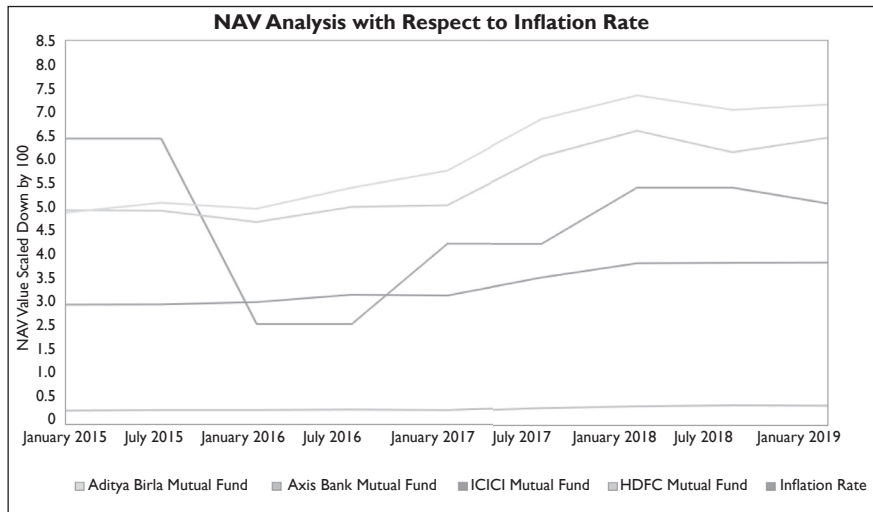
Figure-3: Trend Analysis of Mutual Fund with Respect to Exchange Rate



*The above graph is manually made by researchers from the tabulated data in **Table-2** and **Table-4**.

Figure-3 shows that exchange rate has generally seen an upward since July 2015 to about Jan 2017 between these periods the exchange rate rose about 63.51 to 68.15 per dollar. Thereafter, there was a decrement until Jan 2018 where the dollar began to see some depreciation with exchange rate reducing to 63.68 per dollar. From Jan 2018 there is a linear increase in dollar till Jan 2019.

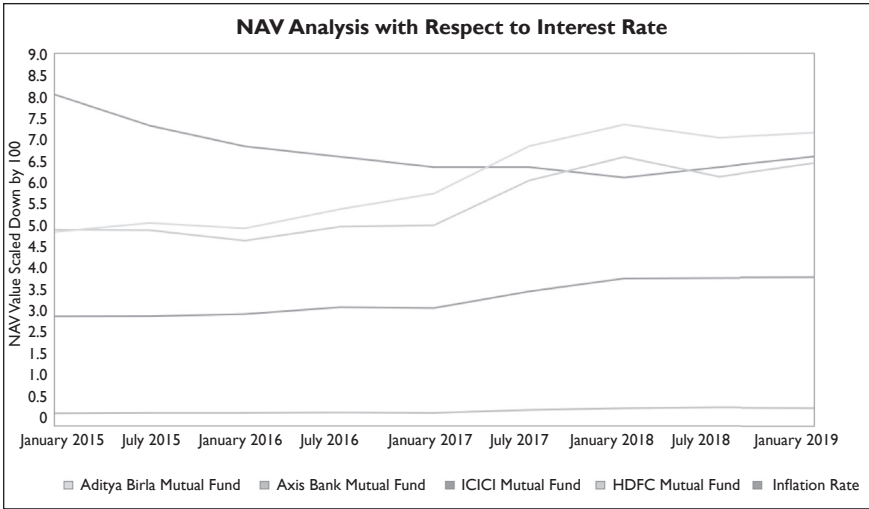
Figure-4: Trend Analysis of Mutual Fund with Respect to Inflation Rate



*The above graph is manually made by researchers from the tabulated data in **Table-2** and **Table-4**.

Figure-4 shows that inflation rate has seen a sudden decrement from 2015 to 2016, with the value decreasing from 6.32% to 2.23%. The value of inflation rate saw a stepwise rise from 2016 to 2018 and decreasing in 2019 to 4.89%.

Figure-5: Trend Analysis of Mutual Fund with Respect to Interest Rate



*The above graph is manually made by researchers from the tabulated data in **Table-2** and **Table-4**.

Figure-5 shows a linear decrement in the value of interest rate from Jan 2015 to Jan 2018 with the slope of decrement being reduced stepwise. The value of interest rate saw a gradual increase from Jan 2018 to Jan 2019 with the current value being 6.250 as of February 2019.

Regression Analysis was used to examine the effect of selected variable for the performance of mutual funds. The regression equation is a multivariate function. The independent variables of study are Inflation Rate, Interest rate and Exchange rate. The dependent variable is NAV of the fund.

The regression equation obtained is:

$$Y = \beta_0 + \beta_1 \text{Int} + \beta_2 \text{Inf} + \beta_3 \text{Exch} + \varepsilon \quad \dots (1)$$

Where: Y=NAV

β_0 – Constant/Y intercept, Int. – Interest Rate, Inf. – Inflation Rate, Exch. – Exchange Rate

ε - Error term in computing the regression model

The above was computed at 95% confidence level to test the significant relationship between financial performance and macroeconomic variables. The coefficient of determination (R2) was used to measure the extent to which the variation in efficiency is explained by the variations in its determinants. F-statistic was also computed at 95% confidence level to test whether there is any significant relationship between financial performance and macroeconomic variables. The findings were presented in form of a tables and graphs to aid in the analysis and ease with which the inferential statistics was drawn. The results were presented in the form of table and graphs to aid in analysis and to calculate inferential statistics. The study examines the effect of selected determinant variables on the performance of sample mutual funds. A coefficient of determination shows the extent to which changes in the dependent variable can be influenced by change in independent variable. The percentage of variation in dependent variable (NAV) explained by all independent variables interest rate, exchange rate and inflation rate.

Table-5: Regression Statistics

Multiple R	0.84860863
R square	0.72013661
Adjusted R square	0.55221858
Standard Error	27.6115848
Observation	9

Source: Author

**The above table is made from the values calculated by running regression on the values taken from Table 4 vs NAV of selected Mutual Funds.*

Table-5 explains that the independent variables that were subjected to study explains 55% of the fund performance as represented by Adjusted R square which means the other factors not studied in this research contributes 44% of fund performance of the mutual funds, and therefore further studies should be conducted for investigating the other (44%).

Table-6: ANOVA Statistics

Model	df	Sum of Square	Mean Square	F	Significance F
Regression	3	9808.9	3269.6	4.2886	0.0755
Residual	5	3812	762.4		
Total	8	13621			

Table-6 depicts the above Anova statistics of the process data which are the population parameters provide with the level of 0.075 significance. The F calculated at 5% of significance is 4.28.

Table-7: Regression Coefficients

	Coefficients	Standard Error
Intercept	345.1237526	392.9304212
Interest rate	-54.6438376	18.19871997
Inflation rate	15.72038905	7.352646176
Exchange rate	3.873391719	4.994219225

Table-7 explains the coefficients of regression in the table were used in coming up with the model specified below.

$$NAV = 345.1237526 + (-54.64383756) *Int + 15.72038905*Inf + 3.873391719*Exch \quad \dots (2)$$

*Where, Int. is Interest rate, Inf. is Inflation rate and Exch. is Exchange rate.

The above regression results explain that the highest contributing factor in NAV is interest rate which is 73.6% of total contribution among given macroeconomic variable, we can conclude that interest rate impacts the highest fund but have a negative impact on the performance of fund while the contribution of inflation rate among the macroeconomic variable is 21.1% influencing performance of the fund with positive significance. Exchange rate contributes 5.3% positively.

Findings and Conclusion

From the trend analysis and regression model the study found out that the macroeconomic variables influence the performance among mutual funds; they influence either positively or negatively. The impact of macroeconomic variables on mutual funds is a substantial, which is 55% of the fund performance. RBI based on various factors decides the interest rate. If the interest rate in the future goes up by a certain percentage then it will drastically affect the performance of mutual fund in negative way. In future with the current trend, the inflation is expected to increase resulting in higher prices. Even though risk increases with the increase in inflation rate, the performance of mutual fund tends to improve. Exchange rate plays a major role while dealing with foreign investments but in general, the contribution of exchange rate in mutual fund is very low.

The ANOVAs result gives an idea about the significance level of these independent parameters influencing the dependent variables, the level of significance is very less which is 0.075. These parameters alone cannot provide with a framework for developing a model to predict the performance of mutual fund, these parameters provide with the 55% explanation of independent variables that is NAV. Certain parameters like investment portfolio which includes the type of investment shall also be included in the model. The regression model is not much reliable in predicting the mutual fund as mutual fund is based on time based data. Certain technique like Neural Network could be used for forecasting the NAV of mutual funds. One way ANOVAs was considered for calculating significance of the above independent grouped data for a confidence interval of 95 percent, which provided with a F value 4.28 which shows that the above data is not sufficient for providing with a decent model for evaluating performance of mutual fund. F value closer to 1 signifies acceptance of NULL hypothesis while deviation from it goes closer to Alternate Hypothesis.

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An Evaluative Study of Solar Photovoltaic Energy (Off-Grid) Development Programmes in India – A Study of Punjab, Haryana and Himachal Pradesh

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Ravneet Kaur²

Abstract

Climate Change has made an adverse impact upon agriculture, industry and other sectors across the world. The need of the hour is to preserve the natural resources by adopting energy conservation programmes by using renewable energy sources which would reduce the impacts of climatic change. Government of India has taken initiatives to let renewable energy meet the demand of energy for socio-economic development. National Solar Mission was introduced to commence solar energy services industry into newer regions and markets. This paper presents an overview of the current status of off-grid solar installations. It has analyzed the role of State Nodal Agencies working in states namely Punjab, Haryana and Himachal Pradesh. An attempt has been made to assess the implementation of the National Solar Mission. It has been found that there is progress in installations of SPV devices in every state of India by facilitating the NSM schemes through awareness programs, subsidy provision and financial incentives. The paper also highlights inadequacies in the governance mechanism, financial allocation and criteria for subsidy under NSM. The issues and challenges in the implementation of the Off-grid solar scheme in northern states adversely affect the working of State Nodal Agencies.

Keywords: Climate Change, Photovoltaic Energy, Solar Energy, Subsidy, The Nodal Agency

Introduction

The planet earth has witnessed drastic changes in the environment. These changes have paved way towards many challenges in food production, aquatic ecosystem, aerial ecosystem and fresh water supply etc. “The earth’s climate system has demonstrably changed on both global and regional scales since the preindustrial era. It also shows that most of the warming (of 0.1 degrees C per decade) observed

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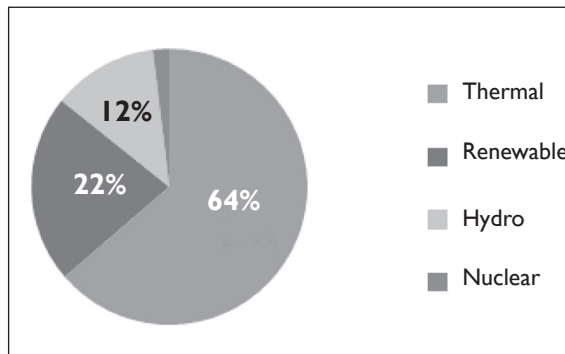
over the last 50 years, is attributable to human activities.”(Sathaye, et al., 2006). Energy is a vital element of industrial product, employment, economic growth, environment and comfort “There is a strong correlation between energy use per person and standard of living in each economy. High per capita energy consumption means a higher per capita gross national product.”(Kaur, 2017)

India consists of 16 per cent of the world population. However, its share in world energy use and electricity use is 4.2 per cent and 3.5 per cent respectively. India has low per capita energy, electricity consumption and carbon dioxide emission (Annexure 1). Moreover, India’s per capita energy use is 0.50 Toe which is comparatively very low in comparison with the USA, China and the average world statistics. (Maithani and Gupta, 2015).

The facts and figures regarding available natural resources in India show 0.6 per cent 0.4 per cent and 7 per cent of the world’s gas, oil and coal reserves, respectively. During the period 2008-18, the imports of coal, natural gas, petroleum and crude oil increased at CAGR (Compound Annual Growth Rate) of 13.44 per cent, 9.44 per cent, 6.67 per cent and 5.20 per cent respectively. This imbalance had led to heavy dependence on energy imports”.(MOSPI, GOI, 2019).In addition to excessive usage of fossil fuels, many households still use firewood, cow dung and crop residue (all biomass fuels) for cooking and lightening purpose.

In India, the majority of electricity is generated either through thermal power plants or hydro plants. There is less usage of Renewable Energy Sources to produce power in comparison with other sources.

Figure-1: The Percentage Share of Different Sources in Electricity Production in India as on 31.03.2019



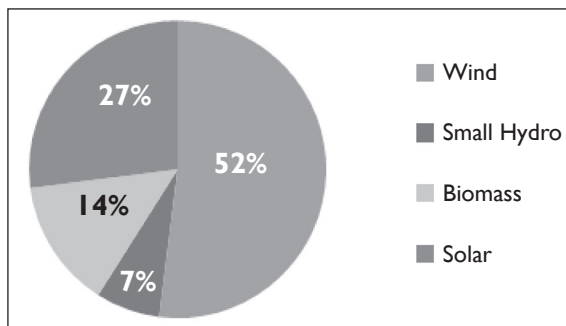
Source: Ministry of New and Renewable Energy. “Overview”. *Annual Reports*, Chapter 1, 2018-19, <https://mnre.gov.in/file-manager/annual-report/2018-2019/English/pdf/chapter-1.pdf>. Accessed 20 February 2020

Figure-1 shows that thermal power constitutes maximum share in producing electricity followed by generation of renewable energy sources and then followed by hydro energy and the energy generation by nuclear energy has a minimum share in energy production. (MNRE, Chapter 1, 2019). However, the production of electricity by various sources (thermal, hydro, nuclear) could not meet the demand of the domestic as well as agriculture and industrial sector. Moreover, the conventional fuels (crude oil, petroleum, coal, etc.) are also imported at large scale and add to environmental pollution. These vulnerabilities due to climate change

could be, addressed by opting green technology option. Renewable energy sources are a means to reduce carbon emissions and to develop all sectors. Renewable energy technologies had been introduced in India not only to supplement and replace conventional power but also provide feasible solutions to meet the electricity deficit of the country. (Navreet and Kaur, 2016) Annexure 2 depicts the contribution of Renewable Energy Sources in power generation from 2006 to 2014, which is not adequate as per the potential and abundance of Renewable Energy Sources in India.

To attain the consumption level of energy, Off-grid and grid renewable energy is a proven viable solution with enormous potential to meet the energy consumption needs. The forms of renewable energy resources are Solar, Wind, Geothermal, Biomass and Water, which have contributed their part in the production of power, as shown in Figure-2 during 2017-18. India also achieved the 4th global position in wind and renewable power and 5th global position in solar power deployment, respectively. The renewable power deployment has more than doubled in the last five years, i.e. 2014 -2019. (MNRE, Chapter 1, 2019)

Figure-2: Percentage Share of Renewable Energy Production by Different sources in 2017-18



Source: Ministry of New and Renewable Energy, "Annual Report", 2017-18, <https://mnre.gov.in/img/documents/uploads/d6982ee8cce147288e7bf9434eebfff55.pdf>. Accessed 28 March 2020

Application of Renewable Energy Resources

Renewable energy generates power to perform various farm activities like pumping water for irrigation and allied activities, domestic use, for the lighting of streets, houses, buildings and also for processing operations and others. These forms of renewable energy include solar energy, wind and water power, oil from plants, wood from sustainable sources, other forms of biomass (plant material), and biogas (gas produced from the fermentation of manure and crop residues). (Ali, et al., 2012)

- Solar Water Pumps
- Biogas Plants
- Solar dryers
- Wind Energy Turbines
- Air and Water Heating
- Solar Water Heating System
- Solar Street Lights

Initiatives of Government of India for Facilitating and Promoting usage of Renewable Energy Sources

Ministry of New and Renewable Energy (MNRE) is the nodal Ministry to all matters relating to new and renewable energy. It has been facilitating the implementation of various programmes to promote renewable energy resources like providing renewable energy to rural areas for lighting, cooking and captive power, disburse renewable energy in urban, industrial and commercial applications and development of alternate fuels and applications. Besides, it also supports research, design and development of new and renewable energy technologies, products and services". (GOI, 2015)

Government of India had initiated many programmes for facilitating the usage of Wind Energy, Solar Energy (Grid and off Grid), Hydro (Grid and Off-grid) and Bio Energy (Bio-Gas, Bio-Fertilizers, Bio-mass). Projects were, framed, and financial allocations were, provided. Certain regulations were, also framed to provide subsidies and changes in tariff policies.

Annexure 3 shows the stages of development of renewable energy in India since 1991. Till 1990, there has been moderate growth in the development of Renewable energy. It was only around 2001-2002 and especially after 2003 that the growth of Renewable energy accelerated. Several policies and regulatory interventions facilitated this boom in the Renewable energy sector. The Union Government launched the National Action Plan for Climate Change (NAPCC) to resolve the major issue of gap articulating between centre and state regarding the vision of Renewable energy sources. Jawaharlal Nehru National Solar Mission was introduced in 2010 to accelerate the development of Solar energy at both Grid and off-grid level. (Chatterjee, 2017)

Overview of Solar Energy Power

Solar energy is, used to generate electricity which is cleaner and promising in comparison to conventional energy sources as they are scarce and emit various toxic gases in the environment. As per estimated measure for Renewable energy, solar energy can reduce the mitigating climate change and will help India in achieving its set target of reducing greenhouse gas emissions by 20 to 25 per cent from 2005 till 2020. (CEEW, 2012) The promotion of solar energy is vital as in accordance to the utility-scale, solar energy leads to various environmental benefits, and it is, also expected that the inflation would come down with its increased deployment. (Harish and Raghavan, 2012)

The systems based on solar energy can play a significant role in the fulfilment of demand of energy by industry. One of the products of solar energy, i.e. Photovoltaic electricity generation, is a promising solution to generate climate-compatible power with sufficient energy potential which would cover the present worldwide demand for electricity consumption.

The Ministry of New and Renewable Energy had formulated various plans to utilize solar energy for power generation. The Ministry also supported demonstration and utilization of selected photovoltaic system in India with the assistance of State Nodal Agencies (SNA) from every state. Other agencies involved in National Solar Mission to demonstrate the programme, conduct research, provide financial assistance and involved in installation and maintenance are (i) National Institute

of Solar Energy (NISE) (ii) Indian Renewable Energy Development Agency Ltd (IREDA) (iii) Solar Energy Corporation of India (iv) Private Channel Partners (v) Akshay Urja Shops. (MNRE, Chapter 3, 2008)

National Solar Mission (Earlier Known as Jawaharlal Nehru National Solar Mission)

Government of India had introduced Jawaharlal Nehru National Solar Mission to commence solar energy services industry into newer regions and markets. The JNNSM was implemented in India in 2010 to improve the policy conditions for its large scale diffusion both at centralized and decentralized levels across the country. The Mission adopted a 3-phase approach, spanning the period in the following way:

- Phase 1 includes the 11th Plan and first year of the 12th Plan (from 2012-13)
- Phase 2 includes the remaining four years of the 12th Plan (2013-17)
- Phase 3 includes the 13th Plan (2017-22) (MNRE)

The first phase (up to 2013) was mainly focussed on solar power energy generation through low investment options like solar thermal, promoting off-grid systems to serve populations without access to commercial energy and the modest capacity addition in grid-based systems. In the second phase, there is an evaluation of the first phase. Accordingly, to increase the capacity of solar energy, a similar process is being followed by the Government of India in the third phase. (MNRE, 2012) The solar installations in various forms are dependent upon Solar Energy Potential of the states.

Table-1 highlights the achievements in grid-connected solar power and off-grid-connected solar power during all the three phases of the National Solar Mission. The analysis of tables shows that more power is generated through grid solar power in every consecutive year in comparison with off-grid solar power.

Table-I: Achievements in Grid-connected and Off- grid-connected Solar Power

Year	The off-grid capacity of SPV Power	Grid Solar Power Installation (MW)
2009-10	0.11 MWp	9.13
	Phase 1	
2010-11	1.23 MWp	32.37
2011-12	11.00 MWeq	481.48
2012-13	17.59 MWeq	1446.76
	Phase 2	
2013-14	116.20 MWeq	2647.00
2014-15	52.77 MWeq	3062.88
2015-16	54.66 MWeq	4878.873
2016-17	98.50 MWeq	9012.66
	Phase 3	
2017-18	104.41 MWp	17,052.37
2018-19	244.52 MWp	28,180.66

Source: MNRE Annual reports, Chapter 1, 2009-10 to 2018-19

Off-Grid Solar Photovoltaics

The scheme for off-grid solar application includes:

- Off-grid and decentralized systems, including hybrid systems to meet/ supplement lighting, electricity/power, heating and cooling energy requirements;

- Solar photovoltaic systems/applications up to a maximum capacity of 100 kWp per site;
- For mini-grids for rural electrification, applications up to a maximum capacity of 250 kW per site and all applications of solar energy to produce heat including steam generation. (MNRE, Chapter 6, 2012)

Among solar photovoltaic technologies, there are some devices/ systems such as solar lanterns, solar home systems, solar street lights, solar pumps, solar power packs, rooftop SPV systems etc. which could be useful both in rural and urban areas to reduce the burden on conventional fuels.

Under Phase-I, II and III of the NSM, MNRE implemented scheme namely “Off-Grid and Decentralized Solar PV Programme” to enhance the deployment of SPV systems in India. Under this scheme, MNRE is providing Central Financial Assistance (CFA) to State Nodal Agencies (SNA) for the deployment of Solar Street lights, Solar pumps, Solar Power Packs and other solar applications. MNRE provides CFA of 30 per cent of benchmark cost or tender cost of SPV devices, whichever is lower to the General Category States and CFA of 90 per cent of benchmark cost or tender cost of SPV devices, whichever is lower to Special Category States.*. (MNRE, Chapter 3, 2019)The subsidy is, provided by the capacity of the solar module and capacity of SPV system.

Table-2: Benchmark Cost for Solar Photovoltaic Projects in Phase I

Year	Subsidy of 30% of the project cost (With Battery backup)	Subsidy of 30% of the project cost (Without Battery Backup)	For select category states*, the subsidy of 90% of the project cost
2010-11	Rs 300/ per Wp	Rs 210/ per Wp	Benchmark cost
2011-12	Rs 81/ per Wp	Rs 81/ per Wp	Rs 243/ per Wp
2012-13	Rs 81/ per Wp	Rs 81/ per Wp	Rs 243/ per Wp
2013-14	Rs 135/ per Wp	Rs 135/ per Wp	Rs 405/ per Wp

Source: Ministry of New and Renewable Energy. “National Solar Mission”. Chapter 4, *Annual Report*, 2015, http://mnre.gov.in/file-manager/annual-report/2014-2015/EN/Chapter%204/chapter_4.htm. Accessed 19 March 2017

*(North Eastern Region, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Union Territories, Island and Districts with International borders)

In Phase 2 of NSM, from 2014-15 to 2016-17

- 30% CFA is, provided by MNRE on SPV systems ranging from Rs 21 per watt peak to Rs 120 per watt for general category states
- In special category states, MNRE provided subsidy ranging from Rs.72/- to Rs.396/- for off-grid solar PV applications. For Solar Water Pumping System, the CFA ranges from Rs.27,630 per Hp to Rs.57,600 per Hp. (MNRE, Chapter 4, 2015)

In Phase 3, from 2017-18 to 2018-19,

- MNRE provided CFA of 30 per cent of benchmark cost or tender cost, whichever is lower in the General Category States and CFA of 90 per cent of benchmark cost or tender cost, whichever is lower to select category states.
- NABARD provided CFA of 40 per cent of the benchmark cost for pumps and lighting systems. (MNRE, Chapter 3, 2019)

Annexure 4 gives an overview of the installation of different solar energy devices in India from 2013-14 to 2019-20. It points out that till 2019-20, there is the maximum installation of Solar Lanterns in India followed by Solar Home Lights, Solar Street Lights and lastly solar water Pumps. However, there is a continuous installation of all the devices in every financial year.

SPV Devices Installed under Off-Grid Solar Power under National Solar Mission

Solar Street Lights

Solar Street light is essential for its paramount significance for economic and social stability. These are not dependent on the utility grid, which reduces their operating costs. The maintenance cost is less in comparison to conventional street lights. The external wires eliminated are to reduce the risk of accidents.

Rural electrification through Solar Street Lights

In 2001-02 the Village Electrification Programme (VEP) was introduced by the Indian Government for providing SPV home-lighting systems in rural households. In 2003-04, VEP was, modified to the Remote Village Electrification (RVE) programme for electrification of those un-electrified remote census villages/hamlets, where grid connectivity was not accessible by 2012 (end of the 11th Plan period). During 2005-06, the National Electricity Policy - 2005 and the Rajiv Gandhi GraminVidyutikaranYojana (RGGVY) both have made an enormous impact on Remote Village Electrification Programme through SPV systems. (MNRE, Chapter 4, 2007). “Demonstration and promotion of solar photovoltaic devices/ systems in urban areas” was implemented in 2007, which provided financial assistance in the form of grants up to 50% of the total cost of SSL. (MNRE, Chapter 4, 2008).

Table-3: State-wise Off-Grid Interactive Solar Street Lights Installed from 2010 to 2017

Year	Punjab	Haryana	Himachal Pradesh
2010	17495	71646	22970
2011	5354	2004	20074
2012	-		628
2013	5354	22018	8058
2014	0.054 Lac	0.220 Lac	0.081 Lac
2015	0.054 Lac	0.220 Lac	0.241 Lac
2016	-	-	-
2017	0.40 Lac	0.20 Lac	0.60 Lac

Source: India Statistics, GOI, retrieved from <https://www.indiastat.com/power-data/26/non-conventional-energy/184/grid-off-grid-and-decentralised-renewable-energy-programmes-1998-2022/449828/stats.aspx>

In 2010, the project falls under the Off-grid solar photovoltaic applications scheme which is a part of the Jawaharlal Nehru National Solar Mission now known as National Solar Mission. Table-3 highlights the Solar Street Light installation from 2010 to 2017 in Punjab, Haryana and Himachal Pradesh which shows that there is a progressive installation of SSL almost every year in all selected states except in 2012 and 2016.

Solar Water Pumps

For the maintenance of sustainable agriculture, there is a need to develop and disseminate products in agriculture sector based on Renewable Energy Technologies (RETs). Renewable energy plays a significant role in the farming sector while performing various tasks like pumping water for irrigation, for livestock or domestic use; lighting farm buildings; powering processing operations and others which brings sustainable development of agriculture sector. (Ali, 2012) Government of India at the Union level and the State Governments had formulated specific policies and programmes. They launched Solar Water Pumps (SWP) as a solution to irrigate fields adequately, which is environmentally friendly and cost-effective. “Current economics indicate an Internal Rate of Return (IRR) of 10 per cent for replacement of diesel pumps with solar pumps without factoring in crop yield improvement benefits due to water availability on demand. Considering even 10% yield benefit, the IRR would be 19 per cent”. (Mahendra, 2008)

Solar Water Pumps operate through Solar Energy which requires less maintenance in comparison to the diesel operated pump sets.” These pumping systems are a perfect solution for small/middle farmers to meet their irrigation requirements who rely on Grid-connected electric pumps or using diesel pump sets. SWPs have many beneficial features like no fuel cost, uses abundantly available free sunlight, no electricity required, long operating life, highly reliable and trouble-free performance, easy to operate and maintain, eco-friendly and saving of conventional diesel fuel”. (Punjab Energy Development Agency) Solar Water Pumps installed in India is very small in comparison to the number of electric pumps, but, if we compare the growth rate of distribution of power, SWPs poses the higher position. (Kumar and Kandpa, 2007)

MNRE had introduced to promote solar PV water pumping systems for irrigation and drinking water in 1993-94. To encourage farmers to invest in SWPs, capital subsidies, low-cost financing and 100 per cent depreciation in the first year were given as the Ministry had a target to install 50,000 PV water pumps in five years.

In 2004-05, MNRE reduced the subsidy on pumps (Pallav, 2007). However, in 2005-06, the Ministry provided an additional provision of interest subsidy through IREDA.

- 222 SPV Pumps were, installed during 2005-06. (Shukla and Guru, 2007).
- During 2007-08 a total of 7068 solar PV water-pumping systems had been installed (MNRE, Chapter 3, 2008).
- In 2008-09 a total of 56 SWPs were installed (MNRE, Chapter 4, 2009)
- In 2009-10, a total of 106 SWPs were, installed. (MNRE, Chapter 4, 2010)

In 2010, Solar water pumps became part of the off-grid and decentralized component of the Jawaharlal Nehru National Solar Mission (JNNSM) with the provision of subsidies from MNRE (30 per cent subsidy) and state governments (equivalent to 56-60 per cent). (Indo German Energy Program, 2013) Table-4 depicts the SWPs installation in Punjab, Haryana and Himachal Pradesh. Himachal Pradesh has the lowest SWPs installation due to its demographic constraint, and Punjab has the highest installation. However, there is no progressive increase in installation of SWPs from 2010 to 2017.

Table-4: State-wise Off-Grid Interactive Solar Water Pumps Installed from 2010 to 2017

Year	Punjab	Haryana	Himachal Pradesh
2010	1850	469	6
2011	1857	469	6
2012	-	-	-
2013	1857	469	6
2014	1857	469	6
2015	1857	469	6
2016	1857	543	6
2017	1857	543	6

Source: India Statistics, GOI, retrieved from <https://www.indiastat.com/power-data/26/non-conventional-energy/184/grid-off-grid-and-decentralised-renewable-energy-programmes-1998-2022/449828/stats.aspx>

Solar Home Lighting System and Solar Lanterns

There are two SPV devices namely Home Lighting Systems and Solar Lanterns which can be, used to provide an adequate source of lighting which are mostly located in remote locations or in those areas where grid supply of electricity is not possible. Home lighting System is powered by solar energy which uses solar cells that convert solar energy (sunlight) directly to electricity. The batteries store this electricity and SHLS later can be used for lighting whenever required. These systems play a significant role in non-electrified rural areas and as the reliable emergency lighting system for critical domestic, commercial and industrial applications. A Solar Lantern is a simple application of solar photovoltaic technology for the areas where the power supply is irregular and scarce. Many people in the urban areas also prefer a solar lantern as an alternative because of continuous power cuts. (Electrical Division)

Table-5: State-wise Off-Grid Interactive Solar Home Lighting System Installed from 2010 to 2017

Year	Punjab		Haryana		Himachal Pradesh	
	SHLS	SL	SHLS	SL	SHLS	SL
2010	8620	4337	28213	9878	16840	2994
2011	8620	17495	49418	73116	16848	22970
2012	-	-	2602	-	-	-
2013	8620	17495	56364	93853	22592	23909
2014	0.086 Lac	0.175 Lac	0.564 Lac	0.939 Lac	0.226 Lac	0.239 Lac
2015	0.086 Lac	0.175 Lac	0.578 Lac	0.939 Lac	0.226 Lac	0.339 Lac
2016	-	-			-	-
2017	0.10 Lac	0.20 Lac	0.60 Lac	0.90 Lac	0.20 Lac	0.30 Lac

Source: India Statistics, GOI, retrieved from <https://www.indiastat.com/power-data/26/non-conventional-energy/184/grid-off-grid-and-decentralised-renewable-energy-programmes-1998-2022/449828/stats.aspx>

Table-5 shows the installation of Solar Home Lighting System in Punjab, Haryana and Himachal Pradesh. Haryana has the highest SHLS installation, followed by Himachal Pradesh and followed by Punjab. Major installations of SHLS happened in Phase II of JNNSM. Table also highlights Solar Lantern installations in selected states which show that Haryana has maximum Solar Lantern installation followed by Himachal Pradesh and later by Punjab. However, there is no Solar Lantern installation between 2012 and 2016.

Solar Power Plants

Stand-alone PV systems are, designed to operate independently of the electric utility grid. They are designed and sized to supply either DC or AC electrical loads. “The simplest type of stand-alone PV system is a “Direct-coupled system”, where the DC output of a PV module or array is, directly connected to a DC load”. In Stand-Alone systems, there is no electrical energy storage (batteries) attached in direct-coupled systems. So they can only operate during sunlight hours, and they are best suitable for typical applications such as ventilation fans, water pumps, and small circulation pumps. (EAI) Table-6 highlights Stand Alone Solar systems installation from 2010 to 2017 in Punjab, Haryana and Himachal Pradesh which shows that there is a progressive increase in capacity of Stand Alone Solar Systems almost every year in all selected states.

Table-6: State-wise Off-Grid Interactive Power Plants Installed from 2010 to 2017 (kWp)

Year	Punjab	Haryana	Himachal Pradesh
2010	121.00	434.40	1.50
2011	121.00	336.00	676.05
2012	100	13.2	400
2013	281.00	864.25	601.50
2014	663.00	864.25	1208.50
2015	1058.00	1024.25	1208.50
2016	1202.00	2321.80	1512.50
2017	2066.00	2321.30	1853.50

Source: India Statistics, GOI, retrieved from <https://www.indiastat.com/power-data/26/non-conventional-energy/184/grid-off-grid-and-decentralised-renewable-energy-programmes-1998-2022/449828/stats.aspx>

Findings

NSM is an excellent model for India to combat energy deficiency, climate change, and a shortage of fossil fuels. It is, found that the objectives and targets could not be, achieved despite financial allocations. There exist multiple reasons along with challenges in governance mechanism, which are as follows:

Priority to Grid Solar Energy: The major focus of NSM regarding physical targets, financial allocations, government subsidy and incentives is towards grid energy supply as compared with off-grid. The research studies, as well as annual reports of MNRE, shows that there are fewer proposals from State Nodal Agencies to MNRE regarding the installation of decentralized solar devices. The States are, divided into two categories; the General Category States and the Special Category States. MNRE provides CFA of 30% of benchmark for former while 90% of benchmark cost for later. The beneficiaries are not interested in paying the rest of the cost of the device even after limited subsidy provision from MNRE.

Himachal Pradesh government receives 90% subsidy from MNRE, and the state government also provides subsidies to beneficiaries. As a result, Himachal Pradesh is in the Hill States category has maximum Solar Street Lights, Solar Lanterns installation. Therefore, to increase the off-grid solar installations, state governments need to contribute by providing subsidies or other financial incentives to beneficiaries.

Lack of feedback mechanism: The analysis of secondary literature highlights that off-grid solar devices scheme under NSM does not have any feedback mechanism regarding the performance and maintenance of solar devices from beneficiaries

Field studies conducted by researcher's state that many operational and structural concerns in selected states Punjab, Haryana and Himachal Pradesh related to off-grid solar devices never reach the team behind the formulation of the scheme, consequently scheme fails to provide fruitful results. To exemplify, lack of Solar Charging Stations to charge the solar lanterns, theft of solar panels and batteries, provision of low Horse Power (Hp) solar pumps, no orientation programs for beneficiaries, non-availability of spare parts and many more problems necessitate the introduction of methods in every state to collect the feedback. Full participation of educated as well as motivated beneficiaries is in need to encourage more SPV installations and to gain the recognition of NSM at the national level.

The promotion and awareness of Off-grid solar resources are inadequate: The review of literature pinpoints that in some rural areas of selected states, people are still not aware regarding cost-efficiency, usage, availability, subsidies related to SPV devices. Moreover, the people dwelling in these remote areas with disrupted grid supply need SPV devices most. In addition to this, the unequal distribution and non-continuous installation of SPV devices in every year are also due to their limited promotion through SNA's.

Therefore, SNAs should send periodic updates to MNRE on mass and awareness program of SPV devices for evaluation. It is, suggested that MNRE financially supports the promotion cells of SNAs to arrange demonstrations in local fairs/ melas through solar technology developers, introduce group meetings with technical solar experts and publicize discussions in a community place with District Managers.

Lack of Grievance Redressal Mechanism in State Nodal Agencies: In accordance to the official websites of State Nodal Agencies, the organizational structure and functioning show that there is no grievance cell establishment in SNAs to handle the problems of beneficiaries related to company's maintenance policy. Under NSM, every private company provides a warranty of five years against manufacturing or installation defects for all components and at least five years for the overall structure.

However, there is no access to any helpline number to beneficiaries where they can register their complaints regarding the performance of companies in providing inefficient maintenance and repair services, other forms of technical support to beneficiaries. As a result, improper service adversely affects the market of SPV devices. Therefore, PEDDA, HAREDA, HIMURJA and all other SNAs should either recruit extra staff for grievance redress purpose or publicize the District Manager contact no. to beneficiaries to improve their access to SNA.

Non-involvement of NGOs: There are many other agencies like NABARD, IREDA and BEE involved in NSM. However, there is a provision of any collaboration of NGOs or third parties in the implementation of solar schemes under NSM. The secondary literature also underlines that to enhance the

implementation of the off-grid solar scheme at an individual level, NGO's participation is certainly required to penetrate the SPV devices installations to the grass-root level.

Therefore, MNRE needs to associate NGOs with every State Nodal Agency to benefit them while implementing an off-grid solar scheme more effectively. These local intermediary parties/ NGOs can provide a suitable platform to generate awareness among consumers regarding off Grid solar devices through demonstrations, rallies, training, labels and other modes. Also, they can absorb the financing risks for beneficiaries to make the devices more affordable and maintenance-friendly for everyone.

The reluctance in people toward the adoption of green energy technologies:

It has been, found in the primary research studies that people, in general, are reluctant towards the adoption of solar energy appliances in agriculture as well as in their household. Besides financial aspects, lack of access, lack of coordination of District managers with Panchayats at the village level, problems in the outreach also make them disinterested in the adoption of new technology.

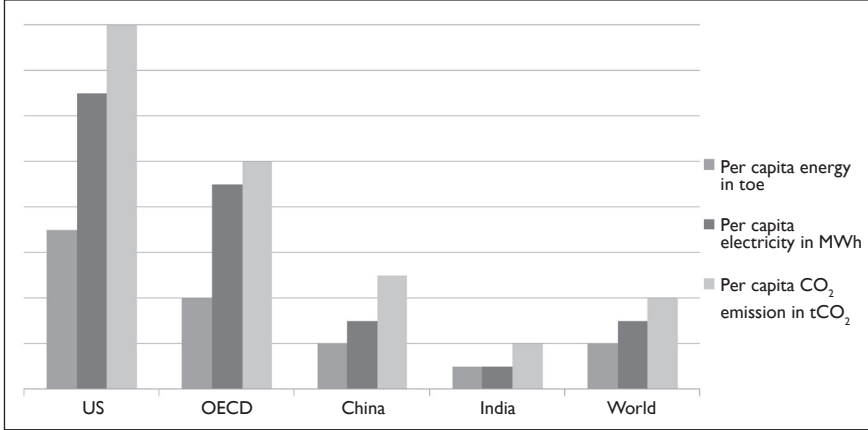
Conclusion

India is, endowed with vast solar energy potential. Therefore, solar energy has turned into an economical power source in long-run due to its profound benefits in contrast to conventional energy sources. There is progress in dissemination of SPV devices in every state of India by facilitating the NSM schemes through awareness programs, subsidy provision and financial incentives. However, in the case of Punjab, Haryana and Himachal Pradesh state, growth of all SPV devices is not at a constant pace. It lacks behind in comparison to their potential and availability. There is no doubt that some of SPV devices like Solar Street Lights and Solar Water Pumps are getting installed by the beneficiaries continuously under the new initiatives namely Atal Jyoti Yojana (AJAY) and scheme for farmers for installation of solar pumps and Grid-connected solar and other renewable power plants launched by MNRE.

It is, observed from reports that State Nodal Agencies in Punjab (PEDA), Haryana (HAREDA) and Himachal Pradesh (HIMURJA) are cross-sector infrastructure regulatory institution which only monitors all energy conservation sector activities. Their primary role under NSM is to bring awareness among masses in their respective state regarding MNRE policies/programs and provide subsidy to beneficiaries by the central Ministry and state Government's interest. However, they have not even satisfactorily completed their responsibility due to many cumbersome bureaucratic procedures, lack of funds and staff, improper designing and execution of NSM and inadequate authority through MNRE. Hence, with proper channelling of resources and delegation of work between MNRE and SNA, NSM can achieve big targets in off-grid solar installations. Moreover, MNRE needs to introduce citizen participation approach, adequate financial assistance, enhance monitoring and promotion part, associate other stakeholders and evaluation of statistical facts through experts in an off-grid solar photovoltaic scheme to improve its implementation in India.

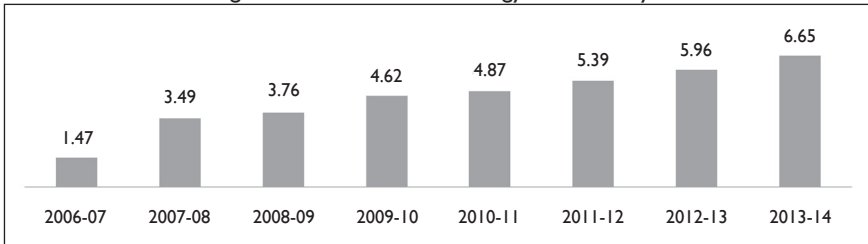
Annexures

Annexure-1: India has A Low Per Capita Energy, Electricity Consumption and CO₂ Emission



Source: Sushanta K Chatterjee. "The Renewable Energy Policy Dilemma in India: Should Renewable Energy Certificate mechanisms compete or merge with the Feed-in-Tariff Scheme?" M-RCBG Associate Working Paper Series, No. 79, https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/programs/crri/files/79_renewable%20energy%20certificate.pdf. Accessed 22 November 2018

Annexure-2: Percentage Share of Renewable Energy In Electricity Production



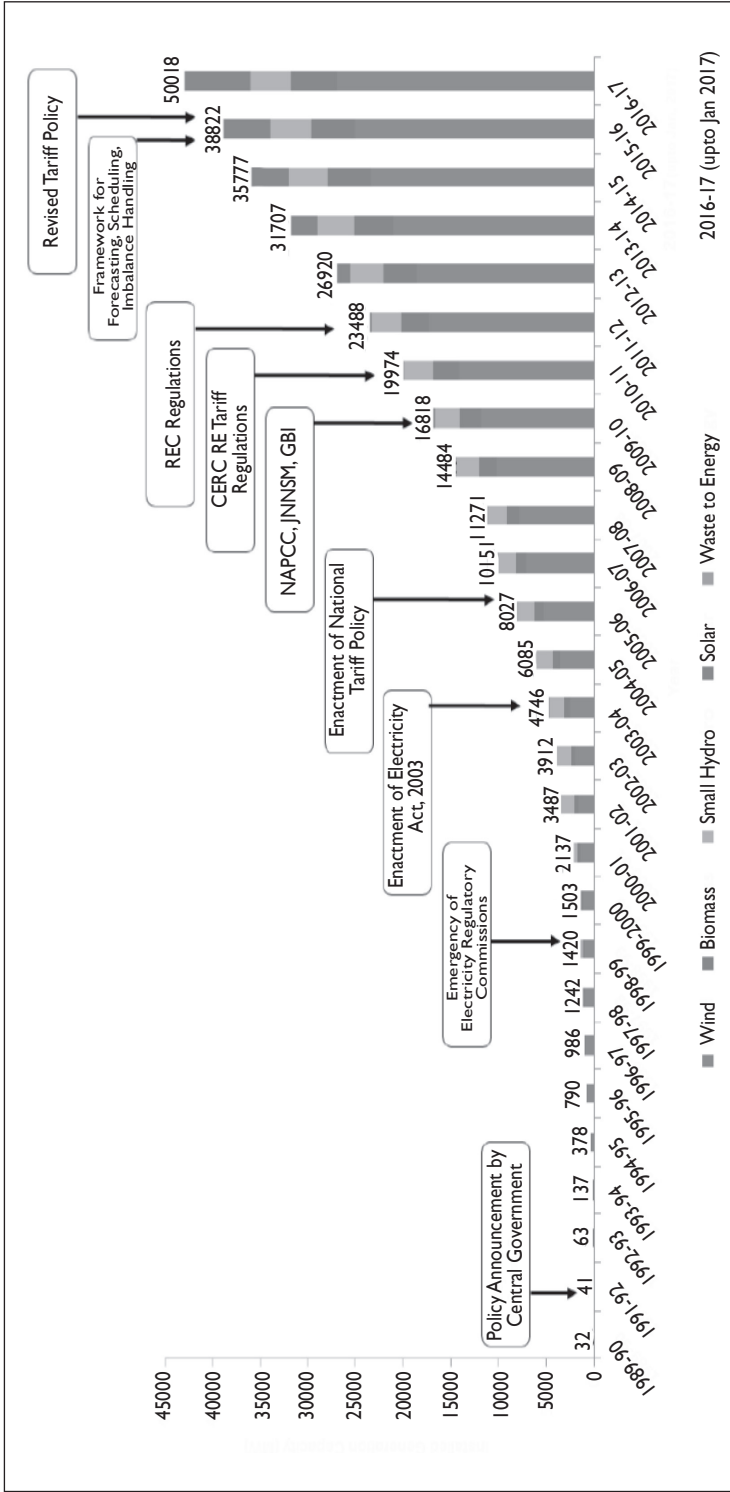
Source: Sushanta K Chatterjee. "The Renewable Energy Policy Dilemma in India: Should Renewable Energy Certificate mechanisms compete or merge with the Feed-in-Tariff Scheme?" M-RCBG Associate Working Paper Series, No. 79, https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/programs/crri/files/79_renewable%20energy%20certificate.pdf. Accessed 22 November 2018

Annexure-4: Year-Wise Achievements of SPV Installations In India

Year	Solar Street Lights	Solar Water Pumps	Home Lights	Lanterns	Solar Power Plants
2013-14	274679	11626	1099505	959862	85138.44
2014-15	62968	18043	27416	10000	22936
2015-16	49985	41927	158956	27069	41927
2016-17	76471	53044	121332	0	26845.92
2017-18	141146	56350	240612	2077071	9052.71
2018-19	53969	65892	67393	2749798	26154.1
2019-2020	702951	254178	1721343	7486703	214345

Source: Ministry of New and Renewable Energy. <https://mnre.gov.in/solar/solar-off-grid>. Accessed on 27 March 2020

Annexure-3: Growth of Renewable Energy Installed Generation Capacity (MW)



Source: Sushanta K Chatterjee, "The Renewable Energy Policy Dilemma in India: Should Renewable Energy Certificate mechanism competes or merges with the Feed-in-Tariff Scheme?" M-RCBG Associate Working Paper Series, No. 79, https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/programs/crif/files/79_renewable%20energy%20certificate.pdf. Accessed 22 November 2018

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Palm Oil Cultivation and Farmers Livelihoods in Tamil Nadu

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Abstract

The oil palm cultivation is one of the essential commercial crops, and it gives an uplift to the farmers in India and Tamil Nadu. The objective of the paper is to study the palm oil cultivation and farmer's livelihood in Tamil Nadu. Primary data collected is from two districts, namely Cuddalore and Thanjavur of Tamil Nadu. We have selected the taluks like Mangalore, Nallur, Panrutti and Virudhachalam from Cuddalore District and in Thanjavur district, like Boodalur, Thanjavur, Thiruvaiyaru, Pattukottai, Puthalur and Orathanadu. Thus, the total number of 109 indigenous farmers and 91 exotic farmers are surveyed. The paper is divided into five sections. The first section is introductory; it contains the background, objectives. The second chapter describes the literature review of studies. The third section deals with the database and methodology. The later part of the article examines the results and discussion and lastly the concluding remarks and policy suggestions.

Keywords: Cultivation, Farmers, Livelihood, Palm Oil, Scheme, Tamil Nadu

Introduction

The agricultural sector is given high priority for foodgrains production during the green revolution. Other crops like oilseeds, pulses and coarse cereals have not made considerable progress. Government of India initiated the National Oilseed Development Project during 1984-85. After that, they launched the Technology Mission on Oilseeds in 1986. The main motives of the schemes were to increase oilseeds production and achieve self-sufficiency in edible oils. In 1991-92, Oil Palm Development Programme (OPDP) was launched under the "Technology Mission on Oilseeds and Pulses" with a focus on area expansion in Andhra

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Pradesh, Karnataka, Tamil Nadu, Orissa, Gujarat and Goa. During the Tenth Plan, Integrated Scheme on Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) was implemented by converging earlier schemes like Oilseeds Production Programme (OPP), Oil Palm Development Programme (OPDP), National Pulses Development Programme (NPDP) and Accelerated Maize Development Programme (AMDP). From April 2010, pulses component of ISOPOM has been merged with National Food Security Mission (NFSM) to intensify efforts for the production of pulses.

Oil Palm Development Programme was started in 1991-92 under the “Technology Mission on Oilseeds and Pulses. The scheme focused on area expansion in the states like Andhra Pradesh, Karnataka, Tamil Nadu, Orissa, Gujarat and Goa. From 2004-05 onwards, the plan implemented as a part of the “Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize” (ISOPOM) and provides support for Oil Palm cultivation in twelve states like Andhra Pradesh, Assam, Gujarat, Goa, Karnataka, Kerala, Maharashtra, Mizoram, Orissa, Tamil Nadu, Tripura, and West Bengal. Even though, Assam, Maharashtra and West Bengal did not undertake Oil Palm cultivation though Maharashtra has now taken oil palm area expansion from 2010-11. Under ISOPOM scheme, the Government is giving support for planting material, cultivation cost, installation of the drip irrigation system, diesel pump sets, training, development of wasteland and technology transfer through demonstration and publicity in the respective states.

The States are implementing area expansion programme under ISOPOM in association with the oil palm industry. Identified areas are allocated to private entrepreneurs for the overall development of the sector, i.e. from plantation to procurement of Fresh Fruit Bunches (FFBs) at the prices fixed by the Project Management Committee (PMC) constituted under OPDP. Presently Andhra Pradesh, Tamil Nadu, Mizoram and Goa have enacted Oil Palm Act while other States are yet to initiate such regulatory provision.

In Tamil Nadu, NMOOP comprises of three mini-missions one each for oilseeds, oil palm. The fund provided is on a 50:50 basis by the centre and state. The objective is to increase the area under oilseeds through crop diversification from low yielding cereal crops to oilseeds crops and expansion of cultivation area under oil palm and oilseeds in wastelands. The scheme is being implemented with equal sharing between the centre and the state. It focuses on the expansion of oil palm coverage in watersheds and wastelands. The scheme implemented is in districts like Karur, Perambalur, Ariyalur, Thanjavur, Thiruvarur, Nagapattinam, Theni and Tirunelveli. During the year 2014-15, oil palm cultivation was taken up in an area of 398 hectares, besides providing maintenance support for older plantations, planting material for intercropping in oil palm fields was provided at subsidized costs. All these activities were carried out at the cost of Rs. 1.62 crore. During the year 2015-16, the scheme proposed was to be implemented with the outlay of Rs. 4.40 crore (Policy Note, Government of Tamil Nadu, 2015-16).

Statement of the Problem

There is a continuous increase in the planted area of oil palm due to increasing demand in the global markets. The impact of oil palm expansion has impacted socio-economic factors. The yield of oil palm increased in Malaysia, Indonesia,

Thailand, Costa Rica and Ivory Coast. Malaysia recorded the highest of 4-5 tonnes per hectare, and the lowest yield of 1.3 tonnes was in Germany. The oil palm cultivation was introduced in India during the 1970s, and mainly, it was cultivated in Kerala, Andaman Nicobar and Goa. The area earlier cultivated has replaced with commercial cultivation in an area of 2.69 lakh hectares during 2013-14. Of which, 1.75 lakh hectares is at fruiting stage. 1.5 lakh tonnes of palm oil is being produced. In India, States such as Andhra Pradesh, Karnataka, Tamil Nadu, Mizoram, Kerala, Odisha, Gujarat, Goa, Maharashtra and Chhattisgarh are major producing states (Status Paper on Oil Seeds, Government of India, 2014).

Literature Review

Various researchers study the oil palm cultivation and its impact on human development with a global perspective. Rethinam, Singh, Olagunju, Noormahayu. M. N, Khalid. A.R and Elsadig focus on the oil palm cultivation in the world.

Singh (2008) has concluded that although oil palm proved economical for the farmers, due to the long gestation period coupled with high investment, there had been less interest. However, owing to support from Govt. and technology, enhanced excitement prevailed in cultivation of oil palm. Abraham (1988) studied the potential of oil palm cultivation in India and found that the cultivation of oil palm required good rainfall throughout the year; soil must be physically fit, chemically balanced and biologically active. He opines that in India Karnataka, Andhra Pradesh, Maharashtra, Kerala and Tamil Nadu are suitable for the cultivation of oil palm. Khan, N.D. Seth and S.D. Gara (1998) identified that per capita consumption of edible oils is rising due to increase in population as well as improvement in socio-economic conditions of the population. So it is imperative to increase productivity per hectares of all oilseed crops.

K.J. Prabhakara Rao (1999) observes that prospects for small scale plantations and matching processing facilities are brighter as compared to large scale plantations. The work states that concentration on small scale plantations by the farmer are more, and it helps to increase in levels of yield. The work identified that in Andhra Pradesh, the first plantation was taken up in 1987-88. An extent of 120 was planted, and at later stages, a pilot project was taken up by the Department of biotechnology in the year 1990-91. In the initial years, the return was low due to newness of the cultivation and processing of oil palm crop. Taking real care was started in 1993.

A.R. Sukumar (1999) through his study on the status of oil palm in Andhra Pradesh opines that Andhra Pradesh has tremendous potential for oil palm cultivation. He made a study on district wise potential of oil palm and found that Krishna district had an estimated area of 1,00,000 hectares and identified as potential for the cultivation of oil palm. He focused on the incentives given to the farmers, constraints in the implementation of oil palm project along with the oil palm act, first implemented in Andhra Pradesh. K.L.Chadha (2006) committee critically assessed the experience of oil palm cultivation in India, briefly reviewed oil palm technologies, identified suitable areas for oil palm cultivation, for financing oil palm development schemes, sources have been identified for the supply of planting material assessed the processing facilities available were suggested.

Madhusudhana Rao (2008) identified that Andhra Pradesh is the first state to formulate and promulgate an oil palm act in 1993 and the law provided regulation for the cultivation of oil palm, processing and matters connected in addition to that. He also identified that 227 mandals were allotted to oil palm companies / processors as factory zone in 8 districts for the development of oil palm. He concludes that if proper care of oil palm takes place, then it can become successful for commercial cultivation. Kochu Babu (2008) stated that oil palm is a perennial and totally a new crop introduced under irrigated conditions in different agro-climatic regions, warrants meticulous planning and conducting of suitable research programs.

Kalanithi Nesaretnam (2009) noted that the palm oil contribution is significant to the world oil market, and it would continue to play a leading role in world oils and fats market with greater acceptance amongst the consumers. Nutritional studies showed no detrimental effects on palm oil consumption. Rao (2009) focused on oil palm development in Andhra Pradesh regarding production and productivity. The study covers Nellore to Srikakulam districts of Andhra Pradesh. He has made efforts for oil palm growers, officials of Science Department, entrepreneurs and policymakers as golden palm under Indian conditions. The study concluded that adequate training and effective implementation of technologies to the farmers to cultivate the oil palm.

Data and Methodology

The study is based on the primary sources collected from two districts, Cuddalore and Thanjavur which come within the group of Oil Palm Area Expansion (OPAE) programme Tamil Nadu. The information containing details of palm oil area under cultivation of indigenous and exotic variety, district data has been collected from the Agriculture Department, Government of Tamil Nadu. Cuddalore and Thanjavur, the largest producers, were selected from Tamil Nadu. From the chosen districts, ten taluks were selected, which were having the highest area under Oil Palm. From each taluk chosen, an appropriate number of villages were selected, having a significant area under exotic and indigenous varieties.

Table- I: Sample Size of Cuddalore and Thanjavur Districts in Tamil Nadu

Name of Selected District	Name of Selected Taluk / Block	Number of Farmers	Indigenous Varieties	Exotic Varieties
Cuddalore	Mangalore	7	1	6
	Nallur	28	2	26
	Panrutti	53	35	18
	Virudhachalam	9	7	2
Thanjavur	Boodalur	5	4	1
	Thanjavur	20	10	10
	Thiruvaiyaru	11	6	5
	Pattukottai	25	18	7
	Puthalur	6	2	4
	Orathanadu	36	24	12
Total Sample Size		200	109	91

Source: Agro-Economic Research Centre, University of Madras, Chennai

We decided the farmers from taluk like Mangalore, Nallur, Panrutti and Virudhachalam from Cuddalore District. In Thanjavur district, we have selected the taluks like Boodalur, Thanjavur, Thiruvaiyaru, Pattukottai, Puthalur and Orathanadu. In this way from each selected region of Cuddalore and Thanjavur 50 households were selected who grow indigenous variety and 50 houses were selected, which becomes an exotic variety of oil palm. Thus, a total number of 109 indigenous farmers and 91 farmers cultivating exotic variety are surveyed in detail. The average annual growth rates, correlation and graphical analysis were presented.

Results and Discussion

Area, Production and Productivity of Oil Palm: Indigenous versus Exotic Varieties

The area and production under oil palm in the study area is given in Table-2. The areas under indigenous varieties per household which worked were out to 12.68 acres as compared with 11.34 acre for exotic varieties. Among the indigenous cultivators, the large and medium farmers grow the variety in 5.60 acres and 3.59 acre, respectively. The marginal farmers cultivate in 1.14 acre, among the exotic variety users, the large group farmers grow crops in 4.79 acres, and the minimal level farmers cultivate in 1.05 acre.

The percentage share of oil palm to a net operated area of the small and medium farmers cultivating indigenous varieties is 30.3 per cent and 29.8 per cent, respectively. The marginal farmers constitute 16.08 per cent. Among exotic varieties users, the marginal farmers are growing 48 per cent, and larger farmers are cultivating 8.28 per cent.

The average productions for indigenous and exotic varieties per acre calculated are to be 15.02 tonnes and 7.70 tonnes, annual respectively. It implies that the indigenous varieties are higher in production than the unusual types due to a long gestation period of 10 to 20 years plantation, whereas for exotic varieties, it is nearly three to five years plantation time.

Table-2: Area and Production under Oil Palm: Variety Wise

Farm size	The area under oil palm (per hh)	Area of oil palm as % NOA	No of plants per acre	No of bunches per plant	Production of FFB* per acre (Tonnes)	Value of Output per acre (Rs)	Value of output per hh (Rs)	Recommended MSP (Rs per tone)	The actual price obtained Rs per tone
Exotic variety									
Marginal	1.05	47.80	56.13	7.99	8.36	42441.50	44563.27	5503.2	5076.7
Small	2.07	20.83	54.68	10.76	7.60	38451.40	79594.48	5476.9	5059.4
Medium	3.43	12.23	56.15	8.87	7.77	40695.80	139587.80	5685.1	5237.6
Large	4.79	18.28	56.17	10.04	7.07	43455.10	208149.68	5614.8	5146.4
Total	11.34	99.15	55.8	9.42	7.70	41261.00	469770.84	5820.0	5380.0
Indigenous variety									
Marginal	1.14	16.08	56.4	8.80	15.95	89479.50	102006.63	5068.7	5610.0
Small	2.36	30.33	56.14	11.19	16.52	88002.04	207684.81	5773.7	5327.0
Medium	3.59	29.81	56.26	10.94	16.24	87426.42	313860.83	5837.7	5383.4
Large	5.60	19.37	56.07	10.32	11.40	60725.52	340062.91	5780.1	5326.8
Total	12.68	95.59	56.22	17.23	15.02	81285.24	1030696.79	5865.1	5411.8

Source: Field Survey Data Collected by AERC, University of Madras

* Fresh Fruit Bunches

Among indigenous users, medium farmers produce a higher output of 16.5 tonnes as against the lowest of 11.4 tonnes by the large farmers. But for exotic varieties users, marginal farmers produce higher of 8.36 tonnes as against the large farmers who produce the lowest of 7.06 tonnes.

Among the indigenous cultivators, marginal farmers are receiving the highest value of Rs. 89,479 and lowest cost obtained by the large farmers (Rs. 60,725). It implies that the marginal farmers are earning more output value because of regular work and continued work in their farm land. On the contrary, the large farmers are receiving the lowest cost because of cutting their plantation trees for alternative crops and ignorance of their work.

The total value of output for indigenous variety was higher than unusual types of cultivation per household. Among indigenous varieties, the large farmers receive output value of Rs. 3,40,063 and lowest cost got is by marginal farmers (Rs. 1,02,006). Whereas, for exotic varieties, the large farmers got the highest value of Rs. 2,08,150 and marginal farmers receive the lowest cost of Rs. 44,563. It implies that the large farmers receive the highest value of money than the marginal farmers due to the large landholding and more financial capacity.

Rs. 5,865 and Rs. 5,280 are the actual prices, received by the indigenous and exotic cultivators. It implies that the indigenous varieties have a higher recovery to extraction ratio than the unusual types. The domestic prices of oil palm significantly influence by production capacity. There are continuous drought conditions and improper and inadequate nutrition guidance for new, resulting in lower FFB yields and low Oil Extraction Ratio (OER).

The average value of output per acre from indigenous varieties of oil palm growers is significantly higher than income from varieties of exotic growers. In 2015-16, annual production of farmers from mature indigenous oil palm received Rs. 81,285 compared to Rs. 41,261 from exotic variety growers. The study indicates that many villagers hope to enter the regular cash economy. The oil palm cultivation is an attractive choice and an alternative in recent decades in Tamil Nadu.

Production, Cost and Resource Use: Indigenous versus Exotic Varieties

The productivity difference in palm during peak and the lean season is illustrated in Table-3. Among indigenous cultivators, productivity during the peak season is calculated to 15.26 tonnes annually. Of which, marginal farmers recorded the highest production of 21.63 tonnes and largest farmers produce at least with 10.22 tonnes. Whereas in the lean season, marginal farmers recorded the highest output of 17.52 tonnes and large farmers deliver the lowest value of 8.2 tonnes. The average productivity among the two seasons work out to 2.95 tonnes. In terms of percentage difference, it accounts for 19.42 per cent variation. The large farmers receive a significant change of 19.77 per cent, and marginal farmers receive the lowest exception of 19 per cent. It implies that the productivity gained from indigenous variety during peak season is higher than the lean season.

Among exotic varieties, the average productivity during peak and the lean season is 7 tonnes and 5.73 tonnes, respectively. The marginal farmers got the highest of 7.35 tonnes, and large farmers recorded the lowest produce of 6.75 tonnes during peak season. During the lean season, large farmers produce the

elevated of 6 tonnes and most inferior produce of 5.4 tonnes by small farmers. The percentage variations among peak and the lean season for exotic cultivators calculated are at 18 per cent. The highest productivity recorded by small farmers is 21.5 per cent and the lowest produce recorded by large farmers 11.26 per cent. It implies that the low yield due to unfavourable climatic conditions, poor quality planting material, improper intercropping practices, inadequate application of fertilizers. The most crucial cause is irrigation, and it is a critical factor for getting low yields in the study area.

Table-3: Productivity Difference in Palm during Peak and Lean Season (Tones per Acre)

Farm Size	Marginal	Small	Medium	Large
Exotic variety				
Productivity in the peak season	7.35	6.88	6.99	6.75
Productivity in the lean season	5.93	5.40	5.59	5.99
Productivity difference in the two-season	1.42	1.48	1.40	0.76
Percentage Difference	23.95	27.41	25.04	12.69
Indigenous variety				
Productivity in the peak season	21.63	14.73	14.46	10.22
Productivity in the lean season	17.52	11.85	11.66	8.20
Productivity difference in the two-season	4.11	2.88	2.80	2.02
Percentage Difference	23.46	24.30	24.01	24.63

Source: Field Survey Data Collected by AERC, University of Madras

Table-4: Percentage Area under Oil Palm Age wise

Farm Size	Marginal	Small	Medium	Large
The age-wise difference in the area				
Percentage area with bearing period up to 2 years	1.00	2.00	5.00	2.50
Percentage area with bearing period 3 to 5 years	1.13	2.19	3.61	5.45
Percentage area with bearing period 6 to 10 years	1.05	2.28	3.50	2.36
Percentage area with bearing period 11 to 15 years	0.00	2.20	3.33	5.00
Percentage area with bearing period 16 to 20 years	0.00	3.00	5.00	0.00
Percentage area with bearing period above 20 years	0.00	0.00	0.00	0.00
Total	3.18	11.67	20.44	15.31
The age-wise difference in productivity (tones per acre)				
Productivity with bearing period up to 2 years	0.00	0.00	0.00	0.00
Productivity with bearing period 3 to 5 years	0.00	1.58	3.97	3.00
Productivity with bearing period 6 to 10 years	21.47	14.90	17.25	12.24
Productivity a with bearing period 11 to 15 years	0.00	16.27	15.58	24.60
Productivity with bearing period 16 to 20 years	0.00	26.00	21.20	15.40
Productivity with bearing period above 20 years	0.00	0.00	0.00	0.00
Total	21.47	58.75	58.00	55.24

Source: Field Survey Data Collected by AERC, University of Madras

The percentage of area under oil palm is given in Table-4. The marginal farmers cultivate 1 acre and as compared with 5 acres for medium farmers. The marginal, small, medium and large farmers undertake palm cultivation at high risk and opportunity cost. They bear the tremendous opportunity cost high with no inflow of cash during the entire gestation period of 3 years before palm starts carrying FFBs. Zero. It implies that the majority of the farmers are cutting down the palm oil tree after 15 years period. The farmers are interested in cultivating alternative crops, and therefore production has decreased.

The marginal farmers recorded the highest yield of 21.47 tonnes as against to 12.24 tonnes for large farmers annually for ten years. The small farmers recorded the highest yield of 26 tonnes as compared with 15.4 tonnes for larger farmers after bearing twenty years. After that, the palm plantation cut off their plants due to dry conditions and lack of availability of water. Some marginal farmers uprooted their plants after 10-15 years. It implies that the yield of palm plantation mainly depends upon its age.

The percentage area under palm plantation gives the highest yield. The average yield per acre by small farmers worked out to 26 acres against 1.58 tonnes for small farmers. The modern high-yielding varieties of palm produce the highest return due to climate conditions and proper management. Even though, non-availability of quality indigenous planting material in proportion to the area expansion is the main problem. The second constraint is non-availability of processing mills within the district. The third constraint is inadequate water. It leads to no opening of spear leaves and decreases leaf production rate. Deficit availability of moisture adversely affects yield, both in terms of the number of bunches and their weights.

Net Returns from Indigenous versus Exotic Varieties of Oil Palm

The net returns per acre from oil palm for exotic variety (Rs per Acre) are presented in Table-5. The total cost of cultivation can be classified into two broad categories, such as establishment cost (E.C.) and maintenance cost (MC). The total cost of farming, including fixed cost value, is estimated at Rs. 36,932/acre. The average production costs of a mature plantation estimated are at Rs. 36,932. The major cost components are weeding (14.38 per cent), fertilizers (12.38 per cent), land preparation (10.84 per cent) and harvesting cost (9.86 per cent). The marginal farmers are spending the fertilizer costs with 14.13 per cent. The average price of establishing for mature palm area is about Rs.32, about 510 for the first three years.

Cost of production depends on land productivity besides the cost of cultivation. In terms of land-use, oil palm gives the highest yield per acre area as compared with any other crops like paddy, sugarcane, cotton and pulses. The average oil yield per acre for oil palm is 7.70 tonnes, as compared with paddy, sugarcane, cotton and pulses, respectively. The production per acre for small farmers estimated is at 7.07 tonnes as compared with 8.36 tonnes for large farmers. There is considerable potential for small holdings to increase output on existing acreages through the use of fertilizer and new genetic stock. Increasing the yield of palm oil production gives the potential to increase production without requiring additional land conversion. Land-use returns from oil palm are significant as compared with many other forms of land-use. Due to low levels of mechanization, large oil palm plantations are labour-intensive.

Table-5: Net Returns per Acre from Oil Palm: Exotic Variety (Rs per Acre)

Farm Size	Marginal	Small	Medium	Large	Total
Average Area Planted (acres)	1.05	2.07	3.43	4.79	2.84
Preparatory tillage	4006.35 (10.65)	4014.27 (10.87)	3976.42 (10.83)	4012.09 (11.0)	4002.28 (10.84)
Manure & FYM	5313.12 (14.13)	4313.39 (11.68)	4327.04 (11.78)	4352.0 (11.93)	4576.39 (12.38)
Major and minor nutrients	998.98 (2.66)	1008.9 (2.73)	1000.97 (2.73)	1005.3 (2.760)	1003.54 (0.0)
Transplanting and gap filling	2954.41 (7.86)	2951.63 (7.99)	2940.55 (8.01)	2945.75 (8.08)	2948.09 (7.98)
Irrigation charges	1611.57 (4.29)	1610.96 (4.36)	1609.85 (4.38)	1606.58 (4.40)	1609.74 (4.36)
Inter cultural operations	1602.63 (4.24)	1601.6 (4.34)	1610.85 (4.39)	1592.04 (4.36)	1601.78 (4.34)
Plant protection chemicals	1069.18 (2.84)	1078.48 (2.92)	1091.98 (2.97)	1070.95 (2.94)	1077.65 (2.92)
Weeding and plant protection measures	5306.26 (14.11)	5300.01 (14.35)	5310.17 (14.46)	5329.55 (14.61)	5311.50 (14.38)
Harvesting and collection	3652.59 (9.71)	3682.05 (9.97)	3632.27 (9.89)	3598.8 (9.87)	3641.43 (9.86)
Pruning	3112.57 (8.28)	3118.02 (8.44)	3110.61 (8.47)	3117.92 (8.55)	3114.78 (8.44)
Grading, storage, transport, packing	-	-	-	-	-
Market/mandi fee etc.	-	-	-	-	-
Interest on Working Capital#	-	-	-	-	-
Variable labour cost	3548.29 (9.44)	3845.43 (10.41)	3675.9 (10.01)	3423.24 (9.38)	3623.22 (9.41)
Total Variable Cost	33175.95 (88.23)	32524.74 (88.07)	32286.61 (87.93)	32054.22 (87.88)	32510.38 (88.03)
Fixed cost including planting material, field preparation cost, supporting material and irrigation setup (Amortized over the lifetime)###	4427.55 (11.73)	4405.05 (11.93)	4430.91 (12.07)	4421.62 (12.12)	4421.28 (11.97)
Total Cost	37603.5 (100.0)	36929.79 (100.0)	36717.52 (100.0)	36475.84 (100.0)	36931.66 (100.0)
Total Revenue	42441.50	38451.40	40695.10	43455.10	41261.00
Total Revenue - Total Cost	4838.00	1521.61	3977.58	6979.26	4329.34
Total Revenue - Variable Cost	9265.55	5926.66	8408.49	11400.88	8750.62
Output produced per acre (in Tonnes)	8.36	7.6	7.77	7.07	7.70

Source: Field Survey Data Collected by AERC, University of Madras

Note: All variable cost items consist of two components: Bearing period cost - that is already during the reference period (i.e., 2015-16)

Cost during the plantation year/gestation period - that has been brought into the 2015-16 prices from the year of plantation /gestation, using the wholesale price index of all commodities for Karnataka state. @ Repair, maintenance and depreciation is 10% discounted value of agricultural assets holdings including tractor & implements and tubewell motor etc. that is divided in proportionate to each crop sown during the year.

Interest on working capital is interest paid on the loans/borrowing divided in proportionate to each crop planted

during the year. ## For amortization refers to the literature Subrahmanyam and Mohandoss (1982), Misra (1992), Sarma (1996),

Chand (1994) – the details given in Chapter Plan References

Table-6: Net Returns per Acre from Oil Palm: Indigenous Variety (Rs per Acre)

Farm Size	Marginal	Small	Medium	Large	Total
Average Area Planted (acres)	1.62	2.36	3.59	5.60	
Preparatory tillage	3743.81 (10.57)	2827.76 (7.53.0)	3397.22 (8.71)	3068.12 (8.24)	3259.23 (8.74)
Manure & FYM	3852.08 (10.87)	4261.34 (11.35)	4810.13 (12.34)	5333.57 (14.32)	4564.28 (12.24)
Major and minor nutrients	2947.61 (8.32)	3170.65 (8.44)	3109.08 (7.97)	2989.18 (8.03)	3054.13 (8.19)
Transplanting and gap filling	2947.61 (8.32)	3439.45 (9.16)	3282.99 (8.42)	2943.56 (7.90)	3153.40 (8.45)
Irrigation charges	1557.71 (4.40)	1868.97 (4.98)	1783.10 (4.57)	1605.64 (4.31)	1703.86 (4.57)
Inter cultural operations	1589.55 (4.49)	1858.97 (4.95)	1790.92 (4.59)	1602.92 (4.30)	1710.59 (4.59)
Plant protection chemicals	1040.99 (2.94)	1248.81 (3.33)	1191.06 (30.06)	1069.92 (2.87)	1137.70 (3.05)
Weeding and plant protection measures	5243.47 (14.80)	5035.29 (13.41)	5901.44 (15.14)	5299.42 (14.23)	5369.91 (14.40)
Harvesting and collection	3570.02 (10.08)	4261.34 (11.35)	4064.26 (10.42)	3629.02 (9.74)	3881.16 (10.41)
Pruning	1571.01 (4.43)	1840.01 (4.90)	1758.51 (4.51)	1610.31 (4.32)	1694.96 (4.54)
Grading, storage, transport, packing	-	-	-	-	-
Market/mandi fee etc.	-	-	-	-	-
Interest on Working Capital##	-	-	-	-	-
Variable labour cost	2809.00 (7.93)	3117.10 (8.30)	3451.11 (8.85)	3614.17 (9.71)	3247.85 (8.71)
Total Variable Cost	30872.86 (87.15)	32929.69 (87.70)	34539.82 (88.59)	32765.83 (87.99)	32777.05 (87.88)
Fixed cost including planting material, field preparation cost, supporting material and irrigation setup including that of the gestation period (Amortized over the lifetime)###	4550.55 (12.85)	4617.59 (12.30)	4446.70 (11.41)	4474.35 (12.01)	4522.30 (12.12)
Total Cost	35423.41 (100.0)	37547.28 (100.0)	38986.52 (100.0)	37240.18 (100.0)	37299.35 (100.0)
Total Revenue	89,479.50	88,002.04	87,426.44	60,725.52	81,285.24
Total Revenue - Total Cost	54056.09	50454.76	48439.92	23485.34	43985.89
Total Revenue - Variable Cost	58606.64	55072.35	52886.62	27959.69	48508.19
Output produced per acre (in tonnes)	15.95	16.52	16.23	11.4	15.02

Source: Field Survey Data Collected by AERC, University of Madras

Note: All variable cost items consist of two components:

Bearing period cost - that is already during the reference period (i.e., 2015-16)

Cost during the plantation year/gestation period - that has been brought into the 2015-16 prices from the year of plantation

/gestation, using the wholesale price index of all commodities for Karnataka state.

@ Repair, maintenance and depreciation is 10% discounted value of agricultural assets holdings including tractor & implements and tubewell motor etc. that is divided in proportionate to each crop sown during the year.

Interest on working capital is interest paid on the loans/borrowing divided in proportionate to each crop sown during the year.

For amortization refers to the literature Subrahmanyam and Mohandoss (1982), Misra (1992), Sarma (1996),

Chand (1994) – the details given in Chapter Plan References

In a majority of palm oil plantations, the small holders are involved and the income generation is higher than other competing crops. While incomes earned by small holders vary widely and are impacted by market access, international pricing, and the form of smallholder engagement, many smallholders their income from oil palm cultivation is significantly higher than income from subsistence farming or from competing cash crops. The farmers incur higher transport costs. Every time the farmers are spending high amounts on transport cost. The concerned company should take it carefully.

Out of various cost components, costs on weeding (14.4 per cent), fertilizers (12.24 per cent), harvesting (10.41 per cent), land preparation (8.74 per cent), transplantation (8.45 per cent) and nutrients (8.19 per cent) constitute 63.4 per cent of the total cost of cultivation. On the other hand, plant protection (3.05 per cent), pruning (4.54 per cent), irrigation charges (4.57 per cent) inter-cultural operations (4.59 per cent) constitute the lowest costs incurred. Among the indigenous varieties, the total cost of cultivation worked out to Rs. 37,299 of which, medium farmers spent the highest price of Rs. 38,986 as against the lowest price paid by marginal farmers (Rs. 35,423). The total income of the farmers calculated is to be Rs. 81,285 and of that, marginal farmers receive the highest revenue of Rs. 89,480 and lowest income earned is by large farmers (Rs. 60,725). The net income received is Rs. 62,556. The marginal farmers got the highest profit of Rs. 82,274 as compared with Rs. 34,834 for large farmers. The average outputs produced by the farmers have increased to 15.02 tonnes. The small farmers recorded the highest production of 16.52 tonnes as compared with 11.4 tonnes for large farmers. The farmers incur more cost during the harvesting time to clear the wastage from the trees. There are substantial incidental charges at the time of harvesting.

Subsidy Received by Households Growing Oil Palm

The Government of India has identified the potentiality of the oil palm and offering the subsidy for the farmers. The State Departments of Agriculture has given support to promoting the crop. It also provided the grant for seed material as well as cultivation practices during the juvenile stage.

Table-7: Subsidy Received for Growing Palm Oil (Rs per Acres)

S. No	Details of subsidy received	Marginal	Small	Medium	Large	Total
Details of activities for which subsidy received (% of households)						
1	Establishment/provision of seed	25.19	24.74	25.09	25.15	25.05
2	Planting material	29.61	29.87	29.65	29.75	29.72
3	Installation of pump set	0	0	0	0	0
4	Bore well/water harvesting /ponds	0	0	0	0	0
5	Establishment of drip irrigation	0	0	0	0	0

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S. No	Details of subsidy received	Marginal	Small	Medium	Large	Total
6	Establishment of sprinkler irrigation	0	0	0	0	0
7	Inputs for intercropping seed, fertilizer	11.05	11.05	10.99	11.09	11.05
8	Construction of vermi compost unit	5.71	5.67	5.69	5.72	5.70
9	Machinery and other tools	13.68	13.87	13.87	13.47	13.72
10	Tree guard	0	0	0	0	0
11	Maintenance cost- gestation period	14.76	14.80	14.71	14.81	14.77
12	Harvesting incentives	0	0	0	0	0
13	Oil palm processing unit	0	0	0	0	0
14	Farmer's training and information	0	0	0	0	0
15	Demonstration, farmers visit etc.	0	0	0	0	0
Amount of subsidy received (Rs per household)						
1	Establishment/provision of seed	2670.71	2609.32	2667.26	2657.52	10604.81
2	Planting material	3139	3150.39	3151.76	3142.95	12584.1
3	Installation of pump set	0	0	0	0	0
4	Bore well/water harvesting /ponds	0	0	0	0	0
5	Establishment of drip irrigation	0	0	0	0	0
6	Establishment of sprinkler irrigation	0	0	0	0	0
7	Inputs for intercropping seed, fertilizer	1171.64	1165.62	1168.16	1171.64	4677.06
8	Construction of vermi compost unit	605.45	597.55	604.42	604.74	2412.16
9	Machinery and other tools	1449.9	1462.42	1474.4	1423.57	5810.29
10	Tree guard	0	0	0	0	0
11	Maintenance cost-gestation period	1565.38	1560.45	1563.52	1564.38	6253.73
12	Harvesting incentives	0	0	0	0	0
13	Oil palm processing unit	0	0	0	0	0
14	Farmer's training and information	0	0	0	0	0
15	Demonstration, farmers visit etc.	0	0	0	0	0
Amount of subsidy received (Rs per acre of palm oil planted)						
1	Establishment/provision of seed	2487.14	2646.82	2644.15	2694.15	10472.26
2	Planting material	2923.24	3146.78	3145.93	3128.78	12344.73
3	Installation of pump set	0	0	0	0	0
4	Bore well/water harvesting /ponds	0	0	0	0	0
5	Establishment of drip irrigation	0	0	0	0	0
6	Establishment of sprinkler irrigation	0	0	0	0	0
7	Inputs for intercropping seed, fertilizer	1091.11	1168.79	1178.36	1146.79	4585.05
8	Construction of vermi compost unit	563.84	602.44	609.73	612.44	2388.45
9	Machinery and other tools	1350.24	1454.63	1451.86	1459.63	5716.36
10	Tree guard	0	0	0	0	0
11	Maintenance cost- gestation period	1457.78	1573.08	1562.39	1578.08	6171.33
12	Harvesting incentives	0	0	0	0	0
13	Oil palm processing unit	0	0	0	0	0
14	Farmer's training and information	0	0	0	0	0
15	Demonstration, farmers visit etc.	0	0	0	0	0

Source: Field Survey Data Collected by AERC, University of Madras

Significant assistance for planting material, cultivation and drip irrigation could be made available under the OPDP scheme. The Government is assisting in planting material with 85 per cent of the cost of seedlings with a ceiling of Rs.8,000/ha, for entire landholding of the farmer. The other aid is cultivation cost with 50 per cent of the cost of inputs during the gestation period of 4 years. The assistance for drip irrigation will be 50 per cent of the value for small, marginal, S.C., S.T. and Women farmers and for other categories of farmers the aid will be 35 per cent of the total cost of the prevailing competitive market rate. Help for diesel pump sets because of the shortage of power, is 50 per cent of the price

subject to a maximum of Rs. 15,000 for installation of diesel pump sets will be provided, at least to those farmers who take up 5 ha. The fourth assistance is vermin compost worth of Rs. 15,000/ha and cutter (Rs. 1,500/ha), protective wiring (Rs. 15,000/ha.) and Metered Diesel (Rs. 10,000/ha.) (National Mission on Oilseeds and Oil Palm in Tamil Nadu, 2015-16).

The subsidy received for growing palm oil in the study area is given in Table-7. Out of various subsidies, planting material is one of the highest grants provided by the Government to the farmers. The plantation material each household received was at Rs. 3,146 followed by the establishment of seed cost worth of Rs. 2,651. The third highest subsidy received by the farmers is maintenance cost (Rs. 1,563) and supported by machinery tools (Rs. 1,453).

Farmers Motivation and their Perception of Oil Palm Cultivation

Table-8: What Motivated Farmers to Grow Oil Palm Crop (Percent of households)

Details of Training	Marginal	Small	Medium	Large	Total
What motivated farmers to grow oil palm					
High Yielding from Oil Palm Cultivation	7.50	11.00	10.50	11.00	40.00
More Profit from Oil Palm Cultivation	8.50	15.00	10.50	8.00	42.00
Less labour uses	5.00	7.00	4.00	2.00	18.00
Total	21.00	33.00	25.00	21.00	100.00
Who provided technical knowhow?					
Godrej Agrovet Private Ltd	15.00	19.00	16.00	13.50	63.50
Dept. of Agriculture, Govt. of Tamil Nadu	4.50	7.50	2.50	3.00	17.50
Fellow Farmers	1.50	6.50	6.50	4.50	19.00
Total	21.00	33.00	25.00	21.00	100.00
Farmer's knowledge about the existing varieties					
Yes	3.50	13.00	4.00	4.00	24.50
Why growers prefer particular variety, they grow					
Good Yield received	10.50	22.50	15.00	15.00	63.00
The government support received in growing oil palm					
Financial Assistance from Government	9.00	18.50	13.00	12.50	53.00
Subsidy Assistance from Government	12.00	17.00	12.00	8.00	49.00
Total	21.00	34.00	25.00	20.00	100.00
Support received from oil palm procuring company					
Nursery and Planting Material provide	13.00	23.50	18.00	11.00	65.50
Procurement facilities arrangement	8.00	9.50	7.00	9.50	35.50
Total	21.00	33.00	25.00	20.50	100.00

Source: Field Survey Data Collected by AERC, University of Madras

The percentage of planting material subsidy to the total support per household is at 29.72 per cent, followed by the establishment of seed (25 per cent). The rate of maintenance subsidy is received at 15 per cent and supported by machinery tools (11.05 per cent). On the contrary, the lowest percentages of allowance are vermicompost (6 per cent).

The amount of subsidy received worked out to Rs. 10,420. Of which, the medium farmers receive the highest subsidy of Rs. 10,620 as compared with Rs. 9,873 for marginal farmers. It implies that all the farmers irrespective of size receive more or less the same kind of cash subsidy in the study area. It is gathered

that farmers, mainly marginal and small farmers, do not get the grants properly by the Government. The farmers are ignorant of the subsidies amount for different incentives. There is a need to scale up the incentives in a big way to accelerate area expansion. The second is to increase the subsidies for oil palm growers in the study area.

The motivated farmers who grow oil palm crop from the farmer's perception are given in Table-8. About 42 per cent and 40 per cent perceive that they are motivated by way of high yields and profit earning opportunities from oil palm growing. The Department of Agriculture, Government of Tamil Nadu, Godrej Agrovet Ltd and Fellow farmers, are providing technical support to the farmers in the village. Sixty-four per cent, 19 per cent and 17 per cent reported that they had received the professional backing of Godrej Agrovet Ltd, Fellow farmers and Department of Agriculture, Government of Tamil Nadu. It implies that Godrej Agrovet Ltd is providing technical support to the farmers. Two-third of the technical support is provided by the Godrej Agrovet Ltd and Fellow farmers.

Table-9: Did Government Help Households to Increase their Area under Oil Palm (Percentage of households saying yes to the following questions)

Description	Marginal	Small	Medium	Large	Total
Making available good quality seedling	13.50	14.08	14.35	15.28	14.30
Making available good quality other planting material	14.50	15.16	16.14	15.28	15.27
Making available intercropping facility like a seed, fertilizer for the intercrop	14.00	18.77	13.00	12.50	14.57
Making provision for pump house for sufficient irrigation	0.00	0.00	0.00	0.00	0.00
Facilitating for drip/sprinkler irrigation	0.00	0.00	0.00	0.00	0.00
Protected cultivation like green house, shade net, plastic tunnel etc	0.00	0.00	0.00	0.00	0.00
Making provision for buy back of FFB through a company	100.0	100.0	100.0	100.0	100.0
Promotion of integrated nutrient management or integrated pest management	14.00	15.88	13.00	15.28	14.54

Source: Field Survey Data Collected by AERC, University of Madras

The farmer's knowledge about the existing oil palm varieties is abysmal in the study area. About 25 per cent viewed that they have no information about the current types. The farmers are using the varieties without knowing the features. The main motive of the oil palm growers prefers the variations due to the excellent yielding for an extended period. Sixty-three per cent viewed that the growers prefer particular variety due to yielding functional capacity.

The oil palm growers generally receive the government support in Tamil Nadu. The Government provides two components, like financial assistance and subsidy. Fifty-one per cent and 49 per cent viewed that they receive the financial aid and allowance from Government. It implies that the economic and allowance assistance provided is with an equal share in the study area. Godrej Agrovet Ltd also provides support to the farmers for the oil palm cultivation. Sixty-six per cent and 34 per cent reported that they received nursery and planting material and procurement facilities to the farmers from the concerned company. It implies

that all the farmers are receiving nursery and planting and procurement facilities. The companies have helped establish nurseries for the oil palm plantation in 11 districts of Tamil Nadu.

Table-10: Perception of Growers about the Oil Palm Cultivation (Percent of Households)

Details of training	Marginal	Small	Medium	Large	Total
How the Government has helped you to increase your area under oil palm					
By providing seedling/nursery	21.00	33.00	25.00	21.00	100.00
By providing material inputs	11.00	19.50	13.50	12.50	57.00
By capacity building (providing training)	9.50	11.50	12.00	13.00	46.00
By providing processing facilities	21.00	21.50	17.00	15.00	75.00
By providing a pre-harvest contract through buyback by a company	21.00	33.00	25.00	21.00	100.00
By providing procurement facility	21.00	33.00	25.00	21.00	100.00
Total	100.00	100.00	100.00	100.00	100.00
What are the good points in the policy towards palm oil					
Financial assistance	12.00	17.00	8.00	8.50	46.00
Building infrastructure	6.00	9.00	7.00	8.50	31.00
Capacity Building (awareness camps)	13.00	22.00	16.00	12.00	63.00
Subsidy provision	13.50	24.50	16.00	11.50	66.00
Any other	0.00	0.00	0.00	0.00	0.00
Total	21.00	32.00	25.00	21.00	100.00
Do you think your income has grown up after cultivation of oil palm crop, if yes how much?					
Less than 20 Percent	16.50	25.00	14.00	9.50	65.00
20 to 40 Percent	4.00	6.00	7.50	6.00	24.00
40 to 60 Percent	0.00	0.00	0.00	0.00	0.00
60 to 100 Percent	0.00	0.00	0.00	0.00	0.00
No increase at all	0.50	1.00	3.50	5.50	10.50
Total	44.50	72.50	47.00	40.50	100.00

Source: Field Survey Data Collected by AERC, University of Madras

The Government assists households in increasing their area under oil palm, which is presented in Table-9. All reported about the making of provision for buyback of FFB through a company. All the farmers are selling their fruits to the Godrej Agrovet Private Ltd, Ariyalur. About 14.30 per cent of the farmers reported that the company is making available good quality seed. 13.50 per cent and 15.28 per cent for the marginal farmers and large farmers viewed that the quality of seeds was good. 15.27 per cent considered that good quality of planting materials was provided. Fifteen per cent saw that intercropping facility like a seed; fertilizer for the intercrop was made available in the study area. 14.54 per cent viewed that the promotion of integrated nutrient management or integrated pest management has been undertaken. It implies that the quality of seed is useful in normal conditions. The intercropping facilities like fertilizers, seeds are available to the farmers without short supply. The integrated nutrient management or integrated pest management is possible only marginally.

The perception of growers about the oil palm cultivation in the study area is given in Table-10. Cent per cent of the farmers reported that they were provided with seeds for palm oil cultivation. The seeds nurseries provided are by the Godrej Agrovet Private Ltd, Ariyalur. Cent per cent expressed that they were provided with a pre-harvest contract through buyback by a company. The Godrej Agrovet Private Ltd arranged to buy the fruits from the farmers. The concerned company

maintains the seed gardens. Input is another significant subsidy, and 56.5 per cent viewed that the Government are providing material inputs.

Subsidy and financial aid are provided to the farmers by the Government and the banks, respectively. Sixty-five per cent of farmers took the grant by the Government positively, and forty-six per cent of farmers reported that they received adequate financial aid by the cooperative institutions and banks. It implies that the special allowance and financial support are provided to the farmers for growing palm oil in the study area.

The generation of income from oil palm cultivation has recently become a source of income to the farmers. More than 64 per cent of those households saw an increase in the revenue by 20 per cent after engagement in oil palm cultivation. About 24 per cent who engaged in oil palm cultivation had shown improvements in their income by 20 to 40 per cent over some time. We found that oil palm cultivation is not the only source of household income. Oil palm cultivation contributed 88.5 per cent of the total family income. From household survey data in Cuddalore and Thanjavur Districts of Tamil Nadu, the proportion of income varied from oil palm cultivation ranging from 64 per cent to 88 per cent. The structure of the relationship between farmers and the plantation company that buy their fruits is a significant determinant of farmer's income. There are several significant variabilities, even within these types. The farmers are free to sell to only to the Godrej Agrovet Ltd. The farmers have access to support through access to credit, technical assistance, FFB transport or other means from the Godrej Agrovet Ltd. The average income from oil palm cultivation is significantly higher than income from other crops in the study area.

Summary and Conclusions

The area under indigenous varieties is 12.68 acre as compared with 11.34 acre for exotic varieties. Farmers are using more indigenous than exotic varieties. Among the indigenous varieties, the small and medium farmers cultivate 30.3 per cent and 29.8 per cent, respectively. The productions for indigenous and exotic varieties are 15.02 tonnes and 7.70 tonnes annually. It implies that the indigenous varieties are produced more than the exotic varieties due to the long period (10 to 20 years) plantation. Whereas for exotic varieties, three to five years plantation. The outputs for indigenous and exotic cultivators are Rs. 81,285 and Rs. 41,261/acre, respectively. The output for indigenous and exotic varieties per household is Rs. 3,02,002 and Rs. 1,18,001 respectively.

The indigenous varieties have a higher recovery to extraction ratio than the exotic types. The domestic price of oil palm significantly influences the production capacity. There are continuous drought conditions. There is also the problem of improper and inadequate nutrition guidance for new plantations. It results in lower FFB yields and low Oil Extraction Ratio.

The small farmers recorded the highest yield of 26 tonnes as compared with 15.4 tonnes for larger farmers after bearing twenty years. After that, the palm plantations are uprooted due to dry conditions and lack of availability of water. Some marginal farmers uproot their plants after 10-15 years. It implies that the yield of a plantation mainly depends upon its age. The age-specific land productivity of oil palm garden is taking into consideration the entire economic life span. The modern high-yielding varieties of palm produce the highest yield due to climatic conditions and proper management. Even though, non-availability

of quality indigenous planting material in proportion to the area expansion is the main problem. The second constraint is non-availability of processing mills within the district. The third constraint is inadequate water. It leads to no opening of spear leaves and decreases leaf production rate. A deficit in the availability of moisture adversely affects yield, in terms of several bunches and weights.

Average production costs for exotic varieties is Rs. 36,932. The major cost components are weeding (14.38 per cent), fertilizers (12.38 per cent), land preparation (10.84 per cent) and harvesting cost (9.86 per cent). It is found that there is considerable potential for smallholders to increase output on existing acreages through the use of fertilizer. Due to low levels of mechanization, large oil palm plantations are labour-intensive. Majorities of palm oil plantations operated are with smallholders. While incomes earned by smallholders vary widely and are impacted by market access, international pricing, and the form of smallholder engagement, for many smallholders, their income from oil palm cultivation is significantly higher than income from subsistence farming or from competing cash crops.

Among indigenous varieties, costs on weeding (14.4 per cent), fertilizers (12.24 per cent), harvesting (10.41 per cent), land preparation (8.74 per cent) and transplantation (8.45 per cent) and nutrients (8.19 per cent) constitute 63.4 per cent of the total cost of cultivation. On the other hand, plant protection (3.05 per cent), pruning (4.54 per cent), irrigation charges (4.57 per cent) and inter-cultural operations (4.59 per cent) constitute the lowest costs incurred. The prices of cultivation are Rs. 37,299 and the total incomes calculated are to Rs. 81,255.

The plantation material is received at Rs.3,146 and followed by the establishment of seed cost (Rs. 2,651). The third highest subsidy is maintenance cost (Rs. 1,563) and supported by machinery tolls (Rs.1,453). The planting material per household is received at 29.72 per cent and followed by the establishment of seed (25 per cent). The maintenance subsidy is received at 15 per cent and supported by machinery tools (11.05 per cent). On the contrary, the lowest grants are vermicompost (6 per cent). Among the planting material subsidy, all the sizes of farmers are receiving more or less same cash kind of support. Whereas for the establishment of seed, the four types of farmers accept the same cash.

The amount of subsidy is Rs. 10,420. The medium farmers receive the highest subsidy of Rs. 10,620 as compared with Rs. 9,873 for marginal farmers. It implies that all the farmers irrespective of size receive more or less the same kind of cash subsidy. It is gathered that farmers, mainly marginal and small farmers, do not get the grants properly by the Government. The farmers are ignorant about the subsidies amount for different incentives. There is a need to scale up the incentives in a big way to accelerate area expansion.

The Department of Agriculture, Government of Tamil Nadu, Godrej Agrovet Ltd and Fellow farmers, are providing technical support to the farmers. Cent per cent reported that they were supplied with for growing oil palm. The seeds nurseries are provided by the Godrej Agrovet Private Ltd, Ariyalur. Cent per cent expressed that they were provided with a pre-harvest contract through buyback by a company. The Godrej Agrovet Private Ltd arranges to buy the fruits from the farmers.

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Assets Inequalities: A Study of Antharagange Gram Panchayat in Shivamogga District of Karnataka

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Abstract

The present study is carried in Shivamogga district, Antharagange Gram Panchayat (GP) of Karnataka state. The objective of the work is to investigate if there are any economic inequalities among the castes in Antharagange, through the households who participated in MGNREGA manual labour work during 2016-17, 2015-16 and 2014-15. For the study a sample of 30 actively participated households and 10 in-active households were selected. The primary data was collected during the month of March-May, 2018. The main findings of the study are that caste and asset inequalities are interlinked, where age and education of the head of the household are vital. The study observed that where there is a household belonging to Schedule Caste the household is having more man days. The study points out that the actively participating households in the MGNREGA are having semi-pucca houses and 70 per cent in, in-active participated households have pucca houses. It is also observed that the average income of households that are actively participating and are in-active have asset inequalities. The study observes that government support in providing land for the weaker sections of the village i.e, SCs / STs would reduce the asset inequalities.

Keywords: Participation of MGNREGA Active and Inactive Households, Economic Assets Inequalities, Antharagange GP in Karnataka

Introduction

Social status is different from household to household in rural India. People from different social, cultural, economic, and religious background live together in villages. For survival of villagers they need minimum basic economic assets. For the gaining of economic assets people are working in different occupations and though they are being able to earn and generate income, asset creation is subject

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to caste biases. Due to persistent following of discrimination in rural India for centuries, the culture differs from caste to caste and religion to religion there is a divide in rural and urban practice of culture in day to day life. The cultural practices are varying from community to community and from place to place (Peter Pesala and Maruthi 2019). Similarly, the economic conditions are greatly influenced by the culture. A person having more economic assets; he/she may be more comfortable and confident in his/her life. Due to income inequalities for long, households in acquisition with more land influence entire society due of their asset possession advantage. After Independence, the Government introduced land reform through Land Ceiling Act, due to which some of the land owners have returned their uncultivated, barren land to the government. The government has distributed this land to the landless workers. This helped the most in the weaker sections of rural India. Fact Sheet (2006) stated that the Dalits suffered throughout from displacement from land for ages in India. According to the study the Bhoodan movement was introduced in Telangana region of Andhra Pradesh and its success was more on paper. Overall, the study reveals that inequalities are higher between Dalit and non-Dalits in India. The study analyzed the SC, STs and others in land holdings and land sizes in different places of India. But there exists high inequalities among the social groups particularly among the Dalits.

The SCs work with their small land holdings and simultaneously work as agricultural labour in their villages. In the above background, the present study tries to find the economic asset inequalities in the Antharagange Gram Panchayat (GP) of Shivamogga district in Karnataka State. For the purposes of analysis the study had chosen economic variables such as the caste of the family, age of the head of the family, status of education, primary occupation, average work man-days, house type, particulars of land, landholdings and income of the households. The main objective of the paper is to investigate the economic inequalities among the castes in Antharagange GP in Karnataka State.

Methodology

This present work is a part of research project entitled “decade of MGNREGA: participatory assessments and way forward”. The state of Karnataka is divided into a total of 30 districts. The study had chosen purposively Shivamogga district in Karnataka state. In Shivamogga district Antharagange GP selected for the study. In Antharagange GP who participated MGNREGA manual labour work during 2016-17, 2015-16 and 2014-15, 30 active participated households were selected. The 30 active participated selected through transit walk during our filed visit. In addition to that 10 in-active participated households also were selected. The objective of the study is to investigate the economic inequalities among the castes in Antharagange GP.

Results and Discussion

Head of the Family

As a prime bread winner the head of the family is very important for household. For any family decision head plays a vital role. As per the study, among the active

participated households of MGNREGA, 87 per cent of the head of the family is male and remaining of the 13 per cent of them are female. Only in case the head of the family dies then women will be the head of the house hold. Also in case of separation the household will have a women heading the household. The study found that Men are head of the family in cent per cent households of BC and ST households, whereas in case of SC and OC it stood at 70 and 50 percent respectively. In other words about 30 and 50 per cent head of the households were women in SC and OC categories. In a similar way, 80 per cent of the head of the households in in-active household, head of the family is male and 20 per cent of them are female (see Table-1). It was observed that were the women were head of the households were mostly widows or single.

Age of the Head

Age is a influencer to motivate and carry progressive work in his/her family life. In 60 percent active households, the age of the head of the family is between 41-60, followed by 17 percent in 31-40, 13 percent in 25-30 and 10 per cent in 61-70. Reviewing the caste, in the social group OC and ST about cent percent were between 41-60 years, 47 percent in BC and 60 perc cent in SC, the age of the head of the family is in the group. A mere 20 per cent in BC, 10 percent in SC households there are head of the family whose age is between 25-30 years. In case of in-active households, about 40 percent of the head of the households age is between 31-40 years, followed by 25-30 in 30 percent, about 20 percent in 41-60 and 10 per cent in 61-70.

Status of Education

Education is a main influencing factor that helps human beings to develop rational outlook. With the establishment of more schools and colleges in rural areas, there are fast changes in rural day to day life and in the structure of economy. The assumption is that there will be no place for superstitions and caste system in an educated society. In the place of traditional occupations, people may also adopt new occupations and adopt technology in easy manner. In an educated society, the people depend more on individual endowments rather on their caste or fate. Further, the education of the head of the family is the more important indicator of the development of society (Busenna and Snehalatha (2013) hence the present study also selected this indicator. Education is very important for human beings, without education in the society, day to day survival turns difficult. In the present study, 40 per cent of the active participated household the head of the household is illiterate, followed by 30 per cent with middle school education, 20 per cent with higher secondary school education and 10 per cent with secondary education. Among the castes in the study OCs are 100 per cent illiterates, followed by 67 per cent ST, 33 per cent BCs, and 30 per cent SCs. The active participated households' data indicate that, SCs are more educated than OCs, BCs and STs (Table-1). In a similar way, the in-active participated households, head of the education status is middle school / class is 40 per cent, followed by illiterates 30 per cent, higher education 20 percent and secondary education at 10 per cent. In caste wise, 50 percent SCs the head of the family is illiterate, followed by BCs at 30 per cent (see Table-1).

Table-1: Head of the Family Gender, Age and Education Status in Antharagange

Gender / Age / Education Classification	Active/ In-active	Name of the Social Group				
		OC	BC	SC	ST	Total
Gender classification	Male	1(50.0)	15(100)	7 (70.0)	3(100)	26(86.7)
	Female	1(50.0)	0(0.0)	3(30.0)	0(0)	4(13.3)
	active	2(100)	15(100)	10(100)	3(100)	30(100)
	Male	0(0.0)	6(75.0)	2(100)	0(0)	8 (80.0)
	Female	0(0.0)	2(25.0)	0(0.0)	0 (0)	2(20)
	In- active	0(0.0)	8(100.0)	2(100.0)	0 (0)	10 (100)
Age classification	Total	2(100)	23(100)	12(100)	3(100)	40 (100)
	25-30	0(0.00)	3(20.00)	1(10.00)	0(0.00)	4(13.33)
	31-40	0(0.00)	3(20.00)	2(20.00)	0(0.00)	5(16.67)
	41-60	2(100)	7(46.67)	6(60.00)	3(100)	18(60.00)
	61-70	0(0.00)	2(13.33)	1(10.00)	0(0.00)	3(10.00)
	Active	2(100)	15(100)	10(100)	3(100)	30(100)
	25-30	0(0.00)	3(37.50)	0 (0.00)	0(0.00)	3(30.00)
	31-40	0(0.00)	3(37.50)	1(50.00)	0(0.00)	4(40.00)
	41-60	0(0.00)	1(12.50)	1(50.00)	0(0.00)	2(20.00)
	61-70	0(0.00)	1(12.50)	0 (0.00)	0(0.00)	1(10.00)
	In- active	0(0.00)	8(100)	2(100)	0(0.00)	10(100)
	Total	2(100)	23(100)	12(100)	3(100)	40(100)
Educational Status	Illiterates	2(100)	5(33.3)	3(30.0)	2(66.7)	12(40.0)
	Primary education	0(0.0)	2(13.3)	0(0.00)	0(0.00)	2(6.7)
	Middle	0(0.0)	4(26.7)	5(50.0)	0(0.00)	9(30.0)
	Secondary*	0(0.0)	4(26.7)	2(20.0)	1(33.3)	7 (23.3)
	Active	2 (100)	15(100)	10(100)	3(100)	30(100)
	Illiterates	0(0.00)	2(25.0)	1(50.0)	0(0.00)	3(30.0)
	Middle	0(0.00)	4(50.0)	0(0.00)	0(0.00)	4(40.0)
	Secondary*	0(0.00)	1(12.5)	0(0.00)	0(0.00)	1(10.0)
	Higher education	0(0.00)	1(12.5)	1(50.0)	0(0.00)	2(20.0)
	In- active	0(0)	8(100)	2(100)	0(100)	10(100)
Total	2(100)	23(100)	12(100)	3(100)	40(100)	

Note: *Secondary education; Source: Primary data collected.

Primary Occupation

Occupation is very important for the rural households. 47 percent of the active participated households of MGNREGA the head of the families primary occupation is agriculture & allied activities, followed by daily wage labour at 43

per. Studying caste wise, it was found that SCs at 70 per cent, OCs at 50 per cent, STs at 33 per cent and BCs at 27 per cent head of the households main occupation is wage labour and it indicated that they are dependent on agricultural, non-farm, MGNREGA labour work and they are economically vulnerable in their day to day life. This is happening due to lack of sufficient land and economic resources. But, a majority of 73 per cent of BC households the head of the households main occupation is agriculture & allied activities and followed by 67 per cent STs, and 10 per cent SCs and the details are presented in Table-2. In case of in-active participated households head of the family primary occupation is agriculture & allied activities is 70 per cent followed by wage labour at 20 per cent. In caste wise, the study observed nearly cent per cent SCs, 63 per cent BCs, the households' main occupation is agriculture and allied activities, and whereas 25 per cent BC house holds the occupation of head is labour activities (Table-2). The study observed that households with their main occupation as agriculture & allied activities are having land and due to this reason they did not participate in MGNREGA rural labour work. However there are cases where the house hold main occupation is daily wage earnings but due to less labour wage offered in MGNREGA work as compared to local market they never participated in MGNREGA.

Average Work Man-days

The work days, nature of work and income are very important for households. The study observed that majority (18 hhs) of the average work days are 300 and followed by 350 (9 hhs), 200 (2 hhs) and 100 (1 hhs) days. Half of the SCs (5 hhs) head of the households are having more man days (350), followed by BCs (2 hhs), OCs (1 hh) and STs (1 hh). SCs are working willingly and voluntarily in different activities and their attitude also positive to work in the village due to this reason the average man days are higher as compared to other social groups in the village. In a similar way, the in-active participated head of the family members' average man days 300 in all nine households and only one woman did not work due to age related factor. The active participated households' average man days are higher than the non-active participated households. The total active participated and in-active participated head of the average man days are higher in OCs households (323, followed by STs (317), SCs (296) and BCs (278). It means that most of the BCs households are little bit contributed less man days (Table-2).

House type

House is very important asset for rural people. Without house, living is very difficult in rural areas. Almost all households are having own house at the time of the study. Owning house is important, but the type of house is very important. Based on the house type, rural households are able to get dignity and pride in the society. In our study active participated households, most (67%) of the households are having semi-pucca houses, followed by pucca (26%) and thatched/Kachcha (7%). The OCs and STs community households are 100 per cent semi-pucca households, whereas some of the BCs (13.3%) households are thatched/kachcha houses. In case of in-active participated households, 70 per cent of household have semi-pucca houses and 30 per cent were pucca houses. The pucca households are higher in BCs (2hhs) and SCs (1 household) (Table-2).

Table-2: Primary Occupation, Number of Man Day and House Type Details In Antharagange

Particulars	Active / In-active	Social Group				Total
		OC	BC	SC	ST	
Primary occupation	Agriculture & allied activities	0 (0.00)	11(73.3)	1(10.0)	2(66.67)	14(46.7)
	Mining & quarrying	1(50.00)	0(0.0)	0(0.00)	0(0.00)	1(3.3)
	Electricity, gas and water supply	0(0.00)	0(0.00)	2(20.0)	0(0.00)	2 (6.7)
	Labour (wage)	1(50.00)	4(26.7)	7(70.0)	1(33.33)	13(43.3)
	Active	2(100)	15(100)	10(100)	3(100)	30 (100)
	Agriculture & allied activities	0(0.0)	5(62.5)	2(100)	0(0.00)	7(70.0)
	Labour (wage)	0(0.00)	2(25.0)	0(0.00)	0(0.00)	2(20.0)
	Unable to work	0(0.00)	1(12.5)	0(0.00)	0(0.00)	1(10.0)
	In-active	0(0.00)	8 (100)	2(100)	0(0.00)	10(25.0)
	Total	2(100)	23(100)	12(100)	3(100)	40(100)
Average man-days	100	0(0)	0(0)	1(100)	0(0)	1(100)
	200	0(0)	1(200)	1(200)	0(0)	2(200)
	300	1(300)	12(300)	3(300)	2(300)	18(300)
	350	1(350)	2(350)	5(350)	1(350)	9(350)
	Active	2(323)	15(300)	10 (295)	3(317)	30(302)
	300	0(0)	7(300)	2(300)	0(0)	9(300)
	0	0(0)	1(0)	0(0)	0(0)	1(0)
	In-active	0(0)	8(263)	2(300)	0(0)	10(270)
	Total	2(323)	23(278)	12(296)	3(317)	40(294)
	House type	Thatched/Kachcha	0(0.00)	2(13.3)	0(0.00)	0(0.0)
Semi-pucca		2(100)	9(60.0)	6(60.0)	3 (100)	20(66.7)
Pucca		(0.00)	4(26.7)	4(40.0)	(0.00)	8(26.7)
Active		2(100)	15(100.0)	10(100.0)	3 (100)	30(100.0)
Semi-pucca		(0.0)	6(75.0)	1(50.0)	0(0.0)	7 (70.0)
Pucca		(0.0)	2(25.0)	1(50.0)	0(0.0)	3 (30.0)
In-active		(0.00)	8(100.0)	2(100.0)	0(0.00)	10(100.0)
Total	2(100)	23(100)	12(100)	3(100)	40(100)	

Source: Primary data collected

Particulars of Land

Birthal et al., (2014) study stated that the SCs and STs households considered landless and other resources and engaged low paid wages and less remunerative in non-farm activities in their villages. Land is an important asset. Without land survival is very difficult in rural area and land provides dignity in the society. Due to lack of land many rural people are migrating from one place to other place, village to urban or city. In our study active participated households, 67 per cent of them are having own land and remaining 33 per cent of them are not. Majority of

the BCs (73%) are having owning land and followed by SCs (67%), STs (60%) and OCs (50%) have the land. In contrary that, 50 per cent of OCs, and 40 per cent of STs, SCs (33%) and BCs (27%) did not have own land during our study period. Among the social groups, no land households are higher in BCs (4 hrs) households and followed by SC (4 hrs) (Table-3). The study identified that the weaker section of the social group are more prone to lack of assets in their day to day life. Due to this reason they have to put more effort to overcome their basic needs.

Land Classification

According to Peter Pesala and Maruthi (2019) study identified different farmers in the study. The study divided into five types of farmers. Those who do not have land are treated as landless labour. Those who have land from 0.1 acre to 2.5 acres study considered as marginal farmer, from 2.6 acres to five acres of land, study treated as small farmers. Whoever has land between 5.1 acres to 10 acres study treated as medium farmers. And those who have more than 10.1 acres of land study considered as large farmers. Among the beneficiaries farmers in our study, marginal farmers are higher (60%), followed by landless labour (33%) and small farmers (7%). There are no medium and large farmers in active participated households. In a similar way, among the castes, BCs (67%) are more in marginal farmers and followed by STs (67%), SCs(50%) and OCs(50%). The landless labours are higher in OCs(50%), followed by SCs (40%), STs (33%) and BCs 27%). In case of in-active participated households, large farmers (30%), small farmers (30%) are more as compared to active participated households. Marginal and landless labours are also available; and their share is 20 per cent. Among the castes in in-active participated households, only BCs(38%) households are having large farmers. No large and medium farmers in in-active participated households (Table-3).

Landholdings

Owning land is important, but how much land is having the households is very important in rural India. The study active participated households average land holding is one acre. Among the farmers in active participated households, small farmers land holdings are higher as compared to marginal farmers (1.3 acres). Among the castes, BCs (4.5 acres) average land size is higher followed by SCs (3acres). But the average land size is very low in OCs (0.5 acre) community. In case of in-active participated households, average land size is higher in large farmers (14 acres) followed by small farmers (4.3 acres) and marginal farmers (1 acre). Among the castes in in-active participated households, BCs average land is higher (14 acres) and followed by SCs (5 acres), and the lowest is one acre in BCs and SCs households, the study observed that the large farmers are available in only BCs households and their land size is 14 acres (Table-3).

Income of the Households

Income is very important for any economic activity. Without income from the primary occupation, survival is very difficult. Our study observed that the average income in all caste is ₹ 51,851 per annum. But, within the social groups, the income difference is so higher in active participated households. The average income per

annum is higher in OCs (₹ 66,060) community, followed by BCs (₹ 59,850) SCs (.42,839) and STs (₹ 32,427).

Table-3: Particulars of Own Land, Size and Income of the Households in Antharagange

Particulars	Active / In-active	Social groups				Total
		OC	BC	SC	ST	
Do you have own land	Yes	1(50.00)	11(73.3)	6(66.7)	2(60.0)	20 (66.7)
	No	1(50.00)	4(26.7)	4 (33.3)	1(40.0)	10(33.3)
	Active	2(100)	15(100)	10 (100)	3(100)	30(100)
	Yes	(0.00)	6(75.0)	2 (100)	0(0.00)	8(80.0)
	No	(0.00)	2(25.0)	(00.00)	0(0.00)	2(20.0)
	In-active	0(100)	8(100.0)	2 (100)	0(0.00)	10(100)
Land classification	Total	2(100)	23(100)	12(100)	3(100)	40(100)
	Small farmers	0(0.00)	1(6.7)	1(10.0)	0(0.00)	2(6.7)
	Marginal farmers	1(50.0)	10(66.7)	5(50.0)	2(66.7)	18 (60.0)
	Landless labour	1(50.0)	4 (26.7)	4(40.0)	1(33.3)	10 (33.3)
	Active	2(100)	15(100)	10(100)	3(100)	30(100)
	Large farmers	(0.00)	3(37.5)	0(0.00)	(0.00)	3(30.0)
	Small farmers	(0.00)	2 (25.0)	1(50.0)	(0.00)	3(30.0)
	Marginal farmers	(0.00)	1(12.5)	1(50.0)	(0.00)	2(20.0)
	Landless labour	(0.00)	2(25.0)	0 (0.00)	(0.00)	2(20.0)
	In-active	(0.00)	8(100.0)	2(100.0)	(0.00)	10 (100)
	Total	2(100)	23(100)	12(100)	3(100)	40(100)
	Total and average land classification	Small farmers	0(0.0)	4.5(4.5)	3.0(3.0)	0(0.0)
Marginal farmers		0.5(0.5)	13.5(1.4)	5.2(1.0)	3.5(1.8)	22.7(1.3)
Landless labour		0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Active		0.5(0.3)	18.0(1.2)	8.2(0.8)	3.5(1.2)	30.2(1.0)
Large farmers		0(0.0)	42.0(14.0)	0(0.0)	0(0.0)	42.0(14.0)
Small farmers		0(0.0)	8.0(4.0)	5.0(5.0)	0(0.0)	13.0(4.3)
Marginal farmers		0(0.0)	1.0(1.0)	1.0 (1.0)	0(0.0)	2.0(1.0)
Landless labour		0(0.0)	0(0.0)	0(0.0)	0(0.0)	0 (0.0)
In-active		0(0.0)	51.0(6.4)	6.0(3.0)	0 (0.0)	57.0(5.7)
Total		0.5(0.3)	69.0(3.0)	14.2(1.2)	3.5(1.2)	87.2(2.2)
Total and average income	Active	132120 (66060)	897752 (59850.1)	428388 (42838.8)	97280 (32426.7)	1555540 (51851)
	In-active	0(0.0)	495460 (61932.5)	192000 (96000)	0(0.0)	687460 (68746)
	Total	132120	1393212	620388	97280	2243000
		(66060)	(60574.4)	(51699)	(32426.7)	(56075)

Source: Primary data collected

The income data indicated that lower sections of the social ladder received lower income and higher section of the households received higher income. According to Ghosh (2016) in India's inequalities are more after introduction of economic liberalization. Ghosh (2016) stated that low-paid, low productivity work is

continues to lead to increase employment. Swaminathan Madhura and Vikas Rawal (2011) observed that the caste play a critical role in economic development in village life in India particularly in Scheduled Caste (SC). The study investigated that the role of caste in inequality in incomes in rural India. The study finds that the income inequality was higher in general community, but the inequalities are differing from village to village and caste to caste and religion to religion. The study finds that, the prosperous agricultural leads in villages, income inequalities are increased in selected villages. In addition to that, not only income inequalities are very high in village, India, but, caste still matters. Study data indicates that the variation is very higher among the social groups in active participated households. In case of in-active participated households, SCs (.96,000) average income is higher as compared to their counter partners of BCs (.61,933). In a similar way, the in-active participated household's average income is higher, as compared to active participated households (Table-3).

Conclusion

The main findings of the study are education is a main influence factor that helps human beings to develop rational outlook. Nearly 40 per cent of the MGNREGA active participated household head of the education is illiterate and in case of in-active participated households, head of the education status is middle School (40%). Secondly, half of the active participated head of the family primary occupation is agriculture & allied activities, followed by wage, labour, electricity, gas and water supply and mining & quarrying. But in caste wise, majority of the SCs, head of the household main occupation is wage labour and it indicated that they are depends on agricultural, non-farm, MGNREGA labour work and other activities in their day to day life.

In case of in-active participated households' head of the family primary occupation is agriculture & allied activities and followed by wage labour. In caste wise, SCs and BCs households' main occupation is agriculture and allied activities. The work days, nature of work and income are very important for households. The study observed that, majority of the SCs (5 hrs) head of the households are having more man days. The non-active participated head of the family members' average man days 300 in all nine households. The active participated households' average man days are higher than the in-active participated households. In our study active participated households, majority (67%) of them are having semi-pucca houses. The OCs and STs community households 100 per cent semi-pucca house constructed. Some of the BCs (13.3%) households constricted thatched/Kachcha houses. In case of in-active participated households, 70 per cent of household constructed semi-pucca houses and 30 per cent were pucca houses. Thirdly, 67 per cent of active participated households are having own land and rest of them are not. Majority of the BCs are having land.

Large farmers are higher in in-active participated households and followed by small farmers. Among the castes in in-active participated households, only BCs households are having large farmers. Among the castes, BCs average land size is higher as compared to other castes. In case of in-active participated households average land size is higher in large farmers. Our study observed that the average income difference is higher in active participated households. The average income

is higher in OCs community, followed by BC, SC and ST. In case of in-active participated households, SCs average income is higher as compared to their counter partners of BCs. The main policy suggestions of the study are: Government has to provide land for the weaker sections of the people/SCs/ST in their villages. Secondly, Government has to provide pucca houses whoever not having in the GP/village.

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